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NEW INNOVATION

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Is a Single Dose of Magnesium Sulfate Enough in Eclampsia?

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Abstract

Introduction: Magnesium sulfate is now a gold standard for the control of eclamptic fits. The place of low-dose magnesium sulfate for the control of eclamptic seizures is yet to be determined.

Objectives: The objective was to compare the efficacy of single dose magnesium sulfate to Pritchard regime in controlling eclamptic fits.

Study Design: Randomized controlled trial: Group 1 was given Pritchard regime and Group 2 was given only loading dose of magnesium sulfate.

Materials and Methods: A total of 60 prospective patients admitted in the emergency ward with eclampsia, who fulfilled the inclusion criteria were included in the study. Outcomes measured were: (1) Anticonvulsant effect, (2) maternal side effects and (3) fetal side effects.

Results: The recurrence of fits was 6.67% in both groups ($P = 1$), side effects-oliguria ($P = 0.02$), loss of patellar reflexes ($P = 0.02$) less in Group 2, and less neonatal complications ($P = 0.045$) in Group 2.

Conclusion: A single loading dose of magnesium sulfate is equally efficacious as repeated dosing and is associated with fewer maternal and fetal side effects.

Key words: Eclampsia, Magnesium sulfate, Pritchard regimen

INTRODUCTION

Eclampsia is a cause of 10-15% direct maternal deaths and is associated with high perinatal morbidity and mortality.¹ Magnesium sulfate is the anticonvulsant of choice for treating eclampsia, known to be more effective than diazepam, phenytoin, or lytic cocktail.²⁻⁶ Optimal regimens, achieving maximal effectiveness with minimal adverse effects have been studied. Vigilance in the use of magnesium sulfate is essential for women's safety.

The aim of the study was to compare the safety and efficacy of two regimens of magnesium sulfate (single dose vs. Pritchard regimen). Eliminating repeat doses can improve the safety profile of magnesium sulfate and avoid respiratory depression.

MATERIALS AND METHODS

This study was conducted in a teaching institution where 60 consecutive patients fulfilling the inclusion criteria were enrolled after written informed consent from the attendants. The protocol was approved by the Local Ethics Committee.

The inclusion criteria were: (1) Pregnant women with eclampsia (antepartum, intrapartum or <10 days postpartum), (2) no previous history of convulsions, (3) normotensive before 20 weeks of gestation.

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Women were excluded from the study if they had: (1) Other causes of hypertension, (2) ≥ 10 days postpartum, (3) magnesium sulfate received prior to admission at the hospital, (4) any associated renal/hepatic/neurological disorders not related to eclampsia, (5) any associated hydramnios, molar pregnancy, diabetes mellitus or Rh isoimmunization.

Drug Protocol

Maternal data were recorded on performa, detailed history was taken, and a detailed examination performed. Blood was taken for hematologic and biochemical investigations and urine sent for analysis of proteinuria.

Group 1: ($n = 30$) patients were given loading dose of 14 g magnesium sulfate (4 g intravenous [I.V] as solution of 20% and 5 g intramuscular [I.M] in each gluteal region) followed by 4 h maintenance therapy of 5 g I.M till 24 h after delivery or after the last convulsion, whichever came later. In the event of recurrent convulsion, an additional dose of 2 g I.V was given and the regime continued.

Group 2: ($n = 30$) patients were given a loading dose of 14 g magnesium sulfate (4 g I.V as the solution of 20% and 5 g I.M in each gluteal region). No maintenance dose was given. If the patient had a recurrent seizure she was switched to maintenance protocol.

General measures for the care of eclamptic patients were initiated, hypertension was managed with I.V labetalol, and labor initiated once stabilization was achieved. The patients were closely monitored for 24 h postpartum.

Primary outcomes measured were: (1) Anticonvulsant effect (prevention of recurrence of fits), (2) maternal side effects, and (3) fetal side effects.

Treatment in both groups was discontinued if: (1) Patellar reflex is absent, (2) urine output < 30 ml/h, (3) respiratory rate < 12 /min.

Statistical analysis was performed using SPSS software. A paired *t*-test was used for comparisons and a probability (*P*) level of < 0.05 was considered significant.

RESULTS

The trial included 60 women who requested a pregnancy termination and who complied with the inclusion criteria. The patient characteristics are mentioned in Table 1. The two groups were comparable in terms of demographic data, history, and blood pressure at the time of admission.

In Group 1, 10 (33.3%) patients and in Group 2, 16 (53.3%) patients delivered vaginally, $P = 0.1923$. Two patients in both

groups (6.67%) had a recurrence of fits, $P = 1$. The side effects observed are mentioned in Table 2. Loss of the patellar reflex was observed in five patients in Group 1, but in none in Group 2 (16.7% vs. 0%) but this was not quite statistically significant ($P = 0.0522$). Oliguria was observed in five patients in Group 1 but in none in Group 2 (16.7% vs. 0%), but this was not quite statistically significant ($P = 0.0522$).

The neonatal outcome is shown in Table 3. Decreased Apgar was noted in three neonates in Group 1 but in none in Group 2 (10% vs. 0%) but this was not statistically significant ($P = 0.2373$). The occurrence of hypotonia, need for oxygen, and neonatal Intensive Care Unit (NICU)

Table 1: Characteristics of the patients at time of admission

Characteristics	n (%)	
	Group 1	Group 2
Age (years)		
<20	0 (0)	2 (6.7)
20-30	30 (100)	25 (83.3)
>30	0 (0)	3 (10)
BMI		
<20	0 (0)	0 (0)
20-25	28 (93.33)	23 (76.7)
>25	2 (6.67)	7 (23.3)
Background		
Rural	22 (73.3)	23 (76.7)
Urban	8 (26.7)	7 (23.3)
Gravida		
1	23 (76.7)	23 (76.7)
2	4 (13.3)	5 (16.7)
3	3 (10)	2 (6.6)
Period of gestation (weeks)		
<32	3 (10)	5 (16.7)
32-36	11 (36.7)	8 (26.6)
>36	13 (43.3)	12 (40)
Postpartum	3 (10)	5 (16.7)
Systolic BP at time of admission (mmHg)		
120-149	6 (20)	8 (26.7)
150-199	21 (70)	19 (63.3)
200-249	3 (10)	3 (10)
Diastolic BP at time of admission (mmHg)		
90-110	15 (50)	9 (30)
110-130	14 (46.7)	19 (63.33)
>130	1 (3.3)	2 (6.67)

BMI: Body mass index, BP: Blood pressure

Table 2: Maternal side effects

Maternal side effects observed	n (%)		P value
	Group 1	Group 2	
Respiratory depression	0 (0)	0 (0)	1
Loss of patellar reflexes	5 (16.7)	0 (0)	0.0522
Cardiac arrest/arrhythmia	0 (0)	0 (0)	1
Hematuria	1 (3.3)	1 (3.3)	1
Nausea/vomiting	2 (6.7)	2 (6.7)	1
Flushing	5 (16.7)	4 (13.3)	1
Dizziness/confusion	5 (16.7)	8 (26.7)	0.5321
Oliguria	5 (16.7)	0 (0)	0.0522

Table 3: Neonatal outcome

Neonatal outcome	n (%)		P value
	Group 1	Group 2	
Abnormal FHR pattern	11 (36.67)	5 (16.67)	0.1432
Apgar<4 at 1 min	3 (10)	0 (0)	0.2373
Apgar<7 at 5 min	3 (10)	0 (0)	0.2373
Hypotonia	11 (36.67)	3 (10)	0.0303
Need for oxygen	11 (36.67)	3 (10)	0.0303
Need for NICU	11 (36.67)	3 (10)	0.0303

FHR: Fetal heart rate, NICU: Neonatal Intensive Care Unit

admission were more in Group 1 (36.67 vs. 10%) which was significant ($P = 0.0303$).

DISCUSSION

Approximately, 72,000 pregnant women die every year because of eclampsia and severe preeclampsia, which equates to almost 200 maternal deaths daily. Preeclampsia-eclampsia ranks second only to hemorrhage as a specific, direct cause of maternal death. The risk that a woman in a developing country will die of preeclampsia or eclampsia is about 300 times that of a woman in a developed country.

Incidence of hypertensive disorders in India is found to be 10.08% with a prevalence of eclampsia of 1-5. Greater numbers of convulsions prior to care may be due to lack of reachable facilities. Time spent in access to care is crucial and may alter maternal and fetal outcome. Convulsions post admissions (76.6%) indicate a lack of standardized care protocol for eclampsia which is mandatory. Time spent between the first episode of convulsion and access to care is between 1 and 4 h in the majority (48.33%) of patients. This indicates the severe need to train medical officers, birth attendants, and paramedical personnel in remote interiors as well as better transport facilities to handle obstetric emergencies. Magnesium sulfate was used only in 44% cases of patients before admission.⁷

Magnesium sulfate is the anticonvulsant of choice for treating eclampsia; more effective than diazepam, phenytoin, or lytic cocktail.²⁻⁶ Although it is a low-cost effective treatment, magnesium sulfate is not available in all low and middle income countries; scaling up its use for eclampsia and severe preeclampsia will contribute to achieving the millennium development goals.¹ A major concern in the use of magnesium sulfate has been its safety especially regarding respiratory depression. The side effects observed in the patients were comparable between the two groups, which was similar to other studies that compared

different regimens.⁷⁻¹⁰ The recurrence of eclampsia also was same between the two groups ($P = 1$). The occurrence of hypotonia, need for oxygen, and NICU admission were more in Group 1 (36.67 vs. 10%) which was significant ($P = 0.0303$).

Single dose regimen has been shown to be an effective alternative to the multi-dose regimen which involves painful I.M. injections.¹¹ The availability of a safe regime of magnesium sulfate which can be used in areas where health facilities and resources are limited can have a major impact in the management of a condition that is known to be associated with high risk of maternal morbidity and mortality.

CONCLUSION

The effectiveness of single regimen of magnesium sulfate appeared comparable to the “standard dose regimen.” Single dose regimen may guarantee more safety and in an environment where cost is an important determinant of accessibility to qualitative health services, it is certainly attractive. More studies are needed to establish the place of single dose regimen of magnesium sulfate in the management of eclampsia.

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Clinical Correlates Associated with Suicide Attempters at a Tertiary Care Centre of Eastern Nepal

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Abstract

Introduction: Globally every 40 seconds a completed suicide case happens. Deliberate self-harm or suicide attempts are an universal phenomenon and may be having various underlying causes including psychiatric and personality disorders (PDs). A previous suicide attempt and its severity are considered as one of the strongest predictors of future completed suicide.

Objectives: The objective was to study the clinico-sociodemographic profiles, personality, perceived stress level and severity of suicide attempt of suicide attempted patients, and to explore the relation between these factors if any.

Materials and Methods: This cross-sectional study was conducted at a tertiary care teaching hospital in eastern Nepal. For this study, 100 suicide attempted patients admitted in various departments of the institute referred to and attending the psychiatric outpatient department were included and evaluated.

Results: Majority of suicide attempters were female, young and mostly from rural areas. Major risk factors for suicide attempt included abnormally perceived stress level, various psychiatric disorders, PDs, and substance dependence.

Conclusion: Effective intervention and management of various mental and behavioral disorders may prove to be one of the most effective ways for suicide prevention. Restriction of the availability of highly toxic pesticides and stress management can possibly reduce the risk of suicide.

Key words: Personality disorders, Predictors, Stress, Substance, Suicide attempt

INTRODUCTION

World Health Organization (WHO) has given a comprehensive definition of attempted suicide as, “an act with a non-fatal outcome in which an individual deliberately initiates a non-habitual behavior that, without intervention from others, will cause self-harm, or deliberately ingest a substance in excess of the prescribed or generally recognized therapeutic dosage, and which is aimed at realizing changes which the subject desired via the actual or expected physical consequence.”¹ Pattison and Kahan (1983) defined deliberate self-harm (DSH) as harming oneself intentionally, with or without suicidal intent.²

Globally every 40 seconds a completed suicide case happens and it has been found that for every completed suicide there may be 10-40 suicide attempts and previous suicide attempt is one of the strongest predictors of subsequent suicide.^{3,4} DSH or suicidal attempts are seen in all part of the world and may be having various underlying causes. Such attempts can lead to serious outcomes-physical, mental, social, occupational, financial, legal problems, and also can lead to death.

Suicide is the tenth leading cause of death worldwide, accounts for 1-5% of all deaths, and has an estimated global figure of a million deaths per year. Estimated annual mortality is 14-5 deaths per 100,000 people.³⁻⁵ Suicide rates may differ across the world, based on age, sex, time, religion, death registration practices, ethnic origin, and probably legal implications.

In developed countries, innumerable researches have been conducted to examine the relevant factors associated with attempted suicide and to find the role of intervention in

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controlling them, but for Nepal a little is known about the extent of attempted suicide and effectiveness of intervention for suicide attempters due to lack of authentic official data. The reported annual suicide rate per 100,000 people in United States of America (USA) is 11.8 (2008), United Kingdom (UK) is 6.9 (2009), and for China is 22.3 (2010). With 34,598 suicide deaths i.e., a national average of 11.26 suicides for every 100,000 people in 2007, suicide represents the tenth leading cause of death in the United States and the third leading cause of death for children, adolescents, and young adults. Sri Lanka has a suicide rate of 20 (2009, Police Department statistics), Bangladesh 7.0 (2009, from news agencies report), and 10.9 per 100,000 of population a year in India with annually over 100,000 people killing themselves (2009).^{4,5} There is paucity of such studies in Nepal though one of the national daily English newspaper, "The Kathmandu post" reported that the number of suicides as per police statistics was of 2789 suicides in 2007 translating into an annual suicide rate of 12 per 100,000 of population and a community-based study conducted in Lalitpur district of Nepal by Thapa and Carlough found a suicide rate of 3.7 per 100,000 population per annum.⁶

In most of the South Asian countries, strong religious and socio-cultural value against suicidal behavior is prevalent and generally people do not report such acts or tend to hide the real facts even when medical complications ensued and required hospitalization. A history of past suicide attempt/s further increases eventual dying by suicide and a proper medical management including psychiatric intervention can reduce immediate as well as the long-term risk of suicide attempt.

Literature search shows that 30-40% of people who die by suicide have personality disorders (PDs).⁷ The risk of suicide seems to be particularly increased in borderline and antisocial PDs. However, nearly all individuals with PDs, who died by suicide have concurrent depressive symptoms, substance-use disorders, or both. The concept of PD is generally not given its due importance in developing countries, where suicidal acts are considered more often as an impulsive act.⁸ Though suicidal behavior frequently occurs in the perspective of acute and chronic stressor, this does not establish an accurate explanation for suicidal conduct. Researchers stress that coping strategy and personality dimension may be very important in a person's life as persons with normal personality and good coping skills are able to deal with challenging situations in a more mature and socially acceptable way than the persons with abnormality in personality and/or coping strategy.

A previous suicide attempt is not only one of the strongest predictors of future completed suicide or attempted

suicide, but also an indicator of extreme psychological distress suggesting that personality profile of a person may probably be aiding in these suicidal attempts and if by any means we can modify/correct them, these acts can be significantly reduced.⁹ Considering all these, this study was done to study the clinico-sociodemographic, personality profile, the role of stress for the suicide attempt and severity of suicide attempt in these cases, and to draw important findings and suggestion.

MATERIALS AND METHODS

This descriptive cross-sectional study was done in the Department of Psychiatry at a tertiary care teaching hospital in eastern Nepal (BPKIHS, Dharan, Nepal). The medical college has well-established major clinical and basic science departments. Department of Psychiatry has five full-time psychiatrists, two psychologists, and adequate supporting staff to look after the 30 bedded ward and outpatient department (OPD) services. A total of 15,472 (51.92/day) psychiatric patients attended the OPD and 440 in-patients were treated for the 12 months ending July 15th 2011.

As per the standard policy of the institute, each case of attempted suicide is referred to psychiatric services while providing medical or surgical management and also at the time of discharge. 100 such hospitalized cases with age of 18 years and above and not suffering from any other illness interfering with the assessment, referred to psychiatric OPD from different wards over a period of 1-year (from May 2010 to May 2011) were included in this study. Ethical clearance was obtained from the Institute Ethical Review Board and informed consent from the willing participants were taken. Standard care irrespective to the participation in the study and due care regarding confidentiality was ensured. Sociodemographic profile and other details regarding suicide attempt were recorded. The diagnoses of psychiatric and PD diagnosis were made according to ICD-10 (WHO, 1992) and International PD Examination (WHO). Cohen's perceived stress scale-14 item and pierce suicide intention scale were applied. Results were tabulated, scored, and suitable statistical measures were applied accordingly.

RESULTS

On analyzing the sociodemographic correlates for the 100 suicide attempters enrolled for this study, it was found that 58% of them were female, majority (66%) of the suicide attempters were <35 years of age and 59% of them were married. 71% of the sample belonged to the rural background and 35% of them have completed SLC (Class Xth) and above. In occupation majority of them were students (31%) (Table 1).

As the method employed for attempting suicide, a majority i.e., 58% of the cases used pesticides followed by sharp object (13%), consumption of psychotropic medication (10%), hanging (6%), jumping (4%), and drowning (1%). During intoxication or withdrawal from alcohol and in some cases of chronic psychiatric illness like schizophrenia, lethal means (*viz.* hanging, jumping, sharp object and drowning) were preferred by patients. Eight of the cases were with unknown poisoning. PD (24%), 19% each of suffering from mood disorders and interpersonal reasons, substance-related disorder (17%), failure in relationship (16%), adjustment disorder (11%), marital problems (9%), and psychotic disorder were the main reasons found for committing the suicidal attempt. Of the PD (24%), emotionally unstable impulsive PD was found in 15 of the subjects (Table 2).

About 65% of the subject reported a score of more than 15 indicating higher perceived stress level and 24 of them reporting much higher perceived stress level. The *P* value was not significant (*P* = 0.659) using the Chi-square test (Table 3).

About 18% of the subject reported a high intent, indicating the high severity of suicidal intention associated with an episode of self-harm while 43% opined of moderate intent

to die. Male were more in high intent group i.e., a higher level of intent to die in comparison to female (30.95% vs. 08.62%) (Table 4).

DISCUSSION

This is a descriptive cross-sectional study, conducted on adult population in 100 suicide attempted patient admitted in a tertiary care teaching hospital and referred to Department of Psychiatry with an aim to establish clinical correlates associated with suicide attempt among them.

In this study, we found that 87% of all cases were of below 45 years of age and 66% of the total cases below 35 years of age. The single largest age group was of 18-24 years, comprising of 39% of all the cases. Many of the studies conducted in past in western countries have reported more cases in the higher age group, but in low-income countries (e.g., Nepal, India) similar findings have been reported.^{5,10}

Table 1: Sociodemographic correlates

Variables	Male N=42 (%)	Female N=58 (%)	Total N=100 (%)
Age in years			
18-24	16 (38.09)	23 (39.65)	39 (39)
25-34	11 (26.19)	16 (27.59)	27 (27)
35-44	6 (14.28)	15 (25.86)	21 (21)
45-54	6 (14.28)	2 (3.45)	8 (8)
55 and above	3 (7.14)	2 (3.45)	5 (5)
Marital status			
Unmarried	17 (40.48)	15 (25.86)	32 (32)
Married	22 (52.38)	37 (63.79)	59 (59)
Divorced	1 (2.38)	2 (3.45)	3 (3)
Widowed/widower	2 (4.76)	4 (6.90)	6 (6)
Domicile			
Rural	26 (61.90)	45 (77.59)	71 (71)
Urban	16 (38.09)	13 (22.41)	29 (29)
Education level			
Illiterate	4 (9.52)	10 (17.24)	14 (14)
Up to Class 5 th pass	12 (28.57)	17 (29.31)	29 (29)
Class 6 th to 10 th studying	8 (19.05)	14 (24.13)	22 (22)
Class 10 th pass to 12 th pass	7 (16.67)	12 (20.69)	19 (19)
Graduating	8 (19.05)	3 (5.17)	11 (11)
Graduate and above	3 (7.14)	2 (3.45)	5 (5)
Occupation			
Business	2 (4.76)	2 (3.45)	4 (4)
Laborer	3 (7.14)	6 (10.34)	9 (9)
Student	12 (28.57)	19 (32.76)	31 (31)
Unemployed	7 (16.67)	4 (6.90)	11 (11)
Farmer	6 (14.28)	10 (17.24)	16 (16)
Service	5 (11.90)	2 (3.45)	7 (7)
Housewife	0	14 (24.14)	14 (14)
Teacher	4 (9.52)	1 (1.72)	5 (5)
Foreign job	3 (7.14)	0	3 (3)

Table 2: Factors related with suicide attempt

Factors	Male N=42 (%)	Female N=58 (%)	Total N=100 (%)
Methods employed for committing suicide attempt			
X60 Pesticides	19 (45.24)	39 (67.24)	58 (58)
X61 Psychotropic overdose	3 (7.14)	7 (12.07)	10 (10)
X70 Hanging	4 (9.52)	2 (3.45)	6 (6)
X71 Drowning	1 (2.38)	0	1 (1)
X78 Sharp object	10 (23.81)	3 (5.17)	13 (13)
X80 Jumping from height	3 (7.14)	1 (1.72)	4 (4)
X83 Unknown	2 (4.76)	6 (10.34)	8 (8)
Reasons found/cited for committing suicide attempt (includes multiple diagnostic entity)			
Substance-related disorder	11 (26.19)	6 (10.34)	17 (17)
Psychotic disorder	2 (4.76)	4 (6.90)	6 (6)
Mood disorder	7 (16.67)	12 (20.69)	19 (19)
Adjustment disorder	4 (9.52)	7 (12.07)	11 (11)
Personality disorder	14 (33.33)	10 (17.24)	24 (24)
Marital problems	3 (7.14)	6 (10.34)	9 (9)
Interpersonal (in-laws, parents etc.,)	7 (16.67)	12 (20.69)	19 (19)
Failure in relationship	5 (11.90)	11 (18.97)	16 (16)
PD diagnostic categories			
Paranoid PD F60.0	1 (2.38)	1 (1.72)	2 (2)
Schizoid PD F60.1	0	1 (1.72)	1 (1)
Dissocial PD F60.2	0	0	0
Emotionally unstable impulsive PD F60.30	6 (14.28)	9 (15.52)	15 (15)
Emotionally unstable borderline PD F60.31	1 (2.38)	1 (1.72)	2 (2)
Histrionic PD F60.4	0	0	0
Anankastic PD F60.5	3 (7.14)	1 (1.72)	4 (4)
Anxious PD F60.6	2 (4.76)	3 (5.17)	5 (5)
Dependent PD F60.7	0	1 (1.72)	1 (1)
Any type	10 (23.81)	14 (24.13)	24 (24)
Single disorder	6 (14.28)	11 (18.97)	17 (17)
Comorbid disorder	3 (7.14)	4 (6.90)	7 (7)

PD: Personality disorder

Table 3: Perceived stress (CPSS)

Score on CPSS (score range of 0-40)	Subject's perceived stress level is	Health concern level	Male N=42 (%)	Female N=58 (%)	Total N=100 (%)
0-7	Much lower than average	Very low	3 (7.14)	5 (8.62)	8 (8)
8-11	Slightly lower than average	Low	6 (14.29)	6 (10.34)	12 (12)
12-15	Average	Average	7 (16.67)	8 (13.80)	15 (15)
16-20	Slightly higher than average	High	17 (40.48)	24 (41.38)	41 (41)
More than 21	Much higher than average	Very high	9 (21.43)	15 (25.86)	24 (24)

CPSS: Cohen's perceived stress scale

Table 4: Severity of suicide attempt PSIS

Score on PSIS (score range of 0-25)	Male N=42 (%)	Female N=58 (%)	Total N=100 (%)
Low intent (0-3)	12 (28.57)	27 (46.55)	39 (39)
Moderate intent (4-10)	17 (40.48)	26 (44.83)	43 (43)
High intent (more than 10)	13 (30.95)	5 (8.62)	18 (18)

PSIS: Pierce suicide intention scale

This may be related to the shorter age expectancy of Nepalese people as compared to developed countries.

Female (58%) outnumbered the male (42%) and it may be the result of workers outsourcing country status of Nepal. Hence, more males go abroad for the sake of employment. 59% of all suicide attempters were married and this finding is contrary to the fact that marriage being a protective factor against suicide, but similar findings have been there in some studies conducted in neighboring countries like India and Bangladesh.^{5,6,11}

Majority (71%) of the cases were having rural background, which is understandable as only 20% of the Nepalese population currently resides in the urban area. Only 35% of the cases had an education of 10th standard and above while 43% were having an education up to class 5th. Students comprised the biggest (31%) chunk of all the occupation and it is in line with past studies done in western countries.¹²

Pesticides have been cited as the most common method of suicide globally as per WHO with an estimated three lac person losing their life as of their consumption.^{13,14} Findings from this study are also in line with this observation. Pesticides related suicide is a real threat in all those countries in which the majority of people have agriculture as their main occupation. Nepal has predominantly an agriculture-based economy and the most common occupation for the Nepalese people is farming. Hence, pesticides are easily available in household and can be purchased easily from the shops.

In western countries, it has been found that the suicide rate is higher in male and male tend to use more violent means for this. Finding in regard of male employing more violent means for suicide attempt in this study is also in line with previous studies.^{15,16}

Relational issues (marital, interpersonal, and failure in a relationship) were found to be the reason for suicide attempt in 44% of the cases. In 77% cases, psychiatric problems were found to be responsible for the suicide attempt. PD was found to be in 24% of the cases while mood disorder (19%) and substance-related problems (17%) were the top three diagnoses. Majority of previous studies have also cited psychiatric illness to be the prime reason for suicide attempt and our findings are consistent with them.^{10,17}

Totally, 24 of the all cases were found to be having any of the PD with emotionally unstable impulsive subtype leading the pack. PD can be responsible for increased substance misuse, inability to sustain and create supportive social relations as of the possible rejectful attitude from the society and hence the susceptibility for attempting suicide.¹⁸

About 65% of the suicide attempters scored more than 15 on Cohen's perceived stress scale indicating that persons with high perceived stress level and health concern level are more prone to make a suicide attempt. Such people also possibly tend to have lesser perceived social support available to them making them even more vulnerable. Our research findings are in line with the studies performed in the past.¹⁹

Various studies done in the past has indicated previous suicide attempt to be the most important factor for predicting a future attempt.¹⁹⁻²¹ Studies have also shown that an attempt of high severity in the past carries even higher risk of further more suicidal attempts.^{22,23} In this study, we found that in 18% of the cases it was found to be of severe intent and it can be presumed that they are possible cases which may eventually end their life by a suicidal attempt in future.

CONCLUSIONS

The finding of this study indicates that factors responsible for suicide attempt mainly include mood disorders, substance use, and PDs. This study also underscores the importance of intervention at the policy-making level to regulate/control of licit and illicit substances, over the counter medicine and dispensing of pesticides. Early detection and intervention

of psychiatric disorder and substance abuse can lead to a possible decline in suicide cases. The major limitation of the finding of this study is this that it cannot be generalized as it was done in a tertiary level hospital hence it can be expected that most of the cases included were had serious medical condition. Further large-scale research is needed to investigate risk factors and means to understand and reduce DSH.

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Ocular Morbidity Due to Dry Eye and its Awareness among Smokers in a Medical College Hospital in South India

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Abstract

Introduction: Smoking and its effects in the human body have been extensively studied due to its high morbidity pattern. Eye related complications have been hugely ignored due to the fact that it presents with less severe symptoms initially. Long-term treatment and management of these symptoms can have a distressing effect on the Quality of life of an individual. Lack of awareness concerning smoking and its relationship with ocular health should be addressed more often.

Aim: The aim was to investigate ocular morbidity pattern and awareness regarding ocular side effects among smokers.

Methodology: A hospital-based cross-sectional study was done among current smokers above 18 years selected by convenience sampling. Institutional Ethics Committee approved the study. Pre-tested and validated questionnaire were used to collect the data. Dry eye evaluation was done along with anterior segment examination.

Results: A total of 280 cases (200 males and 80 females) with age ranging from 18 to 81 years were studied. In 80% of the patients, most common symptom was irritation and 85% patients had symptoms of dry eye. Awareness regarding the effect of smoking on eyes was poor. Though 40% of the respondents were aware that smoking can affect their health and eyes, most (98%) of them said that in spite of knowing that smoking can cause blindness they continued smoking. A little more than one-third (38%) had tried to quit smoking at least once.

Conclusion: Dry eye is commonly associated ocular morbidity seen in smokers. The awareness regarding the effects of smoking on the eye is poor. Therefore, the need for public awareness is necessary.

Key words: Awareness, Current smokers, Dry eye, Hospital based study

INTRODUCTION

Smoking is associated with ocular morbidity which eventually leads to visual impairment.¹ It leads to health problems which primarily affect the respiratory system. It affects both physical as well as mental wellbeing.² Tobacco smoke contains numerous substances, many of which exert toxic influence by producing the ischemia and

oxidative stress on various organs including the eye.¹ It leads to the production of toxins which lead to a decreased blood flow to the capillaries and the resultant decrease in nutrition to the eye. Free radicals produced due to smoking lead to impaired cell function. Many ocular diseases have a strong relationship to exposure to cigarette smoke like nuclear cataract and age-related macular degeneration. Lower association is seen with retinal ischemia, anterior ischemic optic neuropathy, and Graves' ophthalmopathy. Study has shown there is an increased amount of squamous metaplasia in conjunctival epithelial cells of smokers. This is because of inflammation due to the irritants in smoke leading to decrease in growth factors needed for epithelial differentiation. Passive smoking can cause similar health issues in non-smokers and children. Over the next two decades, the consumption of tobacco is expected

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to increase and by 2025 double the associated mortality rate.³ High awareness was found regarding smoking being associated with life-threatening diseases like stroke and cardiovascular problems.⁴ The fact that smoking can affect the eye is little known among the general population. This general lack of awareness increases the risk of developing eye disease.

METHODOLOGY

The study was conducted after obtaining approval of Institutional Ethics Committee. All participants were explained about the purpose of the study before subjecting them to the questionnaire and performing ocular examination as per the examination schedule. At end of the examination, patients were explained regarding the ocular effects of tobacco usage and smoking and were counseled to stop smoking.

Totally, 280 participants who attended the ophthalmology outpatient clinic were included in this study. A hospital-based cross-sectional study was done among current smokers above 18 years selected by convenience sampling. An anonymous, validated questionnaire with the aim to assess the smoking behavior, ocular and systemic health-related complaints, and patients perception of effects of smoking on eye, designed by experts were given to each of the participants. It contained details on smoking like the duration of smoking, number of cigarettes smoked per day, and ocular complaints of the participants. The participants were interviewed as per the questionnaire.

Only current smokers, defined as those who smoked at least 100 cigarettes in lifetime and who now report smoking cigarettes every day or more than 4 days in a week were included in this study. The people who have not smoked since 10 years and also those who were unable to give informed consent or complete the questionnaire, had any systemic or ophthalmic disease, contact lens usage, any history of long-term topical medication, previous ocular surgeries, which thought to influence the dry eye status were excluded.

The eligible participants were subjected to complete anterior segment examination using slit lamp biomicroscopy along with dry eye evaluation which included Schirmer's test 1, tear film breakup time (TBUT) and staining of the cornea with fluorescein dye. The first test done was Schirmer's 1 test, where a Schirmer's strip (Wattmann no 41 filter paper 40 mm long, 5 mm breath) was placed in both the lower eyelid at medial one-third and lateral two third of lower lid and participants were asked to look straight. After 5 min the readings were taken and recorded. This was followed

by TBUT test in which a fluorescein strip (fluostrip, 1 mg fluorescein sodium IP) was applied to the lower bulbar conjunctiva and patient was asked to blink and the ocular surface was observed under slit lamp biomicroscope under blue filter. The time between the last blink and the first dark spot was measured. This was repeated 3 times and an average value was recorded in seconds in each eye. Corneal staining if present was documented. The grading of Schirmer's test and TBUT used is as mentioned in the Tables 1 and 2. All the tests were performed by first and second authors.

The collected data was entered into MS Excel and analyzed using SPSS software version 11.5. Proportion and percentages were calculated. Age-wise analysis was done using "Chi-square test" and a $P < 0.05$ was considered significant.

RESULTS

Of the total 280 cases, there were 259 males and 21 females. The age range was between 18 and 81 years. Mean age among males was 50 (19-81) and females was 47 (18-77). Majority started smoking in the age group of 14-20 years. Only 0.3% had started smoking between 27 and 30 years (Figure 1).

Table 1: Schirmer's 1 test

Wetting in 5 min	Interpretation
<5 mm	Severe
5-10 mm	Moderate
10-15 mm	Mild
>15 mm	Normal

Table 2: TBUT

Result	Interpretation
>10 s	Normal
5-9 s	Borderline
<5 s	Severe

TBUT: Tear film break-up time

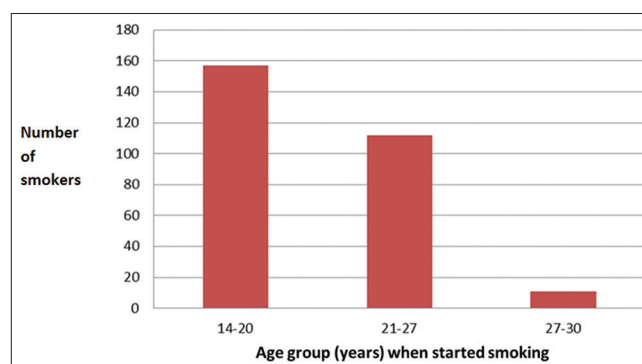


Figure 1: Age in which the participants started smoking

The most common symptom found was irritation of eyes seen in 48%, followed by blurring of vision (16%), burning sensation (15%), and itching (6%) (Figure 2). In the anterior segment, majority of cases showed conjunctival congestion (24%) and 21% had cataract of various grades. In our study, 10% were diagnosed with severe dry eye, 20% with moderate dry eye and 25% with the mild dry eye (Figure 3).

Only 31% of the study participants were aware of the effects of smoking on the eye (Figure 4). Of these, only 28% had tried to quit smoking but had failed. Majority (72%) made no efforts to quit in spite of the knowledge of harmful effects of smoking. Among those who had quit smoking, none of them had success in quitting smoking.

DISCUSSION

Relationships between dry eye and smoking have been studied previously. Smokers are known to have symptoms of irritation, burning, watering, and foreign body suggestive of dry eye. Smoking causes a dysfunctional tear film, which results in dry eye. The mechanism by which smoking causes pre-corneal tear film breakdown has not been confirmed, but the presumptive cause is the effect of lipid peroxidation of the outer pre-corneal tear film. Studies have reported damage in lipid layer, which prevent even spreading of tear film. Smokers are reported to have increased lipid peroxidation. Cigarette smoke contains free radicals, aldehyde, peroxidases, epoxides, nitrous oxides, and other pro oxides, these oxidant groups contribute to the damage.⁸ Chronic smoking has been reported to cause quantitative and qualitative disturbance in ocular surface health.

Older age group and female sex have a higher risk for dry eye disease.⁸ Passive smoking was found to be a risk factor of dry eye among the young children, especially males.⁹

Dry eye is the most common ophthalmological problem causing burning, itching, and dryness. In our study also the most common symptom was irritation of eyes seen in 48%, followed by blurring of vision (16%), burning sensation (15%), and itching (6%). Most common complaint in a study was a reduction in vision. Dry eye is described as a state of the abnormal tear film that can be caused by a number of conditions which alter its composition and affect stability. It negatively affects the quality of life and productivity.^{10,11} It is one of the most commonly seen disorders in eye hospitals. The prevalence of dry eye varies in different studies from 10.8% to 57.1%, showing wide disparity. These are because there is no standardization of types of patient selected, questionnaires made or dry eye diagnostic criteria.¹² In our study, the prevalence of dry eye among smokers was 55%. Many risk factors of

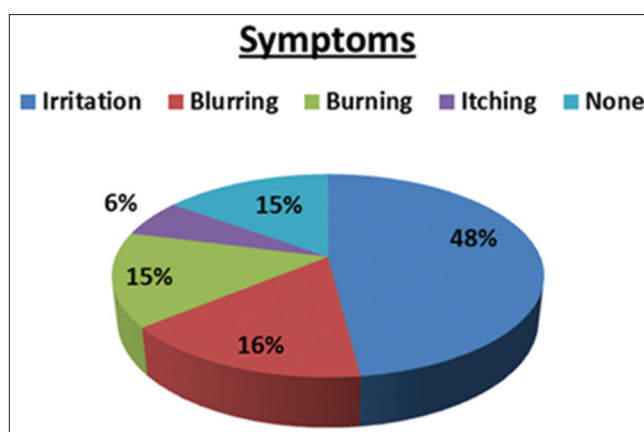


Figure 2: Symptoms experienced by the participants

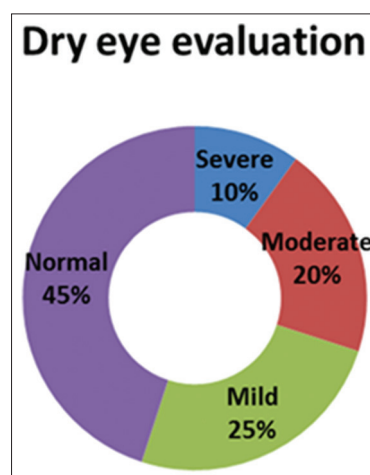


Figure 3: Dry eye evaluation results

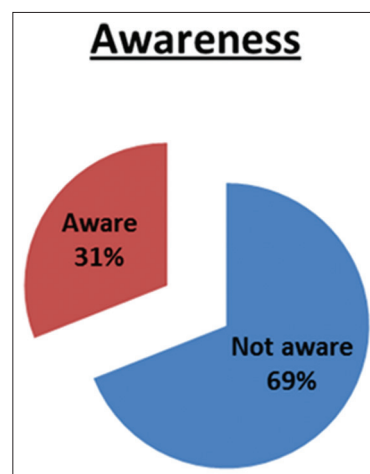


Figure 4: Awareness about the effects of smoking

dry eye suggested in studies are smoking, low humidity, high temperature, air pollution, exposure to sunlight, and drugs.¹³ The treatment modalities in the form of tear substitutes, which provide some degree of relief of symptoms but they require regular application.¹⁴

In our study, the TBUT was altered in all cases diagnosed to have dry eye. One of the major controllable factors that lead to a dysfunctional tear film leading to the dry eye is cigarette smoking. Of the many theories present about how smoking causes breakdown of pre-corneal tear film, the most accepted is lipid peroxidation of outer pre-corneal tear film leading to dry eye.⁸ A cross-sectional study in Turkey, between smokers and age-matched non-smokers, showed that mean Schirmer's and TBUT were significantly lower in smokers along with lower endothelial cells.¹⁵ In the current study, the awareness level of smokers was about the ocular effects of smoking was only 31%. In previous studies done to assess awareness of smoking and its relation to blindness, only a few participants were aware that smoking leads to blindness.¹⁶ The risk of blindness was thought to be only slightly greater than the distractor variable used i.e., deafness. There was a high level of awareness that smoking causes lung and heart disease.^{7,17} However, there was no difference in the incidence of smokers who knew about the ocular complications of smoking who stated that they would who knew about other complications of smoking. No significant difference was found in sex ratio in this group.⁹

In another study which studied the hospital epidemiology in dry eye, it was found that tobacco smoke has been reported to increase the symptoms of dry eye.⁷ Cigarette smoke exposures caused a decrease in TBUT up to 30-40%.¹⁷

Treatment of dry eye was mainly hydrating and lubricating drops which caused a temporary improvement in the symptoms, but they did not treat the cause of inflammation.^{11,18} New studies done have shifted the treatment of dry eye to more toward suppressing inflammation and prevention of modifiable causes of dry eye.¹¹

This study has several limitations. First, the symptoms are self reported and may differ from objective clinical measurement. A control group was not taken in this study. The participants might have been subjected to external factors like exposure at work, passive smoking, air pollution, etc., may affect the eye and is not evaluated. The quantity of tobacco used was not measured and compared with the severity of dry eye. There is also an external social desirability factor bias in a country like India, which could cause smokers to report reduced number of cigarettes smoked. Finally, a hospital sample may not represent general population of the locality.¹⁹

Cessation of smoking reduces the risk of cataract by limiting dose-related damage to the lens. Among the modifiable risk factors of age-related macular degeneration, smoking was considered to be the most important one.

Since it is a preventable and modifiable risk factor, more intensive tobacco control activities are needed.²⁰ Awareness among all age groups should be promoted by mass media, community and health education programs. Warning label on cigarette packs must also highlight on other hazards of smoking (ocular disease, infertility, heart disease, etc.,).

CONCLUSION

Smoking is associated with increased symptoms of dry eye and ocular morbidity.

The awareness of the consequence of smoking on the eye is poor. The ill effects of smoking should be stressed by public eye health campaigns done by the government as well as private health organizations to encourage people to stop smoking. This indicates the lack of eye health promotion information in regard to smoking. Adverse effects of smoking on the eye should be stressed to younger age groups, which are more prone for addictions as majority of smokers start at an early age.

The lack of awareness among the participants in a hospital setting may also show the lack of knowledge regarding the effect of smoking on the eye in general population. There is further need to stress on the need for cessation of smoking in hospitals and how it affects the eye.

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Stereomicroscopic Evaluation of the Impact of Three Different Restorative Techniques on Microleakage at Gingival Seat in Class II Composite Restorations

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Abstract

Introduction: All resin-based restorative materials shrink causing shrinkage stresses pulling the adhesive away from the cavity walls leading to the formation of gaps at the interface. The gap formation further results in marginal discoloration, bacterial invasion, secondary caries, and adverse pulpal reactions.

Purpose: The purpose of this *in-vitro* study was to evaluate the microleakage in Class-II composite restorations with gingival wall in cementum using - (i) light cure composite resin as first gingival increment, (ii) self-cure composite resin as first gingival increment, and (iii) bonded amalgam as first gingival increment.

Materials and Methods: A total of 40 extracted human molars were selected and slot Class-II cavity preparations were made on both mesial and distal surfaces with gingival margins placed in cementum. The teeth were randomly divided into 5 groups of 8 teeth each. Group-I was restored by using 2 mm thick layer of a light cured composite resin as first gingival increment while remaining of restoration was completed with light-cured composite. Group-II and Group-III were restored using self-cured composite and bonded amalgam as first gingival increments respectively. Group-IV and Group-V served positive and negative controls, respectively. Restored teeth were thermocycler, subjected to dye penetration and assessed under a stereo microscope for microleakage evaluation.

Results: As per the current study, the teeth restored using bonded amalgam as first gingival increment displayed the least mean microleakage scores than other experimental groups.

Conclusion: Composite resin - bonded amalgam restoration technique in Class-II Composite restoration shows the least possible microleakage and best marginal seal than other techniques.

Key words: Bonded amalgam, Composite restorations, Dye penetration, Microleakage

INTRODUCTION

Conservative dentistry is on the threshold of post amalgam age. As the countdown begins, composite resins are being introduced as tooth colored replacements for

amalgam restorations. Composite resins today occupy a prominent place in the spectrum of materials, which have given a broader perspective to the approach of aesthetic restorative dentistry. Leinfelder¹ related the popularity of composite resins to a number of improved physical and optical properties.

However, composite resins have certain inherent disadvantages:

- 1) Loss of marginal integrity due to polymerization shrinkage²
- 2) Low modulus of elasticity

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- 3) Low wear resistance
- 4) Microleakage at the interface of tooth and composite resin due to difference in coefficient of thermal expansion.^{3,4}

Microleakage has been one of the most persistent problems associated with composite restorations leading to postoperative sensitivity, secondary caries, and adverse pulpal responses. Composite restorations with margins in enamel have shown negligible microleakage irrespective of the technique used. The microleakage is significantly higher at the gingival margin of the proximal box of Class-II composite restoration,⁵ specially when the gingival margin is placed in cementum. Elimination of microleakage is the key to maintain the pulpal health and the longevity of the composite restoration. Various attempts in the past have been aimed at decreasing the microleakage in Class-II composite restorations like introduction of hydrophilic dentin bonding systems, advent of better composite resins, techniques to reduce the polymerization shrinkage, and C-factor, etc. However, unfortunately none of these methods have gained universal acceptance due to variable results.

Hence in this study an effort has been made to evaluate and compare the microleakage in Class-II composite restorations with gingival wall placed in cementum restored with - (i) light cure composite resin as first gingival increment, (ii) self-cure composite resin as first gingival increment, and (iii) bonded amalgam as first gingival increment.

MATERIALS AND METHODS

A total of 40 extracted human molars free of cracks, caries, and restorations on visual inspection were selected and were stored in deionized water till the beginning of the experiment.

Cavity Preparation

The teeth were mounted three at a time in impression putty to simulate proximal contact and clinical conditions. A slot Class-II cavity preparation was done on both proximal surfaces (as well as distal) of each tooth with diamond point (ISO 014) in air/water cooled high-speed turbine. The dimensions of the cavity were calibrated with the head of the diamond point. The buccolingual width was the same as twice the diameter of the head of bur, horizontally positioned in relation to the long axis of the crown. The axial depth also corresponded to twice the diameter of bur head to ensure cavity to be in dentin throughout its length. The gingival margin was placed 1 mm in cementum. The internal line angles were rounded and cavosurface margins

were without bevel. After cavity preparation, the teeth were randomly divided into 5 groups with 8 teeth in each group.

Group I: All the sixteen cavities in this group were etched with Scotch bond etchant for 15 s followed by application of “Scotch bond multi-purpose plus” dentin bonding system as per manufacturer’s instructions. A 2 mm thick layer of a light cured composite resin (Charisma, Hybrid composite, Heraeus Kulzer) was then placed at the gingival margin as first increment and it was cured for 20 s from occlusal direction. The remaining of the restoration was completed with light-cured composite resin, Charisma, placed in horizontal increments.

Group II: In this group etching and bonding procedures were carried out in the same way as for Group I using “Scotch bond multi-purpose plus” dentin bonding system as per manufacturer’s instructions. Then a 2 mm thick layer of a self-cured composite resin (medicept, Type II restorative material) was placed at the gingival margin as a first increment. Equal lengths of base paste and catalyst paste were mixed, applied in the cavities, and allowed to cure for 10 min. The remaining of the restoration was completed with light-cured composite resin, Charisma, placed in horizontal increments.

Group III: In this group, etching and bonding procedures in the gingival seat area were carried out using “Scotch bond multi-purpose plus” dentin bonding system as per manufacturers instruction. A 2 mm thick layer of freshly triturated amalgam was then condensed on the gingival floor. The remaining of the restoration was completed with light-cured composite resin, Charisma, placed in horizontal increments.

Group IV: Positive control group where cavities were not restored after preparation.

Group V: Negative control group where the teeth were kept intact.

In all the groups, curing was carried out by using a LED light curing unit (Hilux LEDMAX, HeraeusKulzar, Germany) having an output level of 470 mW/cm². A Teflon coated instrument was used to insert and condense the resin in the cavity. All the restorations were finished and polished after 24 h and then stored in distilled water at 37°C for 24 h.

Thermocycling of Samples

The samples were subjected to 400 cycles with a dwell time of 2 s at 5°C ± 1°C and 65°C ± 10°C. Between the two extremes, the samples were kept in a resting bath at 34°C.

Microleakage Test

1. Following thermocycling, the teeth were dried up and apices of all teeth were occluded with fast setting

adhesive material. External surface of each tooth was painted with two layers of nail varnish except 2 mm around tooth-restoration interface to limit dye penetration to the restoration margins. The teeth were then immersed in 1% methylene blue solution for 24 h at room temperature. Afterwards, the teeth were rinsed with tap water and sectioned longitudinally with a wet diamond disc in mesiodistal direction.

Microleakage Assessment

The degree of dye penetration in the hemisections of the teeth was assessed with $\times 20$ magnification under a stereomicroscope. The extension of dye penetration was based on the following ordinal scale

0 = No leakage

1 = Leakage extending to gingival wall but not up to axial wall (Moderate)

2 = Leakage extending to the full extension of gingival wall up to axial wall (Severe).

RESULTS

As the data were non-parametric and qualitative, it was analyzed by Pearson Chi-square test to detect any significant difference in micro leakage in all groups. According to the results, Group III (Bonded amalgam) showed the least mean leakage score of 0.12 ± 0.33 among the three chief experimental groups where 14 out of 16 cavities showed no leakage whereas Group I (light cured composite) showed highest mean leakage score of 1.10 ± 0.78 where 12 out of 16 cavities showed moderate to severe leakage. Group II (Self cured composite) showed a mean leakage score of 0.88 ± 0.75 where 6 out of 16 cavities showed moderate to severe leakage. Negative control exhibited absolutely no leakage while positive control exhibited severe leakage in all cavities. Statistically significant difference ($P < 0.05$) was observed between Group-I and Group-III also between Group-II and Group-III, but no statistically significant difference was observed between Group-I and Group-II.

Statistical analysis by Person Chi-square test clearly demonstrated that Group -I and Group-II both exhibited statistically higher leakage than Group-III. Group wise comparison of total microleakage scores for Group-I, Group-II and Group-III have been shown in Table 1 while group wise comparison of means of micro leakage scores for Group I, II, and III have been shown in Bar diagram-1. The photomicrographs taken under a stereomicroscope ($\times 20$) showing microleakage at the

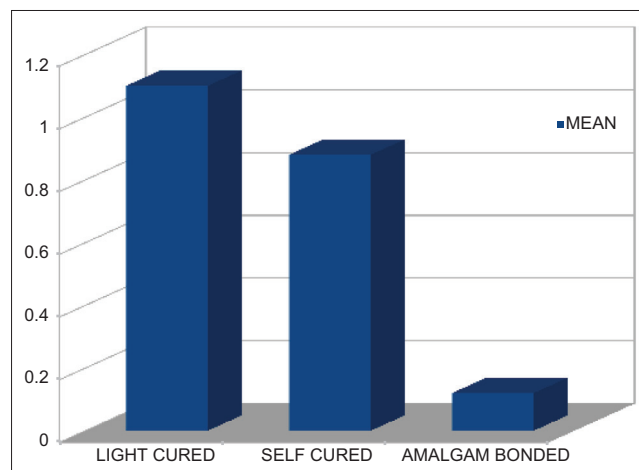
gingival margin for Group-I, Group II and Group-III have shown in Figures 1-3, respectively.

DISCUSSION

Marginal leakage has been defined as the clinically undetectable passage of bacteria, fluids, molecules or ions between cavity walls, and the restorative material applied to it (Kidd 1976).⁶ All resin-based restorative materials shrink

Table 1: Group-wise comparison of total leakage scores of Group I, II, and III

Group	Total cavities showing microleakage	Total Cavities not showing any micro leakage
Group I: Light cure	12	04
Group II: Self-cure	06	10
Group III: Bonded amalgam	02	14



Bar diagram 1: Group-wise comparison of means of Group I, II, and III



Figure 1: Stereomicroscopic image showing microleakage at gingival seat with Light Cured Composite as first gingival increment



Figure 2: Stereomicroscopic image showing microleakage at gingival seat with Self Cured Composite as first gingival increment



Figure 3: Stereomicroscopic image showing microleakage at gingival seat with Bonded Amalgam as first gingival increment

causing shrinkage stresses pulling the adhesive away from the cavity walls leading to the formation of gaps at the interface. The gap formation further results in marginal discoloration, bacterial invasion, secondary caries, and adverse pulpal reactions. Micro leakage is found to be more at the gingival margin in Class-II composite restoration. Theoretically, in Class-II composite restoration the gingival marginal separation is due to superior resin bond obtained at the occlusal margin when the enamel is acid etched. In addition, enamel when present at the cervical margin is usually thin, less prismatic, and less amenable to bonding. However, when the gingival margin is placed in cementum the increase in micro leakage is mainly attributed to the less mineralized structure of cementum, resulting in undurable, and unreliable adhesion. Hence, this *in-vitro* study was undertaken to evaluate the microleakage in Class-II composite restorations with gingival wall placed in cementum restored by using three different restorative techniques.

A total of 40 extracted human molars were selected and were stored in deionized water till the beginning of the experiment. While the majority of bonding studies refer to the use of freshly extracted teeth, several investigators like Outhwaite, LiVingston, and Pashley⁷ showed that the post extraction time had no significant effect on the bond strength to dentin.

A slot Class-II cavity preparation was done on both proximal surfaces of each tooth with a diamond point. The dimension of each cavity was calibrated with the head of the bur. The teeth were then randomly divided into five groups. Group-I was restored with 2 mm thick layer of light cured composite resin as first gingival increment while Group-II and Group-III were restored using self-cured composite resin and bonded amalgam as first gingival increments respectively.

Martin and O'Rourke⁸ found the incremental technique where the gingival increment was placed first provided the best marginal seal than the bulk placement technique. Lambrechts *et al.*⁹ stated that the contraction gap is less likely to be open when the gingival increment is placed first. In all the groups, remaining restoration was completed using light-cured composite placed in horizontal increments. Although horizontal, vertical, oblique, etc. techniques have been recommended Neiva *et al.* stated that micro leakage assessment comparing different restorative placement techniques are not conclusive and no single technique can be universally accepted.¹⁰

The teeth were then stored in distilled water at 37°C for 24 h. Asmussen and Jorgensen¹¹ observed that hygroscopic expansion may partly compensate for polymerization shrinkage and improve marginal adaptation. Hansen¹² found that water sorption after 1 day, produced gap-free fillings with certain bonding agents.

The teeth were then thermocycler, dried, teeth apices were occluded and the external surface of each tooth was painted with two layers of varnish. The teeth were immersed in 1% methylene blue solution for dye penetration. Dye penetration was chosen for assessment of microleakage as (1) it is more convenient, (2) it is found to be as effective as radioisotopes since both penetrate tooth-restoration interface to similar degree.¹³

As per results of present study:

Group-I where light-cured composite resin was used as first gingival increment showed highest mean leakage values. The results of present study are in agreement with the study done by Demarco *et al.*¹⁴ where 11 out of 16 cavities showed leakage (score 1,2).

In the present study, no statistically significant difference was found between Group-I and Group-II (self-cured group). A similar pattern of micro leakage as in present study, with no statistically significant difference between light cured group and self-cured group was demonstrated in study carried out by Hilton *et al.*¹⁵ Such high micro leakage values observed with light-cured composite technique can be attributed to the occlusal curing of resin composite, which leads to development of stresses at the gingival margin of the restoration by virtue of it being farthest from the curing light.

In the present study, Group II where self-cured composite was used as first gingival increment showed high mean leakage score. There was no statistically significant difference between the leakage values of this group and Group-I. Similar results were shown by Beznos¹⁶ and Hilton *et al.*¹⁵ who in their studies found leakage in 9 out of 10 teeth and 10 out of 10 teeth, respectively. Such high leakage results can be due to the contraction stresses of overlying composite resin resulting in interfacial debonding or due to restorations done on teeth with temperatures not simulating that of oral cavity which can result in self-cured resin shrinkage toward center of mass. van Dijken *et al.*¹⁷ in their *in vivo* study found good adaptation of self-cured composite with the margins in cementum (77% gap reduction at tooth restoration interface). This can be attributed to the fact that self-cure composite resin starts polymerizing at the cavity walls where it is warmed by body temperature and accordingly contract toward the cavity walls. However, results of our *in vitro* study are not in agreement with the study of van Dijken *et al.* In present study, Group-III where bonded amalgam was used as first gingival increment showed the best results and the least mean leakage values. This result is in agreement with a study done by Demarco *et al.*¹⁴ where 12 out of 16 cavities showed no leakage (score 0). This is also in agreement with the study of Eidelman *et al.*¹⁸ who found 89% of gingival margins showing excellent adaptation. The reduced micro leakage observed with the composite resin-bonded amalgam technique can be attributed to excellent condensability of amalgam leading to its intimate adaptation to the tooth structure at gingival seat. In contrast, softer resin composite tends to be drawn adhering to condenser during compression against cavity wall.

Thus, from the present study it was observed that though all the techniques showed a micro leakage at the gingival margin in the cementum, the composite resin-bonded amalgam restoration technique showed the least micro leakage among all the three groups.

Although, this study was an *in-vitro* study, efforts were made to simulate the clinical situation closely. It may not be entirely accurate to equate laboratory results with clinical

performance and durability, but at the best the information obtained from *in vitro* tests can be used as a mean of rank ordering performance and could give an indication of likely clinical performance.

As there is a plethora of direct adhesive restorative materials and newer techniques, the dentist is often overwhelmed by newer choices-often one material claims advantage over another, one technique claims an advantage over another. However, of course, as a conservative dentist, we must not rely only on the materials and techniques, but on our own professional skills to diagnose and choose the correct available technique.

CONCLUSION

Therefore, from present study it can be concluded that:

- i. Irrespective of the restorative technique used micro leakage is seen in Class-II composite restoration where gingival margins are placed in cementum.
- ii. However, the composite resin-bonded amalgam restoration technique shows the least possible micro leakage.

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Evaluation of the Efficacy of Supraclavicular Approach for Subclavian Vein Catheterization in Intensive Care Unit Patients: A Series of 50 Cases

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Abstract

Background: Central venous catheters are commonly inserted for hemodynamic monitoring, volume resuscitation, in conditions of difficulty in peripheral access, etc. Infraclavicular approach after subclavian vein (SCV) catheterization is widely used compared to supraclavicular approach. Recently, supraclavicular approach for SCV catheterization has gained prominence because of its well-defined landmarks with more success and less complication rate. Hence, our aim of the study was to perform SCV catheterization using the supraclavicular approach and define the success rate of the entire procedure and its associated complications.

Methodology: In this study, 50 patients belonging to medical, general surgical, neurosurgical cases, who were admitted in the intensive care unit were enrolled and SCV catheterization was performed using the supraclavicular approach.

Statistical Analysis: Demographic data was analyzed using mean and standard deviation. Categorical data were represented as a percentage and absolute numbers.

Conclusion: Access time, number of attempts, success rate of cannulation and any associated complications were recorded. Supraclavicular approach of SCV catheterization is reliably easier safe with a high success rate and is a better alternative to the traditional approaches of central venous cannulation.

Key words: Central venous cannulation, Subclavian vein catheterization, Supraclavicular approach

INTRODUCTION

Central venous catheterization is a routine procedure in the management of critically ill medical and surgical patients in the intensive care unit (ICU).¹ Attaining rapid central venous access is critical in a few emergency conditions. Though various approaches for various central venous catheterizations have been described in the literature, each approach has its own merits and demerits. Internal jugular

vein and subclavian vein (SCV) were commonly preferred for cannulation in ICUs, the indications being volume resuscitation, hemodynamic monitoring, total parenteral nutrition, hemodialysis, etc.²

Infraclavicular approach of SCV catheterization was routinely done because of its acceptability by the patients though it is associated with few complications.³ The complications associated with central venous catheterization are local site infection, arterial puncture, hematoma, hemothorax, pneumothorax, catheter related thrombosis, air embolism, dysrhythmias, lost guidewire, anaphylaxis, catheter displacement, catheter in wrong vessel, etc.,^{4,5} Various approaches were described in order to minimize the complications. One such approach is a supraclavicular approach for SCV catheterization

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which is described by Yoffa in 1965.⁶ However, it is less known and less utilized for reasons unknown but, this approach was described long back. Several advantages were described for this approach in previous studies like identifiable landmarks, easy accessibility, higher success rate and minimal complications unlike infraclavicular approach.^{7,8} Hence, we aimed to perform supraclavicular SCV catheterization by modified Seldinger's technique in 50 patients admitted in respiratory ICU (RICU) for various indications.

MATERIALS AND METHODS

This prospective randomized clinical study was conducted in the RICU in the Department of Anesthesiology and critical care in a tertiary care teaching hospital after approval of the institutional Ethical Committee. 50 patients of both genders admitted in the RICU for various causes were included in the study. Patients who needed central venous catheterizations for various purposes like fluid management and central venous pressure (CVP) monitoring were given importance. Randomization was done by computer-generated random number tables. Written informed consent was taken from all the patients after explaining to them and their attendants about the merits and demerits of the procedure.

Inclusion Criteria

1. ASA Grading I, II, III
2. Both genders
3. Medical, surgical and neurosurgical patients
4. Patients requiring CVP monitoring and infusion of vasopressors
5. Patients requiring long-term management in the RICU.

Exclusion Criteria

1. Morbidly obese patients in whom landmarks were difficult to identify
2. Infection at the site of insertion
3. Trauma to ipsilateral neck/clavicle/first rib
4. Coagulopathy
5. Chest wall/neck deformities
6. ASA Grade > III
7. Age < 14 years and > 70 years.

Routine investigations like complete hemogram, bleeding time, computed tomography (CT), urine examination, coagulation profile, electrocardiogram (ECG), and chest X-ray were carried out in all patients. In the RICU, all patients were monitored with the multipara monitor comprising of noninvasive blood pressure, pulse rate, respiratory rate, SpO₂, and ECG. Before performing the procedure, patients were kept in mild trendelenburg position in order to increase the venous return to distend the vein,

which augments accessibility and also to prevent venous embolism. The landmarks used in supraclavicular approach were lateral margin of lateral head of sternocleidomastoid muscle and superior margin of the clavicle. The point of insertion was 1 cm cephalad and 1 cm lateral to the junction of the lateral margin of clavicular head of sternocleidomastoid muscle with the superior margin of clavicle which forms the claviculosternomastoid angle.

After identification of the landmarks the area was sterilized with chlorhexidine solution. The puncture site was anaesthetized with 2 ml of 1% lignocaine solution. The needle was directed toward the ipsilateral nipple and the cannulation was attempted. The directing needle should be approximately 10° from the sagittal plane and 35° from the coronal plane. The bevel was directed upwards initially to prevent trapping against inferior vessel wall and after successful aspiration of venous blood; it was turned downwards to prevent the J tipped guide wire to enter into the ipsilateral internal jugular vein (IJV). The procedure was performed using modified Seldinger's technique.

The optimal length of the catheter was determined by overlaying the catheter from the puncture site to the second intercostal space. Average length was marked on the catheter before inserting and inserted until that mark. Verification of successful line placement was done with a post procedure radiograph immediately. Ideally, the tip of the catheter should be at the junction of SVC and right atrium. After the procedure, clean dressing was applied to the catheter. After 3 unsuccessful attempts on the right side, the protocol was to attempt the left SCV cannulation. If we had difficulty in threading the guide wire down the vein, the guidewire was removed, the syringe reattached, and the procedure was reattempted. The catheter site was inspected regularly for any evidence of infection. The catheter was removed in patients once their general condition was improved and their hemodynamic stability was attained.

Statistical Analysis

Demographic data like age, height, gender, weight was recorded in all the patients included in the study. Mean and standard deviation (SD) were calculated for demographic data. The parameters measured were

- a) Access time - defined as time taken from the skin puncture until successful cannulation
- b) Success rate of cannulation
- c) No. of attempts
- d) Ease of guide wire insertion - (smooth/failed)
- e) Complication rate.

Access time was analyzed and represented as mean \pm SD. All other categorical variables like success rate and other were represented in percentages.

RESULTS

Totally, 50 patients were enrolled for the study. SCV cannulation (Figures 1 and 2) was attempted in all 50 patients. Table 1 shows the distribution of demographic data like age, height, weight, ASA status, and gender. The mean access time for cannulation was 4.8 ± 1.02 (min) in our study (Table 2). The overall success rate of cannulations using this approach in our study was 88% (44 out of 50) (Figure 3). Of the obtained successful cannulations, 72% of the cannulations were done in first attempt, 28% were done in 2nd attempt, none of the patients required 3rd attempt and none of the patients required left SCV cannulation (Table 3). In 12% (6) patients,

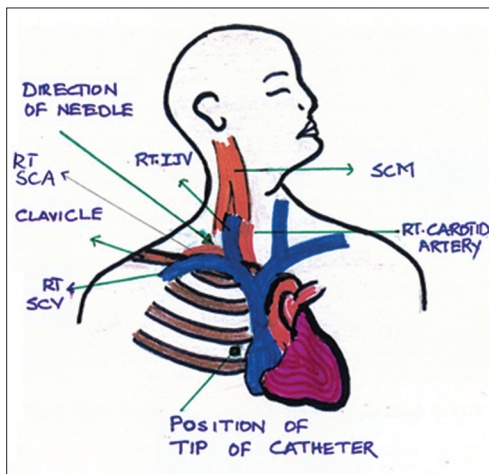


Figure 1: Supraclavicular approach of subclavian vein cannulation



Figure 2: Technique of supraclavicular subclavian vein cannulation

catheterization was unsuccessful (Table 4). The failure rate was due to several causes like unable to locate the vein, arterial puncture, difficulty in the threading the guide wire, catheter entering into ipsilateral IJV (Table 4). None of the patients in our study had serious complications like hemothorax and pneumothorax (Table 4). The average length of the catheter was found to be approximately 9.5-11.2 cm in our study. In the post procedure radiograph, the position was found to be at the junction of superior vena cava and right atrium (Figure 4).

DISCUSSION

SCV cannulation via infraclavicular approach was routinely performed in ICUs for both medical and surgical patients because of its easy access and high acceptance by the patients.⁹ Though this approach is associated with several complications like arterial puncture, hemothorax, pneumothorax, etc., this technique was widely accepted and time honoured.^{10,11} These serious complications could also be life threatening sometimes. Keeping them in view, alternative techniques of SCV cannulation were described.¹²



Figure 3: Success rate

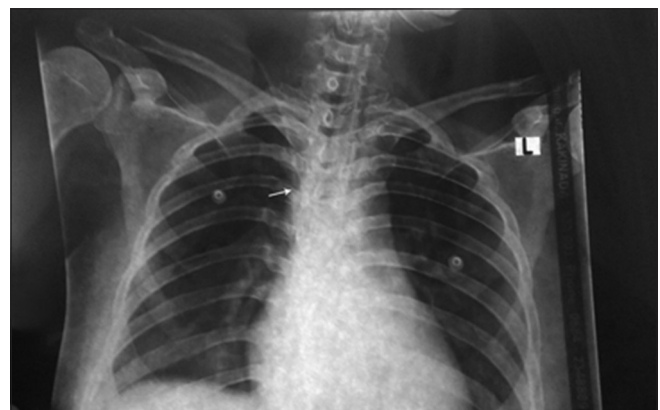


Figure 4: Chest roentgenogram showing position of catheter in subclavian vein

Table 1: Demographic profile

Demographic parameters	n=50
Age (years)	52.5±11.21
Height (cm)	157±15.2
Weight (kg)	68.9±6.53
Gender (M/F)	32/18
ASA (I/II/III)	0/28/22

Data expressed as mean, SD and absolute numbers, SD: Standard deviation

Table 2: Access time

Access time	min
Mean	4.8
SD	1.02

Data expressed as mean or SD, SD: Standard deviation

Table 3: Number of attempts

Number of attempts	n=50
Right SCV	
First	72% (36)
Second	16% (8)
Third	0
Left SCV	
Nil	0

Data expressed as percentage and absolute numbers success rate, SCV: Subclavian vein

Table 4: Complications

Complications %	n=50
4 (2)	Unable to locate the veins
4 (2)	Arterial puncture
2 (1)	Unable to thread the catheter guide wire
2 (1)	Ipsilateral IJV catheterization
0	Hemothorax
0	Pneumothorax

Data expressed as percentage and absolute numbers, IJV: Internal jugular vein

In 1965, Yoffa presented the 1st report of supraclavicular approach to SCV cannulation.¹³ Over a period of time, a number of modifications were proposed to the Yoffa's technique.¹⁴ Several studies reported that the advantages of supraclavicular approach were (1) relatively easy surface landmarks, (2) shorter distance from skin to vein, (3) more straight path to SVC, (4) less proximity to lung, (5) higher initial success rate, (6) fewer complications like arterial puncture, hemothorax, pneumothorax.¹⁵ Hence, we aimed to perform this technique in 50 ICU patients using a modification of Yoffa's technique. In our study, we directed the needle at 10° from sagittal plane and 35° posterior to the coronal plane because this allows for the shortest distance to the target vessel and the first rib to act as a physical barrier to reduce the risk of pneumothorax. In literature, the CT guided approach has shown high success rate. Identification of landmarks was very critical to the success of supraclavicular approach. Initially, we did a pilot study in 15 patients and located the SCV with a finder needle. We found that the technique was relatively easy even to an inexperienced person. After getting acquainted

with the technique, in the study patients we cannulated the SCV directly with the needle.

Czarnik *et al.* published a study demonstrating a high success rate of supraclavicular approach in 370 patients and no life-threatening complications were noted in their study.¹⁶ In our study also the success rate was 88%, which is correlating with the above study. Several complications like arterial puncture, hemothorax, pneumothorax were reported with various other techniques.¹⁷

A study by Muhm *et al.* of 208 supraclavicular lines in 168 hemodialysis patients with large bore catheters reported the following complications - 1 pneumothorax, 7 arterial punctures, 2 thoracic duct punctures without any sequelae.¹⁸ The overall complication rate in our study was very less (12%) and also without any sequelae. The arterial puncture is only 4% and none of the patients had a pneumothorax, hemothorax, and thoracic duct Injury. Sustained pressure for 5 min after arterial puncture caused the cessation of bleeding from the puncture site without any hematoma formation unlike infraclavicular approach where accessibility to apply pressure is not possible. This is an advantage in this technique.¹⁹ Furthermore, there were studies reporting that this approach was successful even in morbidly obese patients.²⁰ This approach should be performed in neurosurgical patients, where right IJV cannulation can be associated with increased intracranial pressure and venous stasis. In our study, the mean access time was 4.8 min ± 1.02 min, which is almost similar to other studies. The catheter was inserted by two experienced anesthesiologists in our study.

Though ultrasound guidance for central venous cannulation has been proved to be useful adjunct now, the use of ultrasound guidance for a supraclavicular approach for SCV cannulation was less studied. Moreover, there is little space to effectively position the transducer while manipulating the needle. Because of non-availability of ultrasound in our institution, the landmark-based technique was followed. We found that this approach was relatively easier, safe with anatomical landmarks, and higher success rate.

CONCLUSION

The supraclavicular approach of SCV catheterization is a better alternative to the traditional approaches of central vein catheterization with reliability, safety, and high success rate.

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Clinical Profile of Oculomotor Nerve Palsy

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Abstract

Introduction: Oculomotor nerve palsy in adults can be caused by various causes like microvascular ischemia, post trauma, orbital inflammation, and tumors. The presenting clinical features and neuroimaging aid in diagnosis and management.

Aim: The aim was to study the clinical presentation, etiology, and prognosis of oculomotor nerve palsy.

Materials and Methods: A prospective study of 30 cases of third cranial nerve palsy was carried out from September 2012 to April 2014 in our Institute. Relevant history was elicited. Clinical examination was performed which included vision acuity testing, extraocular movement assessment, Hess charting for diplopia, eyelid examination, pupillary reaction, and posterior segment evaluation. Details of various etiologies, pupillary involvement, and recovery were documented and analyzed. In all cases, neuroimaging (computed tomography/magnetic resonance imaging brain) was done.

Results: Total 30 cases of oculomotor nerve were studied. 21 were males and 9 were females. The age group ranged from 20 to 75 years. 28 patients had unilateral involvement and 2 had bilateral involvement. Follow-up period ranged from 4 months to 1½ years. Microvascular ischemia accounted for 10 cases, post trauma in 16 cases, idiopathic orbital inflammatory disease in two cases, neurotuberculosis in one case and in one case no specific etiology could be identified. Pupil involvement was seen in 17 cases. Complete recovery was seen in 16 cases and partial recovery in 12 cases. In patients with pupil involvement, 7 had complete recovery. In patients with pupil sparing third nerve palsy, 9 had complete recovery.

Conclusion: In our Institute, the most common causes of 3rd nerve palsy were trauma and microvascular ischemia. Microvascular ischemic patients had a better prognosis.

Key words: Microvascular ischemia, Oculomotor nerve palsy, Post-trauma, Ptosis

INTRODUCTION

The oculomotor nerve supplies superior rectus, inferior rectus, inferior oblique, medial rectus, levator palpebrae superioris as well as pupillary and ciliary muscles of the eye. The oculomotor nerve nucleus complex lies in the midbrain at the level of superior colliculus, ventral to sylvian aqueduct. Each target muscle has its own subnucleus.¹ Knowledge of nerve's course from nucleus to terminal muscles, along with accompanying clinical features help in localizing the site of nerve palsy.²

Patients with third nerve palsy present with eyelid drooping restricted eye movement and binocular diplopia. The position of the eyeball is down and out incomplete isolated third nerve palsy.³ Oculomotor nerve palsy can acquired or congenital, partial or complete, pupil may or may not be involved.⁴ It may be isolated or associated with other neurological signs. Associated symptoms like facial or body numbness, protrusion of eye, periocular pain hearing loss and neurological deficiencies help us in localizing the site of lesion.^{5,6} Recent advances in neuroimaging technique help us early and accurate diagnosis and better management of cases.⁷

Acquired oculomotor nerve palsy in adults could be due to various etiologies. Microvascular ischemia, post trauma, idiopathic orbital inflammation, and intracranial tumors are considered important causes for oculomotor nerve palsy.⁸

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MATERIALS AND METHODS

The study group consisted of 30 cases of oculomotor nerve palsy who attended ophthalmology department during September 2012 to April 2014. The inclusion criteria were; (i) acquired isolated third nerve palsy with recent onset (within 2 weeks) (ii) third nerve palsy associated with other ocular, neurological signs, (iii) informed written consent. Exclusion criteria were, (i) congenital palsy, (ii) patients presenting later than 4 weeks of onset of symptoms.

A detailed patient history including age, gender, present illness and past medical status were documented. Complete ocular examination was done in all cases, which included visual acuity testing by snellen's chart, anterior segment evaluation, and fundoscopy. Extraocular movement restriction was assessed and graded.⁹ Hess charting for diplopia was done. Ptosis, if present was graded as mild (<2 mm), moderate (2-4 mm), and severe (4-8 mm). Pupil involvement was checked by measuring size, shape, and light reflexes. Pupil size was measured by instructing the patient to look at distant target kept at 6 m under the stable light, using millimeter scale.

Detailed systemic and neurological examination was done in all cases. Blood investigations like random blood sugar, lipid profile, and hemoglobin were done in all cases. Investigations like cerebrospinal fluid analysis and mantoux test were done in relevant cases. In all cases, neuroimaging (computed tomography [CT]/magnetic resonance imaging [MRI]) was done.

Patients were reviewed after 1-week, 8 weeks and subsequently. During the follow-up, lid position, extraocular motility, pupil size, and reaction were recorded.

RESULTS

Totally, 30 cases of oculomotor nerve were studied. 21 were males and 9 were females. The age group ranged from 20 to 75 years with a mean of 41.2 years. In our study, 28 patients had unilateral involvement and 2 had a bilateral involvement (Table 1). Follow-up period ranged from 4 months to 1½ years with a mean of 5 months. 2 were lost to follow-up.

A total of 29 patients had specific etiology. Microvascular ischemia accounted for 10 cases, post trauma in 16 cases, idiopathic orbital inflammatory disease in 2 cases and neurotuberculosis in one case. In one case, no specific etiology could be identified (Table 2). Among microvascular ischemia patients, 6 had diabetes, 1 had hypertension and 4 had both. 2 cases which had bilateral involvement were secondary to post trauma. Mild ptosis was seen in 5 cases,

moderate in 12 cases, and severe in 10 cases. 3 patients had no ptosis. Pupil involvement was seen in 17 cases, while 13 patients had pupil sparing third nerve palsy. In the post traumatic group, 11 patients had pupil involvement whereas in microvascular ischemic group only 3 patients had pupil involvement (Table 3).

Complete recovery was seen in 16 cases and partial recovery in 12 cases. In our study, 8 patients in microvascular ischemia group and 6 patients in post trauma group had complete recovery (Table 4). In patients with pupil involvement, 7 had complete recovery. In patients with pupil sparing third nerve palsy, 9 had complete recovery (Table 5).

Post trauma cases had various associated clinical findings (Table 6). 1 case of microischemia was associated with hemiparalysis and rest was isolated third nerve palsy. 1 case of idiopathic orbital inflammatory disease was associated with abducens and optic nerve involvement and other case had only abducens nerve involvement.

Table 1: Demographic characteristics of patients

Characteristics	Number (%)
Gender	
Male	21 (70)
Female	9 (30)
Age (years)	
20-40	13 (43.3)
41-50	8 (26.6)
51-60	6 (20)
>60	3 (10)
Mean age	41.2 years
Laterality	
Unilateral	28 (93.3)
Bilateral	2 (6.6)

Table 2: Etiology of third cranial nerve palsies

Etiology	Number of patients (%)
Post-traumatic	16 (53.3)
Microvascular ischemia	10 (33.3)
Orbital inflammatory	2 (6.6)
Neurotuberculosis	1 (3.3)
Undetermined	1 (3.3)

Table 3: Pupil involvement according to etiology

Etiology	Pupil involving oculomotor palsy no. of patients (%)	Pupil sparing oculomotor palsy no. of patients (%)	Total
Post-traumatic	11 (68.75)	5 (31.25)	16
Microvascular ischemia	3 (30)	7 (70)	10
Orbital inflammatory	1 (50)	1 (50)	2
Neurotuberculosis	1 (100)	-	1
Undetermined	1 (100)	-	1
Total	17	13	30

DISCUSSION

Third cranial nerve palsy accounts for about one-third of presenting cranial nerve palsies.¹⁰ Etiological trends of oculomotor nerve palsy have remained fairly consistent over the decades and the current focus is on diabetes, trauma, and orbital inflammatory diseases. The “rule of the pupil” first noted by Rucker in 1958 is used to describe differences in clinical presentation of a third nerve palsy caused by microvascular etiologies as opposed to those associated with aneurysms.¹¹ Vascular etiologies is commonly associated with normal pupillary function whereas in compressive lesions pupil involvement accompany third nerve palsy.

Oculomotor nerve palsy can result from lesions located anywhere from the oculomotor nucleus to the termination of third nerve in the extraocular muscles within the orbit. Some authors recommended early neuroimaging in patients presenting with acute third nerve palsy whereas others

have recommended observation without neuroimaging unless a spontaneous resolution has not occurred within 3-6 months.^{12,13} According to Madhura *et al.*, MRI is a more sensitive modality for identifying intracranial pathology compared to CT scan (CT/MRI).¹³ Trobe suggested an approach to manage of oculomotor nerve palsy based on the pupillomotor deficit and extraocular muscle function.¹⁴ In our study, all patients underwent neuroimaging.

In our study, post-traumatic secondary to head injury (53.3%) and microvascular ischemia (33.3%) were significant causes for oculomotor nerve palsy. Pupil was involved in 69% of patients in a post trauma group whereas in micro ischemia group, only 31% had pupil involvement. In our study, 70% of the cases were in the age group of 20-50 years of age which is comparable to Menon *et al.* who found 71% incidence in 11-40 years age group.¹⁵ In our study, complete recovery was seen in 69% of microvascular ischemia group compared to 38% in post trauma group. Microvascular ischemic group had the best recovery, which was comparable to previous studies.

Table 4: Recovery of third nerve palsy according to etiology

Etiology	Complete recovery number of patients (%)	Partial recovery number of patients (%)	Default number of patients
Post-traumatic	6 (37.5)	8 (66.6)	2
Microvascular ischemia	8 (50)	2 (16)	-
Orbital inflammatory	1 (6.25)	1 (8.3)	-
Neurotuberculosis	1 (6.25)	-	-
Undetermined	-	1 (8.3)	-
Total	16	12	2

Table 5: Recovery pattern in both the types of oculomotor palsy

Recovery pattern	Pupil involving oculomotor palsy number of patients (%)	Pupil sparing oculomotor palsy number of patients (%)
Complete recovery	7 (46.7)	9 (69.2)
Partial recovery	8 (53.3)	4 (30.8)
Default (lost to follow-up)	2	-
Total	15	13

Table 6: Associated findings in traumatic cases (16 cases)

Associated findings	No. of patients (%)
Optic (2 nd) nerve palsy	5 (31.25)
Trochlear (4 th) nerve palsy	1 (6.25)
Abducent's (6 th) nerve palsy	1 (6.25)
Orbit wall fracture	1 (6.25)
Traumatic retinal detachment	1 (6.25)
Brain hemorrhage	7 (43.75)

We compared our study with other studies (Table 7). The incidence of traumatic third cranial nerve was more in our study compared to other studies (Rush *et al.* 16.2%¹⁶ and Kumar *et al.* 17.5%). It could be attributed to our institute being a trauma referral center. Neurotuberculosis, orbital inflammation, and miscellaneous causes were less reported. None of the patients had aneurysms or neoplasia as underlying etiology in our study. The overall recovery of oculomotor nerve palsy in the present study was 58% as compared to studies by Singh *et al.* (50%)¹⁷ and Richards *et al.*¹⁸

A small number of patients investigated in the present study is the main limiting factor of this study.

CONCLUSION

In our Institute, commonest causes of third nerve palsy were trauma and microvascular ischemia secondary to diabetic micro angiopathy. Complete third nerve palsy

Table 7: A comparative analysis of etiology of third nerve palsies with various studies

Etiology	Rama <i>et al.</i> (1980) ¹⁹ %	Vimala <i>et al.</i> (1992) %	Kumar <i>et al.</i> (2014) %	Present study %
Post-traumatic	21.1	22.2	20.0	53.3
Microvascular ischemia	21.1	22.2	17.5	33.3
Orbital inflammatory	-	9.5	12.5	6.6
Neurotuberculosis	17.5	1.6	12.5	3.3
Undetermined	10.5	30.2	20.0	3.3

was most common in post-traumatic cases. Majority of microvascular ischemic patients had complete recovery.

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Comparison of Temporalis Fascia with Tragal Cartilage-Perichondrium (Composite Graft) as a Grafting Material in Type I Tympanoplasty: A Prospective Randomized Study

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Abstract

Introduction: The quest for an ideal graft material for tympanic membrane repair is an evolutionary process. Temporalis fascia, though being most commonly used does not seem to withstand middle ear pressure changes in the long run. Use of tragal cartilage-perichondrium (composite graft) has come up as a graft material of choice offering resistance from pressure changes, yet being acoustically acceptable.

Aims and Objective: The present study was undertaken to compare the results of autologous tissues like temporalis fascia, tragal cartilage-perichondrium (composite graft), as graft materials for the Type I tympanoplasty.

Materials and Methods: A total of 130 cases of chronic otitis media were considered in the study without any age and sex bias. Two groups were created of these 130 cases, wherein temporalis fascia graft was used in Group A while tragal cartilage-perichondrium (composite graft) was used in Group B. The results were evaluated in the form of graft take-up and acoustic gain described as residual air-bone gap with respect to the graft materials over a follow-up period of 1-year.

Results and Observation: There were 76 (58.46%) male and 54 (41.54%) female patients. Well-healed neotympanum at the end of 1-year follow-up in Group A and B were 92.31% and 96.92%, respectively. Post-operative closure of air-bone gap to <10 dB in Group A and B were 84.61% and 73.85%, respectively.

Conclusion: The graft take-up rate was comparatively better in the tragal cartilage-perichondrium (composite graft) group, while hearing improvement was comparatively better in the temporalis fascia group. Translucent appearance of neotympanum in the post-operative period was seen only with temporalis fascia, while in tragal perichondrial graft the neotympanum was whitish, thicker, and translucent to opaque. Considering the long-term effects of tragal cartilage-perichondrium (composite graft) in providing an anatomically safer ear with useful hearing, we recommend its use as an alternate to the prevailing temporalis fascia graft.

Key words: Acoustic, Cartilage, Fascia, Perichondrium, Tympanoplasty

INTRODUCTION

Chronic otitis media is a common ear disease encountered in developing countries due to poor nutrition, poor

socio-economic standards, lack of health education, and unhygienic habits.¹ It is a major cause for deafness in India.² Otorhinolaryngologists routinely carry out tympanoplasty, as an established surgery with a goal to provide an intact tympanic membrane and reconstruct the sound conducting mechanism.³ A wide range of autologous graft materials that have been used over time in repairing tympanic membrane perforations, however the choice is largely based on surgeons experience and skill.⁴ Mortiz in 1950 reported the first closure of tympanic membrane perforation utilizing a pedicled skin flap. Temporalis fascia

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as a grafting material was first considered by Heerman, while Storrs employed it successfully. Goodhill visualized the idea of grafting tragal cartilage and perichondrium.⁵ Other autologous graft materials used were fat, conchal or septal cartilage, vein and fascia lata.

Certain criteria's which an ideal grafting material used for tympanic membrane closure should meet includes easy availability, good tensile strength, sufficient quantity, low rejection rate, and functionally similar to the tympanic membrane. Successful closure of tympanic membrane perforation in 95% cases utilizing temporalis fascia and perichondrium as a graft material has been mentioned in the literature. Temporalis fascia is the most preferred grafting materials owing its translucency, low basal metabolic rate, anatomic proximity, and suppleness.

However, graft displacement, improper placement,⁶ atrophy, and reperforation of the graft have been noticed in cases of total perforation, chronic mucosal dysfunction, and eustachian tube dysfunction leading to atelectasis of graft.⁷ Cartilage has a low metabolic rate and good acceptance in the middle ear. Cartilage perichondrium graft being tougher and easily neovascularized would theoretically work well in these conditions as the incorporated cartilage will provide mechanical stability and necessary stiffness to avoid retraction and reperforation.⁸

A concern about the vibratory properties of neotympanum being affected by the stiff nature of the incorporated cartilage has been raised. This problem can however, be avoided by adequate thinning of the cartilage. Achieving perforation closure with reasonably good hearing as a routine is a challenge in otology practice. The present prospective study compares temporalis fascia with tragal cartilage-perichondrium (composite graft) as a graft material in Type I tympanoplasty in terms of grafting results and acoustic properties.

Aim and Objective

1. To compare graft take-up rate with temporalis fascia and tragal cartilage-perichondrium (composite graft) as graft materials in Type I tympanoplasty
2. To compare the acoustic improvement following Type I tympanoplasty, using the aforesaid graft materials
3. To compare the retraction or re-perforation rate of neotympanum in both cases.

MATERIALS AND METHODS

Considering long-term anatomical and functional aspects of tympanoplasty, in lieu of the assessment of efficacy

of graft materials, selection of study cases was based on following criteria.

Inclusion Criteria

- a. Unilateral tubotympanic chronic otitis media
- b. Pure conductive hearing loss
- c. Affected ear dry for 4 weeks prior to surgery.

Exclusion Criteria

- a. Patients with active ear discharge
- b. Patients with atticotympanic disease
- c. Ossicular dysfunction or any other ear pathology
- d. Mixed or sensorineural hearing loss
- e. Patients with complications of chronic otitis media, sinonasal pathology or any systemic disease.

With prior Institutional Ethical Committee approval, a prospective randomized study was undertaken with 130 patients of chronic otitis media of tubotympanic variety, who fitted well with the inclusion and exclusion criteria's from August 2012 to November 2014 at Hi-Tech Medical College and Hospital, Bhubaneswar. All cases underwent routine ear nose throat and general medical evaluation. Ear findings with respect to perforation - Size, site, margin, and state of drum remnants, presence or absence of ear discharge, condition of middle ear mucosa, and tuning fork tests, pure tone audiometry findings were noted. X-ray mastoid-schuller's view, both sides to look for pneumatization and to rule out any associated mastoid pathology was done. X-ray paranasal sinuses were taken in selected cases to rule out sinus pathology. Routine investigations such as complete blood count, blood grouping, bleeding and clotting time random blood sugar, liver and renal function tests, routine and microscopic examination of urine, and chest X-ray were done on admission. A specially prepared proforma was used to document the details of history, pre-operative examination, intra-operative, and follow-up findings. A fully informed consent was obtained. Patients were randomly divided into two groups (Group A and Group B).

Group A: Temporalis fascia graft ($n = 65$)

Group B: Tragal cartilage with perichondrium ($n = 65$).

Type I tympanoplasty by underlay technique, using the postaural approach was done for all study cases, under local anesthesia. Temporalis fascia (Figure 1) and tragal cartilage perichondrium composite graft (Figure 2) were harvested by the conventional method. Tragal cartilage composite graft included the posterior perichondrium. The perichondrium was spread out toward periphery and cartilage thinned to <0.5 mm and as an island - The so-called "fried egg appearance." An anterior based tympanomeatal flap was

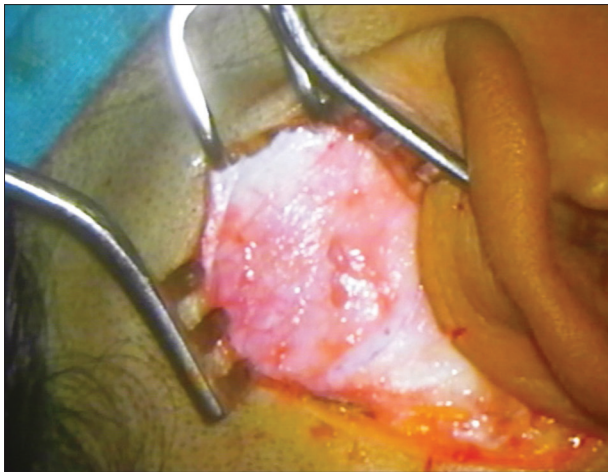


Figure 1: Temporalis fascia graft being harvested



Figure 2: Tragal cartilage perichondrium (composite) graft being harvested

raised and middle ear was examined for ossicular integrity, motility, and any other pathology. The “anterior tucking technique,” was used for large perforations or anterior perforations with the small anterior rim.

All cases were discharged on 2nd post-operative day. Aural pack and post aural stitches were removed on first follow-up visit, 2 weeks later. Subsequently the patients were examined regularly at every 2 weeks for first 2 months and then monthly for 1-year. Hearing assessment with pure tone audiometry covering speech frequency (500, 1000 and 2000 Hz) and assessment of the healed neotympanum was done at 3rd, 6th and 12th month postoperatively. Evaluation criteria were graft take-up and acoustic outcome. Well healed neotympanum with mobility on seigalization was accepted as favorable outcome while any residual perforation, retraction pocket formation was counted as failures. Acoustic outcome was assessed by comparing pre-operative and post-operative pure tone audiometry reports.

OBSERVATION AND RESULTS

The study group consisted of 130 patients, divided randomly into two groups with equal subject count (65 cases), namely Group A and Group B. There were 76 (58.46%) male and 54 (41.54%) female patients. Male to female ratio was 1.4:1. The youngest patient was 11 years old, while the eldest was 58 years old. The mean age was 26.4 years. All the patients were followed for 1-year after the surgery. There were no dropouts. No local or systemic complications were seen in either of the treatment groups.

The patients were followed up regularly for 1-year. In Group A, where temporalis fascia was used as the graft material, the graft take-up in terms of well healed neotympanum, re-perforation, and retraction pocket formation at 3, 6, and 12 months postoperatively was 96.92%, 3.08%, 0% and 95.38%, 3.08%, 1.54% and 92.31%, 3.08%, 4.61%, respectively. While in Group B, where tragal cartilage-perichondrium (composite graft) was used as the graft material, the graft take-up in terms of well-healed neotympanum, re-perforation at 3, 6, and 12 months postoperatively was 98.46%, 1.54% and 96.92%, 3.08% and 96.92%, 3.08%, respectively. None of the patients showed retraction pocket formation (Table 1).

Post-operative hearing was assessed at 3, 6, 12 months post-operatively. At 12 months after surgery, patients with temporalis fascia graft showed an air-bone gap of <10 dB in 55 (84.61%) patients and more than 10 dB in 10 (15.39%) patients. Air bone gap with tragal cartilage-perichondrium (composite graft) was <10 dB in 48 (73.85%) patients and more than 10 dB in 17 (26.15%) patients (Table 2). The 1-year postoperative photograph of well-healed neotympanum, achieved with the use of temporalis fascia and tragal cartilage perichondrium composite graft is depicted in the Figures 3 and 4, respectively.

DISCUSSION

Chronic otitis media is the chronic inflammation of mucoperiosteal lining of the middle ear cleft characterized by ear discharge, a permanent perforation of the tympanic membrane, and impairment in hearing. It is usually a result of earlier active otitis media, otitis media with effusion or a traumatic perforation.⁹ Surgical repair of tympanic membrane, known more commonly as myringoplasty or Type I tympanoplasty has evolved over a long span of time. The term tympanoplasty was coined by Wullstein in 1953, and is defined as any operation where the tympanic membrane is reconstructed with or without reconstruction of the ossicular chain.

Table 1: Graft take-up rate

Surgical outcome	Group A temporalis fascia (n=65)			Group B tragal cartilage-perichondrium (composite graft) (n=65)		
	3 months	6 months	12 months	3 months	6 months	12 months
Neotympanum	63 96.92%	62 95.38%	60 92.31%	64 98.46%	63 96.92%	63 96.92%
Re-perforation	2 3.08%	2 3.08%	2 3.08%	1 1.54%	2 3.08%	2 3.08%
Retraction	0	1 1.54%	3 4.61%	0	0	0

Table 2: Acoustic outcome at 1-year follow

Air Bone gap closure	Group A Temporalis fascia (n=65)		Group B tragal cartilage-perichondrium (composite graft) (n=65)	
	Patient count	Percentage	Patient count	Percentage
<10 dB	55	84.61%	48	73.85%
>10 dB	10	15.39%	17	26.15%


Figure 3: 1-year post-operative photograph of well-healed neotympanum, achieved with the use of temporalis fascia

Figure 4: 1-year post-operative photograph of well-healed neotympanum, achieved with the use of tragal cartilage perichondrium composite graft

Biological tissues of mesodermal origin which contain collagen matrix have been the main basis of evolution of various graft materials.¹⁰ The various graft materials that have evolved over years for tympanoplasty can be grouped as homologous, autologous or xenografts. The most commonly used graft materials are temporalis fascia and perichondrium, whereas cartilage and composite grafts have recently gained more popularity in cases of recurrence or total perforation, severe atelectatic ears or cholesteatoma cases.¹¹

The tympanic membrane repair starts 12 h after surgery while the granulation tissue starts appearing after 36 h. The graft acts as a scaffold to support the regenerating squamous epithelium on the lateral side and mucosa as the medial aspect of ear drum. It constitutes the connective tissue portion of the neotympanum though it lacks the orderly arrangement of collagen fibers.¹² The tympanoplasty is considered successful if the well-healed neotympanum successfully covers the perforation, withstands the pressure changes in the middle ear and its acoustic properties are near normal to the original healthy tympanic membrane.¹³

The use of temporalis fascia is favored by its availability in sufficiently large size from the same incision, being thin yet strong like normal tympanic membrane, and having a low basal metabolic rate. The merits of tragal cartilage-perichondrium (composite graft) are being readily available in operative field, available in adequate amount, having its own blood supply by diffusion through attached perichondrium, easily shaped, low metabolic, and extrusion rate.

The acoustic behavior of the reconstructed tympanic membrane is determined by the way of placement of the cartilage. There are various ways of inserting cartilage, like in the form of several parallel, full thickness strips (palisade technique) or as a single plate of different sizes and shapes (island technique, book cover technique, etc.). Overbosch in 1971 was first to describe a microslice technique to improve the acoustic properties of the reconstructed tympanic membrane.¹⁴ Cartilage slices <0.5 mm thick are similar to the tympanic membrane in their acoustic properties. In a normally ventilated middle ear, a cartilage

plate of thickness <0.5 mm possesses sufficient mechanical stability and low acoustic transfer loss.¹⁵

In patients with chronic eustachian tube dysfunction, the tympanic membrane or the neotympanum retracts and adheres to promontory resulting in atelectasis and surgical failure. In such cases, cartilage-perichondrium gives better results than temporalis fascia or perichondrium alone,¹³ owing to its better ability to withstand because of its higher mechanical stability against middle changes. With cartilage grafts the incidence of post-operative retraction pocket formation is seen less frequently.⁷

In the present study, there were 76 (58.46%) male and 54 (41.54%) female patients. Male to female ratio was 1.4:1. Similar findings were noted in the study of Dornhoffer,¹⁶ where there were 55% males and 45% female patients. While in the study of Strahan *et al.*,¹⁷ 62% were males and 38% were females. The mean age of all the cases together was 26.4 years (range: 11-58 years). Singh *et al.*,¹⁸ in their study had recorded a mean age of 28.9 years (range: 13-48 years). When success rate of the tympanic membrane perforation closure at the end of 1-year with different graft materials was compared, successful graft take-up rate of 92.31% was achieved for temporalis fascia (Group A), while for tragal cartilage-perichondrium composite graft (Group B) it was 96.92%. Our results are comparable with the study of Strahan *et al.*,¹⁷ in which take-up rate of 87.5% was achieved using temporalis fascia and 86% by tragal perichondrium by underlay technique. Singh *et al.*,¹⁸ had recorded a graft success rate of 95% for temporalis fascia and 90% for tragal perichondrium. Sprem *et al.*,¹⁹ had reported a graft take-up rate of 91% with temporalis fascia and 92% using tragal perichondrium.-

In our study with temporalis fascia graft, good hearing results, that is, closure rate of ABG within 10 dB, at the end of 1-year was found in 84.61% cases (Table 2), which is comparable to results obtained by Gupta and Mishra²⁰ (92%) and Strahan *et al.*,¹⁷ (82%), but is more than the results recorded by Dabholkar *et al.*,²¹ (76%), Herman⁶ (75%) and Singh *et al.*,¹⁸ (63%).

With tragal cartilage-perichondrial graft, closure of ABG within 10 dB was found in 73.85% cases, which are comparable to the observations of Gupta and Mishra²⁰ (83%), Dabholkar *et al.*,²¹ (75%) and Dornhoffer¹⁶ (77%), but is higher than the result of Singh *et al.*,¹⁸ (55.5%).

The normal tympanic membrane has to withstand significant pressure changes, but at the same time be flexible and compliant with subtle pressure variations of sounds. Therefore, it needs to be strong in relation to its thickness.

A normal tympanic membrane consists of all three types of collagen: Type I, Type II, and Type III. Type II collagen, having a high tensile strength is the main contributor, spread across the entire membrane, while all three types are found in the peripheral area. Type II provides more strain resistance than Type III. The probable role of Type III is mechano-acoustic, promoting the complex vibration patterns of the tympanic membrane that congregate in the umbo.²² Temporalis fascia consists primarily of collagen Type I.²³ Post-operatively, the graft integrates with the remnant lamina propria of tympanic membrane. Since cartilage is formed mainly by Type II collagen, which is also the main type in lamina propria, a thin cartilage graft would be a better option.²⁴

Hearing improvement and tympanic membrane perforation closure are achieved excellently with the use of either temporalis fascia or tragal perichondrium.²⁵ It was also observed that tragal cartilage-perichondrium graft is thicker and stiffer than temporalis fascia and need not be dried and can be placed as wet graft and is easier to manipulate in the middle ear. Similar findings were noted by Gupta and Mishra²⁰ and Singh *et al.*,¹⁸

Khan and Parab (2011)²⁶ achieved a success rate of 98.20% with the use of tragal cartilage perichondrium composite graft in tympanoplasty. Re-perforation rate is comparatively less and graft integration rate is significantly higher with the use of cartilage graft.²⁷ It was also observed that in the post-operative period, temporalis fascia graft achieves a normal translucent appearance of neotympanum while the neotympanum was whitish and translucent to opaque in appearance in the case of tragal cartilage-perichondrial grafts. Thus, there is a risk of disease recurrence being hidden and iatrogenic cholesteatoma formation.

CONCLUSION

Temporalis fascia, tragal cartilage-perichondrium (composite) grafts are viable autograft material of mesodermal origin, which excludes the risk of iatrogenic cholesteatoma in tympanoplasty. Tragal cartilage-perichondrium (composite graft) can be used as a suitable alternative to temporalis fascia provided the cartilage is appropriately thinned out. This arrangement will provide protection from retraction pocket formation and re-perforation and at the same time will have minimal interference in the sound transmission. Perichondrium is a tough, resilient material having good revascularization. Negative middle ear pressure, especially in cases of eustachian tube dysfunction and large perforations can be counteracted by the incorporation of cartilage in perichondrium as a composite graft.

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Estimation of Stature from Dimension of Hand in Medical Students

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Abstract

Background: Stature is an important consideration in determining the identity. For identifications of the human body or isolated extremities recovered from the mass disaster and fatal assaults, body height can be estimated from its recovered segments or dismembered parts.

Objective: The aim of the study was to develop a relationship between hand length (HL) and body height and to derive a regression equation from HL for stature estimation and to find out the correlation between them.

Materials and Methods: The study was conducted on 200 medical students of age group 18-23 years studying in MGM Medical College, Navi Mumbai, Maharashtra, India. Body height and HL were measured in centimeters by using standard anthropometric techniques and standard measuring devices.

Results: Prediction of stature was found to be most accurate by multiple regression analysis. Correlation coefficients between stature and hand dimensions were found to be positive and statistically highly significant.

Conclusions: The study will be helpful in estimating stature based on HL and may have significance in medico-legal and reconstructive surgeries.

Key words: Correlation, Equation, Hand length, Regression, Stature

INTRODUCTION

Human body parts are supposed to be proportionate to each other and so it is generally agreed that there is a relationship between various body parts and stature.¹ Adult height is most commonly reached during late-teens for males and mid-teens for females.² This dimensional relationship between body segments and the whole body has been the focus of anatomists, scientists, and anthropologists for many decades. Stature or body height prediction occupies an important position in anthropometric research and is one of the important and useful anthropometric parameter that helps in determining the identity of the person.^{3,4}

Nowadays as of natural or manmade disasters like war, acts of terrorism, bomb explosions and road traffic accidents, dismembered human remains, and peripheral parts of the human body are found and then identification of an individual through them is the mainstay in investigations.^{5,6} The identification of isolated extremities itself is a challenging task and requires meticulous analysis and dimensions of the hand and foot have been used for age, gender and stature estimation of an individual.^{7,8} There has been a few studies done in the past to find the correlation between stature and the dimensions of hand and this study was undertaken to study the anthropometric relationship between length of hand and body height in normal young adults and its sexual dimorphism.

MATERIALS AND METHODS

Subject for this study were 200 medical students (100 male and 100 female) of age group 18-23 years studying in MGM Medical College, Navi Mumbai, Maharashtra, India. Before the commencement of this study, ethical clearance

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was obtained from the Institute Ethical Review Committee of the institute. Informed consent of participants were taken and socio-demographic indices like age and sex were noted. Each student was studied for the measurements of stature and hand length (HL). The measurements were taken by using standard anthropometric instruments. The height of the individual was measured between the vertex and floor, with the person standing erect, in anatomical position and the head in the Frankfort plane, using a standing height measuring instrument. HL for the both sides were measured as distance from middle of the distal wrist crease to the distal end of the most projecting point of hand. Measurements were recorded in centimeters to the nearest millimeter using the standard anthropometrical instrument. Students having any disease, deformity, injury, fracture, amputation or record of any surgical procedures of either hand or foot were disqualified from the study. The measurements were taken at a fixed time to exclude diurnal variation and by only one observer in order to avoid inter-observer error. The data obtained were computed and analyzed using statistical package for social sciences and results were drawn. The linear and multiple regression models with the explanatory variables or regressors, HL were used as a statistical model to explain the relation or the variation in stature, the response or dependent variable.

RESULTS

Age, body weight, stature, and HL of 100 each of male and female students is shown in Table 1 and when compared, except of the age it was found to be statistically significant for the rest of the factors between them.

Table 2 shows the difference in the measurement of HL between the two sides of male and female students and it was found to be statistically significant.

Stature and both sides of hand measurements were looked for their correlation and statistically significant ($P < 0.001$) correlation was seen between female stature and right ($r = 0.575$) and left ($r = 0.533$) hand, while same was observed between stature and male right ($r = 0.383$) and left ($r = 0.367$) HL (Table 3).

For both sexes on the basis of correlation between the stature and both side hand measurements, linear and multiple regression equation were arrived upon to calculate it from if any of them is available (Table 4).

Table 5 shows the stature calculation on the basis of hand dimensions from both sides in both sexes and their comparison with the actual stature and though there were variations in minimum and maximum part of the dimensions, but when mean of the HLs were used for calculating the stature, it was nearly the same as of actual stature.

DISCUSSION

This cross-sectional descriptive study was conducted in year 2010-2011 in Department of Anatomy, MGM Medical College, Navi Mumbai as per the study design. Standard anthropometric instruments were used for the measurement of stature and HL of 200 young and healthy medical students (100 males and 100 females), in the 18-23 years age group.

Among female, the mean age (in years) was 18.77 with standard deviation (SD) of 0.908 among while in males, the mean age (in years) was 18.99 with SD of 0.785 and it was statistically insignificant. The mean body weight among male subjects was found to be 70.58 ± 13.79 kg and that among females was 55.27 ± 10.08 kg. The difference in

Table 1: Descriptive statistics for stature and measurements (in cm) of hand in male and female

Variable	Male (N=100)					Female (N=100)					t value (sex difference M vs. F)	P value significance
	Mean	SD	SEM	Min.	Max.	Mean	SD	SEM	Min.	Max.		
Age in year	18.99	0.785	0.0785	18	22	18.77	0.908	0.091	18	23	1.832	0.068 (NS)
Body weight in kg	70.58	13.797	1.38	46	108	55.27	10.084	1.008	35	81	8.955	<0.001
Stature	172.246	5.8727	0.5873	158.9	186.0	158.091	6.3102	0.6310	136.3	172.8	16.421	<0.001
RHL	19.040	1.1426	0.1143	16.4	21.5	17.178	0.9863	0.0936	14.3	19.9	12.336	<0.001
LHL	19.096	1.1020	0.1102	17.0	21.5	17.317	0.9849	0.0985	14.5	19.9	12.037	<0.001

SD: Standard deviation, SEM: Standard error of mean, Min.: Minimum, Max.: Maximum, RHL: Right hand length, LHL: Left hand length

Table 2: Bilateral differences in measurement (in cm) of hand in males and females

Variable	Males (N=100)	t-value	P value	Female (N=100)	t-value	P value
	Mean difference (right - left)±SD			Mean difference (right - left)±SD		
HL	-0.056±0.2564	-2.184	0.031*	-0.139±0.3028	-4.590	<0.001*

P value significant at <0.05, *Significant, HL: Hand length, SD: Standard deviation

body weight among male and female subjects were found to be statistically significant ($P < 0.001$). Similar findings were there in the study by Ozden *et al.* (2005)⁸ conducted in Turkey in this regard. The difference in stature between two genders were found to be statistically significant ($P < 0.001$) with the mean stature of male being 172.24 ± 5.87 cm and that among female was 158.09 ± 6.31 cm.

Mean HL on both sides was found to be larger in male than female. The mean right HL was found to be 19.04 ± 1.14 cm and 17.17 ± 0.98 cm in male and female, respectively and the mean left HL in male was 19.09 ± 1.10 and in females was 17.31 ± 0.98 cm. The difference in these measurements were found to be statistically significant between male and female ($P < 0.001$). The study conducted by Zeybek *et al.* (2008)⁹ also mentions that hand and foot length of male were higher in females and the finding was statistically significant, which is also in accordance to the result of our study. Our findings are also in accordance to the conclusions of the study conducted by Sanli *et al.* and Kanchan *et al.* that hand and foot dimensions were statistically correlated with each other among males and females.^{10,11} Hence our findings reveal a clear pattern of sexual dimorphism with female consistently having smaller stature, lesser body weight, and smaller HL compared to their male counterparts and this is in line with the findings

of the earlier studies done in this regard.¹²⁻¹⁷ Statistically significant ($P < 0.001$) correlation was obtained between stature and male right ($r = 0.383$) and left ($r = 0.367$) HL. Similar statistically significant correlation was seen between female stature and right ($r = 0.575$) and left ($r = 0.533$) hand. Our finding replicates the finding of the study conducted by Krishan and Sharma (2007)¹⁸ in the North Indian population (Rajputs), which found that bilateral hand and foot length in both male and females exhibit statistically significant correlation coefficient with stature.

Linear and multiple regression equation were evolved and it was found that applying these equations, minimum and maximum actual stature and the stature estimated from bilateral HL among male and female varied, but the mean value of actual stature of male (172.24) and stature estimated from bilateral HL (172.2) was almost similar. Similarly, the mean value of actual stature of female (158.09) and stature estimated from bilateral HL (158.1) was almost similar. This finding is in accordance to the study conducted by Krishan and Sharma (2007),¹⁸ which also found greater variation of estimated maximum and minimum stature with respect to the actual minimum and maximum stature, but the mean value estimates were close to each other.

CONCLUSION

Findings of this study reveal that stature can be predicted near precisely by linear and multiple regression analysis even when details are unknown from HL - A problem frequently seen in medico-legal investigations and mass disasters. Sexual dimorphism with female consistently having lesser body weight, smaller HL, and smaller stature

Table 3: Correlation between stature and anthropometric measurement

Variables	Value of r^* (Pearson correlation coefficient)		
	Males	Females	Both
RHL	0.383	0.575	0.733
LHL	0.367	0.533	0.714

Significant at 0.1% level, RHL: Right hand length, LHL: Left hand length

Table 4: Linear and multiple regression equation for estimation of stature (cm) from measurement of hand

Males		Females	
Linear regression equations	\pm SEE	Linear regression equations	\pm SEE
S=134.240+1.1996 (RHL)	0.478	S=94.857+3.681 (RHL)	0.529
S=134.926+1.954 (LHL)	0.501	S=98.945+3.415 (LHL)	0.548
Multiple regression equations		Multiple regression equations	
S=135.736+3.168 (RHL)-1.247 (LHL)	4.363	S=95.879+4.681 (RHL)-1.051 (LHL)	3.496

S: Stature, RHL: Right hand length, LHL: Left hand length; SEE: Standard error of estimate

Table 5: Comparison of actual stature and stature estimated (cm) from measurement of hand

Estimated stature using regression equations for	Estimated stature					
	Males			Female		
	Minimum	Maximum	Mean	Minimum	Maximum	Mean
RHL	167.00	177.20	172.20	147.50	168.10	158.10
LHL	168.10	176.90	172.20	148.50	166.90	158.10
Actual stature	158.90	186.00	172.24	136.30	172.80	158.09

RHL: Right hand length, LHL: Left hand length

compared to their male counterparts was also established. Anatomists, anthropologists, archeologists, and medico-legal investigators may find this relationship between stature and HL of practical use.

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Dexterity Testing as a Means to Evaluate Gender Wise Performance of Surgical Resident Doctors: A Cross Sectional Study

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Abstract

Background: Dextrous hand is one that is quick, able to achieve target positions, focus accurately on target, and is capable of making very small movements skilfully. Variety of tests are available to measure manual dexterity, one among which is O'Connor finger dexterity test. Clinically, this test can be used to determine the consistency with which different surgical tasks are undertaken by novice and experienced surgeons.

Aims: This study aims to evaluate if gender affects manual dexterity of fingers and hand-eye co-ordination.

Materials and Methods: It is a descriptive, cross-sectional study in which 120 resident doctors receiving their training in surgical departments of tertiary health centers of the city were taken. The age group 24-30 was included. Equipment used was O'Connor finger dexterity test, devised by Pune Surgicals, India. The data was entered in Microsoft-Excel and analyzed by Statistical Product and Service Solutions software. Descriptive statistics used were mean, standard deviation, and *P* value. Result was calculated by Kruskal–Wallis test, which was applied to find the significance of the change in scoring of resident doctors performing this test. This test was applied as the sample is categorical as per years of residency. A non-parametric test (Kruskal–Wallis test) is applied for categorical and qualitative data.

Results: In 3 years of residency, there was no significant difference in scores of O'Connor finger dexterity test between males and females. Thus, this study concluded that gender plays no significant role in assessing dexterity of resident doctors.

Conclusion: Besides knowing the fact that gender does not affect manual dexterity, it helped every resident doctor of each year of residency, himself know his grade of dexterity as compared to his peers and improvise on his surgical skills. Thus, it helped every resident doctor to assess their own personal skills as compared to all other resident doctors.

Key words: Dexterity test, Manual dexterity, Surgical skills

INTRODUCTION

Any surgical operation requires tremendous hand dexterity and invaluable hand-eye co-ordination. Precision of finger movements and concurrently the speed with which a surgical task is carried out is also significant. O'Connor

finger dexterity test acts as an invaluable screening test, which in advance determines all the above parameters. Clinically, this test can be used to determine the consistency with which different surgical tasks are undertaken by novice and experienced surgeons.¹ Earlier the test was used in a study for assessing dexterity of patients with functional splint for trapeziometacarpal osteoarthritis.² Functional capabilities of individuals (e.g., dexterity) with finger disabilities was assessed by this test.³

Surgical residents performing this test and scoring below average scores became candidates for intensive training sessions so that at the end of their residency, they become

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competent, efficient and more skillful surgeons. This finger dexterity test is not just the scope for assessing dexterity of surgeons but it can also be explored by physiotherapists, occupational therapists, and neuro physicians in their patients to know their recovery after giving their line of management. This test can also be used to assess if gender really affects dexterity.

Surgical programs often rely on objective measures of medical school cognitive performance, to predict the success of an applicant in their training program. Although job applicants in non-medical fields often undergo dexterity testing prior to being hired, this has not been widely used in the selection process for surgical residency applicants. Thus, successful identification of applicants likely to succeed in surgical fields remains elusive.⁴

MATERIALS AND METHODS

The present study “A study of dexterity testing as a means to evaluate gender wise performance of surgical resident doctors” was conducted at various tertiary health centers of Mumbai. The study was undertaken with the due clearance of the Institutional Ethical Committee. This study included a total of 120 surgical resident doctors consisting of 38 females and 82 males ranging in age between 24 years and 30 years who gave their consent for voluntary participation. After careful clinical examination, only those, who satisfied the inclusion criteria, were chosen for the study. Calculation of sample size was done according to the pilot study, according to which the confidence interval is 95%. Considering various surgical departments, there were 212 resident doctors including all 3 years of residency. Taking into consideration approximately 50% of this population, we considered 120 resident doctors.

Inclusion Criteria

- Subjects in the age group 24-30 years
- Subjects with normal acuity of vision as tested by Snellen and Jaeger's test type
- Subjects having no neuromuscular disorder
- Subjects with corrected acuity of vision, i.e., those wearing spectacles.

Exclusion Criteria

- Subjects age below 24 years and above 30 years
- Subjects having neuromuscular disorder
- Subjects having personal history of smoking and other habits like eating gutka.

The equipment used was O'Connor finger dexterity test apparatus for determining manual dexterity. Proper written

informed consent of the volunteers was obtained before the procedure. The residents were approached in their respective departments. When they were not available there, they were approached personally wherever they were, during their duty hours, and the test was performed then and there only as per their availability. History taking, general examination, and systemic examination were carried out. Resident doctor was made to sit comfortably at a table 30 inches in height. The pin board was placed before him about a foot from the edge of the table, with the tray at the right if the right hand was to be used, and at the left if the left hand was preferred. Suggest that he draw the chair close to the table in order that he may rest his arms on its surface. The tray contained 300 pins. The board was at an angle of about 90° to the subject's working hand, but the subject was made to change this position if he desired. The equipment for the finger dexterity test consists of a board with 100 holes arranged in 10 rows of 10 holes. Above the holes is a shallow well holding 300 metal pins. Each pin is 1 inch long and each of the 100 holes in the board will accommodate three of the pins. The test requires that three pins be picked simultaneously, from the pile of pins with the fingers of one hand and placed into each of the 100 holes, starting from the farthest corner, filling every row one after the other in “Z pattern” moving toward yourself. The time required, in minutes, to fill the 100 holes is the basis for the score. The fewer minutes required, filling the 100 holes, the higher is the score, in turn indicating that the efficiency of a resident doctor in handling surgical instruments is better. Resident doctors of each year of residency were compared among themselves. Every resident doctor was informed about his score and rank as compared to others at the end of the study. Respective HOD's were not informed about the final outcome.

The outcome measures for all resident doctors receiving training in micro and macro surgeries were assessed for their manual dexterity. Evaluation of whether gender affects manual dexterity was carried out. Furthermore, resident doctors scoring below average were recommended more intensive training compared to those scoring average and excellent.

Statistical Analysis

The data entry was done in Microsoft-Excel and the analysis was done by Statistical Product and Service Solutions software. The descriptive statistics that were used were mean, standard deviation (SD) and the *P* value. The result was calculated using Kruskal-Wallis test. This test was applied to find out the significance of change in the scoring of resident doctors performing O'Connor finger dexterity test. This test was applied as the sample is categorical (three categories of residents) as per years of residency.

A non-parametric test (Kruskal–Wallis test) is applied for categorical and qualitative data.

OBSERVATION AND RESULTS

The study was carried out on 120 surgical resident doctors of various tertiary health care centers in the city.

The parameter measured was the scoring of these doctors on a dexterity instrument called O'Connor finger dexterity test instrument (scoring in minutes). Mean and SD of each group was calculated for this study.

The Table 1 shows the total number of resident doctors taken from each 3 years of residency. The resident doctors were taken from various tertiary health centers of Mumbai.

The pie Chart 1 shows the distribution of resident doctors. 45, 33 and 42 were the number of resident doctors taken from 1st, 2nd, and 3rd year of residency.

The surgical departments from which the survey was done were orthopedics, gynecology, and surgery. Resident doctors of each year were considered and asked to perform O'Connor finger dexterity test and the score of each resident doctor was noted (Table 2).

Orthopedic department had 15 junior residents 1st year (JR1), 22 junior residents 2nd year (JR2), and 8 junior residents 3rd year (JR3) (total: 45 resident doctors). Similarly,

Table 1: The number of resident doctors in each year of residency

Year of residency	Total number of residents
1 st year residents	45
2 nd year residents	33
3 rd year residents	42

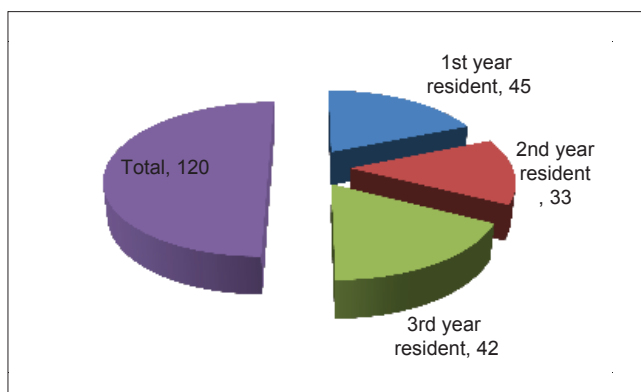


Chart 1: Distribution of surgical residents according to years of residency

gynecology had 20 JR1, 1 JR2, 17 JR3 (total: 38 resident doctors) and surgery department had 10 JR1, 10 JR2, and 17 JR3 (total: 37 resident doctors) (Chart 2).

Totally, 25 males and 20 females were taken from the 1st year of residency. Comparing a commonly combined graph of males and females, it was observed that the scores of either gender did not differ significantly. The resident doctors fitted in the average score of O'Connor finger dexterity test (i.e., 10-14 min) (Chart 3).

Totally, 30 males and 3 females were taken from 2nd year of residency. Comparing a commonly combined graph of males and females, it was observed that the scores of either gender did not differ significantly. The resident doctors fitted in the average score of O'Connor finger dexterity test (i.e., 10-14 min) (Chart 4).

Table 2: Specialty wise distribution of resident surgeons

Specialty	JR1	JR2	JR3	Total
Orthopedics	15	22	8	45
Gynecology	20	1	17	38
Surgery	10	10	17	37

JR: Junior residents

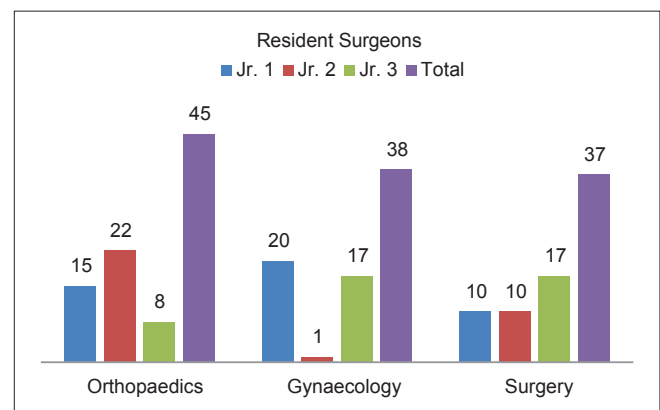


Chart 2: Resident surgeons according to academic year and departments

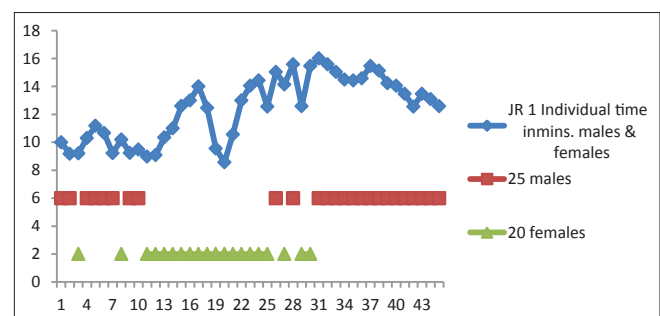


Chart 3: Gender wise distribution of O'Connor finger dexterity score in minutes (1st year junior residents)

Totally, 27 males and 15 females were taken from 3rd year of residency. Comparing a common combined graph of males and females, it was observed that the scores of either gender did not differ significantly, but the resident doctors had excellent score on O'Connor finger dexterity test (<10 min). Thus, besides knowing the fact that gender does not affect dexterity, this study also helped in assessing the resident doctors if their years of residency really improved their digital dexterity (Chart 5).

In all the years of residency, there was no significant difference in the score of O'Connor finger dexterity test (in minutes) between males and females. Thus, this study concluded that gender plays no significant role in assessing dexterity of surgical resident doctors.

DISCUSSION

In this study, O'Connor finger dexterity test was used, which determined if gender affects manual dexterity. Any surgical operation requires tremendous hand dexterity and

invaluable hand-eye co-ordination. Precision of finger movements and concurrently the speed with which a surgical task is carried out is also significant. O'Connor finger dexterity test acted as an invaluable screening test, which in advance determined all the above parameters too.

Gender did not have a significant effect on the scoring scale of O'Connor finger dexterity test. Males and females were equally competent in the scores of manual dexterity assessed by O'Connor finger dexterity test.

Several parameters affect digital dexterity⁵ like the cold. There was a decrement in performance assessed by O'Connor finger dexterity test, under cold temperature conditions.

Digital dexterity performance improves with age.⁶ With this test, it was concluded that digital dexterity is not affected by gender but the performance improved with each succeeding year of residency.

The O'Connor tweezer dexterity test was found to be very successful at screening out those individuals, who do not have the necessary fine dexterity to perform the work of hair graft placement.⁷

Gloves decrease dexterity and hand sensitivity. The use of even thin gloves causes a decrease in dexterity⁸ and sensitivity and increases the time required to perform manual tasks.

The test was used to assess dexterity of individuals with bare hands and those wearing chemical gloves. Thickness of gloves⁹ affects dexterity too.

Clinical condition like diabetes affects motor skills (e.g., dexterity), which was assessed by this test in one study.¹⁰

To predict hand function after an occupational hand injury,¹¹ one study included Purdue pegboard test which worked on the same principle as O'Connor finger dexterity test.

In the study of Forrester and Hilary¹² on thinking drink, as the brain was dehydrated, the fine motor activity was severely affected which was tested by O'Connor finger dexterity test.

Kimmerle *et al.*¹³ evaluate "eye-hand coordination," and "dexterity." By standardized tests such as the O'Connor dexterity tests.

The research¹⁴ effort examined the effect of the Level A suit on fine motor and gross motor dexterity. Tasks

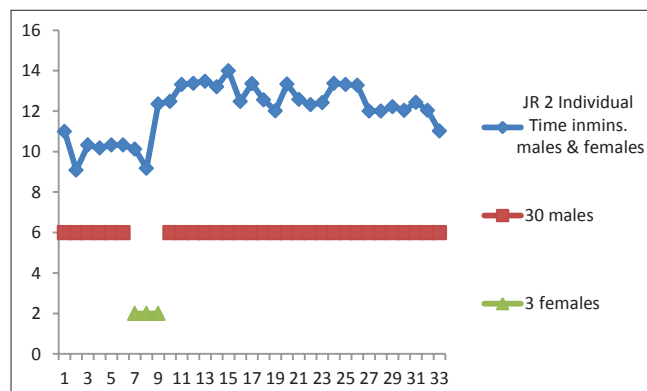


Chart 4: Gender wise distribution of O'Connor finger dexterity score in minutes (2nd year junior residents)

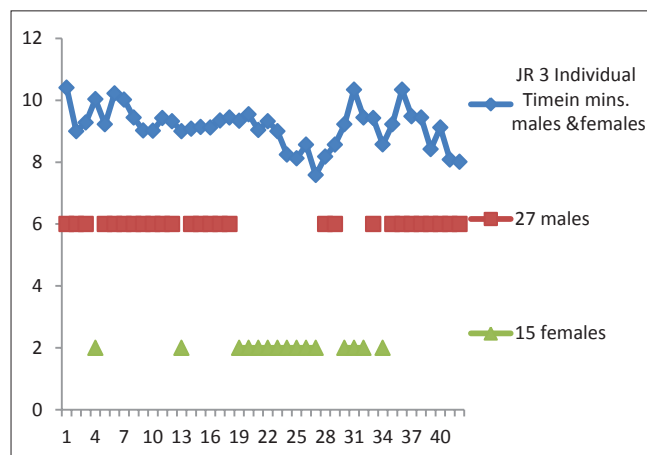


Chart 5: Gender wise distribution of O'Connor finger dexterity score in minutes (3rd year junior residents)

comprised the Minnesota dexterity test 9 (same principle as O'Connor finger dexterity test). There was a significant detrimental effect from wearing the suit for both measures of performance.

Kruskal–Wallis test is a non-parametric test, applied to qualitative data. The distribution of the population was not normal, as the resident doctors were taken from each year of residency, so this test was used.

CONCLUSION

Though this study concluded that gender does not affect manual dexterity, the main aim of this study was “to let the resident doctor of each year of residency, himself know his grade of dexterity as compared to his peers and improvise on his surgical skills.” Thus, it helped every resident doctor to assess his/her own personal skills as compared to all the other resident doctors. All surgical resident doctors receiving training in micro and macro surgeries were assessed for their manual dexterity. Resident doctors scoring below average were recommended more intensive training compared to those scoring average and excellent.

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Pattern of Skin Diseases in Rural India: A Hospital-Based Study

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Abstract

Background: Pattern of skin diseases varies from one country to another and even in different parts within the same country. This is more so common in a country like India that experiences a wide variation in its customs and religions, racial constitution, geographic factors, social and hygienic standards, occupations, and socio-economic conditions.

Aim: The objective of our study was to know the clinical pattern of skin diseases in rural sector of India.

Materials and Methods: All newly diagnosed cases attending outpatient department of Skin and VD, SGT Medical College, Gurgaon during 1 year period between 1st February 2014 to 31st January 2015 were included in the study. Diagnosis was made on clinical basis and lab investigations were restricted to the cases where it carried diagnostic importance.

Results: A study was conducted on 7252 study who attended the Skin and VD outpatient department of SGT Medical College during the period of 1 year. Females were found to be most commonly affected (M:F = 46.6:53.4). Age group between 30 and 44 years carried maximum incidence (29.19%). All disorders were broadly classified into infective (38.19%), non-infective (47.98%) and miscellaneous dermatoses (13.83%). Eczema (17.9%) and fungal infections (17%) came out to be the top two most common disorders.

Conclusion: Our study found a higher incidence of non-infective dermatoses than infective dermatoses. Eczema and fungal infections formed the largest group in their respective categories.

Key words: Dermatitis, Eczema, Incidence, Skin diseases

INTRODUCTION

Skin diseases affect all ages from neonate to the elderly. It causes harm in a number of ways and can have a profound effect on both the individual and the community. It can lead to significant morbidity due to disfigurement, disability or symptoms such as intractable itch, and though rare even death from metastatic skin cancer, TEN, pemphigus.

Pattern of skin diseases vary from country to country. Even in the same country it differs from region to region.

Types of skin diseases are influenced by various factors like genetic, race, religion, occupation, nutrition, habits etc. Geographical factors such as season and climate also contribute to the increased prevalence of certain type of skin disorder in a particular area. The direct effect includes sunshine, heat, cold, humidity - all contributing to what has been described as meteorobiology of the skin. India is such a country where wide variation in climate, socio-economic status, religion, and customs is quite prevalent in different parts of the country. In developing countries, other than hot and humid climatic condition, low hygiene, poor access to water, overcrowding, high interpersonal contact also play significant etiological role for certain skin diseases like pyoderma, scabies, fungal infection.¹⁻⁴

Aims

The present study was conducted with an idea to know the clinical pattern of skin diseases in rural sector of India.

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MATERIALS AND METHODS

The present study was undertaken in the department of Skin and VD, SGT Medical College, Budhera, Gurgaon, India.

Study Population

The study group comprises 7252 he studs attending the Skin and VD outpatient department, SGT Medical College and Hospital, Budhera during the period of February 2014 to January 2015 and the cases referred from the department of medicine, surgery, Gynecology, pediatrics, orthopedics, and oncology. The skin diseases were grouped into infective and non-infective dermatoses.

Selection was on the basis of following criteria:

1. Inclusion criteria: All newly diagnosed cases presenting with skin diseases, all ages and both sexes, with parent/guardian giving verbal consent for the study.
2. Exclusion criteria: Patients treated outside this referral hospital and old cases were not included. Cases with doubtful diagnosis were also excluded from the study.

All the cases were subjected to thorough history taking including name, age, sex, address, religion, economic status of family along with chief complaints, total duration of disease, related past, family and treatment history, complete general physical, local and systemic (where necessary) examination.

Routine investigations were carried out in all the cases, while special investigations like Tzanck smear (cytology), bacterial smear and culture, histopathological examination, and immunofluorescence study were restricted to only few cases where they carried diagnostic importance.

RESULTS

A total of 7252 (only new patients) patients were included in the study conducted over a period of 1 year, of which 3873 (53.4%) were females and 3379 (46.6%) were males. All disorders were broadly classified into infective (38.19%), non-infective (47.98%), and miscellaneous dermatoses (13.83%). Disease-related incidence has been given in (Table 1a and b). Most common dermatoses was found to be eczema (17.9%), followed by fungal infections (17%), acne (8%), and pyoderma (7.7%). Among the non-infective dermatoses, eczema (17.9%), acne (8%) and urticaria (5.5%) constituted top 3 most common dermatoses, whereas fungal infections (17%), pyoderma (7.7%), and scabies (5.7%) constituted most common infective dermatoses.

Maximum number of patients reported in the age group of 30-44 years (29.19%) followed by 15-29 (28.29%) years. Females outnumbered males in all age groups except those under 14 years of age and those between 30 and 44 years where males were predominantly involved (Table 2).

Table 1a: Incidence of non-infective dermatoses

Disease	Number of patients	Percentage
Acne	580	8
Ecema	1298	17.9
Urticaria	399	5.5
Photodermatitis	232	3.2
Melasma	225	3.1
Psoriasis	116	1.6
Vitiligo	65	0.9
Pityriasis alba	44	0.6
Alopecia	72	1
Skin tags and benign appendegial lesions	50	0.7
Insect bite	232	3.2
Drug reactions	87	1.2
Vesiculobullous diseases	6	0.08
Collagen vascular diseases	22	0.3
Lichen planus	51	0.7
Total	3479	47.98

Table 1b: Incidence of infective dermatoses

Disease	Number of patients	Percentage
Fungal infections	1233	17
a. Dermatophytes	863	11.9
b. Pityriasis versicolor	312	4.3
c. Candidiasis	58	0.8
Scabies	413	5.7
Pyoderma	559	7.7
Impetigo	94	1.3
Viral infections	203	2.8
a. Varicella	7	0.1
b. Herpes simplex	29	0.4
c. Herpes zoster	87	1.2
d. Molluscum	22	0.3
e. Warts	58	0.8
Cutaneous tuberculosis	3	0.04
Hansens disease	4	0.05
STD's	261	3.6
Total	2770	38.19
Miscellaneous (including both infective and non-infective dermatoses)	1003	13.83
Total	3773	52.02

STD: Sexually transmitted diseases

Table 2: Incidence in different age groups

Age group	Number of males (%)	Number of females (%)	Total number of patients (%)
<~14	633 (50.64)	617 (49.36)	1250 (17.24)
15-29	894 (43.57)	1158 (56.43)	2052 (28.29)
30-44	1105 (52.2)	1012 (47.8)	2117 (29.19)
45-59	534 (41.85)	742 (58.15)	1276 (17.6)
60-74	187 (37.17)	316 (62.82)	503 (6.94)
>~75	26 (48.15)	28 (51.85)	54 (0.74)
Total	3379 (46.6)	3873 (53.4)	7252 (100)

Eczema was the most common disorder found in both males and females, whereas acne and pyoderma were predominantly reported in females. Fungal infections were more commonly found in males while urticaria and scabies was almost equally common in both sexes.

DISCUSSION

Females outnumbered males in our study (M/F = 46.6/53.4). Although most studies have reported female preponderance,^{5,6} others have reported male preponderance.⁷

Age group of 11-30 years was reported to have maximum incidence in a study from Allahabad,⁸ while other studies reported maximum incidence in age groups of 20-30 and 30-40 years.^{6,9} We found maximum incidence of skin diseases in the age group of 30-44 years (29.19%) followed by 15-29 (28.29%) years. This is very much similar to study by Symvoulakis *et al.*¹⁰

The majority of the male patients were in the age group of <14 (50.64%) and the majority of female patients were in the age group of 15-29 years (56.43%). Other study on pattern of skin diseases conducted in rural India also reported similar figures.⁶

Most of earlier studies have reported higher incidence of non-infective dermatoses,^{1,4,11,12} as in our study, but few have also reported infective dermatoses to carry higher incidence than non-infective dermatoses.^{5,7}

In this study, eczema emerged as the single largest group of disorders, closely followed by fungal infections. Similar finding has been reported by other authors,^{4,5,7,10,11} while few have found fungal infections to be the most common dermatoses.^{1,4,5,7,8,13} This can be attributed to the climatic differences between different geographical areas. Similarly in our study, maximum cases of fungal infections were reported during rainy season between the months of June to September, heat and humidity being the important factors contributing to their higher incidence. Commonest fungal infection was found to be dermatophytosis, followed by pityriasis versicolor and candidiasis, which is again similar to study conducted in Imphal.⁴

Acne, though was one among top 5 dermatoses to be reported carried an individual low incidence of 8%, which can be attributed to the fact that most acne patients are attracted to private clinics. This can be supported by studies carried in private set ups which have reported acne to be the most common dermatoses encountered.⁹

Relatively higher incidence of insect bite cases was noted as compared to other studies, which can be attributed to the proximity of this college to agricultural land and lack of use of various physical barriers like mosquito net and pest control measures by the people. This factor has been supported by various earlier studies.^{14,15}

Hansen's disease and cutaneous tuberculosis carried a low incidence, similar to most other studies conducted in different parts of the country.^{4,12} This can be attributed to the fact that these patients mainly attend either government hospitals or leprosy centers and DOT centers where MDT and ATT are distributed free of cost.

Low incidence of STD's can be attributed to the social stigma attached to these problems which force the patients either to hide their problem or to step into private clinics.⁴

CONCLUSION

Our study found a higher incidence of non-infective dermatoses than infective dermatoses. Eczema and fungal infections formed the largest group in their respective categories.

Since females and young adults were found to be mostly affected, nature of occupation, living conditions, lack of awareness all contribute to an increasing burden of skin diseases in society. Role of public awareness regarding personal and community hygiene and timely reporting of skin disease is of great importance for reducing skin diseases burden and improved quality-of-life.

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Gender Comparison of Heart Rate Variability Response to Exercise in Male and Female Medical Students

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Abstract

Introduction: The various physiological parameters like heart rate, respiratory rate, peripheral blood flow, systolic blood pressure (SBP), diastolic blood pressure (DBP), etc., are controlled by autonomous nervous system. The balance between two branches i.e., sympathetic and parasympathetic is a significant in maintaining normal functions of the body.

Purpose of the Study: The gender difference exists between various physiological parameters and response to various stresses. This study was aimed to study the heart rate variability response to exercise and to compare the finding between in male and female medical students.

Materials and Methods: This study was done in clinical laboratory of Physiology Department. The pulse rate, arterial BP, and heart rate variability (HRV) were measured. Harvard step test was used as exercise method. All the data were recorded at base line after 10 min of rest and immediately after the step test. The results were statistically analyzed by applying unpaired *t*-test.

Results: Our result shows that at rest, the pulse rate, SBP, and DBP were significantly higher in males than in females. After exercise, the pulse rate and SBP were increased and the DBP decreased. The males had higher values than females. Among the HRV parameters, at rest the males had higher values of the mean R-R interval, very low frequency (VLF), LF and the lower values of Total power and high frequency (HF) compared to females. After exercise the Total power, mean R-R interval decreased and males had lower values compared to females. The VLF was significantly higher in males and HF was significantly higher in females at rest and after exercise.

Conclusion: Our results suggest that males have higher sympathetic drive and females have predominant parasympathetic drive.

Key words: Autonomous nervous system, Blood pressure, Exercise, Men, Pulse rate, Women

INTRODUCTION

Variation in the values of physiological parameter is considered as sign of good health. The variation in physiological parameters like heart rate, respiratory rate, peripheral blood flow, systolic blood pressure (SBP), diastolic blood pressure (DBP), etc., is result of control of function by autonomous nervous system.

Autonomous nervous system has two divisions - sympathetic and parasympathetic. Sympathetic stimulation prepares the body to deal with excitement and with stressful conditions. Parasympathetic stimulation has a tendency to slow down the body process except digestion and absorption of food. Its effect is similar to that of peace maker allowing restoration processes to occur quietly and peacefully.

The mean heart rate of healthy person is around 72 beats/min but it is never constant. It keeps on changing continuously. Fluctuation in the heart rate occurs spontaneously and reflects primarily changing levels of activity of autonomic nerves to the heart. Balance between sympathetic and parasympathetic tone is a significant part of cardiovascular regulatory mechanism. Changes in autonomic balance may be a natural developmental processes or a sign of onset of some diseases.¹

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Beat- to- beat fluctuations of R-R interval is known as heart rate variability (HRV). Measurement of HRV has become a widely used tool for assessing the autonomic input to the heart under various physiological and pathological conditions. The spectral analysis of HRV is useful technique for quantifying over all HRV as well as specific components of HRV.^{2,3} In frequency domain, the power spectrum of HRV has categorized into three components- high frequency (HF > 0.15 Hz), low frequency (LF 0.04 - 0.15 Hz), very low frequency (VLF 0.00 - 0.04 Hz). HF component of HRV is mediated almost entirely by the vagus and directly associated with respiratory activity. LF is mediated by both vagus and sympathetic nerves and also other regulatory loops and VLF is associated with thermoregulation and renin-angiotensin system.

HRV is also used to study many pathological conditions. HRV is strong predictor of arrhythmic mortality following acute myocardial infarction.^{2,4,5} Decreased HRV is associated with coronary atherosclerosis,⁶ coronary artery disease,⁵ and congestive cardiac failure.⁷ HRV is also a useful tool in detection of early diabetic autonomic neuropathy.^{2,7}

Various risk factors of cardiovascular diseases like aging, smoking, lack of routine exercise, and insufficient coronary blood flow are associated with either lower values of HF component, higher values of LF component, or increased ratio of low to high power compared with values from their respective control groups.^{6,8-13}

Various studies on animals and human subjects show that the significant differences exist between males and females in basal function of autonomic nervous system. There are clear gender differences in the autonomic response to stressors which vary according to the nature of the stress.¹⁴

Various studies of gender differences in autonomic regulation indicate that women demonstrate significantly greater values of HF spectral power of R-R Interval than do age-control men.^{9,12-15} Higher parasympathetic input to cardiac regulation is not only greater in women but also protective during periods of cardiac stress.¹⁶

Exercise is one of the most powerful stimulators of sympathetic activity. Various exercise tests are used in studies of cardiovascular functions. Harvard step test is one of these methods. Hence we used Harvard step test as exercise modality to study the HRV response to exercise and study the gender difference.

MATERIALS AND METHODS

Site of the Study

The study was done in clinical laboratory of Department of Physiology.

Subjects

This study was done in 54 healthy young, medical students in the age group of 17-25 years. Of 54, 27 were male students and 27 were female students.

A brief history and general physical examination of all the students were done with main emphasis on respiratory diseases and cardiovascular diseases and any medication. All subjects were explained about the procedure and their informed consent was taken. This study was approved by Institutional Ethical Committee.

Study Protocol

All the tests were carried out between 1 and 4 pm. The height and weight of the subject was measured with a scale fixed on the wall and weighing machine.

The subject was asked to lie-down on the couch in supine position and asked to relax and close his eyes. The probe of pulse oxymeter was clipped to the subjects left index finger, care was taken that subject did not move his hand. The probe was connected to the annuphotoreograph which was in turn connected to personal computer with application software (Variability Analyzer 2008, BARC). The base line HRV data was recorded.

The baseline pulse was measured with three finger palpatory method. The cuff of sphygmomanometer was tied around right arm of the subject and BP was measured by auscultatory method.

After the record, the subject was asked to get up and do the Harvard step test. Male subject steps up and down 20 inch bench 30 times/min for 5 min or till exhausted. Female subject steps up and down 18 inch bench 30 times/min for 4 min or till exhausted. The stepping rate was fixed with the help of a metronome. At the end of the task, the subject was asked to lie down on the couch.

Post exercise pulse rate, BP, HRV raw data were recorded immediately after exercise. The recorded HRV raw data were analyzed to get HRV graph and fast fourier transform power spectrum. For computing HRV indices, the recommendation of task force was followed.² VLF, LF, HF spectral powers were determined by integrating power spectrum between 0.00 and 0.04 Hz, 0.04-0.15 Hz, and 0.04-0.5 Hz, respectively and expressed in normalized

units. Total power was calculated between 0.00 and 0.5 Hz and expressed in absolute unit of millisecond squared.

Statistical Analysis

The collected data were statistically analyzed. The unpaired *t*-test was used to compare the pair of parameters pulse rate, BP and heart rate variability components in males and females before exercise and after exercise. The $P < 0.05$ was taken as significant.

RESULTS

The data were expressed as mean \pm standard deviation. The physical characteristics of the subjects' are shown in Table 1.

At rest, the pulse rate, the SBP and DBP were significantly higher in males than in females (Table 2). Among the HRV parameters, the males had higher values of the mean R-R interval, VLF, LF, and the lower values of Total power and HF compared to females. The VLF was significantly high in males and HF was significantly high in females (Table 3).

Table 1: Physical characters of subjects of both sexes

Variable	Mean \pm SD (n=27)	
	Male	Female
Age (years)	18.7 \pm 1.23	18.3 \pm 0.68
Height (feet)	5.68 \pm 0.27	5.11 \pm 0.39
Weight (kg)	63.79 \pm 9.17	50.75 \pm 7.16

SD: Standard deviation

Table 2: Pulse rate, SBP, DBP in male and female subjects before exercise

Variable	Mean \pm SD		<i>t</i> value	<i>P</i> value
	Male (n=27)	Female (n=27)		
Pulse rate (beats/min)	76.1481 \pm 8.5382	72.4444 \pm 7.2182	1.645	0.112
SBP (mmHg)	121.4074 \pm 13.1712	109.1852 \pm 10.3219	3.483*	0.002*
DBP (mmHg)	76.1481 \pm 7.5636	70.6667 \pm 7.3170	2.712*	0.012*

SBP: Systolic blood pressure, DBP: Diastolic blood pressure, SD: Standard deviation, * $P < 0.05$: Statistically significant

Table 3: HRV frequency components in male and female subjects before exercise

Variable	Mean \pm SD		<i>t</i> value	<i>P</i> value
	Male (n=27)	Female (n=27)		
Mean R-R interval (ms)	0.7722 \pm 9.967E02	0.7689 \pm 9.283E-02	0.123	0.903
TP (ms ²)	1751.4444 \pm 1558.0731	2021.6815 \pm 1689.7118	-0.595	0.557
VLF (nu units)	19.3542 \pm 11.9480	12.3797 \pm 6.9892	3.428*	0.002*
LF (nu units)	21.6146 \pm 10.0487	18.9555 \pm 10.2276	0.920	0.366
HF (nu units)	15.6212 \pm 28.6006	39.2280 \pm 13.1299	-2.884*	0.008*

* $P < 0.05$: Statistically Significant, TP: Total power, VLF: Very low frequency, LF: Low frequency, HF: High frequency, SD: Standard deviation, HRV: Heart rate variability

After exercise, there was increase in pulse rate and SBP and males had higher values than females. The DBP decreased after exercise and males had higher values than females (Table 4). Among the HRV parameters, after exercise the Total power, mean R-R interval decreased and males had lower values compared to females. The VLF was significantly higher in males and HF was significantly higher in females (Table 5).

DISCUSSION

The study was conducted in clinical laboratory of Department of Physiology. 54 medical students participated in the study. Of 54, 27 were male students and 27 were female students. All of them were normotensive and free from any cardiovascular disorders, respiratory disorders, and not on any medication.

The pulse rate, arterial BP, HRV was measured before exercise and after exercise. Harvard step test was used as exercise method.

Pulse Rate and Arterial BP Response

In our study, the resting recording showed that mean pulse rate was higher in males. The mean SBP and mean DBP were higher in male (Table 2).

The pulse rate and SBP were significantly increased after exercise in males as well as in females. The DBP was significantly decreased after exercise in both the groups (Table 4).

The results were similar to the study by Davis *et al.*¹⁷ Their results showed that heart rate increased similarly in males and females after exercise. SBP increased significantly greater amount in men than in women. But contrast to our results, they got increase in DBP similarly in both groups. The study by Arai *et al.*¹⁸ showed increase in SBP but no difference between males and females.

There are many differences in several aspects of hemodynamic regulation between men and women. Among these are, low cardiac responses to baroreceptor activation,

low plasmatic renin activity, increased vascular 1-adrenergic response and lower levels of circulating catecholamines in women compared to men.^{1,19-20} Several other studies showed that gender differences in arterial pressure regulation might be related to sexual hormones,²¹⁻²⁴ the estrogens have a cardio protective effect in premenopausal women²⁴⁻²⁷ because after menopause the increase in the arterial BP may be associated with a higher incidence of cardiovascular diseases.^{24,28,29}

The male hormone testosterone also plays a role in arterial BP regulation. Many studies indicate that testosterone increases the mean arterial pressure by activating the angiotensin - renin system.²¹⁻²³

HRV Response

Our results of HRV analysis showed that at resting level, the mean R-R interval and the LF component of power spectrum were higher in males but not significant. The resting HRV was higher in females but not significant. The VLF component of HRV power spectrum was significantly high in males. The HF component of power spectrum was significantly high in females (Table 3).

After exercise, the HRV and its frequency components in all frequencies were decreased significantly in both groups. After exercise, the VLF component of the power spectrum was significantly high in males and HF component of power spectrum was significantly high in females (Table 5).

Our results were similar to the study done by Arai *et al.*¹⁸ and also Yamamoto.²⁹ Their study results showed that there was marked reduction in HRV spectral power at all frequencies

as exercise progressed. But they did not find any significant difference between males and females groups.

The sympathetic and parasympathetic nervous systems are primary mediators of heart rate modulation during exercise.

The studies of HRV, with combination of various pharmacological and physiological manipulations showed that HF component of HRV power spectrum was associated with cardiac parasympathetic activity, LF component of power spectrum might be associated with both cardiac sympathetic and parasympathetic activity also with resistant vessel reactivity,^{17,29,30} VLF component of power spectrum might be associated with thermoregulation and rennin-angiotensin- aldosterone system.^{29,31-33}

Sexual dimorphism exists in neuroendocrine, metabolic and cardiovascular counter regulatory responses to exercise.¹⁷ Several studies have reported sex difference in cardiovascular function at rest and in exercise. The study by Dutra *et al.*, shown that women were presented with the lowest values of LF oscillations and highest values of HF oscillations compared to their male counterparts, regardless of the level of aerobic capacity.³⁴

In our study, we also observed higher HRV and significantly higher HF component of power spectrum in females during rest (Table 3) as well as after exercise (Table 5).

The literature study shows that middle-aged women have the greatest variations in the spectral indices of HRV compared to men of the same age group indicating an increased vagal cardiac modulation, which was evidenced by higher HF values and lower LF values.^{1,35-37} The study by Davis and colleagues also demonstrated that plasma epinephrine and norepinephrine responses were significantly increased in men relative to women during exercise despite of identical relative exercise intensities.¹⁷ The female hormones, especially β -estradiol³⁸ facilitate vagal cardiac function activation.³⁹ The cardiac myocytes contain functional estrogen receptors. Although estrogen slowdown the development of heart failure, it may also play a cardio protective role during acute bouts of exercise.⁴⁰

Table 4: Pulse rate, SBP, DBP in male and female subjects after exercise

Variable	Mean \pm SD		t value	P value
	Male	Female		
Pulse rate (beats/min)	138.5926 \pm 10.4780	123.2593 \pm 9.1172	4.943*	0.000*
SBP (mmHg)	163.1852 \pm 21.5568	142.9630 \pm 11.3323	4.325*	0.000*
DBP (mmHg)	63.7778 \pm 6.0085	62.5926 \pm 6.5590	0.735	0.469*

*P<0.05: Statistically significant, SBP: Systolic blood pressure, DBP: Diastolic blood pressure, SD: Standard deviation

Table 5: HRV frequency components in male and female subjects after exercise

Variable	Mean \pm SD		t value	P value
	Male	Female		
Mean R-R interval (ms)	0.5130 \pm 4.689E-02	0.5356 \pm 5.094E-02	-1.478	0.151
TP (ms ²)	312.6481 \pm 184.2929	601.2111 \pm 580.3850	-2.371*	0.025*
VLF (nu units)	11.1797 \pm 8.2532	6.8504 \pm 4.7616	2.489*	0.020*
LF (nu units)	5.0929 \pm 5.9679	7.3387 \pm 8.1513	-1.281	0.212
HF (nu units)	4.8015 \pm 4.8138	12.1585 \pm 13.9631	-2.463*	0.021*

*P<0.05: Statistically significant, TP: Total power, VLF: Very low frequency, LF: Low frequency, HF: High frequency, HRV: Heart rate variability, SD: Standard deviation

It was also showed that increased sympathetic nervous system drive in men during static exercise using direct recording of muscle sympathetic nerve activity.⁴¹ The higher sympathetic autonomic modulation in men may be due to their physical constitution, comprised of a greater muscle sympathetic nerve activity.⁴² as well as a higher number of sympathetic ganglionic neurons compared to females, which may cause of higher sympathetic balance.^{36,37,42}

Our observation of pulse rate, arterial BP and HRV, before and after exercise suggests that autonomic modulation of heart rate during exercise is associated with withdrawal of parasympathetic activity in both the sex and increased sympathetic drive in males at rest and predominant parasympathetic drive in females at rest and after exercise.

CONCLUSION

The study was done in 54 medical students compromising 27 males and 27 females. Harvard step test was used as exercise modality.

The pulse rate, SBP, DBP, and heart rate variability were recorded before and after Harvard step test.

At rest, the pulse rate, the SBP, and the DBP were higher in male. The basal HRV was higher in females than males. The VLF component of HRV power spectrum was significantly high in males. The HF component of power spectrum was significantly high in females.

After exercise, pulse rate and SBP were significantly increased in both the groups. There was significantly higher pulse rate and SBP in males. The DBP was significantly decreased, after exercise in both the groups.

The heart rate variability was significantly decreased after exercise in both groups. Its frequency components VLF, LF, HF also decreased significantly after exercise in both groups. There was significantly higher VLF in males and significantly higher HF in females after exercise.

Our results suggest that males have higher sympathetic drive at rest and females have predominant parasympathetic drive at rest and after exercise.

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Knowledge, Attitude, and Practice Regarding Oral Health among Primary School Teachers of Bhopal City Central India

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Abstract

Introduction: Restricted-activity days and missing school due to poor oral health is found more in school children who have poor oral health than those who do not. Annually, more than 50 million hours are lost worldwide from schools due to oral diseases. The important and significant period of a child's life is school life and it is here that their lifetime beliefs and habits develop. School teachers can play a very important role in imparting knowledge about the causes and prevention of common oral diseases to school children.

Methodology: Five geographical zones were distinguished on Bhopal city map, and six schools were randomly selected from each zone. In total 30 schools were chosen. A self-administered close-ended questionnaire consisting of 10 items was framed in English. Questionnaires were prepared both in English and the local language, Hindi.

Results: 232 teachers were from government schools and 160 teachers were from the private schools. 266 teachers had good knowledge and good practice toward oral health, the results were statistically significant ($P = 0.000$). Of 392 school teachers, teachers who had 0-5 years of teaching experience showed good practices regarding oral health, the results were statistically significant ($P = 0.038$). The total percentage of teachers having adequate knowledge regarding oral health was found to be 78.6%.

Conclusion: The study showed that the education professionals, had an affirmative practice and attitude regarding the children's oral health care, and they recognize their role in fostering healthy habits and are keen toward the idea of developing integrated pedagogic oral health programs in their school curriculum.

Key words: Children, Knowledge, Oral Health

INTRODUCTION

Children play a most important role as they are the heart of socioeconomic development. Health, wellbeing, education, and development of the children can be affected by oral health.¹ Caries disease and periodontal problems can

affect the children's development and their involvement in important life activities. Presence of pain, infection or dysfunction of the stomatognathic system can limit the necessary ingestion of energetic foods, thus affecting the children's growth as well as their learning, communication skills and recreational activities.² The most significant period of a child's life is spent at school and it is here that their lifetime beliefs and habits develop.³ School teachers can play a major role in imparting knowledge of the causes and prevention of common oral diseases. Higher prevalence of the two most common dental disease, dental caries, and periodontal disease are influenced by the lack of dental awareness.⁴ School teachers by virtue of their training can influence a large number of children thereby

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play major role in the planning and implementation of oral health preventive programs.⁵ Several studies have been conducted to investigate elementary school teacher's oral health knowledge, attitude, and willingness to participate in dental health programs.¹⁻¹³ Many studies have shown poor knowledge of school teachers regarding oral health.^{1,3,5,8,9,14} Hence, the present study was carried out to evaluate the knowledge, attitude, and practice regarding oral health among the primary school teachers of Bhopal city.

METHODOLOGY

A cross sectional questionnaire survey was conducted among the primary school teachers of Bhopal city to assess their knowledge, attitude, and practice regarding oral hygiene. The list of primary schools in Bhopal was obtained from the District Education Office, Bhopal, Madhya Pradesh, India. Bhopal city was divided into 5 geographical zones, and 6 schools were randomly selected from each zone. In total, 30 schools were selected from Bhopal city. The survey was conducted during the period - August to September 2013. Prior permission to conduct the study was obtained from appropriate authorities of the schools, so that the academic schedule of the schools are not disturbed. A self-administered close-ended questionnaire consisting of 10 items was prepared in English. Questionnaires were prepared both in English and the local language Hindi. For this purpose, the questionnaire was translated to Hindi and retranslated to English by a language expert and assessed for its reproducibility. Questionnaire-included details of demographic information of the participants regarding age and gender. It collected information on the subject taught by the teachers, his/her teaching experience in years, their highest educational qualification acquired and information regarding the type of their school i.e., government or private. The questionnaire consisted of 8 knowledge questions, 4 attitude questions, and 6 practice questions. Of 18 questions all were dichotomous close ended with the exception of two questions in which one open end option was given. Each of the close ended questions contained 4-6 options. Each correct answer was given a score of 1 and wrong answers a score of zero. Most of the questions consisted of more than one correct option that was correct. In spite of obtaining prior permissions from the selected schools, a confirmatory telephonic confirmation was made on the previous day with the principal/head master/mistress of the school. All teachers present at the time of the visit were included in the study. The teachers were given ample time to complete the questionnaires, taking care that the academic schedule of the school was not disturbed. But all the teachers required to submit the filled questionnaire on the same day. Teachers were allowed to complete the questionnaire anonymously, and they were assured that

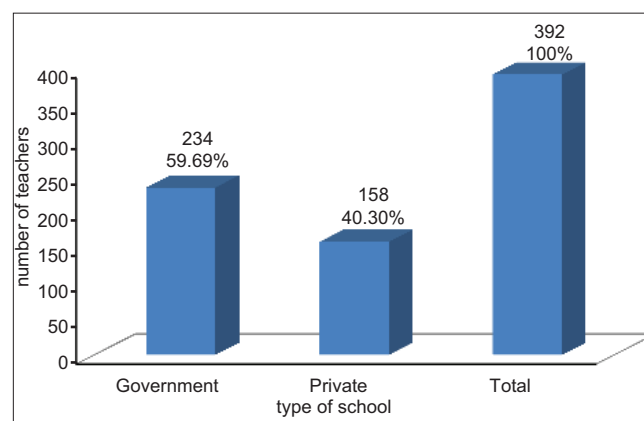
their answers would remain confidential. A total of 428 questionnaires were distributed among the teachers of the selected schools during the study period. Questionnaires with incomplete responses were not considered in the analysis. 36 teachers did not complete the questionnaire, so they were excluded from the study. Hence, a total of 392 primary school teachers who completed the questionnaires were. The response rate was 91%. Data obtained were coded and then entered in the Microsoft office excel worksheet. Statistical analysis was carried out using the SPSS 20.0 version. Chi-square, independent sample *t* test and ANOVA were applied and level of significance was at $P < 0.05$.

RESULTS

The sample consisted of 392 primary school teachers employed in various schools of Bhopal city. On completion, it was found that the teachers were in between the age group of 18-65 years with mean age being 38.07 years. 58 (14.7%) teachers were males and 317 (80.8%) were females. 234 teachers were from government schools, and 158 teachers were from the private schools (Graph 1).

Of 158 government school teachers, 4 (2.5%) teachers had poor overall knowledge regarding oral health, 34 (21.5%) teachers had average knowledge and 120 (75.9%) teachers had good knowledge. Of 234 private school teachers, 2 (0.9%) teachers had poor overall knowledge regarding oral health, 44 (18.8%) teachers had average knowledge, and 188 (80.8%) teachers had good knowledge (Table 1).

Of 158 government school teachers, 152 (96.2%) teachers had poor overall attitude toward oral health, and 6 (3.8%) teachers had good attitude toward oral health. Of 234 private school teachers, 225 (96.2%) teachers had poor overall attitude toward oral health, and 9 (3.8%) teachers had good attitude toward oral health (Table 2).



Graph 1: Distribution of study subjects according to type of school

Of 158 government school teachers, 36 (22.8%) teachers had poor overall practice regarding oral health, 122 (77.2%) teachers had good knowledge. Of 234 private school teachers, 41 (17.5%) teachers had poor overall practice regarding oral health, 193 (82.5%) teachers had good knowledge (Table 3).

DISCUSSION

School teachers are being used as one of the best health personnel available worldwide to instruct their students about health and be unfamiliar with the current oral health concept.^{1,6,15,16}

The study area was limited to Bhopal city of Madhya Pradesh and hence the results of the present study may not be extrapolated to the whole primary school teacher population of the State or Nation. The teachers had received their information on oral health through from a variety of formal and non formal sources.⁴

Nearly, 86.6% responded that consumption of sweets affect dental health which is more in comparison to Lang *et al.* (61.3%),⁹ and 75% as reported by Petersen *et al.*¹¹ and Lin *et al.*¹⁷ The reason for the same in present study is lack of knowledge regarding dental plaque and most of the teachers still believe sugar causes dental problem compared

to other factors in oral cavity which is same like general population in India.¹⁸

About 37% felt that fluoride keeps the teeth white and prevents dental decay which is much less compared to other studies done in other places by Elena,¹⁹ and Manjunath and Kumar.¹⁸

Regarding oral health practices, it was observed that the majority of the education professionals emphasized tooth brushing as a vital method of oral hygiene. All the participants of the study considered that education professionals have a key role in promoting healthy oral habits amongst the schoolchildren and they believe that involving the dentist in educative programs is important. It was therefore concluded that the education professionals surveyed, have positive practices and attitudes regarding the children's care, and they recognize their role in fostering healthy habits and developing integrated pedagogic oral health programs. This was in line with the study done by Antunes *et al.*^{2,20}

Study clearly showed that females from both the mediums were more aware regarding oral hygiene practices. Gender clearly influenced the attitudes with females being more positive than males.

The teachers had received their information on oral health through from a variety of formal and non formal sources. More frequently from TV/radio, magazines, newspapers, friends, and family. This was similar to study done by Kumar *et al.*⁴

CONCLUSION

This survey was an effort to interact with the teachers so that the knowledge, attitude, and practice of the teachers regarding dental issues can be identified. Hence, keeping this information as baseline data further educative and motivational programs can be planned, developed, and organized.

The knowledge about basic oral hygiene measures is a must for every professional other than dentists. The school provides an ideal setting for promoting oral health and teachers form the major work force for the country in instilling good oral health behavior among children.

In order to instill good behaviors among children school teachers are supposed to be well-equipped with sound knowledge, attitudes, and behavior regarding the oral health.

Table 1: Knowledge of the study subjects regarding oral health according to type of school

Type of school	Knowledge (%)				P value
	Poor	Average	Good	Total	
Government	4 (2.5)	34 (21.5)	120 (75.9)	158 (100)	0.314*
Private	2 (0.9)	44 (18.8)	188 (80.3)	234 (100)	

*not significant

Table 2: Attitude of the study subjects regarding oral health according to type of school

Type of school	Attitude (%)		Total (%)	P value
	Poor	Good		
Government	152 (96.2)	6 (3.8)	158 (100)	0.980*
Private	225 (96.2)	9 (3.8)	234 (100)	

*not significant

Table 3: Practice of the study subjects regarding oral health according to type of school

Type of school	Practice (%)		Total (%)	P value
	Poor	Good		
Government	36 (22.8)	122 (77.2)	158 (100)	0.198*
Private	41 (17.5)	193 (82.5)	234 (100)	

*not significant

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Community-Acquired Acute Kidney Injury in a Tertiary Care Hospital: A Cross-sectional Study

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Abstract

Introduction: Acute kidney injury (AKI) is present in 1-5% of patients at hospital admission and it is reported that mortality rates range from 50% to 70% in these patients. The pathogenesis of AKI is complex and characterized by renal vasoconstriction and oxidative stress.

Aim: The aim was to evaluate serum lactate dehydrogenase (LDH), uric acid (UA), amylase, and electrolyte levels in community acquired AKI patients and outcome of patients developing renal failure in the hospital.

Materials and Methods: The present study is a cross-sectional study. A total of 160 participants were included and were grouped into 2 groups: Group-I included 100 patients admitted in emergency ward and Group-II included 60 normal healthy attendants accompanying the patients.

Results: Mean blood urea levels in cases and controls were 87.71 ± 42.65 and 29.7 ± 3.15 mg/dL which was statistically significant (<0.0001). When compared mean serum levels of creatinine (Cr), UA, LDH, amylase, calcium, phosphate, and potassium were 5.25 ± 3.12 mg/dL, 18.42 ± 4.43 mg/dL, 1362.54 ± 502.04 IU/L, 262.83 ± 132.61 IU/L, 7.6 ± 1.4 mg/dL, 4.9 ± 1.9 mg/dL and 5.4 ± 0.5 mEq/L in Group-I (cases) while that of Group-II (controls) were 0.89 ± 0.17 mg/dL, 4.22 ± 1.12 mg/dL, 285.20 ± 33.06 IU/L, 41.72 ± 20.95 IU/L, 9.66 ± 0.85 mg/dL, 3.44 ± 0.47 mg/dL and 3.3 ± 0.8 mEq/L and were statistically significant between the two groups (<0.0001). 60% recovered fully and mortality rate among AKI patients was 22%.

Conclusion: Study indicates that prompt recognition, aggressive management with intravenous hydration and careful monitoring of renal function, serum electrolytes, urine output, urinary UA, Cr, and there ratio to minimize nitrogenous waste production are essential for treating this condition. Study highlights the high morbidity and mortality of patients with community-acquired AKI, so it is recommended to have a close monitoring in these patients.

Key words: Acute kidney injury, Amylase, Lactate dehydrogenase, Uric acid

INTRODUCTION

Acute kidney injury (AKI) has been defined as an increase in serum creatinine (Cr) more than or equal to 0.3 mg per deciliter within 48 h; or an increase in serum Cr to more than or equal to 1.5 times baseline, which is known or presumed to have occurred within the prior 7 days or a

urine volume of <0.5 ml per kg per hour for 6 h.¹ Acute kidney injury is present in 1-5% of patients at hospital admission and it is reported that mortality rates range from 50% to 70% in these patients.² The pathogenesis of AKI is complex and characterized by renal vasoconstriction and oxidative stress in association with tubular and micro vascular injury and interstitial inflammation. In many situations, AKI is associated with a rise in serum uric acid (UA) as a result of both increased generation and decreased excretion. It is widely recognized that markedly elevated levels of UA can cause AKI via super saturation within the tubules with crystallization and intra-renal obstruction.³ Serum lactate dehydrogenase (LDH) may be elevated (to 3 times the upper limit of normal) in as many as 35% of patients with renal insufficiency due to reduced elimination

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rate or to increased release from damaged renal tissue in patients with AKI.⁴ The kidneys play an important role in the regulation of fluids and electrolytes and their malfunction often leading to an electrolyte imbalance. The chemical composition of body fluids, which is regulated by the kidneys, may affect renal function. Conversely, the onset of AKI interrupts the normal regulation of the volume and content of the body fluids.⁵ The present study was aimed to evaluate serum LDH, UA, amylase, and electrolyte levels in community acquired AKI patients and outcome of patients developing renal failure in the hospital.

MATERIALS AND METHODS

The present study is a cross-sectional study carried out at Sheri Kashmir Institute of Medical Sciences (SKIMS) Medical College & Hospital, Bemina, Srinagar, India. Simple random sampling was done to select the patients hospitalized in emergency ward. A total of 160 participants were included and were grouped into to 2 groups: Group-I included 100 patients admitted in emergency ward and Group-II included 60 normal healthy individuals attendants accompanying these patients.

Community-acquired AKI was defined as a serum Cr of ≥ 1.5 mg/dL at the time of admission. Patients above age of 18 years, who did not have their previous renal function records or prior history of renal disease, were presumed to have normal renal function in the past and included in the study. The first serum Cr obtained after admission to the hospital was taken as baseline value. Patients who had diabetes mellitus, pre-existing renal insufficiency or referred following a hospital-acquired renal insufficiency were excluded from the study. Furthermore, oliguria (urine output <400 mL/24 h), decreased renal perfusion (blood pressure $<90/60$ mmHg), drugs induced AKI (AKI due to nephrotoxic, anticancer drugs), sepsis, obstructive etiologies, known or suspected acute renal disease other than acute tubular necrosis and patients suffering from gout and taking medication for it (allopurinol), those with chronic kidney disease and developed acute on chronic kidney disease in the hospital were carefully excluded.

The initial evaluation of the patients with AKI consisted of history, physical examination, laboratory investigations, and ultrasonography. The present study was approved by the ethical committee of the hospital. Before the serum sample was collected, study was explained, verbal informed consent was taken from the patients/attendants of the patients on the day of their hospital admission. All the samples were immediately analyzed for biochemical parameters under study. Blood samples drawn were investigated for blood urea, serum Cr, UA, LDH, calcium, phosphate, sodium,

potassium, and amylase and were analyzed on auto analyzer (Randox-Immola made in Japan). 24-h urine was taken for estimation of UA and Cr on the same auto analyzer. The data obtained were compiled and analyzed using SPSS 20 for Windows version. Means \pm standard deviation were calculated and Student's *t*-test was applied to find out significance level. Statistical significance was defined as two-tailed $P < 0.05$ for all tests unless otherwise specified. Frequency distribution was used to calculate the percentage.

RESULTS

The mean age in Group-I and Group-II were 57.20 ± 19.10 years (with 60 males and 40 females) and 55.27 ± 18.2 years (with 36 males and 24 females), respectively. Mean blood urea levels in cases and controls were 87.71 ± 42.65 and 29.7 ± 3.15 mg/dL which was statistically significant (<0.0001). When compared mean serum levels of Cr, UA, LDH, amylase, calcium, phosphate, and potassium 5.25 ± 3.12 mg/dL, 18.42 ± 4.43 mg/dL, 1362.54 ± 502.04 IU/L, 262.83 ± 132.61 IU/L, 7.6 ± 1.4 mg/dL, 4.9 ± 1.9 mg/dL and 5.4 ± 0.5 mEq/L in Group-I (cases) with that of Group-II (controls) 0.89 ± 0.17 mg/dL, 4.22 ± 1.12 mg/dL, 285.20 ± 33.06 IU/L, 41.72 ± 20.95 IU/L, 9.66 ± 0.85 mg/dL, 3.44 ± 0.47 mg/dL, and 3.3 ± 0.8 mEq/L were statistically significant between the two groups (<0.0001). However, serum sodium levels 137.4 ± 6.8 mEq/L (in cases) and 135.8 ± 8.2 mEq/L (in controls) did not showed any statistical difference (>0.05). There was three folds increase in serum LDH and UA levels in cases, also there was two folds increase in serum amylase levels in cases when compared with controls (Table 1). Total 24 h urine was 264 ± 178 mL/24 h and there was not much volume difference between males and female patients. Total urinary UA and Cr were 981 ± 342 mg/24 h and $2221 \pm$

Table 1: Depicting mean \pm SD and significance of different parameters between cases and controls

Parameters	Mean \pm SD		P value
	(Cases) n=100	(Controls) n=60	
Age in years	57.20 \pm 19.10	55.27 \pm 18.2	>0.05
Sex			
Males	60	36	
Females	40	24	
Blood urea (mg/dL)	87.71 \pm 42.65	29.7 \pm 3.15	<0.0001
Serum Cr (mg/dL)	5.25 \pm 3.12	0.89 \pm 0.17	<0.0001
Serum UA (mg/dL)	18.42 \pm 4.43	4.22 \pm 1.12	<0.0001
Serum LDH (IU/L)	1362.54 \pm 502.04	285.20 \pm 33.06	<0.0001
Serum amylase (IU/L)	262.83 \pm 132.61	41.72 \pm 20.95	<0.0001
Serum calcium (mg/dL)	7.6 \pm 1.4	9.66 \pm 0.85	<0.0001
Serum phosphate (mg/dL)	4.9 \pm 1.9	3.44 \pm 0.47	<0.0001
Serum sodium (mEq/L)	137.4 \pm 6.8	135.8 \pm 8.2	>0.05
Serum potassium (mEq/L)	5.4 \pm 0.5	3.3 \pm 0.8	<0.0001

SD: Standard deviation, LDH: Lactate dehydrogenase, Cr: Creatinine, UA: Uric acid

563 mg/24 h in AKI patients which was much higher than the normal values, also UA/Cr ratio 0.65 ± 0.05 are consistent with causes of AKI (Table 2). Prognosis of the disease was 60% recovered fully and mortality rate among AKI patients was 22% (Figure 1).

DISCUSSION

Community-acquired AKI is common in Asian individuals and the population developing AKI is younger compared with its counterparts in Europe or North America.⁶ In this study, it was observed that there are increased levels of blood urea and serum Cr and decreased urinary volume (<0.3 mL/24 h) meeting the criteria for the defining AKI.⁷ UA levels in these cases were found to be three times higher than in normal participants.⁸ There are several mechanisms by which UA may contribute to AKI: (1) Renal vasoconstriction (via reduction in endothelial cell Nitric Oxide, and stimulation of the renin-angiotensin system) (2) Inflammation (3) Microvascular injury (4) Altered renal autoregulation. (5) There was marked increase in serum LDH levels in AKI patients as renal infarction is known to raise plasma LDH levels and it also known that LDH activity increases during the first 24 h and persists up to 10 days this was in concordance with the present study.^{9,10} AKI is frequently mentioned when non-pancreatic causes of increased serum amylase is considered. In this study, there was more than three folds increase in serum amylase

levels, similar increase was reported by Zachee *et al.* which showed ten folds increase in AKI patients indicating acute pancreatic injury due to this disease.¹¹ There were increased levels in serum phosphate and decreased in serum calcium levels in AKI patients, this could be because of two reasons. First, in AKI, the kidneys cannot synthesize vitamin D which normally raises the level of calcium in the body. Without vitamin D calcium is not absorbed from the diet. Second, high levels of phosphate bind to calcium and can deposit in the tissues. Serum phosphate rises because the kidneys are normally responsible for excreting phosphate. When they do not work, phosphate is absorbed in the diet and not excreted and one of the functions of the kidney is to eliminate phosphorous from the body, when AKI occurs that ability is lost.^{12,13} AKI is the most common cause of hyperkalemia, kidneys help control the balance of potassium in the body and they do not work properly so they cannot filter extra potassium from the blood or remove it from the body. Releasing too much potassium can result from increased breakdown of red blood cells, increased breakdown of muscle tissue, burns, trauma and or other tissue injury and uncontrolled diabetes. In this study hyperkalemia was seen possibly due to above reasons.¹⁴ As the serum urate levels rise rapidly and AKI occurs as a consequence of tubular deposition and obstruction of urate and UA leading to oliguria, marked hyperuricemia, and hyperuricosuria.¹⁵ A UA to Cr ratio (mg/mg) >1.0 is consistent with acute UA nephropathy, whereas values <0.75 are consistent with other causes of AKI, similar values (i.e., <0.75) were seen in the present study explaining possible causes of AKI.¹⁶

Table 2: Urinary biochemistry in patients having AKI with respect to gender

Urine biochemistry	Total (n=100)	Males (n=60)	Females (n=40)
Total volume mL/24 h	264±178	275±147	238±231
UA mg/24 h	1443±28.15	932±15.12	897±8.55
Cr mg/24 h	2221±563	2347±378	2274±285
UA/Cr ratio (mg/mg)	0.65±0.05	0.63±0.04	0.61±0.03

Urinary volume=1500-2000 mL/24 h, Urinary uric acid=250-750 mg/24 h, Urinary Creatinine=600-2000 mg/24 h, UA/Cr ratio= <0.75 are consistent with causes of acute renal failure, AKI: Acute kidney injury, UA: Uric acid, Cr: Creatinine

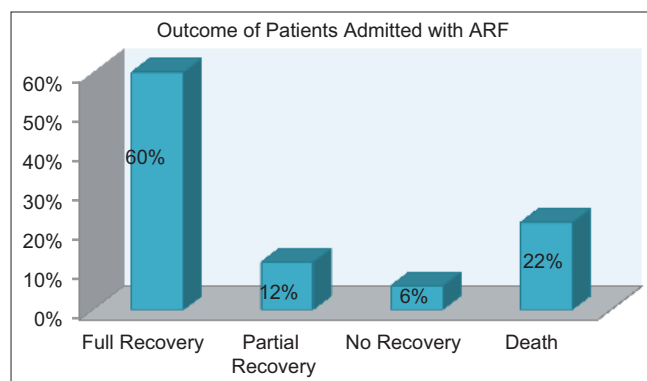


Figure 1: Frequency distribution and outcome of the patients admitted in emergency department with acute kidney injury

CONCLUSION

AKI is a complex disorder for which there is no currently accepted uniform definition. Having a standard for diagnosing and classifying AKI would enhance our ability to improve the management of these patients also, formation of a multidisciplinary collaborative network focused on AKI and have proposed uniform standards for diagnosing and classifying AKI. We propose that serum UA is a marker for AKI. Serum LDH activity may be linked to a reduced function of renal tubules, thus we concluded that LDH was useful as a marker for evaluating AKI. Serum amylase levels showed several folds increase in AKI patients indicating acute pancreatic injury with AKI so it is warranted to do amylase levels in all these patients. Study also, indicates that prompt recognition, aggressive management with intravenous hydration and careful monitoring of renal function, serum electrolytes, urine output, urinary UA, Cr, and their ratio to minimize nitrogenous waste production are essential for treating this condition. Study highlights the high morbidity and mortality of patients with Community-

Acquired AKI, so it is recommended to have a close monitoring in these patients.

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Management of Lateral Epicondylitis (Tennis Elbow) By Injection of Autologous Blood: Our Experience in a Rural Teaching Institution

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Abstract

Background: Lateral epicondylitis or tennis elbow is a commonly viewed disorder seen in day to day orthopedic outdoor practice. The disorder commonly affects sports personnel. Persons engaged in other various household activities are also routinely seen suffering from this disorder. For the management of this condition, various treatment options have been reported and autologous blood injection has emerged as one of the acceptable, secure, and efficient modality of treatment with agreeable results.

Objectives: The aim of this present study was to report the results of autologous blood injection in the treatment of lateral epicondylitis.

Materials and Methods: A prospective study was conducted from January 2014 to January 2015 on patients of lateral epicondylitis, who presented to the orthopedic out-patient department at the institute hospital. They were managed by autologous blood injection technique. Routine functional activities were restricted for 3 weeks after injection. Follow-up was done at 10th day and then at 3rd week, 6th week and 12th week. Visual analog scale (VAS) and Verhaar *et al.* scoring system were used to assess the results.

Results: Totally, 27 patients suffering from lateral epicondylitis were treated by autologous blood injection (37.04% males, 62.96% females). The mean age of the patients were 34.56 ± 9.87 years. The mean pre-injection VAS score was 4.78 ± 2.75 which improved to 0.33 ± 1.36 ($P < 0.001$). As per Verhaar *et al.* scoring system at the end of 12 weeks follow-up, 70.34% patients showed excellent results and 25.93% showed good results. There was no response to this procedure in one patient and he showed poor results as per Verhaar *et al.* scoring system.

Conclusions: Autologous blood injection, on the basis of satisfactory outcomes, can be considered as one of the secure and efficient treatment modality for the management of lateral epicondylitis.

Key words: Autologous blood injection, Lateral epicondylitis, Tennis elbow

INTRODUCTION

Lateral epicondylitis or lateral tendinosis of elbow, which is popularly known as tennis elbow is the common cause of elbow pain on the lateral aspect having a prevalence of 1-3%

in aged 45-54 years.^{1,2} (Runge is usually credited for the first description of the condition, in 1873. The term tennis elbow first appeared in an 1883 paper by Major called Lawn-tennis elbow). Among the general population, the incidence is increasing owing to the awareness about this disease. It is reported to be a degenerative process (rather than an inflammatory process), characterized by angiofibroblastic degeneration or hyperplasia within the common extensor tendon, particularly involving the extensor carpi radialis brevis.³ Repetitive movements of the affected muscles causes this disorder and in the working age group this is one of the common cause of elbow pain. This is responsible for

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a considerable disability in terms of the extent and worth of work done by these persons. There may be a major weakness of grip strength particularly when the elbow is in extension, thus distressing a lot of common daily activities of life.⁴ Although the diagnosis of tennis elbow is quite clear-cut, there has been no agreement on the most favorable management approach.⁵ Various treatment approaches have been reported. Conservative treatments including minimally invasive techniques, local steroid injections, ultrasonic therapy, bracing, and physiotherapy have been tried in many patients with variable success. Surgery is often the last option and includes open, percutaneous, or arthroscopic release of the extensor origin, debridement and denervation of the lateral epicondyle, and anconeus rotation.^{6,7} However, no management strategy has shown to be better than others. Corticosteroid injection is one of the most common methods used.⁸ The reason cited for its use is based on the hypothesis that the disease is inflammatory. According to recent studies, tennis elbow is a proliferative process and it has been named angiofibroblastic degeneration or hyperplasia. Use of autologous blood in the treatment of tennis elbow was first reported in 1993 by Edwards and Calandrachio. They showed promising results even in those patients that were not cured by other methods.⁹ Humeral and cellular mediators (growth factors) present in the blood on being injected locally, initiate an inflammatory process at the injured tissue site, and result in repair.

Aiming this hypothesis, this prospective study was undertaken to evaluate the functional outcome of management of lateral epicondylitis patients by local infiltration of autologous blood. It is simple and easy to obtain, cost effective, least traumatic, and with least risk for immune-mediated rejection.

MATERIALS AND METHODS

A prospective study was conducted on 27 patients of lateral epicondylitis presenting to the orthopedic out-patient department at the institute hospital, which were managed by autologous blood infiltration from January 2014 to January 2015. A detailed clinical and surgical history was taken in all patients particularly regarding the degree of pain and the activity restrictions before starting the procedure along with proper elbow examination. Standard anteroposterior and lateral X-ray views of the elbow were done in all cases to rule out other causes of lateral elbow pain like radiocapitellar arthritis. Patients were given a detailed explanation of the adopted procedure and proper consent was taken. Patients with coexisting pathology i.e., rheumatoid arthritis of elbow, cervical radiculitis, trauma around elbow, surgical treatment for lateral epicondyle, diabetes mellitus, hyperuricemia, and patients who had received steroid injection within 3 months

were all excluded from study. Patients were diagnosed on the basis of clinical presentation of pain around lateral epicondyle region which is used to exacerbate by physical activities, tenderness over the origin of extensor carpi radialis brevis at the lateral epicondyle, and pain occurring around the extensor origin on forced dorsiflexion of the wrist and middle finger.

Technique

All the patients were managed by locally injecting autologous blood. Two ml of venous blood was drawn from the ipsilateral upper limb. It was then mixed with 1 ml of 2% lignocaine solution before injecting locally. In the outpatient department itself, the injection was administered under all aseptic precautions by the same author (MMS) in all the patients. Just proximal to the lateral epicondyle the needle was introduced and then moving along the supracondylar ridge up to the under surface of the extensor carpi radialis, the contents were injected extra-articularly. For 3 consecutive weeks, injections were given once a week. Following every injection, for first 2 days, nonsteroidal anti-inflammatory medications along with broad spectrum antibiotic were given. Elbow was not immobilized and patients were asked to refrain from regular daily activities for 3 weeks. After 3 weeks patients were advised guarded physiotherapy in the form of stretching the musculature about the wrist and elbow, especially the extensor compartment of the forearm.^{9,10} The evaluation of results were done according to Verhaar *et al.* scoring system¹¹ (Table 1).

RESULTS

In this study total 27 patients, 17 females (62.96%) and 10 males (37.04%) of lateral epicondylitis were studied to evaluate the job-related work satisfaction outcome after they were managed by local infiltration of autologous blood. Right side was involved in the majority ($n = 20$) of cases, which was the dominant hand in 74.07% of cases. Mean age of the patients were 34.56 ± 9.87 years (range 19-55) and average duration of symptoms was 4.5 ± 4.17 months (range 0.5 month to 18 months). As far occupation is considered, 15 females were housewives while two were office workers. Among males, eight were manual laborers including 3 cases of carpenters, 2 cases of plumbers and 3 cases of hard laborers, and 2 cases of college going students (Table 2). All the college going students and office workers (2 males and 2 females) were using two wheelers either motorcycle or scooter for transportation. All the patients were called for follow up on the 10th day, and after 3 weeks, 6 weeks, and 12 weeks. The results were assessed according to "visual analog scale (VAS)" (Figure 1 and Table 3). At the end of the study, the satisfaction level of the patients was measured by Verhaar scale (Figure 2, Table 4). Satisfaction outcome level

Table 1: Scoring system for the results of treatment based on the criteria of Verhaar et al. (1993)

	Pain on lateral epicondyle	Patient's satisfaction for the results of treatment	Subjective loss of grip	Pain on resisted dorsiflexion of the wrist
Excellent	No pain	Satisfied	No loss of grip	No pain
Good	Occasional slight pain after strenuous activity	Satisfied	No or slight	No pain
Fair	Discomfort after strenuous activity but at more tolerable level than before	Satisfied or moderately satisfied	Slight or moderate	Slight or moderate
Poor	No relief of pain	Not satisfied	Severe	Severe

Table 2: Summary of patients' characteristics

	No.	%
Females (n=17, 62.96%)		
House wives	15	88.24
Office workers	2	11.76
Males (n=10, 37.04%)		
Manual laborers*	8	80
Students	2	20

*Including carpenters-3, plumbers-2, hard laborers-3

Table 3: Assessment by visual analog scale

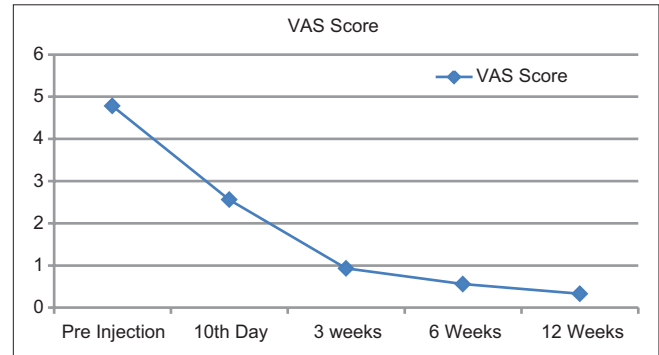
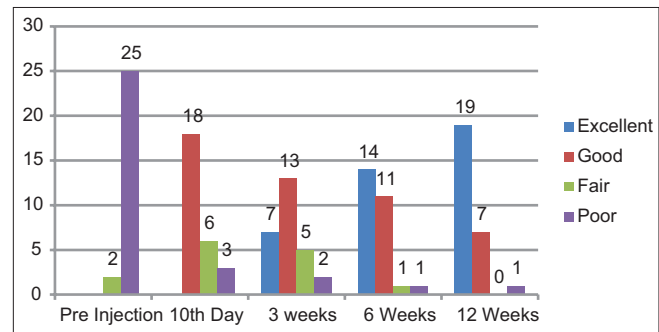
Pain	Pre Injection (n=27)	10 th day (n=27)	3 weeks (n=27)	6 weeks (n=27)	12 weeks (n=27)
Nil (VAS-0)	-	4	17	22	24
Mild (VAS 1-3)	11	15	8	3	2
Moderate (VAS 4-6)	8	6	1	1	-
Severe (VAS 7-10)	8	2	1	1	1
Mean VAS	4.78±2.75	2.56±2.19	0.93±1.69	0.56±1.55	0.33±1.36
P value		<0.001	<0.001	<0.001	<0.001

VAS: Visual analog scale

Table 4: Assessment by Verhaar et al. scoring system

	Excellent	Good	Fair	Poor
Pre injection (n=27)	-	-	2	25
10 th day (n=27)	-	18	6	3
3 weeks (n=27)	7	13	5	2
6 weeks (n=27)	14	11	1	1
12 weeks (n=27)	19	7	0	1

showed a degree of pain and functional recovery as per job related work type of the patient at 3 weeks, 6 weeks, and 12 weeks after treatment (Table 5). No difference was seen in the response to procedure based on gender or in dominant vs. non-dominant hand involvement. Maximum relief in pain was observed during the first 6 weeks after injection. At the end of 12 weeks, 96.3% ($n = 26$) of patients were satisfied with the procedure and had complete recovery, while 85% ($n = 23$) were satisfied at the end of first 6 weeks ($P < 0.001$). In one patient, no response was seen and he was advised for surgery. Local steroid injection was not given in any patient after the autologous blood injection. Although during this procedure, no major complication was seen, we

**Figure 1: Line plot of the mean VAS scores in the pre injection phase, at 10th day follow up and at 3, 6 and 12 weeks of review****Figure 2: Assessment based on Verhaar et al scoring system in chart form**

observed few minor complications during the early period of this study. Post injection pain was seen in five patients, which subsided in 2-3 days. In three patients, ecchymosis was observed over the lateral aspect of elbow which disappeared in a weeks' time after giving rest to the part. Infection was not seen in any case.

DISCUSSION

G.P. Mills, in 1928 quoted the golden words for tennis elbow; there is probably nothing which brings the surgical profession into greater discredit at the present times than the inability to cure the tennis elbow.¹² Are these words still holding true? Only time will answer. He was correct perhaps in his era but now a lot of things have been reported since then. Nirshl in 1979 disproved the theory of persistent inflammation as the cause of tennis elbow.¹³

Table 5: Assessment of pain and functional recovery as per job related work type

Work type	3 weeks	6 weeks	12 weeks
Making chapatti (n=15)	Mild pain; complete recovery (9) Severe pain; no recovery (6)	No pain; complete recovery (12) Mild pain; complete recovery (2) Severe pain; no recovery (1)	No pain; complete recovery (14) Severe pain; no recovery (1)
Washing clothes by hand (n=15)	No pain; complete recovery (8) Mild pain; complete recovery (2) Severe pain; no recovery (5)	No pain; complete recovery (13) Mild pain; complete recovery (1) Severe pain; no recovery (1)	No pain; complete recovery (14) Severe pain; no recovery (1)
Lifting weight (n=3)	Severe pain; no recovery (3)	Mild pain; complete recovery (3)	No pain; complete recovery (3)
Tightening of screws (n=3)	No pain; complete recovery (1) Severe pain; no recovery (2)	No pain; complete recovery (2) Mild pain; complete recovery (1)	No pain; complete recovery (3)
Plumbing work (n=2)	Severe pain; no recovery (2)	Mild pain; complete recovery (1) Severe pain; no recovery (1)	No pain; complete recovery (2)
Riding motor cycle/ scooter (n=4)	Mild pain; complete recovery (3) Severe pain; no recovery (1)	No pain; complete recovery (2) Severe pain; no recovery (2)	No pain; complete recovery (4)

Years later in 1992 Regan *et al.* supported the theory of angiofibroblastic tendinosis in a cadaveric study.¹⁴ Advantages of autologous blood injection for the treatment of refractory lateral epicondylitis were summarized by Edwards and Calandruccio in their excellent work on the subject along with some other authors also reported the similar advantages.^{9,15-18} This technique being minimally traumatic, reduced risk of immune-mediated rejection, simple to acquire and prepare, and inexpensive are the other advantages. In our present study, majority of patients were housewives or manual laborers including carpenters, plumbers and hard laborers, and none of the patients were involved in sports activities. In this study, we also observed that routine daily work such as chapatti making, washing clothes by hand and lifting weight along with tightening screws, riding two wheelers, and plumbing work seem to be the causative factors for lateral epicondylitis. Statistical analysis indicates that there is considerable difference in mean VAS score at 10th day (2.56 ± 2.19), 3 weeks (0.93 ± 1.69) and after 6 weeks (0.56 ± 1.55) and after 12 weeks (0.33 ± 1.36) as compared with 1st day (4.78 ± 2.75) along with $P < 0.001$. Our results in the present study are similar to the study of Edwards and Calandruccio,⁹ who reported improvement in VAS from 7.8 to 2.3 in cases of refractory tennis elbow treated by autologous blood infiltration. A case series of 35 patients with refractory lateral epicondylitis was reported by Connell *et al.* in which the median score improved from 6 points at baseline to 0 points on Nirschl's stage at 6-month follow-up ($P < 0.001$).¹⁶ Similar results were reported by Suresh *et al.*¹⁹ in their published work on the effect of autologous blood in medial epicondylitis. They found it to be safe and effective in all the patients and showed that median score improved from 6 points at baseline to 1 point at 6 months follow-up ($P < 0.001$) as per Nirschl scoring system. They also showed improvement in function, in terms of excellent, good, fair, and poor ranging from poor status in 22 cases on Day 1 to excellent status in 16 cases, good in 08 cases, and poor in one case at 12 weeks according to Verhaar *et al.* scoring system. Bisset *et al.*²⁰

proved that the results of autologous blood infiltration are better than steroid treated patients. They also found that the long-term results of steroid injection are worse as compared to physiotherapy alone or wait and watch policy. Kazemi *et al.*¹⁸ also reported in their trial, that the benefits afforded by autologous blood injection outweighed those by local corticosteroid injection.

Our study showed autologous blood injection can be considered a low-cost treatment method for lateral epicondylitis.

CONCLUSION

Local injection of autologous blood offers encouraging benefits in the treatment of patients of lateral epicondylitis over other traditional nonsurgical modalities. This minimally invasive technique is secure, efficient, cost effective, and compliant.

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A Comparative Study of Sevoflurane and Propofol for Laryngeal Mask Airway Insertion in Adults

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Abstract

Background: Intravenous (IV) propofol is widely used for providing anesthesia for laryngeal mask airway (LMA) insertion. Sevoflurane is a new volatile anesthetic with rapid induction and recovery characteristics.

Aim: The aim was to compare conditions for LMA insertion in adults after induction of anesthesia with either inhalation of sevoflurane or IV propofol.

Settings and Design: A randomized double-blinded clinical trial.

Materials and Methods: In this study, 60 patients ASA Grade I and II aged 18-60 were randomly divided into two groups ($n = 30$ in each group). Group P received IV propofol. In group S, after priming the Magill's circuit with 8% sevoflurane with O_2 (flow rate - 8 l/min) for 30 s patients were asked to take vital capacity breaths via the face mask connected to the primed circuit. After the loss of eyelash reflex, which was considered as the end point of induction, the LMA insertion was attempted by an anesthesiologist blinded to the induction technique. Scoring systems were used to grade the conditions for insertion.

Statistical Analysis: The results are analyzed by Student's *t*-test, Mann-Whitney test (non-parametric test) and chi-square test.

Result: LMA insertion was faster in propofol group (101.2 ± 13.2) as compared to sevoflurane group (116.3 ± 7.06) with a ($P < 0.0001$), which is highly significant. The overall insertion was excellent with propofol with 29 patients scoring 18. With Sevoflurane, 24 patients had excellent conditions for LMA insertion, 2 patients had satisfactory condition for LMA insertion and 4 patients had poor conditions for LMA insertion when grading was done using 18 point score.

Conclusion: Propofol is superior to sevoflurane as sevoflurane takes longer time as compared to propofol for jaw relaxation as well as LMA insertion.

Key words: Laryngeal mask airway, Propofol, Sevoflurane, Vital capacity

INTRODUCTION

The laryngeal mask airway (LMA) has gained widespread popularity for airway management during surgery. With the use of LMA, muscle relaxation is not needed, laryngoscopy is avoided and hemodynamic changes are minimized during insertion.¹ Ideal induction agent for LMA insertion would

provide loss of consciousness, jaw relaxation, and absence of upper airway reflexes rapidly without cardiorespiratory compromise. A popular method of providing anesthesia for LMA insertion is with the use of intravenous (IV) propofol, which has the advantages of inducing anesthesia rapidly and depressing upper airway reflexes. However, bolus IV propofol has been associated with adverse effects like hypotension, apnea, and pain on injection.^{2,3}

Sevoflurane is a halogenated volatile anesthetic agent, with a pleasant odor and low blood gas solubility, which allows rapid smooth inhalational induction with excellent recovery. Several studies have shown that induction of anesthesia after inhalation of sevoflurane is comparable with IV propofol.^{4,5}

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The aim of this study was to compare the conditions for LMA insertion following induction of anesthesia with inhalation of sevoflurane or IV induction with propofol.

MATERIALS AND METHODS

This is a prospective randomized double-blind clinical trial carried out from December 2008 to Jan 2010, In the Department of Anesthesia, Seth G.S. Medical College, Mumbai.

After informed consent, 60 ASA Grade I and II patients, aged between 18 and 60 years who are undergoing minor surgical procedures under general anesthesia. Both inpatients and day cases were included in this study. They were randomized into two groups of 30 each.

Group S: Sevoflurane group

Group P: Propofol group

Patients were excluded if they were predicted to have a difficult airway (Mallampatti Grade III or IV), had a history of GI reflux, were receiving anti-epileptic medication, had a history of cardiovascular, renal, hypertensive disease, pregnancy or known allergy to any anesthetic agent.

All the patients were kept on fasting for at least 12 h and the nil per oral status was confirmed before the induction of anesthesia. Patients were premeditated with inj. Ranitidine 50 mg and injection ondansetron 4 mg I/V. On arrival to operation room-IV, line was secured and monitors for electrocardiogram, noninvasive blood pressure (NIBP) and SPO₂ were connected and baseline vital data like heart rate (HR), NIBP, SPO₂ were recorded. Injection glycopyrrolate 0.2 mg was administered IV to all patients. All patients were preoxygenated for 3 min with 100% oxygen using a fresh gas flow of 8l/min. Patients were randomly allocated into Groups S and P.

Group P: Received propofol 2 mg/kg body weight. Increments of 10 mg of propofol were given if necessary. Propofol 200 mg in 20 ml mixed with 2 ml of 2% lignocaine to reduce pain on injection.

Group S: Sevoflurane 8% was introduced into the fresh gas flow of 8l of oxygen and patients were instructed to take a vital capacity breath and hold it as long as they could.

The point of start of injection of propofol or introduction of sevoflurane 8% was considered as starting point of induction. Their anesthesia circuit was primed with 8% sevoflurane with O₂ at 8 L/min.

Loss of eyelash reflex was considered as the desired endpoint for induction in both groups. Injection fentanyl 2 µg/kg was injected immediately after the loss of eyelash reflex after this jaw relaxation was assessed by anesthesiologist. If jaw relaxation was not adequate, it was reassessed after every 15 s. Once jaw relaxation was adequate, a standard LMA (LMA size #3 for women and #4 for men) lubricated with lignocaine jelly on its posterior surface was inserted using brains method by an experienced anesthesiologist.

The following data were recorded:

- Time taken from start of induction to loss of eyelash reflex, Jaw relaxation and successful LMA insertion.
- Number of attempts of LMA insertion.
- NIBP, HR, and SPO₂ were monitored from beginning of induction up to 5 min of induction.

The conditions of insertion of LMA were graded by an observer on a three-point scale using 6 variables, e.g., jaw relaxation, ease of LMA insertion, coughing, gagging, laryngospasm, and patient movement. Overall conditions for insertion of LMA were assessed as excellent, satisfactory or poor on the basis of total score obtained by summing up the individual scores of each component. Maximum score of 18 (Excellent - 18, satisfactory - 16-17, poor ≤16) is attained (Table 1).

Method of Statistical Analysis

The Excel and SPSS (SPSS Inc., Chicago) software packages were used for data entry and analysis. The results were averaged (mean ± standard deviation [SD]) for each parameter for continuous data and numbers and percentage for categorical data presented in The results were averaged (mean ± standard deviation [SD]) for each parameter for continuous data and numbers and percentage for categorical data was presented.

The results are analyzed by Student's *t*-test, Mann–Whitney test (non-parametric test), and Chi-square test.

Table 1: Grading of conditions for LMA insertion

Introduction of the LMA	3	2	1
Jaw opening	Full	Partial	Nil
Ease of insertion	Easy	Difficult	Impossible
Patient response	3	2	1
Coughing	Nil	Minor	Severe
Gagging	Nil	Minor	Severe
Laryngospasm	Nil	Partial	Total
Patient movements	Nil	Moderate	Vigorous
Total score			
18	Excellent		
16-17	Satisfactory		
<16	Poor		

LMA: Laryngeal mask airway

In all the above tests, $P < 0.05$ was accepted as indicating statistical significance.

OBSERVATION AND RESULTS

There was no statistical significant difference between the groups with respect to age, weight, ASA grade distribution.

The mean age in Group P was 34.86 ± 10.5 (SD) and in Group S, it was 37.06 ± 10.7 (SD), ($P = 0.21$). The mean weight in Group P was 53 ± 6.1 (SD) and in Group S, it was 55.8 ± 7.9 (SD), ($P = 0.12$).

The mean of number of attempts in Group P was 1.03 ± 0.18 (SD) and in Group S, it was 1.16 ± 0.37 (SD), ($P = 0.23$) statistical not significant (Graph 1).

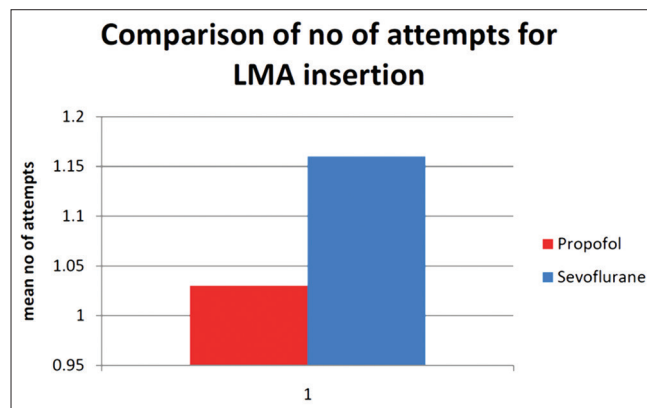
Inference

Time taken between two groups is compared by using Mann–Whitney test. Sevoflurane has taken a longer time for induction and LMA insertion (Table 2 and Graph 2). Time taken for the loss of eyelash reflex shows no

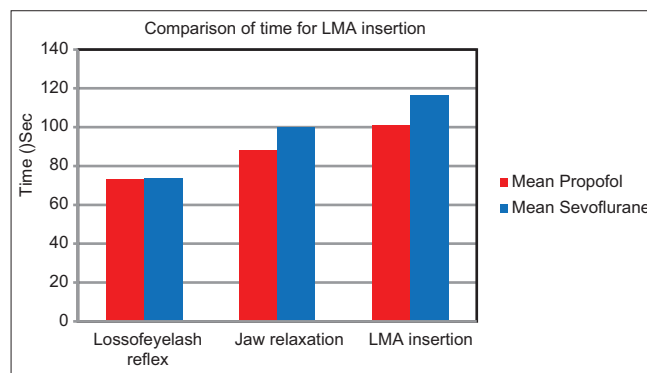
statistically significant difference between the two groups. Jaw relaxation was earlier in propofol group (88 ± 12.2) as compared to sevoflurane group (100.1 ± 7.48) with a ($P < 0.0001$), which is highly significant and LMA insertion was earlier in propofol group (101.2 ± 13.2) as compared to sevoflurane group (116.3 ± 7.06) with a ($P < 0.0001$) which is highly significant.

The overall insertion was excellent with propofol with 29 patients scoring 18 (Table 3). With sevoflurane, 24 patients had excellent conditions for LMA insertion, 2 patients had the satisfactory condition for LMA insertion, and 4 patients had poor conditions for LMA insertion when grading was done using 18 point score.

Both the groups exhibited stable hemodynamic profiles (Table 4). HR between two groups at 1 min after induction showed a fall with propofol ($P = 0.03$) which was statistically significant but clinically accepted. There was statistical significant difference in mean arterial blood pressure between the two groups after induction at 1 min ($P = 0.002$), at 2 min ($P = 0.004$), at 3 min ($P = 0.0005$), which are highly significant. Propofol group had a larger decline



Graph 1: Comparison of number of attempts for laryngeal mask airway insertion



Graph 2: Comparison of time of laryngeal mask airway insertion

Table 2: Comparison of time for LMA insertion between two groups

	Propofol			Sevoflurane			P value
	N	Mean	SD	N	Mean	SD	
Loss of eyelash reflex	30	73.5	12.8	30	74	8.34	0.85
Jaw relaxation	30	88	12.2	30	100.1	7.48	<0.0001
LMA insertion	30	101.2	13.2	30	116.3	7.06	<0.0001

LMA: Laryngeal mask airway, SD: Standard deviation

Table 3: Grading of conditions for LMA insertion between two groups

Parameter	Grade	Description	Group S	Group P
Jaw relaxation	3	Full	27	30
	2	Partial	03	00
	1	Difficult	00	00
Ease of LMA Insertion	3	Easy	25	29
	2	Difficult	05	01
	1	Impossible	00	00
Coughing	3	Nil	30	30
	2	Transient	00	00
	1	Persistent	00	00
Gagging	3	Nil	30	30
	2	Transient	00	00
	1	Persistent	00	00
Patient movement	3	Nil	30	30
	2	Moderate	00	00
	1	Vigorous	00	00
Laryngospasm	3	Nil	30	30
	2	Partial	00	00
	3	Total	00	00

LMA: Laryngeal mask airway

Table 4: Analysis of the hemodynamic parameters

	Time after the start of anaesthetic induction (minutes)					
	0	1	2	3	4	5
MBP						
Group P	93.7±6.6	84.4±5.7	81.6±4.3	78.5±6.3	78.4±6.7	78.4±6.5
Group S	90.4±6.2	88.8±6.7	85.6±5.12	84.0±5.0	82.0±5.74	81.4±4.7
P value	0.0531	0.004*	0.002*	0.0005*	0.06	0.10
Pulse rate						
Group P	81.0±7.3	78.5±8.4	77.2±9.1	77.8±8.9	76.9±8.8	75.4±9.1
Group S	83.4±8.6	83.0±7.6	81.0±10.6	79.0±8.8	79.7±8.8	79.4±8.5
P value	0.18	0.03*	0.43	0.89	0.27	0.11

*Significant P value, MBP: Mean arterial blood pressure

in MAP as compared to sevoflurane group. There is no statistically difference between two groups at 4 and 5 min.

DISCUSSION

Satisfactory insertion of LMA after induction of anesthesia requires a sufficient depth of anesthesia.⁶ Propofol is a common IV anesthetic agent used for LMA insertion because of its greater depressant effect on airway reflexes.³ Sevoflurane is suitable for inhalational induction technique even in high concentrations because of its low blood gas solubility and minimal respiratory irritant effect. The vital capacity induction technique with sevoflurane was used to make the technique similar to that of IV bolus injection of propofol.⁷

Comparison of Time Taken for LMA Insertion

In our study, mean time taken from induction to successful laryngeal mask insertion was significantly shorter with propofol compared with sevoflurane. With sevoflurane group, the LMA insertion has taken 116.3 ± 7.06 s while propofol has taken 101.2 ± 13.2 s, with a $P = 0.0001$ which is highly significant.

Jaw relaxation has taken a longer time in sevoflurane group (100.1 ± 7.4) s than propofol group (88 ± 12.2) s with $P = 0.0001$ which is highly significant.

Priya *et al.*,⁸ in their study noted that propofol is known to depress laryngeal reflexes facilitating LMA insertion. They concluded that propofol is better than sevoflurane for LMA insertion using the loss of eyelash reflex as the end point of induction probably due to better jaw relaxation. Even in our study propofol took lesser time for induction in comparison with sevoflurane.

Thwaites *et al.*,⁹ in their study observed that induction with sevoflurane was significantly slower when compared with propofol (mean 84 [SD24] s vs. 57 [SD11] s), but was associated with lower incidence of apnea and shorter time to establish spontaneous ventilation.

Lian *et al.*,⁴ in their study achieved insertion of LMA with sevoflurane in 127 s almost similar to the time taken in our study (117 s). They concluded that prolonged jaw tightness after sevoflurane induction of anesthesia may delay LMA insertion. According to them, propofol is known to have a relaxant effect on jaw muscles, whereas inhaled anesthetics may cause increased tone and spasticity. Therefore for a similar depth of anesthesia, there may be greater jaw relaxation with propofol.

Muzi *et al.*¹⁰ in their study reported jaw tightness after sevoflurane anesthetic induction, which resulted in failure to insert the LMA in several patients.

Analysis of Condition for LMA Insertion and Patient's Response

In this study, inadequate jaw relaxation was found in 3 patients in sevoflurane group. In the same patients, ease of LMA insertion was difficult requiring second attempt. The statistical analysis using Mann–Whitney test revealed no significant difference between the 2 groups. Coughing was found in 2 patients in sevoflurane group, but was statistically not significant.

Totally, 28 patients in propofol group had LMA inserted in first attempt and two patients in the second attempt. In sevoflurane group, 5 patients had LMA inserted in the second attempt, probably due to inadequate jaw relaxation. The mean number of attempts taken for LMA insertion in propofol group (1.03 ± 0.18) was less compared with sevoflurane (1.16 ± 0.37), but this was statistically not significant ($P = 0.23$).

The overall condition of LMA insertion was graded as excellent in all 29 patients belonging to propofol group. 24 patients in sevoflurane group had excellent conditions (score of 18). 2 patient in sevoflurane group had satisfactory condition (score of 17) and 4 patients had score of 16 with LMA insertion grading as poor.

In a similar study conducted by Priya *et al.*,⁸ features like coughing, gagging, and patient movements did not reach statistical significance. Priya *et al.* in their study noted that jaw relaxation with propofol was much better. With sevoflurane, they noted that induction took a longer time because sevoflurane has less relaxation properties when compared to propofol.

Lian *et al.*⁴ in their study found that more attempts at insertion of LMA were required in patients in sevoflurane group versus those in propofol group, they suggested that this was primarily because of incidence of initially impossible mouth opening.

Philip *et al.*¹¹ in their study noted more airway-related events (cough, hiccough) in the sevoflurane group and

more hemodynamic events in the propofol group which is consistent with our study. The airway related incidents in our study was more in sevoflurane group when compared to propofol group, but is not of any statistical significance. This cannot be commented as the study group is very small.

Other features like coughing, gagging, patient movements, and laryngospasm did not reach statistical significance in our study.

The depth of anesthesia between the two groups was not compared. However, a point to note is the difficulty of comparing the depth of anesthesia between inhaled and IV anesthetics.

The hemodynamic responses were stable for both the groups and clinically accepted. In our study, there was a statistically significant difference in mean arterial pressure in the propofol group at 1, 2 and 3 min after induction, which was comparable to the study by Thwaites *et al.*,⁹ Lian *et al.*,⁴ Priya *et al.*⁸ who also noted lower mean arterial pressure values in patients receiving propofol.

CONCLUSION

We found that propofol is superior to sevoflurane as sevoflurane takes longer time as compared to propofol for jaw relaxation as well as LMA insertion. The number

of attempts for LMA insertion was more in sevoflurane group. However, the hemodynamic status of the patient is better maintained with sevoflurane than with propofol.

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An Emergency Obstetric Hysterectomy in Modern Era: A Conventional Surgery Still Saves Lives

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Abstract

Background: The medical science is progressing day by day. There are invention and introduction of new drugs, equipments, and surgical techniques. However, if we analyze obstetrics and complications it is seen that still the conventional surgeries are useful in some emergencies and it is found to be lifesaving. The obstetric hysterectomy is one such surgery which is still used and is a lifesaving surgery.

Objective: The retrospective study was undertaken to evaluate the cases of emergency obstetric hysterectomy performed during last 1 year (January 2014 to December 2014) in tertiary Care Center at Government Medical College Akola, Maharashtra. It was especially done in Vidarbha region of Maharashtra to analyze these cases as it is a different geographical area. The incidence, indications, complications of the procedure, and the outcome (both maternal and fetal) was analyzed.

Materials and Methods: All the cases of emergency obstetric hysterectomies in last year were analyzed retrospectively. The data were collected from the hospital records, occupational therapy records, and operative notes.

Results: It was found that there were 3672 confinements in last year. Confinements include all the abortions, normal deliveries, and cesarean sections in the study period. There were 15 emergency hysterectomies performed which gives an incidence of 0.40%. It was found that as many as 60% of the cases were unregistered and unimmunized. The most common indication was rupture uterus. The second common was atonic postpartum hemorrhage. Most of the cases of rupture uterus were in previous cesarean cases. The mortality was seen only in one case.

Conclusion: The emergency obstetric hysterectomy should be a part of training in postgraduate studies. It is a surgery, which should be known to every obstetrician. The number of antenatal registrations should also increase for early detection and management of complications.

Key words: Emergency obstetric hysterectomy, Post-partum hemorrhage, Rupture uterus, Unregistered cases

INTRODUCTION

Obstetric emergencies are sometimes really catastrophic. Time really matters and every second is important to save the life of a patient. According to definition, obstetric

hysterectomy is a hysterectomy performed on a gravid uterus during pregnancy, during delivery or after delivery.

The first daring step was taken by Horatio Storer in 1869. This just revolutionized the management of a catastrophe to reduce the number of deaths.¹ His patient succumbed to death post-operatively. After few years, Eduardo porro performed a successful cesarean hysterectomy. His patient survived.

On analyzing last few years data, it is found that the main indications of obstetric hysterectomy now are:

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- Rupture uterus
- Uncontrolled hemorrhage
- Adherent placenta
- Sepsis.

Obstetric hysterectomy can be performed as a planned elective operation in conditions like morbidly adherent placenta (placenta increta, placenta percreta) pregnancy with carcinoma cervix, invasive mole, etc. During such a planned procedure blood, intensive care unit back up, help from other faculties like surgery and urology can be kept ready which reduces morbidity and mortality in these serious conditions.²

Emergency obstetric hysterectomy is more common in developing countries like India as:

- Negligence and unawareness of patients
- High number of unregistered pregnant patients
- Large number of home deliveries and deliveries unattended by trained personal.

This review gave us insight to understand and analyze the incidence, maternal profile, indications, and maternal outcome of obstetric hysterectomy from our area.

The incidence of obstetric hysterectomy is different in various hospitals due to difference in available facilities like trained personal at peripheral medical centers, quality of antenatal care, monitoring during labor and delivery, post-delivery care and hygiene, facility for blood transfusion, and quick and efficient transport.

MATERIALS AND METHODS

A total of 15 cases of emergency obstetric hysterectomies done during last 1 year (January 2014 to December 2014) in Government Medical College, Akola, Maharashtra were analyzed retrospectively.

The record of all the cases was obtained from admission register, indoor case sheets, operation theater record, post-operative ward, and mortality register. This data were analyzed for demographic features, risk factors, indications, postoperative complications, morbidity, mortality, and perinatal outcome.

RESULTS

Incidence

A total of 15 obstetric hysterectomies were done during last year among 3672 confinements giving an incidence of 0.40%.

Maternal Profile

Maternal demography shows that the cases were distributed among different age group. Most of them were in between 20 and 30 years. This was observed mostly during 2nd or 3rd pregnancy. Only one woman was a primigravida, whose hysterectomy was done due to severe sepsis. One was a grand multipara with her 5th delivery. Her hysterectomy was done for rupture uterus (Tables 1 and 2).

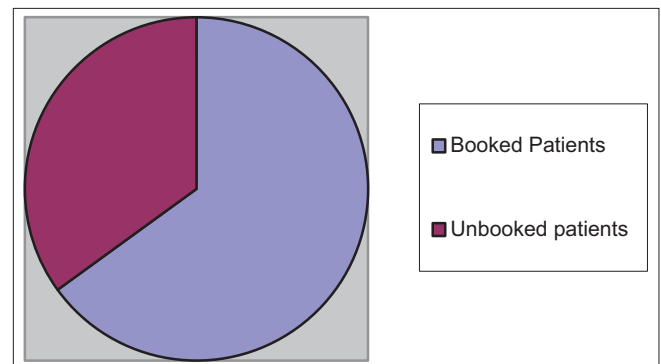
As many as 35% were unregistered for the antenatal care. Most of them were from the rural area and from very remote places which made access to a medical care difficult. However, there were very few which were unaware of the need for antenatal care and the need for hospital delivery (Graphs 1 and 2).

Table 1: Age-wise distribution of patients

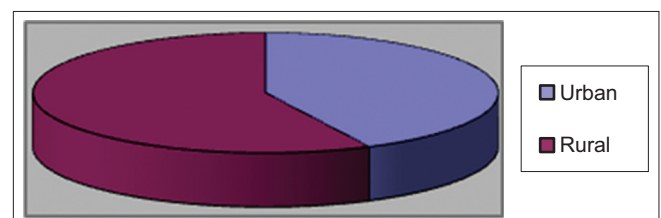
Age in years	Number of patients	Percentage
<20	0	0
20-25 years	4	26.66
25-30 years	6	40
30-35 years	3	20
More than 35 years	2	13.33
Total	15	100

Table 2: Distribution of patients according to parity

	Number of patients	Percentage
Primi	1	6.66
Second para	7	46.66
Third para	4	26.66
More than 3 para	3	20



Graph 1: Percentage of booked and unbooked patients



Graph 2: Percentage of rural and urban population

During the analysis of our total 15 obstetric hysterectomies, it was found that there were 3 hysterectomies among 2570 vaginal deliveries giving an incidence of 0.11%. As many as 10 hysterectomies were performed during 1102 cesarean sections, an incidence of 0.90%. Almost all cases were with the history of prior one or two cesarean sections. One hysterectomy was done for invasive mole and one was done 15 days after last cesarean section for severe uterine sepsis leading to torrential secondary hemorrhage.

Thus, this finding suggests that reducing primary cesareans will in turn reduce the number of uterine ruptures, which in turn will reduce the incidence of obstetric hysterectomy as well (Table 3).

Indication

Rupture of uterus was found to be the most common indication of emergency obstetric hysterectomy. Two of the three patients of vaginal delivery had lateral wall rupture due to obstructed labor. In these women, there was a delay in referral to a tertiary care center. Among the cases of cesarean deliveries, five women had previous scar rupture with profuse bleeding, which necessitated hysterectomy. One patient had previous two cesarean sections with placenta percreta with the involvement of bladder. In this patient, planned cesarean with obstetric hysterectomy was performed.

However, surprisingly remaining 4 patients with previous cesarean delivery had a lateral uterine wall rupture. The injudicious use of utero-tonics (like misoprostol or oxytocin) was noticed among all of these 4 cases. This shows that not only the previous uterine scar, but also the injudicious use of uterotonic leads to severe maternal morbidity (Figures 1-4).

In the patient of the above photograph, the tear in the uterus involved the lateral wall of the uterus with the bladder and ureters also. She was the one whom we lost in spite of all the measures.

Postpartum hemorrhage was the second common cause. Three patients had atonic PPH that did not respond to medicines and routine conservative methods and five had both atonic and traumatic type of PPH (Graph 3).

In women with mixed PPH in the beginning, the bleeding was due to trauma due to extensive laceration initially, but

later as anoxia supervened. This led to secondary atonicity. There was a broad ligament hematoma in few women with rupture uterus. This was also tackled during obstetric hysterectomy with internal iliac artery ligation.

In the patient of uterine inversion, the inversion was corrected under anesthesia but patient kept on bleeding hence her obstetric hysterectomy was performed (Photo 4 and Graph 4).

Risk Factors

Analyzing the risk factors guides us for better obstetric management. Previous uterine scar increases the risk of repeat cesarean as well as the incidence of morbidly adherent placenta. Therefore, the incidence of primary cesarean should be reduced and cesareans should be done only for absolute indications.

Type of Hysterectomy

Due to poor general condition in patient, a total hysterectomy could be performed only in 40% patients and in 60% cases, a sub-total hysterectomy was done.



Figure 1: Amount of hemoperitoneum



Figure 2: Rupture in lateral wall of uterus

Table 3: Distribution of cases of obstetric hysterectomy

Event	Following vaginal deliveries	Following cesarean section	Invasive mole	Sepsis
Total no of cases	2570	1102	1	1
Number of obstetric hysterectomies	3 (0.11%)	10 (0.90%)	1	1

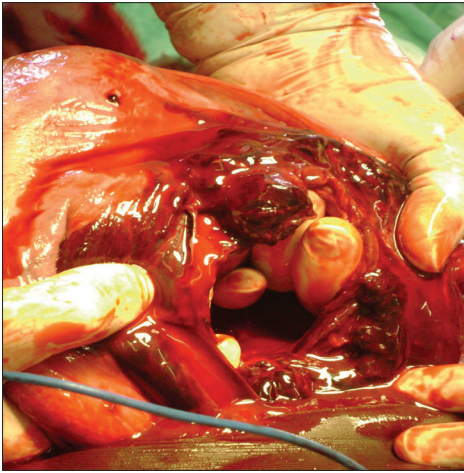


Figure 3: Rupture in uterus extending from lateral wall through cervix and vagina

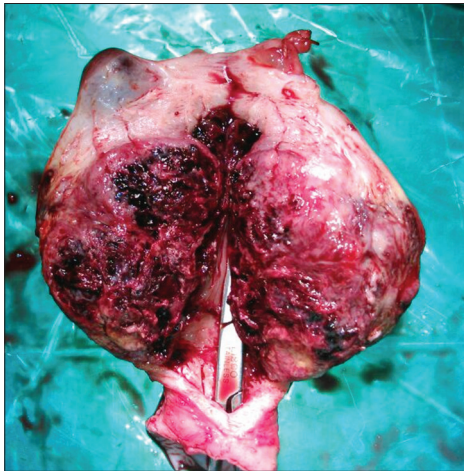


Figure 4: Hysterectomy for invasive mole

Post-operative Complications

All cases needed transfusion with blood and blood products. Few patients needed the support of dopamine drip due to hypotension. Oxytocin and prostaglandins (both PGE1 and PGF2) were used in 30% cases to manage atonic PPH. B-Lynch type of compression sutures were used in one patient. Internal iliac artery ligation was done in 6 cases (5 of rupture and 2 of atonic PPH). All patients were kept in the intensive care unit for critical care.

Other postoperative complications causing maternal morbidity were:

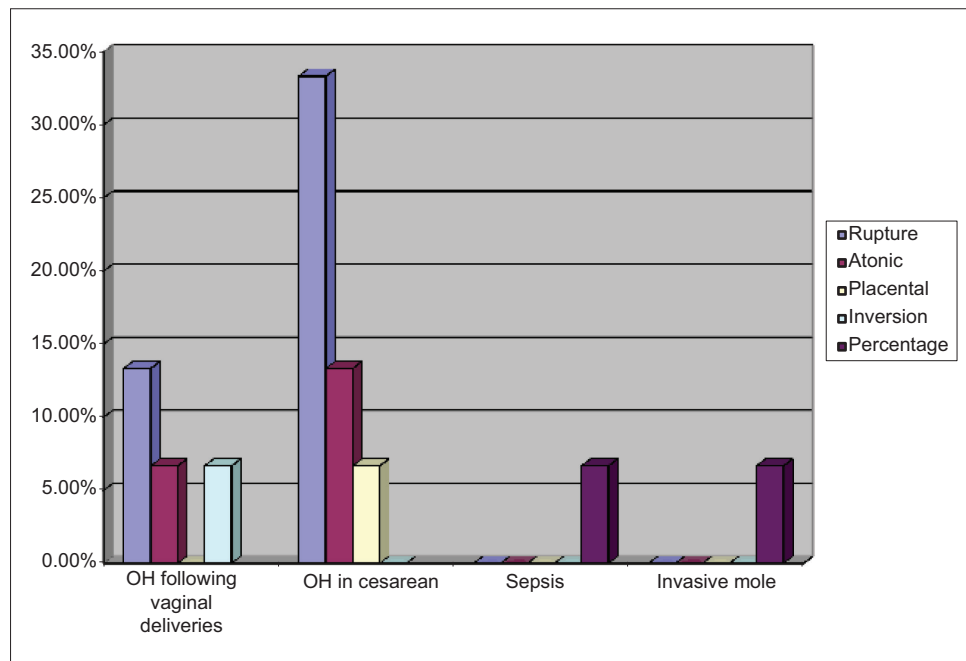
- Infection (fever, respiratory involvement, wound infection)
- Bladder injury in three
- Coagulopathy in one.

Only one woman died and this was due to hypovolemic shock because of uterine rupture. She was referred from far distance and one was delayed referral (Table 4).

Perinatal Morbidity

About 12 of 15 cases resulted in a perinatal loss. In all the patients of the rupture uterus, the baby was lost.

The patients have to be hospitalized for about 2 weeks on an average. Only two patients were kept admitted for more than 20 days. Of these, one had sepsis and one had deep vein thrombosis. Delay in referrals contributed to their moribund condition.



Graph 3: Indication of obstetric hysterectomy

DISCUSSION

Ever since Horatio Storer performed the first Cesarean hysterectomy in 1869, the procedure has been widely used to save a maternal life.¹ In our present study, we found the incidence of obstetric hysterectomy is 0.40%, which is similar to that of Sinha and Mishra² (0.38%) and Mantri *et al.*³ (0.32%). However, Devi *et al.*,⁴ Agashe *et al.*⁵ and Pawar and Shrotri⁶ reported very low incidence of 0.0779%, 0.056% and 0.09% respectively. Sahu *et al.*⁷ reported an incidence of 0.2006% and Gupta *et al.*⁸ 0.26%.

The comparison of the few studies is given in Table 5.

In our study, the most common indication for obstetric hysterectomy was rupture of uterus. PPH and morbidly

adherent placenta were next common indications. Rupture of uterus was found to be significantly associated with grand multiparity, scarred uterus, unsupervised labor, injudicious use of oxytocin, and low socio-economic status of the women.

Rapidly increasing incidence of cesarean section is a contributing high-risk factor as reported by Prabhjot and Wadia.⁹ Stanco *et al.*¹⁰ found that previous cesarean section increases the risk of obstetric hysterectomy by 15-20 times.

Our study showed the incidence of obstetric hysterectomy following vaginal delivery of only 0.11% and that following cesarean section was 0.90%. That means it is approximately nine times. Almost very similar results were seen in the study of Devi *et al.*⁴ and of Pawar and Shrotri.⁶

In our study rupture uterus (50%) was the most common indication. In other studies also rupture uterus was the most common indication as shown by Sinha and Mishra² (69.9%), Mantri *et al.*³ (67.28%), Pawar and Shrotri⁶ (40%), Sahu *et al.*⁷ (38.8%), Gupta *et al.*⁸ (69.7%), Kore *et al.*¹¹ (38.2%) and Pati *et al.*¹² (64.4%).

Only one obstetric hysterectomy was done for morbidly adhesion of placenta in our study. However, it accounted for 26% in the study of Devi *et al.*

Sometimes a subtotal hysterectomy has to be done as it is quicker and hence preferable in the moribund patient. However, in case of low-lying placenta a total hysterectomy is needed Kore *et al.*¹¹ reported 38% total hysterectomies.

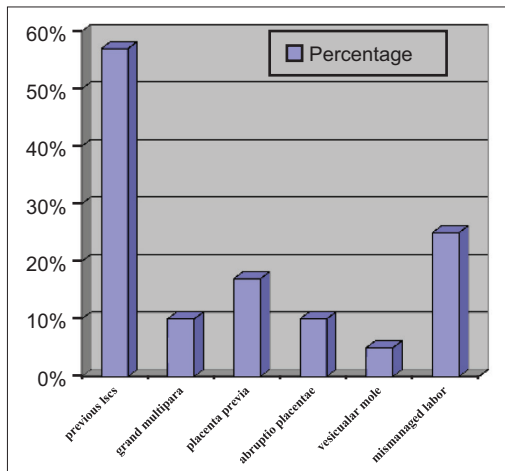
There was only one maternal mortality in our study which contributes to 6.66%. It was found similar to that reported by Gupta *et al.*,⁸ Kore *et al.*¹¹ and Pawar and Shrotri⁶.

CONCLUSION

The analysis of indications of obstetric hysterectomy and measures to improve the hygiene, awareness among the populations and need of registration for ANC care will definitely help to improve the outcome.

The number of first cesarean should be reduced to improve future outcome. Learning the operative skills for ligation of uterine and internal iliac artery and B-Lynch suture will also help in reducing obstetric catastrophes.

Though a good and timely surgery can save life, it is resorted to very late as it sacrifices patient's future reproductive capacity. Delay in the decision can sacrifice her life itself.



Graph 4: Graph analyzing the risk factors

Table 4: Postoperative complications

Causes	Number	Percentage
Febrile morbidity	10	66.6
Wound infection	5	33.33
Urinary tract infection	11	73.3
Septicemia	1	6.66
Maternal mortality	1	6.66
DIC	1	6.66
Shock	4	26.6

DIC: Disseminated intravascular coagulation

Table 5: Comparison with other reported series

Authors	Incidence (%)	Major indications	
		Rupture uterus	PPH
Devi	0.07	23	19.2
Mukherjee <i>et al.</i>	0.15	38.3	14.9
Kore <i>et al.</i>	0.18	38.2	32.3
Gupta <i>et al.</i>	0.26	69.7	9.7
Kumari Archana <i>et al.</i>	0.73	75	8.03
Present study	0.37	50	25

PPH: Post-partum hemorrhage

Hence, timely decision and good surgical skill is needed to have a good outcome.

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Evaluation of Pre-emptive Gabapentin 600 mg for Postoperative Analgesia for Laparoscopic Cholecystectomy

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Abstract

Background: Pre-emptive analgesia is a safe and new approach for alleviating post-operative pain. Gabapentin is tried in a wide range of doses, but results are variable. The present study evaluated the analgesic efficacy of pre-emptive gabapentin 600 mg for postoperative analgesia for laparoscopic cholecystectomy.

Materials and Methods: A total of 80 patients, aged 18-60 years, of American Society of Anesthesiologists Grade I or II, were allocated to Group G (gabapentin) or Group P (placebo). Patients in Group G received 600 mg gabapentin capsule orally 2 h prior to laparoscopic cholecystectomy, while patients in Group P received placebo. Amount of total intraoperative fentanyl required, duration of effective analgesia, number of tramadol doses required in 24 h post-operatively, and any untoward effects were assessed.

Results: Both groups were comparable in demographic data, duration of surgery, and average intraoperative fentanyl requirement. The "duration of effective analgesia" in Group G was 978.8 ± 82.43 min (Mean \pm standard error of mean [SEM]) and that in Group P was 269.9 ± 62.68 min (Mean \pm SEM). Numbers of tramadol doses required in 24 h were significantly higher in the placebo group than Gabapentin group. Nausea and vomiting were significantly higher in the placebo group (55% and 27.5%, respectively) than gabapentin group (25% and 10% respectively).

Conclusion: Pre-emptive use of 600 mg of oral gabapentin given 2 h prior to laparoscopic cholecystectomy, gives clinically adequate analgesia up to 978.8 ± 82.43 min (Mean \pm SEM). The incidence of side effects was minimal.

Key words: Gabapentin, Laparoscopic cholecystectomy, Postoperative analgesia, Pre-emptive analgesia

INTRODUCTION

Postoperative pain is a function of various factors like site of surgery, site of incision, extent of tissue trauma, mobility of site of surgery, and its relation with respiration. Gains in controlling pain would aid in early mobilization, nutrition, and limited hospital stay improving patient satisfaction.

Pre-emptive analgesia is the administration of analgesic before occurrence of the painful event. It is very simple and effective method.¹

Gabapentin is a second-generation anticonvulsant used in the treatment of chronic neuropathic pain.² However, growing evidence suggests that its perioperative administration also provides postoperative analgesia. Laparoscopic surgeries allow early mobilization, early return to normal physiology, and early discharge from hospital; so it obviously compels the need of analgesia congruent to these factors.³ Gabapentin claims properties, which are suitable for advantages of laparoscopy.

Significant numbers of randomized controlled trials using gabapentin have been performed for various surgeries.

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Some studies claim good analgesic efficacy,⁴ while others state only marginal gains.⁵ There is variability in doses (300-1200 mg) and results.⁶⁻⁹

Hence, the present study was designed to evaluate effects of gabapentin as a pre-emptive analgesic contributing to postoperative analgesia in cases of laparoscopic cholecystectomy.

MATERIALS AND METHODS

The study approved by Institutional Ethical Committee, was carried out from June 2010 to June 2013. This prospective, double-blind, randomized controlled study consisted of 80 patients aged 18-60 years of both genders, scheduled for elective laparoscopic cholecystectomy under general anesthesia with ASA physical Status I and II. Written informed consent was taken. Patients with uncontrolled systemic medical illnesses, chronic use of any analgesic or gabapentin, associated pancreatitis, history of suspected allergy to gabapentin or pregabalin, obesity, indications of cholecystectomy other than cholelithiasis, and patients on antiepileptic medication were excluded from study.

Preoperatively detailed medical, surgical, obstetric, and allergic histories were noted. Detailed general and systemic examination was done. Investigations like hemogram, blood sugar level, blood urea level, serum creatinine, liver function tests, urine routine, and electrocardiography (ECG) were checked. Demographic data like age and weight (in kg) were obtained. The patients were familiarized with the 10 cm visual analogue scale (VAS) for postoperative pain assessment.

Considering 40% increase in duration of effective postoperative analgesia to be clinically relevant, with a power of 95% and probability of Type 1 error 5% ($\alpha = 0.05$), we required 39 patients in each group. We took 40 patients in each group considering the possibility of dropouts.

Patients were randomly allocated to two groups by a computer-generated random table by another anesthesiologist, who was unaware of the study protocol and did preanesthesia check-up. The primary anesthesiologist who was unaware of premedication drug did observations.

Group G received gabapentin 600 mg oral capsule and Group P received placebo (yeast) oral capsule 2 h prior to surgery with sips of water. Along with this, patients were asked to take their routine medicines if any, like antihypertensives if not contraindicated. Patients were kept fasting for 6-8 h prior to anesthesia. Hydration was done

with 500 ml ringer's lactate solution over 4 h preoperatively to keep patient euhydrated with balanced salt solution. Each patient was given intravenous ranitidine 50 mg and metoclopramide 10 mg, 30 min prior to surgery.

On arrival in the operation theatre, baseline monitoring of ECG, non-invasive blood pressure oxygen saturation by SpO₂, and respiratory rate were started. Preoxygenation was done with 100% oxygen till SpO₂ of 98-100% was achieved. Sedation was given with midazolam 0.05 mg/kg and fentanyl 2 mg/kg intravenously. Induction was done with propofol 2 mg/kg. Intubation was done smoothly under the effect of suxamethonium 2 mg/kg. Maintenance was achieved with oxygen + 66% nitrous oxide with isoflurane [MAC 1-1.2%] to keep stable hemodynamics. Boluses of fentanyl in increments of 20 mg each were used to keep hemodynamics within 20% variation from preoperative vital parameters. No other analgesic was given. Total intraoperative requirement of Fentanyl was noted. Muscle relaxation was achieved with vecuronium 0.1 mg/kg. Top-up doses of vecuronium were given at every 30 min interval or when respiratory attempts were noted on capnography, whichever is earlier. Ventilation was done in closed circuit with intermittent positive pressure ventilator in pressure-controlled mode (P_{max} 20-22 cm of water). Intraoperative continuous monitoring was done with pulse rate, non-invasive blood pressure, ECG, saturation of oxygen in SpO₂, end-tidal carbon dioxide (EtCo₂), respiratory rate, airway pressure and volume, FiO₂, and respiratory gas monitoring.

Postoperatively neuromuscular blockade was reversed with neostigmine 0.04 mg/kg and glycopyrrolate 8.0 mg/kg. Extubation was done when spontaneous respiration was adequate and adequate muscle tone (head lift of 5-10 s) was achieved. No additional systemic analgesic was given neither any local analgesic infiltration was used.

The anesthetic and surgical techniques were standardized for all patients. Average duration of surgery noted. Postoperatively pain monitoring was started immediately and done 1 h by VAS scores till patient complained of pain of VAS ≥ 4 . At that time injection tramadol, 50 mg slow bolus was given intravenously. VAS score assessment was done then 2 h or when patient complained of pain, till 24 h. Additional doses of tramadol 50 mg were given whenever VAS ≥ 4 . Numbers of such tramadol doses were noted up to 24 h. No other analgesic or sedative was given during this period. Since anesthesia sheet was not attached to case sheet, observer was not able to identify the group to which patient belongs. Side effects like nausea, vomiting, drowsiness, giddiness, itching, and their time of occurrence were noted. Nausea and vomiting were treated with intravenous ondansetron 4 mg.

The “duration of effective analgesia” was considered to be the time interval between the end of anesthesia (extubation) and the time of first requirement of tramadol dose at VAS ≥ 4 .

All data were analyzed to compare the duration of effective analgesia, total intraoperative Fentanyl requirement, number of tramadol doses up to 24 h, and incidence of side effects between two study groups.

Statistical Analysis

The results obtained in the study are presented in a tabulated manner and analyzed using Statistical Package for Social Sciences software (version 11.5 for MS windows). The parameters were represented by mean value \pm standard error of mean (SEM). The statistical significance in mean difference was performed by using “Chi-square test” for age, sex, weight, ASA class number of tramadol doses, and side effects; and “independent sample *t*-test” for average duration of surgery, intraoperative fentanyl requirement, and duration of effective analgesia. A $P < 0.05$ was considered significant and < 0.001 as highly significant.

RESULTS

Demographic parameters such as age groups, sex, weight, ASA class, and average duration of surgery were comparable in both groups (Table 1).

The intraoperative fentanyl requirement was measured to find out whether pre-emptive gabapentin gives clinically effective operative analgesia. Total dose of intraoperative fentanyl required was 129.5 ± 3.986 (mean \pm SEM) micrograms in gabapentin group and 137.4 ± 3.819 (mean \pm SEM) micrograms in the placebo group. The P value obtained by using independent sample *t*-test was 0.158; it was non-significant, indicating that average

intraoperative fentanyl requirement was not significantly different between two groups.

Duration of effective analgesia was significantly greater in Gabapentin group (978.8 ± 82.43 min [mean \pm SEM]) as compared to placebo group (269.9 ± 62.68 min [mean \pm SEM]). P value obtained by independent sample *t*-test was <0.0001 that is highly significant. This suggests that gabapentin definitely provides a longer duration of postoperative analgesia.

We measured the number of tramadol doses, to evaluate whether the residual analgesic effect of gabapentin remains up to 24 h. Placebo group required significantly higher tramadol doses as compared to gabapentin group. About 57.5% patients in the gabapentin group required no dose of tramadol and they were discharged home successfully after 24 h. 37.5% patients in gabapentin group required a single rescue analgesic dose of tramadol and only 5% patients required 2 doses. Not a single patient in gabapentin group required more than 2 tramadol doses (Table 2).

In the placebo group, about 55% patients required 2 tramadol doses in 24 h. 10% patients required 3 and 7.5% patients required 4 tramadol doses in 24 h. Due to such higher doses of tramadol, significantly higher proportion of patients from the placebo group had nausea (55%) and vomiting (27.5%) as compared to gabapentin group. This also prolonged the regular diet resumption and mobilization. The incidence of somnolence, giddiness, and itching were not significantly different between two study groups (Table 3).

DISCUSSION

Management of postoperative pain is a leading concern of all anesthesiologists. Though laparoscopic surgeries are said to have less post-operative pain, patients do have considerable pain after laparoscopic procedures. Laparoscopy is definitely beneficial for cholecystectomy

Table 1: The comparison of demographic parameters between two groups

Parameters	Group G (n=40) Gabapentin N (%)	Group P (n=40) Placebo N (%)	P value
Age group (years)			
<30	8 (20.0)	8 (20.0)	0.624
30-39	10 (25.0)	12 (30.0)	
40-49	9 (22.5)	6 (15.0)	
50-59	5 (12.5)	9 (22.5)	
≥ 60	8 (20.0)	5 (12.5)	
ASA1:ASA2	19:21	23:17	0.3825
Male:Female	13:27	18:22	0.251
Weight (in kg) (mean \pm SEM)	65.58 \pm 9.98	64.38 \pm 8.47	0.589
Duration of surgery (in minutes) mean \pm SEM	72.4 \pm 3.55	76.2 \pm 3.67	0.456

P value more than 0.05 is non-significant, SEM: Standard error of mean

Table 2: The comparison of use of tramadol in 24 h between two groups

Parameter	N (% of patients)		P value
	Group G (n=40) Gabapentin	Group P (n=40) Placebo	
Number of tramadol doses used in 24 h			
Nil	23 (57.5)	4 (10.0)	$P < 0.0001$
One	15 (37.5)	7 (17.5)	0.0452
Two	2 (5.0)	22 (55.0)	$P < 0.0001$
Three	0	4 (10.0)	0.0402
Four	0	3 (7.5)	0.0775

$P < 0.05$ is significant

Table 3: The comparison of side effects between two study groups

Parameter	N (%) of patients		P value
	Group I (n=40) gabapentin	Group II (n=40) placebo	
Side effects			
Nausea	10 (25.0)	22 (55.0)	0.006 (significant)
Vomiting	4 (10.0)	11 (27.5)	0.0450 (significant)
Somnolence	1 (2.5)	0	
Giddiness	0	0	
Itching	0	0	

$P < 0.05$ is significant

and it can actually make the procedure a day case if adequate analgesia is provided. A qualitative and quantitative review performed by Steen Moiniche *et al.*, showed poor efficiency of pre-emptive treatment with surgical wound infiltration, thoracic epidural analgesia, postoperative opioids, NSAIDS, and intraperitoneal instillation of bupivacaine.¹

Pre-emptive use of gabapentin has gained widespread attention recently because of its ease of administration, fewer side effects, and favorable results in various procedures.^{8,10,11} Gabapentin does not enhance bleeding and has no effect on the gastric mucosa, platelets, and renal function like NSAIDS. It is not associated with severe nausea -vomiting, heavy sedation, and respiratory depression like opioids. Its perioperative administration is efficacious for preoperative anxiolysis,¹² attenuation of the hemodynamic response to laryngoscopy and intubation,¹³ and preventing chronic post-surgical pain and postoperative delirium.⁷ Thus, Gabapentin has peculiar advantages for ambulatory anesthesia and surgery.

In literature, wide range of doses of gabapentin have been studied preemptively for abdominal surgeries like hysterectomy and for superficial surgeries involving more subcutaneous dissection like mastectomy. Some studies used higher doses like 1200-1600 mg.^{7,8,12,14} These studies claimed effective postoperative analgesia and found no significant difference in gabapentin and control group, in the incidence of side effects like dizziness or sedation in spite of such a higher dose. However, the significant dizziness was observed with single 1200 mg dose given 1 h prior to surgery in a study by Turan *et al.*,¹⁵ which might be due to a higher dose. Very few studies with pre-emptive gabapentin are available for laparoscopic surgeries. Of these, one by Pandey *et al.* claimed effective analgesia after laparoscopic cholecystectomy with 300 mg dose;⁶ but same dose given 1 h prior to similar procedure did not prove effective in study done by Gregg *et al.*⁵ Thus efficacy of pre-emptive gabapentin is not much explored in laparoscopic surgeries. Moreover, the available study

results are not consistent. Hence, we decided to evaluate whether pre-emptive gabapentin 600 mg can alleviate the postoperative pain of laparoscopic cholecystectomy.

Absorption kinetics of gabapentin is dose dependent, possibly due to a saturable transport system. The bioavailability of a single 300 mg dose is 60% and that of single 600 mg dose is 40%. It decreases with an increasing dose,⁶ so we selected 600 mg dose; as is found to be adequate in controlling postoperative pain in the literature.^{11,16,17} Furthermore, it prevents side effects produced by higher doses like vomiting, dizziness, etc. which defeat the purpose of making this procedure a day case.

We selected cases for only laparoscopic cholecystectomy, so that the kind of pain and severity of pain will not vary much in individual patients, and this will minimize subjective variation in pain assessment.

Peak plasma levels of gabapentin of 2.7-2.99 mg/l are achieved 3-3.2 h after ingestion of a single 300 mg capsule. It undergoes first order kinetic elimination. The elimination half-life of gabapentin is between 4.8 and 8.7 h.¹⁸ Considering this pharmacokinetics of gabapentin; duration of surgery, and time of administration of drug are important determinants of postoperative analgesia. We gave 600 mg of oral gabapentin 2 h (120 min) prior to induction and average duration of surgery was 72.4 ± 3.552 min. This period together constitutes around 3 h 15 min, which is similar in both gabapentin and placebo groups. This explains that during intraoperative period, the effective plasma concentrations of gabapentin were probably not achieved, so intraoperative fentanyl requirement was not found to be significantly different between two study groups.

We found significantly lower incidence of nausea and vomiting in the gabapentin group. This can be due to lower requirement of tramadol doses in this group as well as antiemetic action of gabapentin.¹⁹

Mathiesen *et al.*²⁰ performed the systematic review on procedure-specific effects of gabapentin in postoperative pain. They demonstrated that preoperative gabapentin varying from 300 mg to 1200 mg reduces 24-h postoperative opioids consumption for patients in abdominal hysterectomy and spinal surgery. An improvement in the incidence of nausea was demonstrated for abdominal hysterectomy patients, whereas no other side effects (vomiting, dizziness, sedation) showed significant differences between treatment groups.

Dahl *et al.*⁴ summarized in their review that postoperative pain may be considered as transient or reversible type

of “neuropathic” pain. Despite differences in surgical procedures, general anesthetics and use of intraoperative opioids, a significant effect of gabapentin on postoperative analgesic requirements during the first 24 h was observed in 6 out of 7 studies, while analgesic requirement was reduced from postoperative day 2-10 in the study by Fassoulaki *et al.*²¹ The inconsistency across studies in the magnitude of analgesic effect of gabapentin may be a function of different dosing, regimens, and type of surgeries.^{4,6,12,19,20}

Limitation of current study design is that we found a wide range of “durations of effective analgesia” with gabapentin, minimum being 120 min to maximum of 1440 min. Hence, the standard deviation is also more. This typical observation of skewed readings about gabapentin is also observed in other studies.¹⁵ It means gabapentin may lack the specificity of potency of analgesic effect. Further research is required for its analgesic and safety profile in other major surgeries.

The antihyperalgesic effects of gabapentin result from an action at the $\alpha_2\delta$ subunit of voltage dependent calcium channels, which are up regulated in the dorsal root ganglia and spinal cord after peripheral injury.²² Antiallodynic effect of gabapentin result from antagonism of NMDA receptor and calcium channel blockade.²³ It also inhibits central neuronal sensitization and is the rationale for its use as a pre-emptive analgesic in the treatment of acute postoperative pain.²⁴ Thus, pre-emptive gabapentin definitely has a unique position in multi-modal approach for postoperative analgesia.²⁵

CONCLUSION

Gabapentin given 2 h prior to laparoscopic cholecystectomy as a pre-emptive analgesic in single 600 mg oral dose definitely provides effective postoperative analgesia.

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Assessment of Oral Hygiene Knowledge, Attitude, and Practices among Engineering Students in North Bangalore: A Cross-sectional Survey

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Abstract

Introduction: Oral health is a vital component of the general health of an individual that influence on one's general quality of life and well-being. Enhanced oral health can be achieved with increased awareness and better practices. Young adults encounter a number of issues of late teenage that affects oral health.

Aim: The aim of the study was to assess the knowledge, attitude, and practices of oral hygiene among 17-20 year old engineering students of North Bangalore, India.

Materials and Methods: A cross-sectional descriptive study was conducted among 500 engineering students of North Bangalore. Pre-tested structured closed-ended questionnaire, comprising of 21 multiple choice questions, was self-administered to assess their knowledge, attitude, and practices toward oral hygiene. On the basis of the responses received through questionnaires, the data obtained were analyzed by using statistical software package SPSS version 17.0 and $P < 0.05$ was considered statistically significant.

Results: Among the 500 participants, according to 93% of them, oral health is important for overall health. 67% brush their teeth twice daily and 30.8% brush only once in a day. The difference between males and females for brushing their teeth was statistically significant ($P = 0.0224$). 64.6% used tongue cleaner and only 6% used dental floss. 65.2% students recognize tooth decay as a black spot and a hole in the tooth and 21.4% identifies it by pain. According to 43.8% participants, dental visits are needed only when there is a problem and 33.0% were aware about the significance of dental visits at least once in 6 months.

Conclusions: Awareness of studied subjects about oral hygiene stands satisfactory. Knowledge about dental floss and identification of tooth decay was inadequate. Oral health promotion programs are needed to improve oral health knowledge, attitude, and practices of the students.

Key words: Attitude, Knowledge, Oral hygiene, Young adults

INTRODUCTION

It has been established that optimal health cannot be attained or maintained independent of oral health.^{1,2}

Oral health is the standard of health which enables an individual to eat, speak and socialize without active disease, discomfort or embarrassment and which contributes to general well-being.³ Oral disease qualifies as major public health problems owing to their higher prevalence and significant social impact.⁴ Improvement in oral health-related knowledge is considered to be an essential prerequisite for improving oral health in a community.²

The primary concern of the dental professional should be to impact a positive oral health, knowledge, and behavior in the society.⁵ Knowledge acquisition regarding oral health

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involves complex cognitive processes: perception, learning, communication, association, and reasoning.⁶ Studies have shown that there is an association between increased knowledge regarding oral hygiene and better oral health.^{7,8} Those who have assimilated the knowledge and feel a sense of personal control over their oral health are more likely to adopt self-care practices. Developing such knowledge plays a key role in improving the oral health.⁹

An attitude is a relatively enduring organization of beliefs around an object, subject or concept which predisposes one to respond in some preferential manner. Attitude is an acquired characteristic of an individual. People demonstrate a wide variety of attitudes toward dental care and dentists. These attitudes naturally reflect their own experiences, cultural perceptions, familial beliefs, and other life situations and they strongly influence the health status of the oral cavity.¹⁰⁻¹³

Dramatic change in the trend of oral diseases may be attributed to modification in the dietary habits, improved oral hygiene practices, effective use of fluorides, and establishment of community preventive programs.¹⁴ Along with this, a notable improvement in the level of oral health awareness, dental health knowledge, and attitudes among the young adults in developed countries has been cited as an important contributing factor for improved oral health.¹⁴

The young college students play a vital role in health promotion and preventive information dissemination among the family and their society. It is therefore important that their own oral health knowledge is good. Apart from that, their oral health attitude and practices conforms to the expectation of the population. They play a vital role in health promotion and preventive information dissemination among the family and their society. The booming young engineering students are not exposed to health care knowledge as medical professionals. These 17-20 years old youngsters are filled with avid quests for intimate relationships and other major commitments involving career and life goals. They encounter a number of issues of late teenage, i.e., peer pressure, change in food habits that cumulatively affects oral health. Bangalore is the capital of Karnataka State and a hub of academic institutions, having multicentric students, coming from different places. Hence, the purpose of the study was to assess the knowledge, attitude, and practice of oral hygiene among 17-20 years engineering college students of North Bangalore, India.

MATERIALS AND METHODS

The present study was an observational, descriptive, cross-sectional survey. It was conducted among 17-20 years old

1st year engineering students of North Bangalore. The sampling technique used in the study was, simple random sampling method (for selection of the engineering college) followed by opportunity sampling (for selection of the participants). Engineering college was selected using Simple Random Sampling method from North Bangalore Engineering colleges. All the first year students who were present on the day of survey ($n = 500$) were included in the study. Permission to conduct this study was obtained from the concern authorities of the college, who in turn, through a circular, notified students about the intent of the study. The ethical clearance was obtained. Pilot study was conducted on 50 students for pre-testing of the questionnaire and to determine feasibility of the study.

The study involved self-administration of pre-tested structured closed-ended questionnaire, to each student in their classrooms. Questionnaire consisted of 21 multiple choice questions to evaluate knowledge (7 questions), i.e., how do they notice tooth decay, role of fluoride in preventing tooth decay, where do they learn on oral health, etc., attitude (4 questions), i.e., importance of oral health, why should one take care of teeth and gingiva, how often one should visit dentist etc., and practices (10 questions), i.e., brushing frequency and duration, period of changing of toothbrush, use of adjunct oral hygiene aids, frequency of eating sweets, etc. The students received a full explanation on how to fill in the questionnaire. The students were asked to fill in the questionnaire without discussing with each other and an average time of 20 min was taken to complete the procedure. It was made sure that none of the questions were left unattempted. Anonymity of the respondents was assured. The students were then provided with Health Education regarding Oral Hygiene Practices using Audio Visual aids. The study was completed within a period of 2 months.

Statistical Analysis

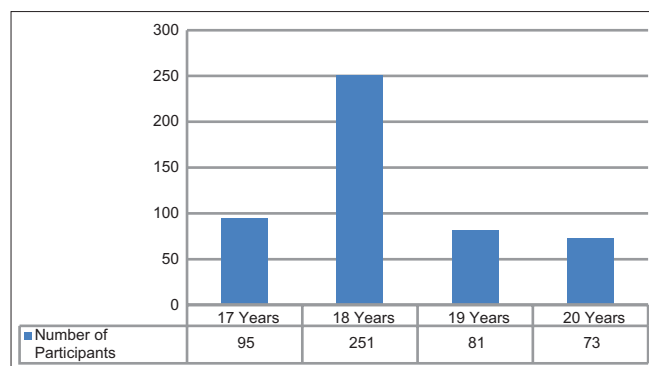
The data collected were compiled using MS-Office Excel and was subjected to statistical analysis using by using the statistical software package Statistical Package for the Social Sciences (Chicago, IL, USA) version 17.0 for MS Windows and $P < 0.05$ was considered statistically significant. Frequency distribution, number, and percentage were calculated. The descriptive statistics and Statistical significance of any difference between the two genders were determined using the Chi-square test.

RESULTS

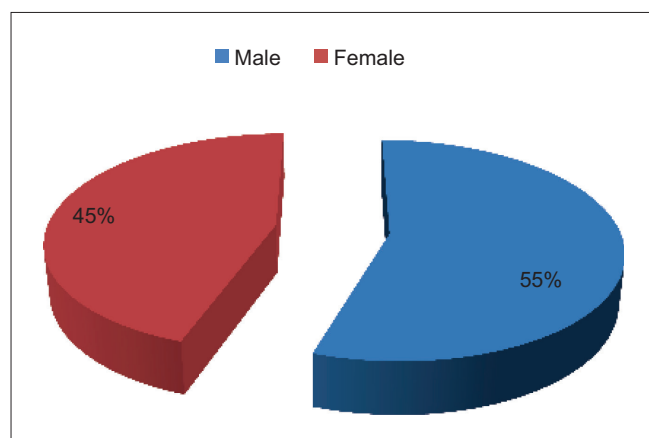
Total of 500 1st year engineering students participated in the study. Among 500 students aged 17 years (95), 18 years (251), 19 years (81), 20 years (73) (Graph 1), 276 were males and 224 were females (Graph 2).

Table 1 reveals that 61.4% participants, gain awareness on oral health through media (TV radio, internet), 18.8% learn on oral health through print media (newspapers, magazines), and 19.8% gain knowledge through family and friends. 32.40% participants had knowledge about dental deposits; whereas 25.40% did not know about it. 65.2% students notice tooth decay with black spot and hole in the tooth, 21.4% identifies by pain and 5.6% have no knowledge about it. 66.0% students knew if there is a bleeding on probing, it is a sign of unhealthy gingiva. 56.0% participants were aware that fluoride prevents dental caries. The difference between males and females regarding knowledge of oral hygiene was not statistically significant ($P > 0.05$).

Table 2 shows most of the study population (93%) think that oral health is important for overall health. According to 64.60% of the participants, dental treatment is expensive. 59.00% (Male 57.63%, Female 42.37%) students were of the opinion that dental and gingival care is needed to keep teeth longer in oral cavity, care of teeth and gingiva should be taken; whereas according to 19.6% (male 47.96%, female 52.04%) individuals, care of teeth and gingiva should be taken to reduce further dental treatment; 12.0% (male 45.00%, female 55.00%) participants view was to prevent halitosis; 9.40% (male 68.09%, female 31.91%)



Graph 1: Age-wise distribution of participants



Graph 2: Gender distribution of participants

participants told the reason for the same to improve looks. The difference between males and females, regarding the attitude of teeth and gingival care, was statistically significant ($P = 0.0374$). According to 43.8% participants, one should visit dentist when there is a problem. 33.00% said, should visit the dentist, once in a 6 months.

Table 3 reveals that 67% (male 51.94%, female 48.06%) brushes their teeth twice daily and 30.8% (male 61.04%, female 34.96%) brush once in a day. The difference between males and females, regarding practice of tooth brushing, was statistically significant ($P = 0.0224$). 56.20% students had a practice of using medium bristle toothbrush; 33.40% used soft bristle toothbrush; whereas only 1% used hard bristle tooth brush. 41.40% individuals brushed their teeth for 2-3 min, 11.40% brushed for 1-2 min, and 9.60% students brushed their teeth for more than 4 min. In addition to toothbrush, 64.6% used tongue cleaner and only 6% used dental floss. 49% eat sweets daily, whereas 34.8% eat sweets occasionally. 61.00% participants rinse their mouth with water always after meals. Majority, 49% change their toothbrush once in 1-3 months; whereas 12% change when it is spoilt. 67.40% (male 49.26%, female 50.74%) individuals visited dentist at least once. The difference between males and females, regarding the practice of changing toothbrush, was statistically significant ($P = 0.0001$). Of that, 34.20% visited dentist for oral check-up; 19.40% for tooth decay; 6.60% for cleaning of teeth, and 7.20% for braces.

DISCUSSION

Health is a universal human need. It has been established that optimal health cannot be attained independent of oral health.

This research work presented a comprehensive overview of the knowledge, attitude, and practices of oral hygiene among 17-20 years engineering college students of North Bangalore, India.

In the present study, the knowledge regarding oral hygiene was satisfactory except knowledge about dental floss and identification of tooth decay; whereas poor knowledge on the perception of oral health was reported among engineering students of Thiruchengode.⁵

In the present study, a very high percentage (67%) of the engineering students reported of brushing their teeth twice daily and it was accordance with the results of Peltzer and Pengpid (2014)¹⁵ reported it to be 67.20% in University students. On the contrary, Rimondini *et al.* (2001)¹⁶ described a much higher percentage (92.1%) in Italian

Table 1: Comparison of gender-related to knowledge of oral hygiene

Items	Male (%)	Female (%)	Total (%)	Chi-square	P value
How many permanent teeth are there in adult's mouth?					
20	1 (100.00)	0 (0.00)	1 (0.20)	1.8304	0.6083
28	18 (62.07)	11 (37.93)	29 (5.80)		
30	8 (47.06)	9 (52.94)	17 (3.40)		
32	249 (54.97)	204 (45.03)	453 (90.60)		
If there is a yellow or brownish yellow discoloration near tooth/gum, what is it?					
Food particles	67 (56.78)	51 (43.22)	118 (23.60)	4.7114	0.1942
Calculus/tartar	93 (57.41)	69 (42.59)	162 (32.40)		
Stains	42 (45.16)	51 (54.84)	93 (18.60)		
Don't know	74 (58.27)	53 (41.73)	127 (25.40)		
If there is bleeding from gums while brushing, what is it?					
Gums are healthy	19 (61.29)	12 (38.71)	31 (6.20)	0.8271	0.6612
Gums are unhealthy	178 (53.94)	152 (46.06)	330 (66.00)		
Gums are infected	79 (56.83)	60 (43.17)	139 (27.80)		
How do you notice tooth decay?					
Black spot and hole in the tooth	175 (53.68)	151 (46.32)	326 (65.20)	7.7857	0.0506
Bleeding from gums	26 (66.67)	13 (33.33)	39 (7.80)		
Pain	54 (50.47)	53 (49.53)	107 (21.40)		
Don't know	21 (75.00)	7 (25.00)	28 (5.60)		
Fluorides prevent dental decay?					
Agree	151 (53.93)	129 (46.07)	280 (56.00)	0.7392	0.6909
Disagree	44 (53.2)	37 (45.68)	81 (16.20)		
Don't know	81 (58.27)	58 (41.73)	139 (27.80)		
Where do you learn on oral health?					
Media (TV, radio, internet)	171 (55.70)	136 (44.30)	307 (61.40)	0.9073	0.635
Print media (newspaper, magazine)	48 (51.06)	46 (48.94)	94 (18.80)		
Others	57 (57.58)	42 (42.42)	99 (19.80)		
Total	276 (55.20)	224 (44.80)	500 (100.00)		

* $P < 0.05$ statistically significant**Table 2: Comparison of gender-related to attitude of oral hygiene**

Items	Male (%)	Female (%)	Total (%)	Chi-square	P value
Do you think, oral health is important for overall health?					
Yes	253 (54.41)	212 (45.59)	465 (93.00)	1.6824	0.1946
No	23 (65.71)	12 (34.29)	35 (7.00)		
Do you feel, dental treatment is expensive					
Yes	176 (54.49)	147 (45.51)	323 (64.60)	0.1864	0.6659
No	100 (56.50)	77 (43.50)	177 (35.40)		
Why should you take care of teeth and gums?					
To improve looks	32 (68.09)	15 (31.91)	47 (9.40)	8.4601	0.0374*
To reduce future dental treatment	47 (47.96)	51 (52.04)	98 (19.60)		
To keep the teeth as long as possible	170 (57.63)	125 (42.37)	295 (59.00)		
To prevent bad breath	27 (45.00)	33 (55.00)	60 (12.00)		
How often should you visit the dentist?					
Once in a 6 months	85 (51.52)	80 (48.48)	165 (33.00)	3.1942	0.3627
Once in a year	54 (55.10)	44 (44.90)	98 (19.60)		
Once in 2 years	13 (72.22)	5 (27.78)	18 (3.60)		
When there is a problem	124 (56.62)	95 (43.38)	219 (43.80)		
Total	276 (55.20)	224 (44.80)	500 (100.00)		

* $P < 0.05$ statistically significant

University students whereas Prasad *et al.* (2010)⁵ and Gasgoos *et al.* (2007)¹⁷ reported small percentage 30.7% and 15.4%, respectively. The present observation may be due to the occupancy of the students in their curricular activities and ignorant attitude toward oral hygiene, considering it as less important. In this study, Males brush their teeth more

frequently than females which were statistically significant ($P \leq 0.05$), it was contrary with the result of El-Qaderi and Taani (2004),¹⁸ Gasgoos *et al.* (2007)¹⁷ and Prasad *et al.* (2010),⁵ where females brush their teeth more frequently. This difference can attributed to a higher regarding personal hygiene and health care among males.

Table 3: Comparison of gender-related to oral hygiene practices

Items	Male (%)	Female (%)	Total (%)	Chi-square	P value
How many times do you brush your teeth daily					
Once in a day	94 (61.04)	60 (38.96)	154 (30.80)	9.5870	0.0224*
Twice in a day	174 (51.94)	161 (48.06)	335 (67.00)		
More than 2 times	5 (100.00)	0 (0.00)	5 (1.00)		
After every meal	3 (50.00)	3 (50.00)	6 (1.20)		
What kind of toothbrush do you use					
Hard	3 (60.00)	2 (40.00)	5 (1.00)	6.4596	0.0912
Medium	144 (51.25)	137 (48.75)	281 (56.20)		
Soft	96 (57.49)	71 (42.51)	167 (33.40)		
Do not know	33 (70.21)	14 (29.79)	47 (9.40)		
You brush your teeth for ____ minutes					
1-2 min	32 (56.14)	25 (43.86)	57 (11.40)	1.5559	0.6694
2-3 min	115 (55.56)	92 (44.44)	207 (41.40)		
3-4 min	99 (52.66)	89 (47.34)	188 (37.60)		
More than 4 min	30 (62.50)	18 (37.50)	48 (9.60)		
In addition to toothbrush and toothpaste, do you use _____					
Dental floss	17 (56.67)	13 (43.33)	30 (6.00)	5.8398	0.0539
Tongue cleaner	166 (51.39)	157 (48.61)	323 (64.60)		
None	93 (63.27)	54 (36.73)	147 (29.40)		
Do you use mouthwash					
Yes	99 (53.23)	87 (46.77)	186 (37.20)	0.4668	0.4944
No	177 (56.37)	137 (43.63)	314 (62.80)		
How often do you change your toothbrush					
1-3 months	140 (57.14)	105 (42.86)	245 (49.00)	7.2048	0.0656
3-6 months	58 (46.77)	66 (53.23)	124 (24.80)		
Cannot decide	38 (53.52)	33 (46.48)	71 (14.20)		
When it is spoilt	40 (66.67)	20 (33.33)	60 (12.00)		
Do you rinse your mouth with water after eating					
Always	169 (55.41)	136 (44.59)	305 (61.00)	4.9481	0.0842
Sometimes	92 (52.27)	84 (47.73)	176 (35.20)		
Never	15 (78.95)	4 (21.05)	19 (3.80)		
How frequently do you eat sweets? (including tea, coffee)					
Daily	128 (51.61)	120 (48.39)	248 (49.60)	3.3635	0.3389
Once in a week	45 (62.50)	27 (37.50)	72 (14.40)		
Occasionally	99 (56.90)	75 (43.10)	174 (34.80)		
Never	4 (66.67)	2 (33.33)	6 (1.20)		
Have you ever visited a dentist					
Yes	166 (49.26)	171 (50.74)	337 (67.40)	14.7583	0.0001*
No	110 (67.48)	53 (32.52)	163 (32.60)		
Total	276 (55.20)	224 (44.80)	500 (100.00)		

*P<0.05 statistically significant

About 70.40% students were using adjunct oral hygiene aids such as dental floss (6%) and tongue cleaner (64.60%) in the present study, which is contrary to the finding reported by Gasgoos *et al.* (2007),¹⁷ where 51.3% 1st year University students of Mosul, were not using such a means.

Hamilton and Coulby (1991)⁸ found that a high percentage (44%) studied in North Eastern Ontario used dental floss; in contrast, this current study reported only 6% students used dental floss. This could be attributed to the lack of oral health education or the cost factor of the dental floss.

In the current study, 66% of the respondents knew that bleeding gums while brushing indicates unhealthy gingiva and a similar result was obtained in the study conducted by Taani (2002).¹⁹

Visiting the dentist for routine check-up is “preventive care use.” In this study, 67.40% participants had visited dentist at least once. Fear of the dentist could be the cause of not visiting dentist in 32.6% students in the current study. A significantly higher percentage (75.8%) was reported by Peltzer and Pengpid (2014)¹⁵ and lower percentage (44.3%) was reported by Prasad *et al.* (2010)⁵ for visiting dentist at least once.

Among the participants who visited dentist, 19.40 students responded as last visit was due to decay in tooth and 34.20% responded for oral check-up. Higher finding was stated by Prasad *et al.* (2010)⁵ as 26.1% for decay in tooth and 43.9% for regular visit as reason for last dental visit. Wierzbicka *et al.* (2002)²⁰ claimed 66% participants visited dentist for oral check-up.

In this study, 49.60% participants consume sweets daily; in contrast lower percentage for the same (33.7%) was described by Prasad *et al.* (2010)⁵ among engineering students of Tiruchengode. In the study by Harikiran,²¹ 56.1% 11-12 years students of Bangalore city, consumed sugar daily.

This study targets key issues of lack of oral health awareness in some areas that must be addressed when creating health and hygiene promotion programs. Young adults are more receptive to learning and are very likely to adopt healthy behaviors at a younger age. They can also be agents of change by spreading what they have learned at this age to their family and community members.

Limitations

Several limitations must be considered when interpreting the results of the present study. Students' self-reporting of behaviors may have resulted in over-reporting of proper hygiene practices. Determination of causality is difficult using this cross-sectional study design.

CONCLUSION

This study presented a comprehensive overview of oral health-related knowledge, attitude, and practices of engineering students of North Bangalore. The awareness about the oral health of the studied subjects stands acceptable. Knowledge about dental floss and identification of tooth decay was inadequate. More concentration needs to be undertaken regarding oral health care in terms of health education programs.

RECOMMENDATIONS

Community-oriented oral health promotion programs are needed to improve oral health knowledge and practices of the engineering students. Inclusion of health-oriented program in their curriculum would improve their knowledge and behavior, so as to be a good model to the community.

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Breastfeeding and Weaning Practices of Children in Rural Area of Punjab, India: A Questionnaire Study

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Abstract

Background: Breast milk provides many nutritional benefits to a child and contains anti-infective properties that protect newborns from primary infection. Optimal breastfeeding practices promote healthy growth and development of newborns. Breastfeeding is the feeding of an infant or young child with breast milk directly from female human breasts (i.e. via lactation) rather than using infant formula.

Methods: This cross-sectional study was undertaken in three randomly selected sub centers of Verka block. A total of 286 mothers with aged 12-24 months children were interviewed in house to house survey. Data collected by using pretested questionnaire on breast feeding practices.

Results: In this study, 95.1% mothers started to breast feeding. Most of 64.4% children were put on the breast after 48 h. 52.1% mother's breast fed their babies after 12 months, 4.9% of mothers did not breast fed their babies because of local breast problem, mother's illness and due to other reasons like milk unsuitable, prematurity and hospitalization, etc. Any milk other than breast milk given to the child was considered as top feed. 25.8% of total mothers started top feed within 2 months. 53.0% mothers used cow's milk as a top feed. 32.7% of the mother used whole milk as a top feed, while 12.3% of the total mothers used 1:3 dilution of the top feeding. The gradual switching over the child from breast milk alone to other foods is called weaning. 47.2% of the total children were weaned before 6 months of age.

Conclusions: The study concluded breast feeding is almost universal in rural Punjab, but initiation of breast is very much delayed and faulty weaning practices, mothers should be equipping with knowledge through various ways.

Keywords: Breast-feeding, Questionnaires, Weaning

INTRODUCTION

Childhood malnutrition is an important public health issue in India. Breastfeeding is almost universal, however rates of early initiation, exclusive breast feeding, and timing complimentary feeds are far from desirable. This feeding practice varies from region to region. Numerous advantages of breast feeding over artificial milk have been documented. Promotion of breastfeeding is justified on firm scientific grounds. Several studies on breastfeeding have shown a general decline in breastfeeding in urban

areas. Breast milk provides many nutritional benefits to a child and contains anti-infective properties that protect newborns from early infection.¹

Under-nutrition is an underlying cause of an estimated 53% of all under-five deaths. Those who survive may be locked into a vicious cycle of recurring sickness and faltering growth, often with irreversible damage to their cognitive and social development.² Irrespective of the fact that breastfeeding in India is almost universal, psycho social, and cultural barriers still exists to early breastfeeding.³ The exact reasons for this delay are not clearly known. Pioneer nutrition scientist victora¹ has argued clearly in favors of increased investments in action on breastfeeding and complementary feeding and rightly noted that this topic has received little funding, especially when compared with large investments for the control of other diseases. The poor infant feeding and faulty weaning practices and their consequences including malnutrition of their children are

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one of the World's major public health problems (Dutta Banik, 1975).⁴ The present study was planned with objective to study the breast feeding practices among the mother aged 12 to 23 + months in rural areas of Punjab.

METHODS

The present cross sectional study was conducted in Verka block of Amritsar district. This block is field practice area attached to the Department of Community Medicine, Government Medical College, Amritsar. Three working sub centers to be studied were selected by using random sampling technique. The respondents were informed about the purpose of the study. The mothers were interviewed through pretested instrument consisting of questions covering various aspects of breast feeding. The information so collected was compiled; statistically analyzed, and following results were drawn.

RESULTS

Socio Demographic Profile

In this study, the majority of the mothers were between the ages of 20 and 29 years old (83.78%) and below 20-year-old (5.1%). 63.45% of total families belonged to scheduled caste. About 70.26% of the mothers were illiterate. Almost all mothers were housewives. The overall higher percentages of illiterate parents are due to the fact that, it is a rural area and laboring is the principal occupation in all three sub centers, so they were belonged lower class.

Initiation of Breast Feeding

Of the 286, 95.1% mothers initiated breast feeding. (Table 1) Practice of breast feeding by almost all rural mothers has consistently been reported while Walia *et al.* in their study have shown a declining trend in breast feeding especially in the urban areas.⁵ Idris *et al.* (1981) have also reported the same phenomenon.⁶ Decreasing trend in breast feeding was found in this study, in the same block it was observed by Padda (1981) that 2.2% women did not breast feed their babies.⁷ Of which 99.7% breast fed on demand feed showing thereby of old traditional custom of breast feeding. Demand feeding was also reported by Anand and Rao (1962) in 83%.⁷ A total of 2.1% of the mothers initiated breastfeeding within 6 h (Graph 1 and Table 2). A total of 4.9% of the mothers in this study didn't breastfeed their babies due to local breast problem 21.4%, mother's illness 42.8% and due to other reasons like milk unsuitable, prematurity and hospitalization in 35.8% (Table 3).

Duration of Breastfeeding

Only 8.1% of the mothers did the exclusive breastfeeding until 6 months and started weaning after 6 months 52.1%

mother's breastfed their babies even after 12 months. Prolonged breastfeeding was practiced in the study area. This might be due to that some mothers giving breastfeed for a prolonged period because of not starting the supplementary feed.

A total of 65.7% of the mothers in our study did not start top feeding before 4 months (Table 6). Out of total mothers who started top feeding within 4 months, 53% mothers started with cow's milk while 41.8% used buffalo's milk to their babies.¹⁰ Mixed milk was used by 5.2% cases (Table 4 and Graph 2). Similar observation was also made by Thaman and Manchanda (1968) 53% infants were given cow's milk and 42.7% buffalo's milk.⁸

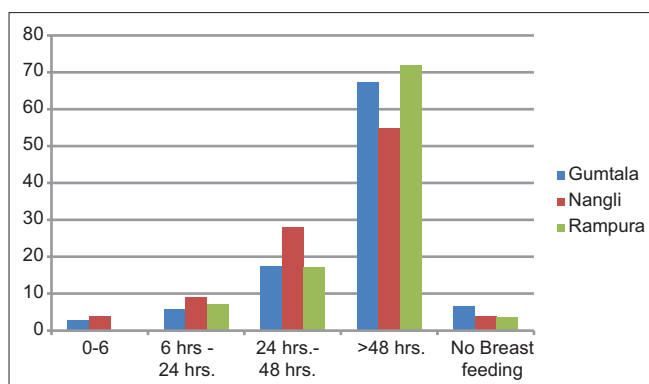
Of the total mothers (47.2%) started weaning at the age of 6 months. Only 3.9% mothers are given semisolid before the age of 4 months (Table 5).

Thus, prolonged breastfeeding was practiced in the study area. This might be due to that some mothers giving breastfeed for a prolonged period because of not starting the supplementary feed. Majority of the women (85%) reported that they initiated breast feeding on the 3rd day of delivery.⁹ 4.9% mothers did not breast feed their babies because of local breast problem 21.4%, mother's illness 42.8% and due to other reasons like milk not suitable, prematurity, and hospitalization in 35.8%. 65.7% mothers did not start to feed within 4 months of age. Mothers who started top feeding within 4 months 53% mothers started with cow's milk, while 41.8% used buffalo's milk to their babies. Mixed milk was used by 5.2% cases. 32.6% started whole milk, 36.7% with 1:1 dilution (Table 4), 18.4% with 1:2, and 12.3% with 1:3 dilutions with water. This might be due to the fact that because they might have thought that animal milk is was heavy and dilution with water would make it easier for the child to digest. Some might have diluted it because of economic reasons. 47.2 and children were given semisolid food within 6 months of age and 52.8% of children were weaned after the age of 6 months. Sanjay *et al.* documented in a study that only 8.4% children, even in the ICDS group were weaned before 6 months.¹⁰

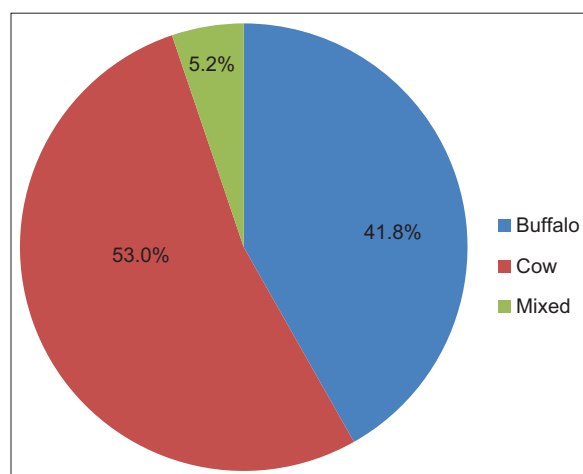
About 47.2% children were given semisolid before the age of 6 months. Only 3.8% children were given semisolid even before 4 months of age.

DISCUSSION

Poor infant feeding and faulty weaning practices and their consequences including malnutrition of their children are one of the World's major public health problems. This study was carried out in three sub centers areas, one sub center at subsidiary health center level, second sub



Graph 1: Distribution of mothers according to initiation of breast feeding



Graph 2: Distribution of children according to the type of milk used in top feeding

Table 1: Distribution of children according to breastfeeding practices

Breast feeding	n (%)			
	Gumtala	Nangli	Rampura	Total
Yes	97 (93.3)	96 (96.0)	79 (96.4)	272 (95.1)
No	07 (6.7)	04 (4.0)	03 (3.6)	014 (4.9)
	104 (100)	100 (100)	82 (100.0)	

Table 2: Distribution of mothers according to initiation of breastfeeding

Time (in h)	n (%)			
	Gumtala	Nangli	Rampura	Total
0-6	3 (2.8)	4 (4.0)	00	07 (2.4)
6-24	6 (5.8)	9 (9.0)	06 (7.3)	21 (7.4)
24-48	18 (17.4)	28 (28.0)	14 (17.2)	60 (20.9)
After 48	70 (67.3)	55 (55.0)	59 (71.9)	184 (64.4)
No	07	04	03 (3.6)	14 (4.9)

center on the road, and third one in the remote area of the field practice area. In this study population, majority mothers initiated breast feeding. It is further seen from

Table 3: Reason for failure of breastfeeding

Reasons	n (%)			
	Gumtala	Nangli	Rampura	Total
Local breast problem	01 (14.4)	1 (25.0)	1 (33.0)	3 (21.4)
Mother's illness	3 (42.8)	2 (50.0)	1 (33.0)	6 (42.8)
Any other	3 (42.8)	1 (25.0)	1 (34.0)	5 (35.8)

Table 4: Distribution of children according to the dilution of top feeding

Dilution	n (%)			
	Gumtala	Nangli	Rampura	Total
Whole	19 (38.0)	13 (41.9)	00	32 (32.6)
1:1	16 (32.0)	13 (41.9)	07 (41.2)	36 (36.7)
1:2	9 (18.0)	5 (16.2)	4 (23.5)	18 (18.4)
1:3	6 (12.0)	-	6 (35.3)	12 (12.3)
Total	50 (100)	31 (100)	17 (100)	98 (100)

Table 5: Distribution of children according to the start of top feeding within 4 months

Duration in months	n (%)			
	Gumtala	Nangli	Rampura	Total
1-2	38 (36.5)	21 (21.0)	15 (18.3)	74 (25.8)
2-3	05 (4.8)	5 (5.0)	1 (1.2)	11 (3.8)
3-4	07 (6.7)	5 (5.0)	1 (1.2)	13 (4.5)
No				188 (65.7)

Table 6: Distribution of children according to the age at weaning start

Time of start	n (%)			
	Gumtala	Nangli	Rampura	Total
<4 months	06 (5.7)	-	5 (6.1)	11 (3.9)
4-6 months	45 (43.3)	43 (43.0)	36 (43.9)	11 (43.3)
No weaning	53 (51.0)	57 (57.0)	41 (50.0)	13 (52.8)

this study that most (64.4%) of the children were put on the breast after 48 h. This may be due to superstitions/beliefs, that before the 2nd day, the mother is not actually to breastfeed their children. They were given pure lacteal feeds and discarded the colostrums. Any milk other than breast milk given to the child is considered as a top feed. This study revealed that about one fourth of the children received top feed between 1 and 2 months. Dilution was found to be very widespread. Dilution of milk might be due to the fact that the mother's might have thought that animal milk was heavy and dilution with water will make it easier for the child to digest. Some might have diluted it because of economic reasons. It is important to educate mothers regarding exclusive breast feeding. As due to top feed, chances of infection are more. The gradual switching over the child from breast milk to other foods is called weaning. 52.8% of children were weaned after the age of

6 months. Only 3.8% children were given semisolid before the 4 months of age.

CONCLUSION

From this study it was found that practice of early initiation, exclusive breast feeding and timely start of weaning was found to be insignificant. These are indispensable for the proper growth and development of children. This can be made by educating the elderly, newly married women, health care providers and private practitioner, and local staff of the health care delivery system which had a strong hold in their areas.

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Clinico-Histopathological Study of Leprosy

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Abstract

Background: Leprosy presents itself in different clinico-pathological forms, depending on the immune status of the host. The study of pathological changes in leprosy lesions has contributed a great deal to understand the disease and clinico-pathological correlative studies have provided further insights into the disease, its varied manifestations and complications.

Objective: The study was undertaken to correlate different types of leprosy clinically and histopathologically.

Materials and Methods: A total of 100 leprosy skin biopsies were studied over a period of 24 months between 2004 and 2006. Biopsies were fixed in 10% formalin and processed. 5 μ sections were stained with hematoxylin and eosin and modified Fite Farraco for lepra bacilli. Subsequently clinical and the histopathological correlation was studied using Ridley–Jopling classification.

Results: The majority of patients were in the age group of 20-29 years (30%). There were 80 (80%) males and 20 (20%) females. Overall clinicopathological correlation was observed in 65% of cases. The correlation was highest in indeterminate leprosy (81.81%) followed by lepromatous leprosy (78.57%), borderline lepromatous leprosy (70%), borderline tuberculoid (64.28%), mid borderline (55.55%) and tuberculoid (42.85%).

Conclusion: The histopathological features in leprosy indicate the accurate response of the tissues while the clinical features indicate only the gross morphology of the lesions caused by the underlying pathological change. Since tissue response varies in the disease spectrum, because of the variability of cell-mediated immunity, it is logical to expect some disparity between the clinical and histopathological features. For accurate typing of leprosy, correlation of clinical and histopathological features along with bacteriological examination appears to be more useful than considering any of the single parameters alone.

Key words: Histopathology, Leprosy, Ridley–Jopling classification

INTRODUCTION

Leprosy (Hansen's disease) is a chronic infectious disease caused by *Mycobacterium leprae* that primarily affects the skin and peripheral nerves.¹ It is a disease which apart from causing awful disfiguration and physical pain and hardship, leads to isolation, rejection, social stigma and ostracization that still characterize attitudes toward leprosy.

Leprosy expresses itself in different clinico-pathological forms depending on the immune status of the host.¹

Diagnosis of leprosy is based on different clinical parameters which involves detailed examination of skin lesions and peripheral nerves.² Demonstration of acid-fast bacilli in slit skin smears by Ziehl–Neelsen's staining also aids in diagnosis of leprosy.³ Histopathological examination of skin or nerve biopsies and demonstration of lepra bacilli in tissue sections provide a valuable aid to arrive at confirmatory diagnosis and its exact typing, differential diagnosis and progression and regression of the disease in patient under treatment.⁴

Keeping in mind the public health problem and intense research work being done in understanding its pathogenesis, this chronic granulomatous infectious disease was considered worthwhile to study clinically, pathologically and to correlate both so as to facilitate the institution of accurate mode of therapy and regular follow-up of patients to prevent undesirable complications.

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MATERIALS AND METHODS

The material for the study consisted of 100 randomly selected leprosy patients, who were attending the Department of Skin and STD, Dr. B.R. Ambedkar Medical College Hospital, Bengaluru. Cases were collected for a period of 2 years from 2004 to 2006.

Cases were selected regardless of their age, sex, socio-economic status, and occupation.

A detailed history was taken, and informed consent was obtained before performing skin biopsies. Skin biopsies were obtained from the suggestive lesion by punch biopsy of minimum 2 mm thickness. All the biopsies were received by the Department of Pathology, Dr. B.R. Ambedkar Medical College, K.G. Halli, Bengaluru. Skin biopsies were fixed in 10% formalin for 24 h. After fixation entire tissue was processed in toto and embedding done in paraffin. Two sections of 5 μ thickness were cut from paraffin block. One of the section was stained by hematoxylin and eosin and the other by modified Fite Farraco. Hematoxylin and eosin stained sections were examined for the status of the epidermis, presence of Grenz zone, type and extent of granuloma and involvement of nerves and adnexa. Modified Fite Farraco stained sections were examined for lepra bacilli. The cases were classified according to Ridley–Jopling classification.² Indeterminate and histioid types of leprosy were also included for the purpose of analysis.⁵ The cases were analyzed with regards to age, sex, clinical mode of presentation and microscopic appearances. Finally, clinicopathological correlation and conclusion were drawn.

Inclusion Criteria

Untreated leprosy patients who did not give any history suggestive of reaction were taken for the study.

Exclusion Criteria

Patients who are on treatment for leprosy were excluded from the study.

RESULTS

Of the 100 cases of leprosy, the majority belonged to the age group of 20-29 years (30%). The lowest age of onset was 8 years old female and the highest was 65-year-old male. 80 were male and 20 were female with a male to female ratio of 4:1.

The most common clinical type of leprosy was borderline tuberculoid (BT) leprosy seen in 42% of cases. Tuberculoid leprosy and lepromatous leprosy (LL) constituted 14% of

cases each. Least number of cases (9%) was classified as mid-borderline leprosy (Table 1).

The most common histopathological type of leprosy was BT leprosy seen in 40% of cases, followed by indeterminate leprosy (IL) in 15% of cases (Table 2).

Clinico-histopathological correlation was observed in 6 cases (42.85%) of TT, 27 cases (64.28%) of BT, 5 cases (55.55%) of BB, 7 cases of (70%) of borderline lepromatous leprosy (BL), 11 cases (78.57%) of LL and 9 cases (81.81%) of IL (Table 3).

Maximum clinico-histopathological correlation was seen in IL (81.81%) followed by LL (78.57%), BL (70%), BT (64.28%), BB (55.55%) and minimum in TT (42.85%).

Table 1: Clinical types of leprosy

Clinical types	Number of cases	Percentage
TT	14	14
BT	42	42
BB	09	09
BL	10	10
LL	14	14
IL	11	11
Total	100	100

TT: Tuberculoid leprosy, BT: Borderline tuberculoid leprosy, BB: Mid Borderline leprosy, BL: Borderline lepromatous leprosy, LL: Lepromatous leprosy, IL: Indeterminate leprosy

Table 2: Histopathological types of leprosy

Histopathological types	Number of cases	Percentage
TT	11	11
BT	40	40
BB	9	9
BL	14	14
LL	3	3
HL	8	8
IL	15	15
Total	100	100

TT: Tuberculoid leprosy, BT: Borderline tuberculoid leprosy, BB: Mid Borderline leprosy, BL: Borderline lepromatous leprosy, LL: Lepromatous leprosy, IL: Indeterminate leprosy, HL: Histioid leprosy

Table 3: Percentage of parity in various types of leprosy

Clinical type	Total number of cases	Histopathological parity	Percentage of parity
TT	14	06	42.85
BT	42	27	64.28
BB	09	05	55.55
BL	10	07	70
LL	14	11	78.57
IL	11	09	81.81
Total	100	65	65

TT: Tuberculoid leprosy, BT: Borderline tuberculoid leprosy, BB: Mid Borderline leprosy, BL: Borderline lepromatous leprosy, LL: Lepromatous leprosy, IL: Indeterminate leprosy

The overall clinico-histopathological correlation was 65% (Table 3).

DISCUSSION

A disease like leprosy needs an appropriate classification because of its varied manifestations. The most commonly accepted classification by research workers is that of Ridley and Jopling, which is primarily based on immunity but has been correlated with clinical, histopathological and bacteriological findings. Despite having such an accurate classification, leprosy cases showed disparity between the clinical and histopathological features because the clinical diagnosis was made on the lines of Ridley-Jopling classification even when a histopathological examination had not been done.⁶

The most common age group affected in our study was 20-29 years. Similar observation was made by Sehgal *et al.*⁷ and Moorthy *et al.*⁸

In our study, the majority of the patients were males (80%), whereas females formed a minority (20%). This observation was similar to the study done by Narayan *et al.*⁹ and Nadkarni and Rege.¹⁰

Clinical spectrum of leprosy cases in this study revealed maximum cases (61%) in borderline group (BT+BB+BL),

followed by both LL (14%) and TT (14%) and least in IL group (11%) and similar predominance of cases in borderline group was also observed by Shenoi and Siddappa,¹¹ Nadkarni and Rege¹⁰ and Moorthy *et al.*⁸

In this study, the histopathological characteristics were consistent with clinical diagnosis in 65 out of 100 (65%) cases. After excluding indeterminate cases in this study, lepromatous cases seem to present the least problem for classification (Table 4). Similar highest percentage of correlation between clinical and histopathological diagnosis of LL cases was also observed by Shenoi and Siddappa,¹¹ Bhatia *et al.*⁶ and Kalla *et al.*¹² in their respective studies. Poor correlation which was seen in tuberculoid leprosy in this study was in concordance to the observations made by Sehgal *et al.*⁷ and Moorthy *et al.*⁸

IL

Nine out of 11 clinically diagnosed IL cases showed histopathological features of the indeterminate type (81.8%). The 81.8% of parity in our study was almost equal to the study done by Kar *et al.*¹³ who have shown a correlation in 27 (81.2%) out of 32 cases. This was in contrast to a study conducted by Singhi *et al.*¹⁴ who found agreement only in 9 (12.3%) out of 72 cases (Table 5).

Features of BT seen in 2 cases of IL can be explained by the fact that the indeterminate lesion is probably progressing towards borderline spectrum.

Tuberculoid (TT) Leprosy

Six out of 14 clinically diagnosed tuberculoid cases showed histopathological features of tuberculoid leprosy (42.8%). The 42.8% of parity in our study was almost equal to the study done by Sehgal *et al.*⁷ and Moorthy *et al.*⁸ Our observation in tuberculoid series when compared to the other studies showed less correlation, being the least except in the study conducted by Dubey *et al.*,¹⁵ Jerath and Desai,¹⁶ Shenoy and Siddappa,¹¹ Kar *et al.*,¹³ Nadkarni and Rege,¹⁰ Narayan *et al.*⁹ and Singhi *et al.*¹⁴ (Table 5).

Table 4: Clinico-pathological correlation of different types of leprosy

Clinical type	Number of cases	Histopathological type							Percentage of parity
		TT	BT	BB	BL	LL	HL	IL	
TT	14	6	7	-	-	-	-	1	42.85
BT	42	4	27	2	4	-	-	5	64.28
BB	9	1	3	5	-	-	-	-	55.55
BL	10	-	1	2	7	-	-	-	70
LL	14	-	-	-	3	3	8	-	78.57
IL	11	-	2	-	-	-	-	9	81.81
Total	100	11	40	9	14	3	8	15	65

TT: Tuberculoid leprosy, BT: Borderline tuberculoid leprosy, BB: Mid Borderline leprosy, BL: Borderline lepromatous leprosy, LL: Lepromatous leprosy, IL: Indeterminate leprosy

Table 5: Comparative study of clinico-pathological correlation of leprosy by different workers

Clinical types	Sehgal <i>et al.</i> (1977) (%)	Dubey <i>et al.</i> (1981) (%)	Jerath and Desai (1982) (%)	Macular series (%)		Nadkarni and Rege (1999) (%)	Moorthy <i>et al.</i> (1999) (%)	Narayan <i>et al.</i> (2001) (%)	Singhi <i>et al.</i> (2003) (%)	Our study (2006) (%)
				Shenoi and Siddappa (1986)	Kar <i>et al.</i> (1994)					
TT	30.0	76.9	74.5	77.8	87.5	88.0	46.15	82.40	76.7	42.85
BT	26.3	100	64.7	62.2	60.9	80.7	66.66	88.20	47.4	64.28
BB	66.6	85.7	53.8	20.0	54.5	69.9	50	70.00	33.9	55.55
BL	42.8	100	28.5	14.4	53.8	81.3	70	93.30	40.7	70
LL	66.6	93.5	61.5	100	71.4	95.3	80	100	75.9	78.57
IL	-	-	88.8	85.7	81.2	93	20	-	12.3	81.81

TT: Tuberculoid leprosy, BT: Borderline tuberculoid leprosy, BB: Mid Borderline leprosy, BL: Borderline lepromatous leprosy, LL: Lepromatous leprosy, IL: Indeterminate leprosy

Features of IL were seen in 1 (7.14%) case and BT were seen in 7 cases (50%) of tuberculoid leprosy. In the histopathological features of IL seen in 1 case of tuberculoid leprosy, the probable explanation can be that the lesions must have evolved from an earlier lesion of indeterminate, hence the biopsy showing features of IL. Similarly, features of BT seen in a case of tuberculoid leprosy can be explained by the fact that the tuberculoid lesion is probably progressing toward borderline spectrum (BT).

Borderline Cases

In this study, the maximum number of patients (61%) was in the borderline spectrum. It is an unstable group of leprosy. It tends to show frequent changes with alteration in the immunological behavior of the host. It includes BT, BB and BL of the Ridley and Jopling classification between two polar types.

BT Leprosy

Of 42 cases clinically diagnosed as BT, 27 cases correlated histopathologically (64.2%). The 64.2% of parity in our study is almost equal to that of Jerath and Desai¹⁶ who found complete agreement in 11 (64.7%) out of 17 BT cases. Correlative studies conducted by Sehgal *et al.*⁷ found agreement only in 5 (26.3%) out of 19 cases (Table 5).

Mid Borderline (BB) Leprosy

5 of the 9 clinically diagnosed BB cases depicted consistent histopathology (55.5%). The 55.5% of parity in our study is almost equal to that of Kar *et al.*,¹³ who found agreement in 6 (54.5%) out of 11 cases. This was in contrast to a study done by Dubey *et al.*¹⁵ revealed correlation in 6 (85.79%) out of 7 cases (Table 5).

BL Leprosy

Out of 10 cases of BL 7 cases showed clinicopathological correlation (70%). Our study was in concordance with Moorthy *et al.*⁸ (70%). Shenoy and Siddappa¹¹ observed correlation only in 4 (14%) cases out of 28 cases (Table 5).

LL

Out of the 14 clinically diagnosed LL, 11 (3 LL and 8 HL) showed a histopathological correlation (78.5%). The 75.5% parity in our study is nearer to the study done by Singhi *et al.*¹⁴ who observed 75.9% parity.

Shenoy and Siddappa¹¹ and Narayan *et al.*⁹ observed a cent percent concordance in their respective studies (Table 5).

There was a complete correlation between the clinical and histopathological diagnosis in 65% of the cases. Differentiation between subtypes of leprosy was sometimes difficult or impossible. Hence different studies were performed regarding clinico-histopathological correlation

and showed variable results. Percentage of correlation between clinical and histopathological diagnosis reported by various authors ranges from 33% to 89% (Table 6).

The variation in different studies may be due to different criteria used to select the cases and difference in number of cases of each type. Various factors also influence the histopathological diagnosis such as differences in sample size, choosing the biopsy site, age of the lesion, immunological and treatment status of the patient at the time of biopsy.^{6,10}

The disparity between clinical and histological observations was anticipated because the parameters used for the histopathologic classification are well-defined, precise and also take into account the immunologic response of the tissue, while the clinical classification gives recognition only to the gross appearances of the lesions which is due to the underlying pathological change.

Moreover, a sizable proportion of leprosy cases (BT + BB + BL) are in a continuously changing immunological spectrum and histological classification gives a better indication for any recent shift of a case position in the spectrum.

CONCLUSION

Clinical diagnosis of early leprosy lesions offers difficulties even to experienced dermatologists. A definitive diagnosis may be possible by histopathological examination of the skin lesion.

As there can be some degree of overlap between different types of leprosy, both clinically and histopathologically, correlation of clinical and histopathological features along with bacteriological index appears to be more useful for accurate typing of leprosy than considering any of the single parameters alone.

Table 6: Clinico pathological correlation by various authors

Authors	Number of cases	Overall parity %
Ridley and Jopling (1966)	82	68.3
Sehgal <i>et al.</i> (1977)	95	33.7
Dubey <i>et al.</i> (1981)	100	89.0
Verma <i>et al.</i> (1981)	30	66.7
Jerath and Desai (1982)	130	68.5
Shenoi and Siddappa (1986)	100	47.6
Kar <i>et al.</i> (1994)	120	70.0
Lakshmi <i>et al.</i> (1996)	32	66.0
Nadkarni and Rege (1999)	2640	81.8
Moorthy BN <i>et al.</i> (1999)	372	62.6
Narayan <i>et al.</i> (2001)	90	87.7
Singhi <i>et al.</i> (2003)	2098	62.8
Our study (2006)	100	65

If a biopsy is taken at an early stage, there is likely to be discordance between the clinical and histopathologic features. As disparity depends upon the lesion biopsied at the time of study, biopsy from the lesion which is morphologically suggestive of clinical diagnosis, serial biopsies from the same lesion, or from paired lesions should be studied for a better clinico-histopathological correlation.

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Study of Correlation of Cord Blood Lipids and Neonatal Anthropometry

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Abstract

Background: There can be fetal origin of adult diseases according to Barker's hypothesis.

Aims and Objectives: The aim was to study the relation and any association between anthropometry and neonatal umbilical cord serum lipids.

Material and Methods: Totally, 162 neonates were selected for a cross-sectional study. The correlation of variables was found out with the lipid profile, i.e.; total cholesterol (TC), triglycerides (TG), high-density lipoprotein (HDL) and low-density lipoprotein (LDL), and correlation was also worked out between some socio-demographic and important anthropometric measurements like gender, head circumference (HC), birth weight (BW), abdominal circumference (AC), and Ponderal index (PI).

Results: BW negatively correlated with LDL and TG and positively with AC, whereas PI also negatively correlated with LDL and positively with AC. AC positively correlated with HDL and negatively with TC. There was no statistical difference found on the basis of gender, BW, age of mother, and PI with the lipid profile. The correlation was studied in between anthropometric parameters i.e. AC, PI, and BW. There was statistically significant negative correlation between cholesterol and AC ($r = -0.1962$, $P = 0.0325$), HDL with AC ($r = -0.1882$, $P = 0.0404$) and LDL and BW ($r = -0.2095$, $P = 0.0074$). The variations among the other parameters in the group were not statistically significant.

Conclusion: AC correlated negatively with levels of cholesterol and HDL and BW correlated negatively with LDL. Maternal changes during gestation may bear an impact on lipid metabolism in neonates.

Keywords: Anthropometry, Cord blood, Cord lipids, Newborn

INTRODUCTION

Cardiovascular diseases are the most frequent cause of adult death in the western world and it may soon become the leading cause of death on all continents¹ India ranked 38th for coronary artery disease and 39th for the prevalence of heart attack among the adult population in 2009.²

The cardiovascular diseases and other manifestations of atherosclerosis are responsible for one-third of all causes of mortality among adults³ and dyslipidemia, which is one of the main risk factors for atherosclerosis may have its onset during childhood.⁴ Over the last decade there was a great deal of interest to find out whether the lipid metabolism and alterations in the lipids as observed during the fetal period could result in permanent changes in the structure and functions of the organs that would be reflected in the adult life. Some experimental and clinical studies have shown the presence of fatty striae in the aorta during the fetal development period.⁵⁻⁷ The epidemiological investigations which have tried to link the weight and lipid changes at birth to congenital heart disease in adult life; remain inconclusive.⁸⁻¹³ The serum lipid

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concentrations in newborns may have an impact on various clinical conditions. Gestational age has an important effect on serum lipid and apolipoprotein concentrations. As the fetus matures, total cholesterol (TC) concentration is reduced, while that of triglycerides (TG) increases.^{14,15} Low birth weight (BW) is associated with preterm and Intra-uterine growth restriction babies, irrespective of gestational age, and may be associated with increased TC and apolipoprotein B (apo-B) serum concentrations.¹⁶ The correlation of cord blood lipid profile in newborns with their anthropometric data and their role as markers for adulthood chronic diseases are still not completely explored. Recently, obesity and hyperlipidemia have been increasing among children and adolescents, which are a risk factor for cardiovascular disease (CVD).^{17,18} The effect of intrauterine factors on the emergence of these risk factors also has been suggested.¹⁹ Moreover, several maternal and fetal factors, such as hypertension, diabetes, obesity, and low or high BW, can influence fetal plasma lipids.^{14,20-22} Cord sera have been demonstrated to contain all well-characterized adult lipoproteins and apolipoproteins.²³

Hence, this study was planned to find any evidence for the association of anthropometric factors with cord blood lipids and this study can serve as a starting point for studying lipids later in life.

Aims and Objectives

1. To estimate the biochemical parameters such as serum lipid profile TC, TG, high-density lipoprotein (HDL), and low-density lipoprotein (LDL) in umbilical cord blood sample
2. To measure anthropometric parameters such as BW, length, head circumference (HC), abdominal circumference (AC), and calculate Ponderal index (PI) of the newborns
3. To find out any association between biochemical parameters and anthropometric parameters.

MATERIALS AND METHODS

The study was carried out at SKNMC and GH, a tertiary level teaching hospital in the western part of Maharashtra, Pune. The study was conducted for a period of 8 months from September 1, 2013 to April 30, 2014. Ethics clearance was obtained from the institutional ethics committee and informed consent was obtained from the mother and all GCP guidelines were followed for the study. A total of 162 newborns were studied. Inclusion criteria consisted of all healthy neonates just delivered to apparently healthy mothers. Neonates with perinatal asphyxia and congenital abnormalities were excluded from the study. 4 ml of umbilical cord blood sample was obtained by clamping

umbilical cord post-delivery from the placental end of the umbilical vein. Serum was separated by centrifugation and analyzed on the same day for lipid profile, that is TC, TG, HDL and LDL. The HCs, ACs, lengths and the weights of the newborns were recorded. The gestational age was calculated from last menstrual period. The age in completed years and the parity of the mother was recorded. A detailed clinical history was also recorded.

AC and HC were measured by crossing of tape method at the intersectional point with non-stretchable tape at the level of umbilicus before breastfeeding and superior orbital bridge after passing over occipital protuberance. Weight was measured using a standard electronic weighing scale of survivor Herron electronics with a least count of 1 g with no clothing. Length was measured using infantometer. PI was calculated by the formula $\text{weight (g)}/\text{length (cm)}^3 \times 100$. Biochemical estimations were done on EM 360 fully automated biochemistry analyzer. Serum TC was estimated by CHOD-PAP method, serum TGs by GPO-PAP method, HDL by polyethylene glycol precipitation method, and LDL in mg/dl was calculated by subtracting HDL + TG/5 from the TC.

Statistical Analysis

Continuous data were computed as mean \pm standard deviation (SD). The Student's *t*-test was applied for comparison of mean values and χ^2 statistics was used for qualitative data. This was done using OpenEpi, Medclar software. Different statistical analysis was analyzed using Pearson's correlation coefficient MedCalc version 13.2.2.

RESULTS

A total of 162 newborns were studied, out of which 73 were females and 89 were males. The minimum age of the mother was 17 years and the maximum age was 35 years, with a mean age of 23.92 ± 4 years. 114 were full-term vaginal normal deliveries, 28 were delivered by lower segment caesarean section. Except two babies, all babies were appropriate for gestational age (AGA). One was small for gestational age (SGA) and one was large for gestational age (LGA). The minimum and maximum values along with

Table 1: Anthropometric measurements of neonates (n=162)

Parameter	Min value	Max value	Mean	SD
BW (g)	1500	3645	2696.5	397.1
Length (cm)	32	52	45.49	3.7
HC (cm)	30	42	34.21	2.08
AC (cm)	22	31	26.89	2.89
PI	3260	8676	5968.2	1009.4

BW: Birth weight, HC: Head circumference, AC: Abdominal circumference, PI: Ponderal index

mean and SD of each parameter studied are given in the Tables 1 and 2.

The level of TG in case of females was apparently more as compared with the males (males = 56.62 ± 31.09 and females = 57.10 ± 31.12 , but statistically non-significant). The other parameters of lipid profile in both the genders were statistically non-significant. Babies with AC <26 cm had higher levels of TC and TG than babies with AC more than 26 cm, but there was no statistical significant between the both the groups.

Table 3 describes correlation coefficients between AC, PI, and BW. There was statistically significant negative correlation between cholesterol with AC ($r = -0.07$, $P = 0.034$) and HDL with AC ($r = -0.042$, $P = 0.0385$) and negative correlation between, BW and LDL ($r = -0.209$, $P = 0.007$) as shown in Figure 1. The variations among the other parameters in the group were not statistically significant.

Table 4 shows a comparison on the basis of percentile PI and lipid profile into two groups A and B. Group A (PI is <10 percentile) and Group B (PI is more than 10) only LDL showed statistical difference in two groups ($P = 0.001$) whereas other parameters did not show any significant statistical difference.

DISCUSSION

Anthropometric measurements and levels of lipids TC, TG, HDL, LDL has no statistical significant difference

Table 2: Details of lipid profile of neonates (n=162)

Parameter	Min value	Max value	Mean	SD
TC (mg/dl)	25	125	63.03	20.1
TGs (mg/dl)	19	285	56.62	31.09
HDL (mg/dl)	14	49	24.94	7.23
LDL (mg/dl)	10	97	27.62	12.99

TC: Total cholesterol, TG: Triglycerides, HDL: High-density lipoprotein, LDL: Low-density lipoprotein, SD: Standard deviation

in the gender, BW, age of mother, PI. There has been a statistically significant negative correlation between cholesterol with AC ($r = -0.1962$, $P = 0.0325$) and HDL with AC ($r = -0.1882$, $P = 0.0404$) and negative correlation between LDL and BW ($r = -0.2095$, $P = 0.0074$) the variations among the other parameters in the group have been statistically significant. In this study, the cord blood lipid profile screening of neonates in this part of western Maharashtra has been almost comparable with the neonates screened in other parts. Measurement of serum lipoproteins in infancy and childhood could be a predictive marker for lipoprotein disorders and CVD in adulthood.²⁴ Studies have shown that small for date babies tend to develop metabolic syndrome as adults.²⁵ The present study has demonstrated that cord blood TC levels do not have significant association with BW as has been reported by Kumar *et al.*²⁶ This is similar to the studies by Desai *et al.*²⁷ who have not found association between BW and lipid levels, but in a study conducted by Mathur *et al.* reported significantly lower cholesterol levels among babies weighing lower than 2.5 kg. The mean TG level reported in the present study has been much lower than the one reported by Epi *et al.* perhaps the quiescent state of fat utilization in the fetus and the absence of need for fat

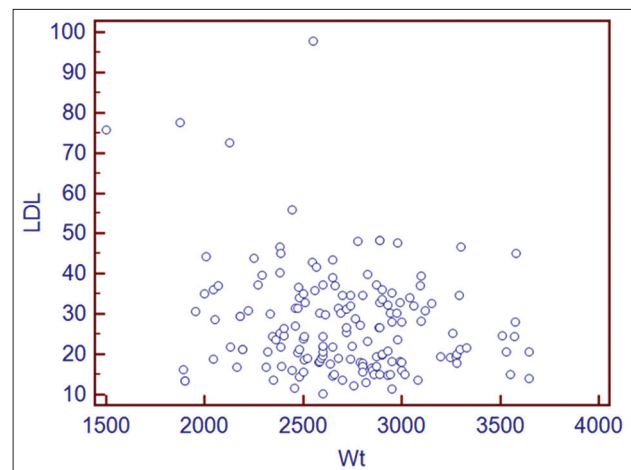


Figure 1: Correlation between birth weight and low density lipoprotein

Table 3: Correlation coefficients between AC, PI and BW

Correlation coefficients		Cholesterol	TG	HDL	LDL
Abdominal Circumference	r	-0.1962	-0.087	0.1882	-0.04590
	CI	(-0.3 to -0.01)	(-0.2 to 0.09)	(0.008 to 0.35)	(-0.22 to 0.13)
P value		0.0325*	0.3487	0.0404*	0.620
Ponderal Index	r	-0.07336	-0.1093	-0.04276	-0.1894
	CI	(-0.2 to 0.08)	(-0.25 to 0.04)	(-0.19 to 0.11)	(-0.33 to -0.03)
P value		0.3535	0.1661	0.5890	0.0158*
Birth Weight	r	-0.1177	-0.1479	-0.0667	-0.2095
	CI	(-0.26 to 0.03)	(-0.21 to 0.088)	(-0.21 to 0.088)	(-0.3 to -0.05)
P value		0.1357	0.0603	0.3986	0.0074*

*Significant. AC: Abdominal circumference, BW: Birth weight, PI: Ponderal index, Coefficient Constant = r, Confidence interval=CI

Table 4: Percentile PI and lipid profile of 162 newborns

PI	Group A (<10 percentile)		Group B (more than 10 percentile)		P value
Serum lipid profile	n=18		n=144		
	Mean	SD	Mean	SD	
TC	63	29.3	66.94	27.10	0.54
TGs	57	31.7	60.64	25.68	0.70
HDL	24.9	7.3	24.05	5.8	1.0
LDL	27.6	11.4	37.07	20.86	0.001*

*Significant. PI: Ponderal index, TC: Total cholesterol, TG: Triglycerides, HDL: High-density lipoprotein, LDL: Low-density lipoprotein, SD: Standard deviation

mobilization are responsible for low serum TGs at birth. The values of HDL and LDL have been similar to those reported by Nayak *et al.*²⁸ In the light of our study as well as other earlier studies, we may suggest that cut off point of 2.5 kg as a guideline for assessment. Barker *et al.* have reported an inverse correlation of BW and neonatal AC with adult serum cholesterol, LDL-cholesterol (LDL-C), and apo-B levels suggesting that the association between aberrant lipoprotein metabolism and low BW is present by the time intrauterine growth restriction is clinically evident.²⁹ In our study, we have also found that almost all of the neonates have been AGA this could be due to better antenatal care at the tertiary health center where majority of the mothers of these babies have been registered and all have been given counseling about health, nutrition and better care during pregnancy. Our study has not shown any difference in lipid profile gender wise. This could be due to the fact that we have considered sex regardless of the BW. This is in accordance as shown by Magon *et al.*³⁰ However, this is in contrast to the study done by Kharb *et al.*³¹ who have found that cord blood of females had higher TC, HDL, LDL, as compared to male newborns. This study has shown that the lipid profiles in male and female infants are not significantly different from each other. In contrast, Badiie and Kelishadi³² have shown that all lipid levels in female newborns are higher than those for boys, have reported that the levels of TC, LDL, HDL, and TG in female newborns are significantly higher than the levels for boys. In the study by Kharb *et al.*³¹ on 100 Indian healthy newborns, cord blood of female newborns has shown higher TC, HDL-cholesterol, LDL-C, apo-I, and AI as compared to male newborns. Another study by Bastida *et al.* also has reported similar result.³³ Kelishadi has shown that babies who have PI <10 percentile (SGA) have significantly lower TC, LDL-C, HDL, and apo-A and higher concentrations of TG and LDL. Ella Ophir has studied 480 newborns with respect to the body size her findings have been that LDL negatively correlates with AC, BW, and HC. Our study had findings similar to the above study. Lack of any significant difference in total TG levels between the two groups in the present study supports a constitutional

basis for the differences in apolipoprotein metabolism, observed in our study. Other reports have demonstrated that abnormal lipoprotein profiles in childhood persist into adult life.^{34,35} Furthermore, the prevalence and severity of carotid artery atherosclerosis in later life are linked to lower BWs.³⁶ A Swedish cohort study has found a strong relationship between impaired fetal growth and subsequent cardiovascular mortality.³⁷ These findings indicate that fetal growth restriction is associated with a chronic pattern of atherogenic lipoprotein metabolism. Lack of any significant difference in total TG levels between the two groups in the present study supports a constitutional basis for the differences in apolipoprotein metabolism, observed in our study. We could not find any association between the maternal age and that lipid profile of the baby. Limitations of our study was that we could not get SGA and LGA babies to be included in our work, secondly height, and weight of mothers could not be included for measuring BMI status of mothers and correlate with their babies. We have not measured placental weight, which directly reflects nutritional status of the mother and child.

CONCLUSION

AC correlated negatively with levels of cholesterol and HDL whereas BW correlated negatively with LDL. Studying for the association of prenatal factors with cord blood lipid profile can serve as a beginning point for studying lipid changes during early life and for correlating them with the cardiovascular disease later.

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A Study of Histological Changes in Placentae among Gestational Diabetic Women

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Abstract

Background: Prevalence of diabetes mellitus is increasing in women of childbearing age due to mainly lifestyle changes. In India, abnormal glucose tolerance found up to 10% of the total pregnancies. Histological placental changes have been commonly reported in gestational diabetic women by many researchers. The placenta being the bridge between maternal and fetal activities, considered as a window through which maternal dysfunctions, and their impacts on fetal well-being can be understood.

Aim: The aim of the study was to find out the histological changes in placentae of women with gestational diabetes mellitus.

Material and Methods: A total of 40 placentae from clinically diagnosed gestational diabetic pregnant women were studied and an equal number of controls were taken sequentially. Histological changes in both groups were recorded and analyzed using 'Z' test of significance.

Results: The mean numbers of syncytial knots, fibrinoid necrosis, stromal fibrosis and cytotrophoblastic proliferation was significantly higher ($P < 0.01$) in placentae from gestational diabetic women while mean numbers of vasculo-syncytial membranes were significantly lower ($P < 0.01$) in placentae from gestational diabetic women.

Conclusion: The placentae from gestational diabetic women were found significant histological changes as compared to controls, which may alter the perinatal outcome.

Keywords: Diabetes mellitus, Histology, Placentae, Pregnancy

INTRODUCTION

Diabetes mellitus is an “iceberg disease” affecting 150 million people worldwide. This number is predicted to double by the year 2025 with the greatest number of cases being expected in China and India. In India, studies have shown the prevalence rate of diabetes mellitus to be 2.4% in rural and 4-11% among urban dwellers. World Health Organization has declared that India will become the “diabetic capital of world” by the year 2025.¹ Gestational diabetes mellitus is defined as any degree of glucose intolerance with onset or first recognition during

pregnancy. Abnormal glucose tolerance occurs in 3-10% of the total pregnancies.²

Placenta is the most accurate record of the infant's perinatal experience. If some time spent on the minute examination of the placenta after delivery, it provides very useful information about the perinatal health of the baby and the mother.³ Some workers found in their studies that placentae of diabetic women did not show any unusual feature while others had observed frequent abnormalities in such placentae, but any consistent pathologic finding was not observed. The placenta of diabetic women have shown villous lesions on light microscopy, such as excess syncytial knot formation,⁴⁻⁶ increased thickness of vasculo-syncytial membrane,^{7,8} villous fibrinoid necrosis,^{4,8-10} villous fibrosis,⁸⁻¹⁰ and abnormalities of villous vascularisation.⁵

There is a paucity of literature regarding histological changes in placentae of gestational diabetic women in this

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population. This study is an attempt to find the histological changes in placentae from gestational diabetic women.

MATERIALS AND METHODS

It was an observational comparative study conducted between April 2012 and September 2014 in Anatomy Department of Sawai Man Singh Medical College, Jaipur (Rajasthan). After obtaining approval from Institutional Ethical Committee, 40 placentae from confirmed cases of gestational diabetes mellitus women were collected from Obstetric Department and equal numbers of controls were taken from uncomplicated normal pregnancies. All respondents were properly explained about the study and their written consent was taken. Complete medical and obstetric history was recorded to identify the confounders. The mothers were examined clinically along with recording of relevant investigation reports. The data was collected on a pre-tested and pre-structured proforma.

Pregnant women aged between 20 and 38 years, para 1-5, gestational age between 37 and 42 weeks, deliveries by either vaginal route or caesarean section were included. While women who did experience any complication during pregnancy like hypertension, hypothyroidism, anemia, abruptio placentae, multiple pregnancies, jaundice, and maternal malnutrition were excluded from the study.

The placentae were collected soon after delivery and washed in running tap water to clean all blood. Surface dried between blotting papers and the placentae were cut to obtain two samples of size 1 cm × 1 cm from each placenta, one from the peripheral part and one from the central part. The pieces were routinely processed for paraffin embedding and sectioning. The slides were stained with hematoxylin and eosin stain and examined under light microscope. The histological abnormalities like syncytial knots, fibrinoid necrosis, stromal fibrosis, vasculo-syncytial membranes, and cytotrophoblastic proliferation were recorded as percentages. The 'Z' test was used to determine whether there was a statistical significant difference between control and study group. A $P < 0.05$ was considered to be statistically significant.

OBSERVATIONS AND RESULTS

Each histological parameter was recorded as percentages of villi showing the features and these were compared with normal cases.

Syncytial Knots

Syncytial knots are focal aggregation or clumping of syncytial nuclei on the outer surface of a tertiary placental

villus, forming a multinucleated protrusion from the villous surface (Figure 1). Such knots are rarely seen in the immature placenta, but gradually increases in number throughout gestation and at term are present on between 10% and 30% of the terminal villi.¹¹ The mean villous counts showing syncytial knot formation were to be significantly higher ($P < 0.01$) in the diabetic group (25.78 ± 11.30) as compared to a mean value 14.25 ± 6.82 in the controls.

Fibrinoid Necrosis

Fibrinoid necroses are small collections of structureless, homogeneous, eosinophilic material within the villi (Figure 2). At term, fibrinoid necrosis involving up to 3% of placental villi is a normal finding and any incidence greater than this is excessive.¹² The mean villous counts showing fibrinoid necrosis were significantly higher ($P < 0.01$) in the diabetic group (6.70 ± 2.14) as compared to a mean value 2.25 ± 1.66 in the controls.

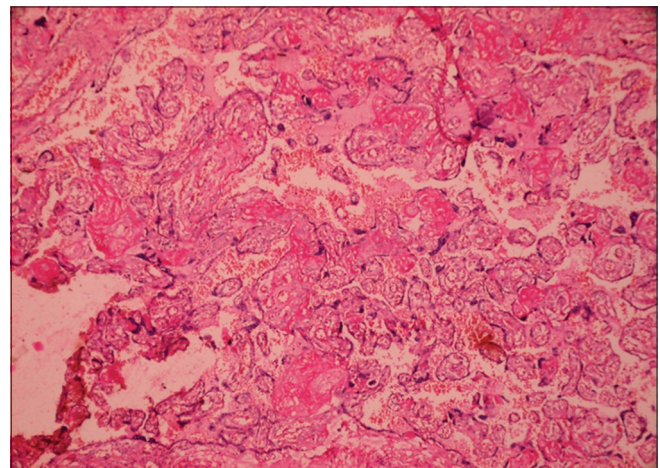


Figure 1: Syncytial knots in study group (hematoxylin and eosin group, x10)

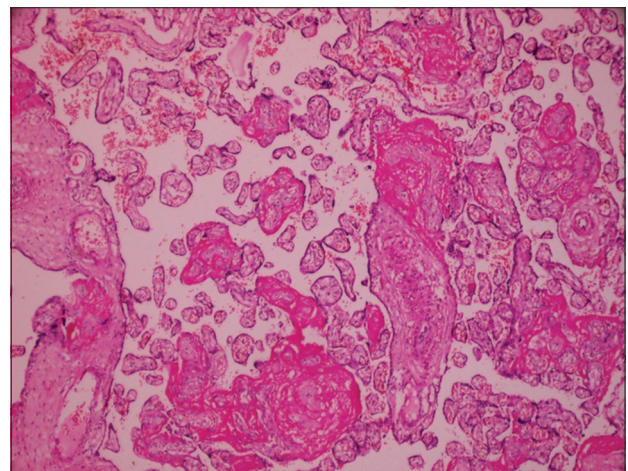


Figure 2: Fibrinoid necrosis in study group (hematoxylin and eosin group, x10)

Stromal Fibrosis

Stromal fibrosis was observed as pink colored collagen fibers within the core of the villi. The stroma of the mature placental villi usually contains little collagen, yet in all placentae some villi are markedly fibrotic (Figure 3). At term, normally 3% terminal villi show stromal fibrosis, above that it is considered as abnormal finding.¹³ The mean villous counts showing stromal fibrosis were significantly higher ($P < 0.01$) in the diabetic group (7.90 ± 4.86) as compared to a mean value 2.70 ± 2.63 in the controls.

Vasculo-syncytial Membrane

In all mature normal placentae the villous capillaries are sinusoidal and closely approximated to overlying trophoblast. In many villi, the dilated capillaries bulge out toward the intervillous space, over such vessels the syncytium is often thinned and anuclear and may appear to be fused with the vessel wall to form a “vasculo-syncytial membrane” (Figure 4). In mature normal placentae, vasculo-syncytial membranes are present in 6-30% of terminal villi.¹⁴ The mean villous counts showing vasculo-syncytial membranes were significantly lower ($P < 0.01$) in

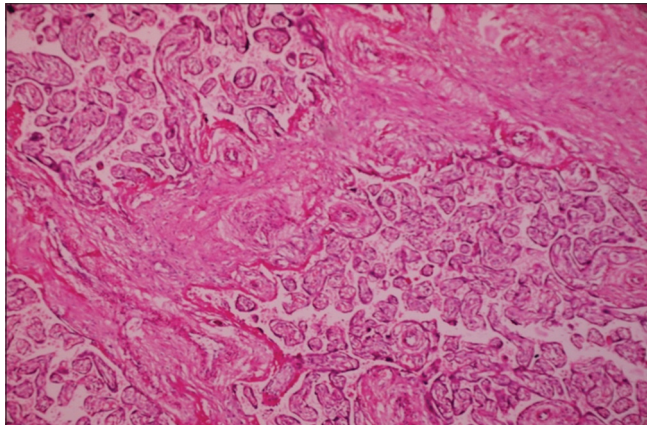


Figure 3: Stromal fibrosis in study group (hematoxylin and eosin group, $\times 10$)

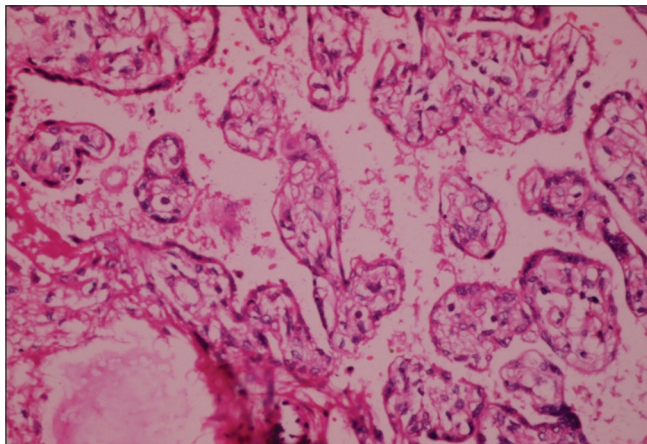


Figure 4: Vasculo-syncytial membrane in control group (hematoxylin and eosin group, $\times 40$)

the diabetic group (5.93 ± 4.52) as compared to a mean value 15.78 ± 6.51 in the controls.

Cytotrophoblastic Proliferation

Cytotrophoblastic proliferation can be seen beneath the syncytiotrophoblast and external to the basement membrane as lighter stained nuclei, present in a single row (Figure 5). In mature normal placentae, cytotrophoblastic proliferation is present in up to 20% of terminal villi.¹⁵ The mean villous counts showing cytotrophoblastic proliferation were significantly higher ($P < 0.01$) in the diabetic group (18.63 ± 8.94) as compared to a mean value 8.70 ± 5.35 in the controls.

Histological changes of placentae in gestational diabetic and normal pregnancies with the parameters syncytial knots, fibrinoid necrosis, stromal fibrosis, vasculo-syncytial membrane, cytotrophoblastic proliferation are given in Table 1.

DISCUSSION

In the present study, the mean numbers of syncytial knots per 100 villi were higher in the diabetic group as compared to control group and this difference was highly significant

Table 1: Histological changes of placentae in gestational diabetic and normal pregnancies

Parameter	Mean \pm SD (N=40)		'Z' value	P value
	GDM	Controls		
Syncytial knots	25.78 \pm 11.30	14.25 \pm 6.82	5.525	0.000
Fibrinoid necrosis	6.70 \pm 2.14	2.25 \pm 1.66	10.392	0.000
Stromal fibrosis	7.90 \pm 4.86	2.70 \pm 2.63	5.952	0.000
Vasculo-syncytial membrane	5.93 \pm 4.52	15.78 \pm 6.51	7.861	0.000
Cytotrophoblastic proliferation	18.63 \pm 8.94	8.70 \pm 5.35	6.028	0.000

SD: Standard deviation, GDM: Gestational diabetes mellitus

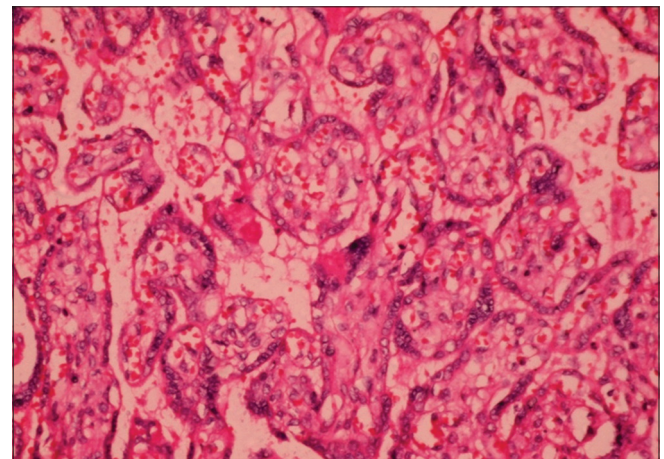


Figure 5: Cytotrophoblastic proliferation in study group (hematoxylin and eosin group, $\times 40$)

($P < 0.01$). Similar results were found in earlier studies by Verma *et al.*^{9,10} in New Delhi, and Gheorman *et al.*¹⁶ in Craiova, Romania, where they found significantly more syncytial knots in placentae of diabetic mothers.

The basic change determining a high level of villous syncytial knot formation is a reduced fetal villous blood flow. Thus, placentae with high syncytial knot counts also have a high incidence of villi with non-sinusoidal capillaries and these are the villi that show a high incidence of syncytial knot formation.¹¹

The mean numbers of villi showed fibrinoid necrosis per 100 villi were higher in the diabetic group as compared to control group, and this difference was highly significant ($P < 0.01$). Similar results were found in earlier studies by Daskalakis *et al.*¹⁷ in Athens, Greece, Verma *et al.*^{9,10} in New Delhi, Evers *et al.*¹⁸ in Netherlands and Gheorman *et al.*¹⁶ in Craiova, Romania, where they found significantly more fibrinoid necrosis in placentae of diabetic mothers. Fibrinoid necrosis is the hallmark of immunological reaction in the villous tissue. It is possible that the high incidence of fibrinoid necrosis in placentae from diabetic women is also explicable on a similar basis. Burstein *et al.*⁷ found an anti-insulin antibody in placenta tissues from diabetic women.

The mean numbers of villi showed stromal fibrosis per 100 villi were higher in the diabetic group as compared to control group and this difference was highly significant ($P < 0.01$). Similar results were found in earlier studies by Daskalakis *et al.*¹⁷ in Athens, Greece, Verma *et al.*^{9,10} in New Delhi, and Gheorman *et al.*¹⁶ in Craiova, Romania, where they found significantly more stromal fibrosis in placentae of diabetic mothers. Villous fibrosis is associated with reduced fetal villous blood flow. The high incidence of villous fibrosis in the placentae from diabetic women is probably due to reduction of fetal blood flow by obliterative endarteritis of fetal stem arteries, which is a common feature of such placentae.¹³

The mean numbers of villi showed vasculo-syncytial membranes per 100 villi were less in the diabetic group as compared to control group and this difference was highly significant ($P < 0.01$). No comparable data are available on vasculo-syncytial membranes in placentae of pregnant women with gestational diabetes mellitus. It is possible to state that if $<6\%$ of villi in a placenta have vasculo-syncytial membranes than this is an indication of either immaturity or regression.¹⁴

The mean numbers of villi showed cytotrophoblastic proliferation per 100 villi were more in the diabetic group

as compared to control group and this difference was highly significant ($P < 0.01$). Similar results were found in earlier studies by Verma *et al.*⁹ in New Delhi where they found significantly more syncytial knots in placentae of diabetic mothers.

CONCLUSION

The study has conclusively shown that placentae of gestational diabetic women show significant histological changes that can be associated with impaired function of the placenta, leading to an adverse perinatal outcome.

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Dengue Fever on the Rise: A Threatening Scenario in Eastern India

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Abstract

Background: Dengue is an acute arboviral infection prevalent in India causing both epidemic and endemic. In human beings, dengue virus infection can lead to a wide range of clinical manifestations ranging from asymptomatic infection to life-threatening complication like dengue shock syndrome.

Materials and Methods: This hospital-based prospective study was carried out at Calcutta National Medical College and Hospital from January 2013 to December 2014. Blood samples were taken from all the patients who were admitted or visited out-patient departments in our tertiary care hospital with symptoms of dengue fever for ≥ 5 days.

Results and Analysis: Of 1337 samples 198 samples (14%) were dengue IgM positive. In the year 2013, 23 out of 442 samples (5.2%) were IgM positive and in the year 2014, 175 samples (19.5%) were IgM positive out of 895 samples.

Conclusion: From our study it appears that the incidence of dengue infection is gradually increasing in our country. Proper vector control is required to prevent such infection.

Keywords: Dengue fever, Endemic, IgM antibody, IgM capture ELISA

INTRODUCTION

Dengue fever or “break-bone fever,” is a mosquito-borne infectious disease caused by dengue fever virus (DENV) belonging to the family Flaviviridae and genus flavivirus. The word “dengue” is derived from the Swahili phrase Kadinga pepo, meaning “cramp-like seizure.” The first record of this disease was noted in a Chinese medical encyclopedia in 992 AD, the original publication of which dated back during the Chin Dynasty (265-420 AD).¹ At that time, the disease was associated with flying insects and was then referred to as “water poison.”²

The causative agent, DENV, has four distinct serotypes termed DENV-1, DENV-2, DENV-3, and DENV-4,

respectively transmitted by several species of mosquito within the genus *Aedes*, principally *Aedes aegypti*. It may cause a subclinical infection or a severe flu-like illness and can occasionally be fatal e.g. dengue hemorrhagic fever or dengue shock syndrome. The lifelong immunity developed after infection with one of the four virus types is type-specific.

Dengue fever is primarily a disease of the tropical countries with maximum occurrence in the equatorial regions of Africa, the Americas, South-East Asia, and the Western Pacific.³ Since 1960s, a dramatic increase has been noted in the incidence of dengue fever, with current estimates of 50 million to 528 million people being infected yearly. This increase is believed to be due to several factors, including global warming, climatic factors, urbanization, exploding population density, and socio-economic constraints on control measures.⁴⁻⁶ In 2012, the World Health Organization classified dengue as the “most important mosquito-borne viral disease in the world” due to significant geographic spread of the virus and its vector into previously unaffected areas and the subsequent costly burden of the disease.^{5,7-10} Disability-adjusted life year (DALY) estimates differ, but a

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2009 estimate of DALYs lost due to dengue globally was 700,000/year.^{11,12} The main burden of this morbidity and mortality in most countries lies with children.^{13,14} According to the National Vector Borne Diseases Control Program (NVBDCP), the number of cases in India increased steadily, from 3306 in 2001 to 50 222 in 2012 along with a significant increase in the number of deaths.¹⁵ In West Bengal, 3306 confirmed dengue cases were reported from 1 January 2012 to 30 September 2012, of which nearly 2000 cases were recorded from the Kolkata Metropolitan Corporation areas.¹⁶

However, since then very little information is available regarding the current trends of dengue fever in Eastern India, this study aims at determining the current prevalence of dengue fever and to identify any change in its prevalence pattern, if any.

MATERIALS AND METHODS

This prospective study was done at our tertiary care hospital from January 2013 to December 2014. The study included all patients who were admitted or visited outpatient departments of Calcutta National Medical College and Hospital with symptoms of dengue fever for ≥ 5 days during the study period. Serum obtained from such patients were analyzed for the presence of specific dengue IgM antibodies using NIV DEN IgM Capture ELISA Kit.

At first, the samples were diluted using sample diluent for DEN IgM in the ratio of 1:100 and transferred to anti-human IgM coated wells. Positive and negative controls for the tests were set up using DEN IgM positive control and DEN IgM negative control respectively as per the protocol. IgM antibodies in the patient's serum were captured by anti-human IgM coated on the solid surface (wells). In the next step, dengue antigen was added which got bound to capture human IgM in the sample. Unbound antigen was removed during the washing step. In the subsequent step biotinylated flavivirus anti DEN monoclonal antibodies were followed by Avidin-HRP. Each step was followed by washing with wash buffer using Washwell microplate washer. Subsequently, chromogenic substrate (TMB/ H_2O_2) was added and the reaction was stopped by 1N H_2SO_4 . The intensity of color/optical density (OD) was measured at 450 nm.

If OD value of the samples tested were less than OD value of negative control by a factor 2 (sample OD \leq negative control OD \times 2), the samples were considered to be "negative." On the other hand, if OD value of the samples tested exceeded OD of negative control by a factor 3 (sample OD \geq negative control OD \times 3), the samples were considered as "positive."

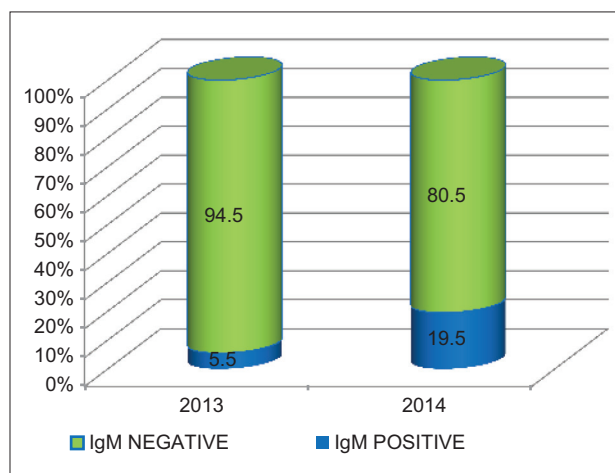
RESULTS AND ANALYSIS

The study conducted over a period of 2 years showed 5.5% IgM positivity in the year 2013 and 19.5% positivity 2014 (Graph 1).

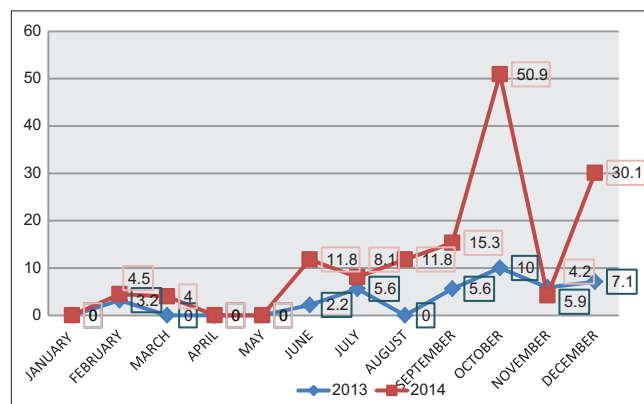
In the year 2013, maximum IgM positivity (10%) was recorded in the month of October. Also in the year 2014, most cases occurred in the month of October with IgM positivity of 50.9%; followed by 30.1% positivity in the month of December (Graph 2).

In both the years, children between 0 and 10 years of age accounted for the most number of IgM positive cases. In the years 2013 and 2014 respectively in this age group accounted for 27.9% and 35.4% of all IgM positive cases. In 2013 and 2014, 11-20 years age group showed 25% and 21.2% dengue IgM positivity, respectively (Graph 3).

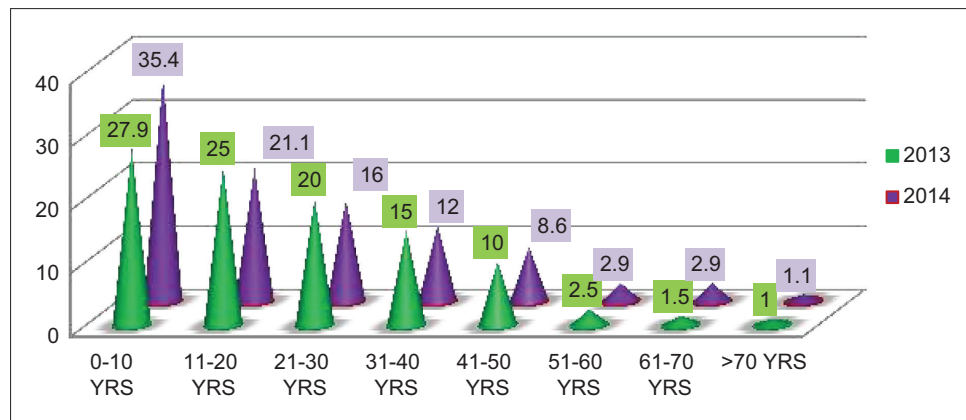
In 2013, 65.2% of all positive cases were found to be male and the rest 34.8% were found to be female. On the other hand, 56.6% of male and 43.4% of female showed IgM positivity in the year 2014 (Graph 4).



Graph 1: Percentage of IgM positive dengue cases in 2013 and 2014



Graph 2: Prevalence of dengue fever (in percentage) over 2013 and 2014



Graph 3: Distribution (percentage) of IgM positive cases of dengue fever according to age

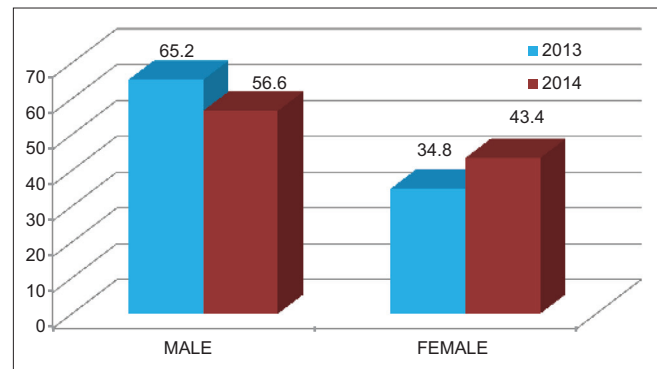
DISCUSSION

Dengue fever is widespread and endemic in most major cities in India. Data obtained from NVBDCP and NIV show that dengue has been endemic in 16 states since the beginning. These are Andhra Pradesh, Goa, Gujarat, Haryana, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh, West Bengal, Chandigarh, Delhi, and Puducherry. During 2010-2012, dengue encroached into the remaining states.^{17,18}

A study done at All India Institute of Medical Sciences, New Delhi during 2003-2005 reported 44.56% seropositivity in 1820 samples. Another study carried out from 2005-2010 in Pune showed 48.45% positivity on testing 5106 samples. In both these studies, most cases belonged to the 21-30 years age group with maximum occurrence in the month of October.^{19,20} Similarly, in our study conducted during 2013-2014 maximum number of cases occurred in the month of October. However, in contrast to the above studies, in our study children of 0-10 years have been found to be the most commonly affected age group followed by those belonging to the age group of 11-20 years. This finding is fairly similar to a study carried out in South India where children (6-15 years) were affected more.²¹ In our study, males were affected more than females. This finding is similar to another study in West Bengal but differs from the study in South India.^{21,22} In our tertiary care hospital, during 2013-2014, out of the total 1337 samples 198 samples (14%) were dengue IgM positive, with an increase in positivity from 5.2% in the year 2013 to 19.5% in the year 2014.

CONCLUSION

Gradual increasing incidence rate of dengue infection in India is alarming us about the causation of dangerous



Graph 4: Distribution of IgM positive cases of dengue fever (percentage) in 2013 and 2014 according to sex

epidemic in future. Preventive and vector control interventions are required to reduce dengue transmission, thereby decreasing the incidence of the infection and preventing outbreaks of the disease.

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Caries Experience in Permanent Dentition among 11-14 Years Old School Children in Panchkula District (Haryana) India

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Abstract

Background: Dental caries is a major public health issue with high morbidity and has a great impact on the general health of a population. It is a disease with multifactorial causes. Dental caries is a lifetime disease, and the highest priority risk group is between 11 and 14 years of age.

Objective: To find dental caries experience in permanent dentition among 11-14 years old school children in Panchkula district, Haryana.

Materials and Methods: This cross-sectional study was conducted among 512 school children of Panchkula district, Haryana, in the age group of 11-14 years. Dental caries experience was assessed using WHO dentition status proforma (2013). The data were subjected to statistical analysis. Chi-square test was used to find an association between the study variables. Unpaired *t*-test and one-way ANOVA were used to compare the mean difference.

Results: Among the 512 study subjects, 286 (55.86%) were males and 226 (44.14%) were females. Caries prevalence was found to be 47.46%. Mean decay-missing-filled teeth (DMFT) of the population was 0.98 ± 0.42 . Mean DMFT was found to be higher among females (1.03 ± 0.47) when compared to males (0.92 ± 0.39) ($P = 0.189$).

Conclusion: The prevalence of dental caries among school going children is considerable in this population. There is a need to generate awareness about oral health and the prevention of dental caries and to institute measures for the provision of dental care services at the school level.

Keywords: Caries experience, Dental caries, School children

INTRODUCTION

Dental caries is an international public health challenge, especially among young children. Dental caries is a multifactorial disease of the teeth that results in localized dissolution and destruction of the calcified tissue.¹ It is the most prevalent oral disease and has a very high morbidity

potential, and is of main concern to the dental health professionals. Untreated caries and associated infection can cause considerable pain and discomfort and reduce the intake of food. Severe caries can affect child's quality of life. There is practically no geographic area in the world whose inhabitant does not exhibit some evidence of dental caries. It affects both the sexes, all races, all socioeconomic status and all age groups.² The control of dental caries in young children is a continuing problem, and it is easier to manage if groups of the population with greatest needs are indentified.³ In a developing country like India, dental caries still exists as a smoldering disease that has ingressed its tentacles deep into those regions where there are inadequate resources of dental treatment, lack of public awareness and motivation and increase in the utilization of

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refined carbohydrates.⁴ According to National Oral Health Survey 2002-2003, caries prevalence in India is 51.9%, 53.8% and 63.1% at ages 5, 12 and 15 years, respectively.⁵ Dental caries is a lifetime disease and the highest priority risk group is between 11 and 14 years of age.⁶ Not many studies have been done in this region, particularly in this age group to assess the dental caries experience. Hence, the present study was carried out with the aim to assess the dental caries prevalence and experience among 11-14 years old school going children of Panchkula district, Haryana.

MATERIALS AND METHODS

The present cross-sectional study was conducted by Department of Public Health Dentistry, Swami Devi Dyal Hospital and Dental College, Barwala, Panchkula, Haryana to assess the dental caries experience in permanent dentition among 11-14 years old school going children in Panchkula district (Haryana) India. A survey was systematically scheduled and was spread over a period of 4 months from July 2014 to October 2014. The ethical clearance was obtained from the institutional review board prior to the onset of the study. Permission to examine the school children was obtained from the District Education Officer. A multistage probability sampling was used. The primary sampling unit consists of four blocks of Panchkula (i.e. Pinjore, Raipur Rani, Barwala and Morni). Within each block, the schools were randomly selected proportional to number of private and government schools. A total sample size of 512 school children within the age group of 11-14 years from the selected schools who were present on the day of examination were included in the study. Those with handicapping conditions, including medically compromised, on long term medication, undergoing orthodontic treatment, not willing to participate in the study, absent on day of examination and those having any evidence of caries in primary retained teeth were excluded from the study. A detailed weekly and monthly schedule was prepared well in advance by informing and obtaining consent from authorities of respective study areas. The examination of the subjects as per guidelines of American Dental Association for Type III examination was carried out in concerned school premises, under natural daylight conditions or using artificial illumination with subjects seated comfortably on ordinary chair with back rest and the examiner sitting in front of the child. Clinical examination included assessment of dental caries using WHO criteria (2013).⁷

Statistical Analysis

The data were entered into Microsoft excel and analyzed using SPSS version 17 software (SPSS Inc, Chicago, IL, USA). Descriptive statistics was used for data

summarization and presentation. Chi-square test was used to find an association between the study variables. Unpaired *t*-test and one-way ANOVA were used to compare the mean difference. The level of significance was set at a value of $P < 0.05$.

RESULTS

Among the 512 study subjects, 286 (55.86%) were males and 226 (44.14%) were females. The number of subjects in the age group of 11 year, 12 year, 13 year and 14 year were 118 (23.05%), 130 (25.39%), 125 (24.41%) and 139 (27.15 %), respectively (Table 1). Caries prevalence was found to be 47.46% (Table 1) while mean decay-missing-filled teeth (DMFT) of the population was 0.98 ± 0.42 . Mean DMFT was found to be higher among females (1.03 ± 0.47) when compared to males (0.92 ± 0.39). The mean DMFT scores for 11, 12, 13 and 14 years old school going children were found to be 1.04, 0.81, 0.92 and 1.10 respectively (Table 2). Highest mean DMFT score was recorded among the 14 years old subjects, but the difference between age groups was not found to be statistically significant ($P = 0.078$).

DISCUSSION

In the present study, dental caries prevalence was found to be 47.46%. Similar results were obtained by Dhar *et al.* (2007)⁸ and Singh and Singh (1999).⁹ Our results were in concordance with a study done by Peedikayil *et al.* (2013)¹⁰ and Ingle *et al.* (2014).¹¹ Wide variation of caries prevalence

Table 1: Caries prevalence and distribution of subjects according to different age groups

Age (years)	n (%)		Total subjects (%)	Caries prevalence (%)
	Male	Female		
11	63 (12.31)	55 (10.74)	118 (23.05)	48.92
12	74 (14.45)	56 (10.94)	130 (25.39)	46.00
13	70 (13.67)	55 (10.74)	125 (24.41)	45.44
14	79 (15.43)	60 (11.72)	139 (27.15)	49.48
Total	286 (55.86)	226 (44.14)	512 (100.00)	47.46

Chi-square value=6.337, $P=0.096$

Table 2: Mean DMFT according to age and gender

Age (n)	Mean DMFT	df	P value
DMFT			
11 (118)	1.04	3	0.078
12 (130)	0.81		
13 (125)	0.92		
14 (139)	1.10		
Gender		998	0.189
Males	0.92		
Females	1.03		

DMFT: Decay-missing-filled teeth

in this age group has been reported. In a study conducted by Malvania *et al.* (2014),¹² a caries prevalence of 17.15% was observed. On the contrary, studies conducted by Al-Darwish *et al.* (2014),¹³ Datta and Datta (2013),¹⁴ Kalra *et al.* (2011)¹⁵ and Goyal *et al.* (2007)¹⁶ have reported caries prevalence ranging from 72% to 87%. The widely differing prevalence may be due to age group and sex taken for the study, uniformity of selection of the sample, area selected and the methodology used for the survey.

The overall mean DMFT found in our study (0.98) was similar to that reported by Singh and Singh (1999)⁹ but is not in concordance with those reported by Ingle *et al.* (2014),¹¹ Al-Darwish *et al.* (2014)¹³ and Goyal *et al.* (2007).¹⁶ This could be due to the fact that former two studies were conducted in Haryana where the groundwater concentration of fluoride has been reported to be high (2.09-6.90 mg/l)^{17,18} when compared to permissible limit of 1.0 mg/l (WHO 1971).¹⁹

Mean DMFT was higher among females (1.03) as compared to males (0.92) which was not statistically significant ($P = 0.189$). This is in line with the findings of Singh and Singh (1999),⁹ Shailee *et al.* (2012),²⁰ Shammery and Guile (1990),²¹ Salapata *et al.* (1990)²² and Obry-Musset *et al.* (1991).²³ This is perhaps due to the fact that girls have the habit of taking snacks between meals due to their longer indoor stay in comparison to boys who mostly spend their time in outdoor activities. It may also be attributed to the fact that teeth erupt earlier in females than males, which means female teeth would have been exposed to the oral environment for a longer period than the male of the same age.²⁴ The observation of higher caries risk among females could also be related to fluctuating hormonal levels during puberty.²⁵

Mean DMFT score for 11, 12, 13, 14 years was found to be 1.04, 0.81, 0.92, 1.10 respectively, but it was not statistically significant ($P = 0.078$). Increase in caries prevalence with increasing age was also reported in studies conducted by Al-Darwish *et al.* (2014),¹³ Shailee *et al.* (2012)²⁰ and Goyal *et al.* (2007).¹⁶ The reason behind higher prevalence in caries with age could be that caries being a continuous and cumulative process had obviously increased over a span of 2-3 years. With increasing age, children become more independent in their choices of food. This could also be attributed to limited use of fluoride toothpaste, greater consumption of sugary foodstuffs due to active growth period and neglect of oral hygiene due to casual approach during this period of identity crisis.¹⁶

These data on dental caries status helps to determine the appropriate treatment planning for children. This study indicates a lack of preventive dental care facilities and

awareness and gives an overview of the existing caries in school children of Panchkula district, Haryana. There is a need for periodic surveys of caries prevalence and severity so that preventive programs could be implemented and monitored accordingly. Moreover, school time is an effective phase for promotion of oral health in relation to children. As children spend considerable amount of time in the schools, health behavior of the children can be influenced and can be reached at a satisfactory level when their health habits are being formed.

CONCLUSION

The results exhibited a comprehensive assessment of dental caries experience in a sample of school going children. The current study shows that further emphasis should be given to the effective implementation, scientific monitoring, evaluation and impact of the school-based oral health promotion and preventive programs in Panchkula district, Haryana.

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Study of Body Mass Index and Premenopausal or Postmenopausal Breast Cancer

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Abstract

Introduction: Obesity has increased its role in prevalence of many diseases since the early 1980s, as acknowledged in many studies and strongly suggests that obesity represented by body mass index (BMI) increases the relative risk of premenopausal or postmenopausal breast cancer.

Materials and Methods: A retrograde study of total 200 case patients who were newly diagnosed with breast cancer and 200 controls of women ages 35-64 years were taken for the study. The point of this study was Rama Medical College, Hapur, Uttar Pradesh. All subjects were interviewed using a structured questionnaire prepared on demographics, reproductive history, medical history, including weight and height, family history of breast cancer and other life-style factors. BMI was calculated at the age of 18 and recent at the time of diagnosis of breast cancer.

Results: Author observed in premenopausal breast cancer women having BMI at 18 years age <20 (reference value) were 50% and in control group 46%. Author calculated the $OR_{BMI \geq 25 \text{ kg/m}^2 \text{ versus } <20 \text{ kg/m}^2} = 0.67$. Apart of BMI, maximum cases of weight change since 18 years weight was 5.1-15.0 kg group in premenopausal women 39% and in the control group 38%. In postmenopausal breast cancer women, the odds ratio (OR) found the borderline results. Apart of BMI, maximum cases of weight change since 18 years weight was 5.1-15.0 kg group in postmenopausal women 35% and in control group 31% and OR showed $OR_{weight \text{ change } 5.1-15 \text{ kg versus } <5 \text{ kg}} = 1.19$. Overall $OR_{BMI \geq 25 \text{ kg/m}^2 \text{ versus } <20 \text{ kg/m}^2} = 0.67$.

Conclusion: This study found an inverse association between increasing BMI at age 18 years and risk of breast cancer in women ages 35-64 years especially in premenopausal women. In postmenopausal women, BMI at the age of 18 and recent BMI did not have any significant effect on breast cancer incidence, but weight change from 18 years age to recent had the direct association with breast cancer.

Keywords: Body mass index, Breast cancer, Obesity, Post menopause, Pre menopause, Risk, Women

INTRODUCTION

Since the early 1980s, obesity has dramatically increased in prevalence for many disease,¹ and the consequences of this epidemic in terms of health care expenditures and future anticipated mortality are staggering.² The results of numerous studies, as summarized in both systematic reviews³ and meta analyses⁴ have accumulated to suggest that the obesity body mass index (BMI) increase the risk of

breast cancer in premenopausal women or postmenopausal. In many studies, it was found that there was positive between BMI and breast cancer risk in many studies of postmenopausal women⁵ and an inverse association between BMI and breast cancer risk in premenopausal women. In one studies, Renehan *et al.*⁶ reported that each 5 kg/m² increase in BMI will increase a 12% relative risk of postmenopausal breast cancer, while each 5 kg/m² increase in BMI was associated with an 8% decreased relative risk of premenopausal breast cancers. The World Cancer Research Fund also determined the strength of the matter that the inverse association between body fatness and premenopausal breast cancer is probable.³ The inverse relation between BMI and risk in premenopausal women and the positive relation between BMI and risk in postmenopausal women³ suggest that, there is a "transition" in which BMI ceases to be protective and

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contributes increased risk. There were few studies on the age at which such a transition occur, and it is unknown if there is disparity by race. In a report of American Institute on the prevention of cancer³ said that body fat percentage, a probable risk-reducing factor for premenopausal breast cancer and as a risk-increasing factor for breast cancer in postmenopausal women. Obesity during adolescence,⁷ at age 18 years,⁸ and in adulthood⁹ have been inversely associated with premenopausal breast cancer risk in women while in some women, obesity at age 18 years has been found to be both not associated¹⁰ and inversely associated¹¹ with breast cancer risk among premenopausal women. Similarly, the established inverse relationship between adult BMI and premenopausal breast cancer in women has not been as consistent,^{10,12,13} while some studies have even suggested a positive association between adult BMI and premenopausal breast cancer risk in women.

Few studies have provided data on the effect of BMI on postmenopausal breast cancer in women, and with mixed results.^{11,14} The number of studies comparing postmenopausal women and premenopausal women were inadequate. Hence, the author had tried to find out the effect of BMI on premenopausal or postmenopausal breast cancer in Indian origin.

MATERIALS AND METHODS

A retrograde study of a total of 200 case patients were women ages 35-64 years of breast cancer who were newly diagnosed between January 2014 and December 2014. The spot of the study was Rama Medical College, Hapur, Uttar Pradesh and 200 control subject completed interviews. There were no special efforts for selection of control subjects, as they were hospital patients' relative or visitors. All subjects were interviewed using a structured questionnaire that included questions based on demographics, reproductive history, medical history including body height and weight, family history of breast cancer, physical activity and other life-style factors. BMI was recorded in the study questionnaire by asking the women their height without shoes and body weight at age 18 and at the reference date, was the date when breast cancer diagnosis was made.

BMI was calculated as body weight in kilograms divided by height in meters squared (kg/m^2). BMI at age 18 and at the reference date (recent) was calculated apart of this weight change from age 18 years until the recent measurement was also recorded. The reference category for BMI used were $\leq 20 \text{ kg}/\text{m}^2$ at age 18 years, $\leq 25 \text{ kg}/\text{m}^2$ at recent age and weight change was $< 5 \text{ kg}$. We considered a postmenopausal woman if she had experienced a final

menstrual period of > 12 months and had not used hormonal therapy before or during this interval after the last menstrual period. Women considered premenopausal if they were still menstruating and had not taken any hormone therapy during the 12 months before the reference date. If she had undergone surgical menopause, or/ due to chemotherapy or radiation therapy, hysterectomy in last 12 months before the reference date were excluded. In addition, we excluded participants with missing BMI at age 18 years. Author calculated odds ratios (OR) as relative risk estimates to examine the relationship between different body size measurements and risk of breast cancer. authors included several possible confounding variables in this model that were selected as: Age of breast cancer diagnosis, education, family history of breast cancer, parity, number of pregnancy and duration of breastfeeding, but all these variables were dropped out as these factors were altering the ORs by $< 10\%$ from final model.

OBSERVATIONS AND RESULTS

From Table 1, author observed in premenopausal breast cancer women having BMI at 18 years age < 20 (reference value) were 50% and in the control group 46%. 42% case and 43% in both category were in BMI 20-24 group, while BMI 25+ were only 8% in premenopausal group and 11% in the control group. Author had calculated the $\text{OR}_{\text{BMI} \geq 25 \text{ kg}/\text{m}^2 \text{ versus } < 20 \text{ kg}/\text{m}^2} = 0.67$. Authors observed that the recent BMI was < 25 in 64% cases in both premenopausal breast cancer group and control group, OR was calculated but not significant except in BMI $> 35+$ group. Apart of BMI, maximum cases of weight change since 18 years weight was 5.1-15.0 kg group in premenopausal women 39% and in control group 38% and OR showed $\text{OR}_{\text{weight change } > 25.1 \text{ kg versus } < 5 \text{ kg}} = 1.10$.

Table 1: Breast cancer associated with BMI in premenopausal women

Variables	Cases (n=100)	Control (n=100)	OR
BMI at age 18 years (kg/m^2)			
<20	50	46	1.00
20-24	42	43	0.90
25+	8	11	0.67
Recent BMI (kg/m^2)			
<25	64	64	1.00
25-29	22	21	1.05
30-34	8	8	1.00
35+	6	7	0.86
Weight change age 18 years to recent (kg)			
≤ 5	33	33	1.00
5.1-15.0	39	38	1.03
15.1-25.0	17	19	0.89
> 25.1	11	10	1.10

BMI: Body mass index, OR: Odds ratio

Author observed for postmenopausal breast cancer women from Table 2, having BMI at 18 years age <20 (reference value) were 52% and in the control group 50%. 42% case and 43% in both category were in BMI 20-24 group while BMI 25+ were only 6% in the postmenopausal group and 7% in the control group. Author calculated the OR and found the borderline results. Authors observed that the recent BMI was <25 in 48% cases in the postmenopausal breast cancer group and 46% in the control group, OR calculated but not again significant. Apart of BMI, maximum cases of weight change since 18 years weight was 5.1-15.0 kg group in postmenopausal women 35% and in the control group 31% and OR showed OR_{weight} = 1.19.

All cases compiled in Table 3, then calculated the OR_{BMI} = 0.67 and OR_{BMI 20-24 kg/m² versus <20 kg/m²} = 0.92 for recent BMI, all OR calculated were at border line.

Table 2: Breast cancer associated with BMI in postmenopausal women

Variables	Cases (n=100)	Control (n=100)	OR
BMI at age 18 years (kg/m ²)			
<20	52	50	1.00
20-24	42	43	0.94
25+	6	7	0.82
Recent BMI (kg/m ²)			
<25	48	46	1.00
25-29	30	31	0.93
30-34	14	14	0.96
35+	8	9	0.85
Weight change age 18 years to recent (kg)			
≤5	19	20	1.00
5.1-15.0	35	31	1.19
15.1-25.0	26	27	1.01
>25.1	20	22	0.96

BMI: Body mass index, OR: Odds ratio

Table 3: Breast cancer associated with BMI in all women

Variables	Cases (n=200)	Control (n=200)	OR
BMI at age 18 years (kg/m ²)			
<20	102	96	1.00
20-24	84	86	0.92
25+	14	18	0.73
Recent BMI (kg/m ²)			
<25	112	110	1.00
25-29	52	52	0.98
30-34	22	22	0.98
35+	14	16	0.86
Weight change age 18 years to recent (kg)			
≤5	52	53	1.00
5.1-15.0	74	69	1.09
15.1-25.0	43	46	0.95
>25.1	31	32	0.99

BMI: Body mass index, OR: Odds ratio

Weight change to recent from the age of 18, also not having any significant OR.

DISCUSSION

In this study, authors observed that women of ages 35-64 years, the BMI at age 18 years was associated with decreased risk of breast cancer in women. In premenopausal women, recent BMI was associated with reduced risk. Among postmenopausal women, for recent BMI associations was not significant. The borderline significant protective effect of increasing adult BMI on the risk of breast cancer in premenopausal women is supported by several researches^{9,14} but not all^{15,16} previous studies. We observed a borderline significantly reduced risk of premenopausal breast cancer associated with BMI of 25 kg/m² or greater at age 18 years in women and this was consistent with a study.¹¹

We found no association between recent BMI and postmenopausal breast cancer overall. Most previous studies^{15,16} have found recent BMI to be associated with increased risk of postmenopausal breast cancer, only a small number of studies have reported no association^{17,18} or an inverse association.^{16,19} Till now it is uncertain when the menopausal transition BMI shift from protection form to risk form for breast cancer.²⁰

Most studies have reported no effect of obesity at 15-20 years of age,^{15,19} although the Women's Health Initiative observational study²¹ and the black women's health study¹¹ suggested a protective result. Our results were consistent with these two studies and suggested that BMI at age 18 years might be associated with a reduced risk of postmenopausal breast cancer. Authors observed some association between weight change from age 18 years to recently and breast cancer risk in all women. That was consistent with one study²² and opposite to some.^{9,23} In postmenopausal women, there was strong and consistent evidence that weight gain is associated with breast cancer risk, at least in white women.^{8,15,22} The probable mechanisms by which obesity may protect against breast cancer in young women have not been completely evaluated. It has been seen that any protective effect of high BMI in adult women is because of higher prevalence of menstrual irregularities or anovulatory cycles in women with high BMI and, thus, low level to ovarian sex steroids.²⁴ One anticipated mechanism is that obese premenopausal women have a higher number of anovulatory cycles, decreased estradiol and progesterone levels,²⁴ which causes reduced risk of breast cancer.²⁵ An intriguing alternative mechanism for the protective effect of early obesity is that body fat at young age influences the histological constituents of the breast

tissue. The exact age that obesity is most protective against premenopausal breast cancer is not obvious. High BMI at age 20 years was observed as a strong protective factor for premenopausal breast cancer among women.

As women pass through menopause, the defensive effect of obesity on breast cancer risk is replaced by an increased risk. This effect of obesity is possibly due to peripheral adipose tissue becoming an important source of estrogen. It is indistinct how long it takes for this transition to take place, for obesity to be risk factor from protective state for breast cancer. Pike *et al.*²⁰ have modeled this effect and argue that it takes a decade for a BMI of 30 kg/m² in a premenopausal woman to become a risk factor. It is possible that the reason that we found no increased risk of postmenopausal breast cancer in women with high BMI might be partially explained by the relatively young age of the postmenopausal women in our study.

CONCLUSION

In this study, the authors found an inverse relationship between increasing in BMI at age 18 years and increasing in the risk of breast cancer in women ages 35-64 years especially in premenopausal women. In postmenopausal women, BMI at the age of 18 and recent BMI did not have any significant effect on breast cancer incidence, but weight change from 18 years age to recent had the direct association with breast cancer.

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Comparative Study of 4 Treatment Protocols in the Management of Acute Otitis Externa

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Abstract

Introduction: Acute otitis externa (AOE) or “Swimmers ear” is commonly seen in all age groups. AOE occurs *de novo* or in association with chronic suppurative otitis media (CSOM), acute otitis media with grommets. The causative organism found in both types and their treatment protocol is different. The present study evaluates efficacy of treating AOE without CSOM, acute otitis media and ears with tympanostomy tubes.

Materials and Methods: A total of 184 patients with AOE graded according to the severity of symptoms and signs are grouped into four treatment protocols. Clinical response to treatment is recorded on microscopic examination, resolution of infection and visual analog scale (VAS). Standard statistical analysis is performed by calculating *P* value. Treatment protocols showing *P* < 0.05 is considered as significant.

Results: Patients of Group A (systemic oral antibiotics + non-steroidal anti-inflammatory drugs (NSAIDs) + initial ichthammol glycerine, followed by spirit boric acid drops) showed rapid conversion of VAS from 10 to 2 in 89% of the patients with Senturia Grade 3 within 48 h, when compared with other protocols showing <74% conversion of VAS. Statistical significance noted in all the three parameters with protocol A (*P* < 0.05).

Conclusion: Initial local treatment (external auditory meatus) plays an important role in controlling, preventing recurrence of AOE in addition to systemic oral antibiotic therapy in the management of AOE. A more comprehensive study is required to follow avoidance of systemic oral antibiotics as prescribed by treatment protocol by American Association of Otolaryngologists in the treatment of diffuse AOE.

Keywords: Acute otitis externa, Ichthammol glycerine, Senturia classification, Spirit boric acid ear drops

INTRODUCTION

Acute otitis externa (AOE) also known as “Swimmers Ear” is treated by all the ENT practitioners commonly. AOE is localized inflammation of the skin of external auditory meatus (EAM).¹ Normally certain level of wax in the EAM provides a protective lipid coat to the canal skin lowers the pH and contains lysozymes. This acts as

a barrier to infection as well as mechanical and chemical barrier.² Predisposing factors like narrow EAM, absence of wax, swimmers, habit of introducing sharp objects in EAM are described. In India use of use of ear bud is on the rise since 15 years. These are included in the monthly grocery list of household items by most of the families.³ Acute Otitis Externa (AOE) is clinically characterized by itching; pain in the ear, fullness in the ear, pain on mastication and diminished hearing. The EAM may be filled with dry or wet debris. Narrowing of EAM is due to edema of the skin and peri-audicular swelling.⁴ *Pseudomonas* and *Staphylococci* are frequently cultured bacteria. *Aspergillus niger* and *Candida* are common among the fungal elements.³ Basically the treatment consists of removal of debris from EAM, control of pain and inflammation. Treatment consists of local ear drops which include acetic acid which

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changes the pH of the canal skin. Other available local treatment is with antifungal and antibiotic drops with or without steroids.⁵ Evidence based clinical trials vary in the treatment of AOE and include studies combining local treatment of EAM with or without systemic antibiotics. Review of literature shows few randomized clinical trials (RCT) studies using antibiotic ear drops with or without steroids, aluminum acetate drops, polymyxin + neomycin and steroid drops. Some authors have used ichthammol glycerine wicks, topical antibiotic-steroid-acetic acid drops. Similarly antifungal agents with or without steroids are tried by few authors. The present study reviews four such protocols in the management of OAE. Patients with OAE *de novo* only are included in the present study.

Aim

To compare clinical efficacy of four protocols used in the treatment of acute external otitis; to evaluate the subjective response of the treatment using visual analog scale (VAS); to observe the role of oral systemic antibiotics in resolving the skin of OAE.

MATERIALS AND METHODS

A total of 184 patients attending the outpatient department (OPD) of Government General Hospital attached to Kurnool Medical College, Kurnool Andhra Pradesh during June 2011 are taken up for the present study. Patients included are those with the presenting complaints of pain in the ear, pain in the ear on chewing, hearing loss and watery discharge. Patients with associated symptoms such as fever, malaise and pain in the neck and swelling around the ear are also included. The patients are divided into four structured groups such that all the age groups are equally represented. History of other symptoms of head and neck like tonsillitis, sinusitis are elicited. Predisposing factors like humidity, swimming, occupation, narrow ear canal are noted. Patients with history of similar episodes and those undergoing already treatment are also included. Patients with diabetes mellitus and post radiation are excluded. All the patients are examined for status of EAM with otoscopy and under microscope. EAM is looked for edema of the canal skin, epithelial debris, redness canal skin and visibility of tympanic membrane. Patients are examined for periauricular swelling, tragus sign, and mastoid tenderness. Regional lymph node swelling is looked for and recorded.

Inclusion Criteria

1. Patients aged between 2 and 70 years
2. Patients with *de novo* AOE
3. Patients with complaints of <3 week's duration
4. Patients treated elsewhere for the same complaint.

Exclusion Criteria

1. Patients with chronic suppurative otitis media
2. Patients with grommets *in situ*
3. Patients with acute suppurative otitis media
4. Patients with diabetes mellitus
5. Post irradiation patients
6. Viral and reactive causes of external otitis.

Senturia classification is used to grade the patients according to their symptoms and condition of the EAM skin. Grade 3 of the classification is ignored as it specifies chronic variety. The treatment protocols are grouped as A, A1, B and B1. The patients are allotted to A, A1, B and B1 groups, 46 in each group depending upon a lottery system. All the four treatment schedules are given for 5 days and extended to 2 more days depending upon the resolution. All the patients of four groups were subjected to otoscopy microscopic examination to record the status of the skin of EAM and tympanic membrane on the day 1, 3, 5 and 7. These EAM findings are used to grade the severity of the OAE in the patients. Initial VAS is used to measure the pain and discomfort complained by the patients. VAS was used on 1st, 3rd day and 7th day. Swabs collected from ears of all the patients are sent for microscopic examination and culture sensitivity of microorganism.

Treatment given for Group A consisted of:

1. Oral amoxycillin with clavulonic acid (25 mg/kg body weight in two doses)
2. Oral NSAID (diclofenac sodium with paracetamol)
3. Local treatment with ichthammol glycerine wicks in EAM (ichthammol BPC 1973 10.0% w/w. B.P.C) for 48 h.
4. Spirit and boric acid ear drops for remaining 3 days.

In Group A1 patients oral antibiotic is not given; local treatment is same as Group A.

Group B patients received:

1. Oral amoxycillin with clavulonic acid (25 mg/kg body weight in two doses)
2. Oral NSAID (diclofenac sodium with paracetamol)
3. Local treatment with neomycin + polymyxin B + bacitracin + steroid ointment wicks for 48 h.
4. Ofloxacin with dexamethasone ear drops for remaining 3 days.

In Group B1 patients oral antibiotic is not given; local treatment is same as Group B.

Oral NSAID is given to patients aged above 12 years only. Below 12 years only paracetamol is administered; dose depending upon the age.

For all the patients external auditory canal (EAC) is cleaned by suction clearance for removal of debris, dried up secretions and purulent material or fungal elements, before inserting wicks.

All the patients underwent supervised follow-up for 48 72 h; 2-3 visits in the OPD.

After 48 h, if the resolution is from Grade 2c to Grade 1, the patients are asked to continue ear drops for the remaining 3 days and report on 7th day. Patients are examined on day 1, 3, 5 and 7 by otoscopic and examination with microscope. Assessment of pain and discomfort is scored with VAS. All the observations were tabulated and statistical analysis done using *P* value. *P* value below 0.05 was taken as significant.

OBSERVATIONS

All the 184 patients included in the present study are grouped into four treatment protocols A, A1, B and B1. The youngest patient is 2 years old and the eldest patient is aged 69 years 6 months. The mean age is 29.4 years. Female patients are 87 and males are 97. Patients with unilateral ear involvement are 146 (79.34%) and the remaining 38 (20.65%) had bilateral involvement. History of use of sharp objects or finger nails in the ears either by the family members or themselves was found in 169 (91.84%) of the patients. 65 (35.32%) of the patients are found in the habit of going to swimming. Reasonable care is taken to get a structured sample in each treatment group to represent all the ages equally. 85 (46.1%) of the patients gave history of similar episodes previously within 2 years. Post auricular lymph node was palpable in 23 (12.5%) of the patients. Pre-auricular lymph node was palpable in (16.30%) of the individuals. Age distribution of the present study is shown in Table 1.

Among the 184 patients 87 (47.28%) presented with Grade S2c, 62 (33.69%) with Grade S2b and 19 (10.32%) with S2a Grade. 12 (6.52%) of the patients presented with S1 type (Table 2). Initial VAS score is measured in each patient after clinical examination. All the patients with Grade S2c scored 8 on VAS. Patients with S2b scored 6 on VAS (Table 2).

Table 1: Age distribution of patients (n=46x4=184)

Age interval	Group A	Group A1	Group B	Group B1
2-10	06	06	06	06
11-20	06	06	06	06
21-30	08	08	08	08
31-40	12	12	12	12
41-50	08	08	08	08
51-60	03	03	03	03
61-70	03	03	03	03

After 48 hrs the VAS score and grading on otoscopy and under microscope is done. It is observed in Group A; the patient's VAS score reduced from 8 to 2 in 12 of the 22 patients (54.54%). In Group A1 conversion of VAS from 8 to 2 is in 3 patients (15%); *P* = 0.007 which is less than predicted value of 0.05. Similarly in Group A the VAS score reduced from 8 to 4 in 6 of the 22 patients (27.27%). In Group A1 reduction of VAS score from 8 to 4 is in 2 patients (10%); *P* = 0.049 and significant in Group B, VAS score reduced from 8 to 2 in 11 out of 24 patients (45.83%). In Group B1 VAS score reduced from 8 to 2 in 4 of the 23 patients (17.39%). where the *P* = 0.026 and the predicted *P* < 0.05. There was no significant reduction in VAS in patients in remaining groups (Table 3).

There was relief in pain and discomfort in 71.42% (10 out of 14 patients) of the patients of Group B; VAS score reduced from 4 to 2 and the *P* = 0.018 which was significant. There was no significant improvement in pain relief in Group A and A1 during this same period; *P* > 0.05 (Table 4).

Otoscopy and microscopic examination on 7th day for resolution of AOE grading from S2c to S1ii is observed that 15 of the 22 patients (59.09%) of Group A and 7 patients (35%) of patients of Group A1 showed resolution. The *P* = 0.035 which is less than predicted value *P* < 0.05. Similarly in Group B, 14 out of 24 patients (58.33%) showed resolution from S2c to S1. In Group B1 5 out of 23 patients (21.73%) showed resolution from S2c to S1. The *P* = 0.015. Resolution from Grade S2b to S1 is seen in 14 out of 18 patients (77.77%) in group A. In group A1 the resolution from S2b to S1 is in 6 out of 16 patients (37.5%); *P* = 0.029 and significant. In Group B, there is resolution from Grade S2c to S1 in 14 out of 24 patients (58.33%) when compared to Group B1 patients the resolution is seen in 5 patients; the *P* = 0.015 and significant. (Table 5).

The present study showed single organism culture of *Pseudomonas aeruginosa* in 63 (34.23%) and *Staphylococcus aureus* in 46 patients (25%); total in 109 patients (59.23%). Two organisms culture of *P. aeruginosa* and *S. aureus* is seen in 47 patients (25.54%). The most common organism is *P. aeruginosa* 34.23% (Table 6). Augmented amoxycillin is used empirically in the present study to treat the patients with AOE. The study showed that the percentage of sensitivity of augmented amoxycillin to *P. aeruginosa* is 87.30%, for cephalosporins-2 is 86.43%, for quinolones it is 79.36% and for amino-glycosides it is 88.88%. For combined infection of *S. aureus* and *P. aeruginosa* the percentage of sensitivity with augmented amoxycillin is 93.61%, with amino-glycosides it is 97.87%, with cephalosporins-2 it is 82.97% and with quinolones it is 78.72% (Table 6).

Table 2: Patients graded according to Senturia classification and VAS (n=46×4=184)

Senturia grading	Severity of symptoms	Otoscopy	VAS	Group A	Group A1	Group B	Group B1
S1	Mild	Edema, dry scaly skin	2	3	4	3	3
S2a	Mild to moderate	Edema, redness, clear wet scales, odorless secretions	4	4	5	5	6
S2b	Moderate	Edema, narrowing of EAM, sero-purulent secretions, TM obscured partially, peri auricular swelling	6	18	16	14	14
S2c	Severe	Near total closure of EAM, TM not visible, thick, wet scaly amalgam with purulent secretions, swelling over mastoid process	8	22	20	24	23

TM: Tympanic membrane, EAM: External auditory meatus, VAS: Visual analogue scale

Table 3: Assessment of patients after 3rd day of treatment (n=46×4=184); P<0.05

VAS score	Group A	Group A1	P value	Group B	Group B1	P value
Change in VAS: 8 to 6	4	15	0.997	4	9	0.911
Change in VAS: 8 to 4	6	2	0.049	10	8	0.265
Change in VAS: 8 to 2	12	3	0.007	11	4	0.026
Change in VAS: 6 to 4	4	6	0.997	3	7	0.088
Change in VAS: 6 to 2	14	10	0.172	11	7	0.138
Change in VAS: 4 to 2	4	5	0.549	5	3	0.171

VAS: Visual analogue scale

Table 4: Assessment of patients after 5th day of treatment (n=46×4=184); P<0.05

Improvement in VAS	Group A	Group A1	P value	Group B	Group B1	P value
Change in VAS: 6 to 4	2	10	0.996	2	4	0.735
Change in VAS: 6 to 2	2	5	0.849	2	5	0.849
Change in VAS: 4 to 2	8	8	0.433	10	3	0.018

VAS: Visual analogue scale

Table 5: Grading resolution on otoscopy findings after treatment on 7th day (n=46×4=184); P<0.05

Grading resolution on otoscopy	Group A	Group A1	P value	Group B	Group B1	P value
S2c to S2b	3	8	0.934	4	9	0.911
S2c to S2a	4	5	0.549	6	9	0.739
S2c to S1	15	7	0.035	14	5	0.015
S2b to S2a	4	10	0.947	5	6	0.543
S2b to S1	14	6	0.029	9	8	0.342
S2a to S1	3	4	0.557	3	3	0.391

Table 6: Types of organism isolated and sensitivity to different antimicrobial agents n=184; P=0.44

Organism	Isolated organism (n=184) (%)	Percentage of sensitivity		Antibiotics	
		Augmented amoxycillin	Cephalosporins 2	Quinolones	Amino glycosides
<i>P. aeruginosa</i>	62-34.23	55-87.30	48-76.19	50-79.36	56-88.88
<i>S. aureus</i>	46-25	-	-	-	-
<i>Candida</i>	13-7.06	-	-	-	-
<i>A. niger</i>	15-8.15	-	-	-	-
<i>P. aeruginosa</i> + <i>S. aureus</i>	44-25.54	44-93.61	39-82.97	37-78.72	46-97.87
Negative for organism	4-02.1				

P. aeruginosa: *Pseudomonas aeruginosa*, *A. niger*: *Aspergillus niger*, *S. aureus*: *Staphylococcus aureus*

In the Groups A and B patients who are administered oral antibiotic along with different local treatment protocols, it is observed that there was resolution in 58 of the 87 patients (66.66%) on 7th day. In Group A1 and B1 the resolution is observed in 33 out of 84 patients (39.28%). The $P = 0.004$ which is significant (Table 7).

DISCUSSION

The incidence of AOE is worldwide.⁵ The incidence is 10% of the population at some stage and can present in acute, chronic or necrotizing forms. AOE may be associated with eczema of the ear canal, and is more

Table 7: Comparison of resolution between Groups A+B and A1+B1 on day 7

Observation	Total of group A+B	Total of A1+B1	P value
Resolved to S1/total patients (S1c+S2b+S2a)	58/87	33/84	
Percentage	66.66	39.28	0.004

common in swimmers, humid environments, and people with absence of ear wax or with narrow ear canals, hearing-aid users, and after mechanical trauma. It is due to diffuse inflammation of the skin of the EAM. This study was conducted in 2010, in Government General Hospital, Kurnool which showed an OPD census of 41040. The sample taken for the study represents only 0.44% of the total census. It is seen common in children over 2 years of age. Change of local pH of the skin, frequent wetting of the skin, use of unclean towels leads to impairment of defense mechanism of the skin making it susceptible to bacterial infection. Desquamation of the skin gives rise to microscopic fissures that provide a portal of entry for infecting organisms.² other risk factors for AOE include Trauma, a foreign body in the ear, using a hearing aid, certain dermatological conditions, chronic otorrhea, wearing tight head scarves and being immune-compromised. Ear piercing may lead to infection of the pinna.⁶ Its clinical implications range from a mild inflammation and discomfort to a life-threatening infection.

The youngest patient among the 184 patients is 2 years old and the eldest 69.6 years. The mean age was 29.4. Male to female ratio was 1:1.2. 79.3% of the patients had the unilateral disease. History of interference with EAM was seen in 92% of the patients. 34% of the patients are swimmers. History of similar episodes was seen in 44% within 2 years. Post auricular lymph node was palpable in 12% of the patients. Pre-auricular lymph node was palpable in 16% of the individuals. 47.82% of the 184 patients belonged to Grade S2c of senturia classification. 33.69% of the patients presented with S2b, 10.86% of the patients came with S2a and 7.06% of them came with S1 Grade of AOE.

The most comm organism cultured was *P. aeruginosa* 34.23%, followed by a combination of *P. aeruginosa* and *Staphylococci* in 25.54% *S. aureus* in 25% of the patients. Fungal elements found under microscopy were *A. niger* in 8.15% and *Candida* in 7.06% of patients. The present study showed single organism culture in 59.23% of patients and two organism cultures is found in 25.54%. The most common organism is *P. aeruginosa* 34.23%. In a study by Bojrab *et al.*,⁶ single organism growth were occurred in

67 (79%) samples and two organisms were isolated from 18 (21%) samples. The most common isolates were *P. aeruginosa* (43%), *S. aureus* (17%), *Candida albicans* (15%), *Proteus* spp. (7%), *Streptococcus pyogenes* (6%), *Haemophilus* spp. (4%), *Klebsiella oxymora* (3%), *Vibrio alginolyticus* (2%), *Streptococci* Group C and G (2%) and *Escherichia coli* (1%). The present study shows that the percentage of the sensitivity of augmented amoxycillin to the organism is 87.30%, for cephalosporins-2 is 86.43%, for quinolones it is 79.36% and for amino-glycosides it is 88.88%. In the present study oral systemic antibiotic augmented amoxycillin (25 mg/kg body weight) was used empirically in Group A and. Though used empirically the difference in sensitivity between amino-glycosides (88.88%) and augmented amoxycillin (79.36%) is not statistically significant $P = 0.44$ (Table 6). Roland and Stroman⁷ in their study concluded that Bacterial infections of the external ear canal are most often caused by *P. aeruginosa*. However, there are a great number of other Gram-positive and Gram-negative bacteria species that are recovered from patients with AOE. Because of this diverse etiology, the best topical therapeutic choice for topical therapy is for the most potent, broad-spectrum (especially anti-*P. aeruginosa*) antibiotic available.

Initial VAS score is measured in each patient for each grade of the AOE. All the patients with Grade S2c scored 8 on VAS. Patients with S2b scored 6 on VAS (Table 2). It is observed in Group A in whom oral antibiotic is used the subjective relief from pain and discomfort as scored on VAS score is significantly better than Group A1 patients; $P = 0.007$. Similarly, the statistical significance is noted between Group B and B1; $P = 0.026$ and the predicted $P < 0.05$ (Table 3).⁸ In patients, more than 12 years, a 10 point numerical rating scale was used, and the score was given by the patient. In the present study a VAS score with five images of facial expression showing the grade of pain and discomfort are used. Each image is given a score of two points.

In a study by Rosenfeld *et al.*⁹ where the primary outcome considered was clinical resolution of AOE. It was recommended that clinicians should not prescribe systemic antimicrobials as initial therapy for diffuse, uncomplicated AOE unless there is extension outside the ear canal or the presence of specific host factors that would indicate a need for systemic therapy. In the present study, most of the guidelines recommended are followed, except to usage of systemic oral antibiotic with an intention to observe the difference in response to local treatment, time taken to give relief from pain, irritability and to put back the patient to normalcy as early as possible. In a study by Hornigold *et al.*¹⁰ compared the use of glycerol and ichthammol (G and I) ribbon gauze versus

topical antibiotic and steroid drops in the management of otitis externa found statistically significant decrease in the pain score between each visit for the entire group of patients and decrease in canal wall swelling ($P < 0.001$). There was no significant difference between drops and ribbon gauze in terms of pain relief, canal wall edema, or aural discharge.

In the present study the Group A patients who are treated with ichthammol glycerine wicks in EAM the VAS score reduced within 48 h from 8 to 2. The $P = 0.007$. Similarly, VAS score fell from 8 to 4 with a $P = 0.049$.

In another study by Bhatta *et al.*,⁸ in a comparison of 10% ichthammol glycerine pack with steroid-antibiotic pack for relieving pain in cases of AOE, there was statistically significant decrease in the number of visits in steroid group ($P < 0.05$). However, decrease in pain score in second visits as compared to first visit was not significant ($P > 0.05$) in both groups. Edema occurring due to inflammation stretches nerve fibers and cause an extreme amount of pain. So treatment includes not only antibiotics and analgesics systemically but also aural packing. Ichthammol has antiseptic action while glycerine due to its hygroscopic nature decreases edema. G and I solution has a specific anti-staphylococcal action.^{9,10} Topical antibiotic steroid combination therapies are superior to steroid therapy alone for the symptomatic control of otitis externa. Hajioff and MacKeith,¹ reviewed literature of cohort studies and RCT published in clinical evidence (Online). They reviewed Medline 1966 to October 2007, Embase 1980 to October 2007, clinical evidence search and appraisal October 2007 and the Cochrane Database of Systematic Reviews.

In current UK practice, most clinicians would use a combination of topical corticosteroid plus antibiotic agent as first-line treatment of AOE.¹¹ In the UK, the consensus opinion is that amino-glycoside/corticosteroid combination therapy can be used if limited to a course of <2 weeks. Waitzman and Elluru¹² used ciprofloxacin as oral systemic antibiotic in their study of acute external otitis and found beneficial when local treatment consisted of regular suction clearance of EAC for removal of debris and antibiotic ear drops.

CONCLUSIONS

AOE *de novo* is a common clinical entity occurring in ENT practice. Systemic use of oral antibiotics in all patients is unnecessary according to the recommendations of American Society of Otolaryngology. Their guidelines concentrate only on local treatment to EAM. Local instillation of ear drops prepared from antibiotics like quinolones, soframycin, amino-glycosides and polymixin etc. are used. Usage of spirit, boric acid, aluminium acetate, and topical acetic acid are used. The present study in Indian scenario shows use of systemic antibiotic and whichever local treatment the clinician chooses, shows definite statistical significance in the reversion of not only the pathological process of AOE, but also relief to the patients in the form of demonstration of VAS score. In both the parameters the P value is significantly below 0.05.

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Cross Leg Flap - Still a Reliable Option for Lower Limb Salvage: A Retrospective Study

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Abstract

Background: With the development of various options for lower extremity reconstruction, the cross leg flap has become a lesser utilized choice. However, it still is a robust method when other methods cannot be used. We studied the patients who underwent cross leg flap coverage at our institution. We found it be reliable though associated with various disadvantages, especially patient discomfort. With better understanding of anatomy, the method of performing the flap has changed, and the disadvantages are lessened.

Methods: The retrospective study was done. Records of all patients who underwent cross leg flap at our hospital from January 2008 to December 2014 were studied, and results evaluated.

Results: A total of 13 patients were studied. Flap survived in all patients. One patient had marginal necrosis, and two patients had marginal epidermal necrosis. No further intervention was required in any patient, and all defects healed completely.

Conclusions: Cross leg flap is a reliable option for lower limb reconstruction, which can be used when other options are not available.

Key words: Cross leg flap, Lower extremity reconstruction, Lower extremity trauma

INTRODUCTION

Lower extremity trauma, especially middle and lower third leg and foot, continues to pose a challenge for reconstructive surgeon. The number of patients with such injuries continues to increase day by day because of road traffic accidents and other causes. The vascularity of this region is poor¹ and options for reconstruction are limited as it is at one end of the body. With detailed anatomical studies various pedicled flaps, both muscle and fasciocutaneous, have been described. Reverse sural flap with its distal pedicle is suitable for a large number of patients and has made the management of distal defects comparatively easy.² Free flaps are also being used frequently for these defects.³ This has made the cross leg flap a less favored choice.

However, there are still many patients where other options are precluded, and they benefit from the cross leg flap. With the better delineation of anatomy, larger amount of tissue can be transferred based on smaller pedicle, which makes the flap more comfortable for the patient and the surgeon. The use of external fixator for fixing the legs for the duration the flap remains attached to the donor site has also mitigated problems associated with dressings and immobilization complications.^{4,5}

METHODS

This study was carried out retrospectively. Records of all patients who underwent cross leg flap coverage from January 2008 to December 2014 were studied.

Surgical procedure - The flaps were raised on three sides - Proximally, laterally and medially, leaving them attached distally. Dissection was done deep to deep fascia. These flaps are based on perforators related to posterior tibial artery or peroneal artery. The anatomical basis of these flaps has already been described.^{6,7} Perforators were identified by hand-held Doppler. However, Doppler is

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not a must if anatomical guidelines are properly followed. The proximal limit of flaps was kept at 6 cm from knee joint. In two cases cross foot flap was done, which was random pattern flap with skin harvested from the instep of the opposite foot. The donor site and bridge segment were covered with split-thickness skin graft. The flaps were partially divided at 3 weeks and completely divided at 4 weeks. For holding the legs together plaster of paris was in earlier cases, later external fixator was used.

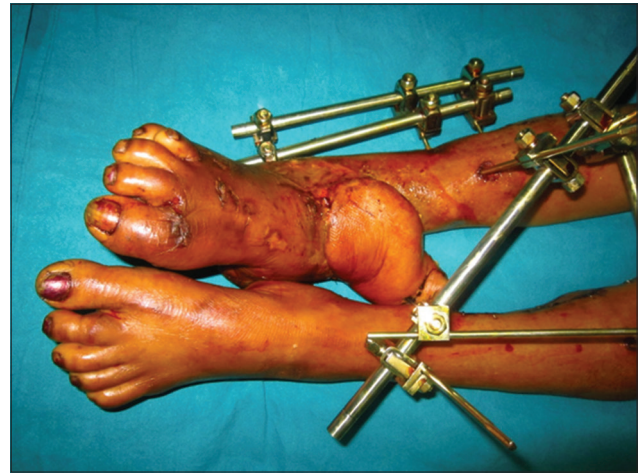
RESULTS

For the 7 year period January 2008-December 2014, 13 patients underwent cross leg flap. During this duration, a total of 137 patients underwent flap reconstruction for lower limb salvage at our institution. Thus only 10% required cross leg flap coverage. In 11 patients, the donor site was calf and in 2 patients the donor site was instep of opposite foot. Males were 11 (85%) and 2 (15%) were females. The minimum age was 9 years and maximum age was 52 years, average age being 25 years. Cause of injury in all patients was road traffic accident excepting one in whom the injury was because of falling down hillside. One patient had marginal necrosis of 1 cm and 2 patients had marginal epidermal necrosis. All of them healed without any further intervention. Defect size varied from 6 cm × 6 cm to 14 cm × 9 cm (Pictures 1-6).

DISCUSSION

Though a multitude of options is available for the reconstruction of lower limb defects, a comprehensive solution is still not available. All available solutions have their own associated problems. Cross leg flap was introduced by Hamilton in 1854 and has been a workhorse for lower limb reconstruction.⁸ However, with better

understanding of anatomy other options have been described, which lead to a decline in the use of cross leg flap. In our study, 10% of patients undergoing lower limb reconstruction underwent this flap.



Picture 2: Wound covered with cross leg flap



Picture 3: After flap division



Picture 1: Compound fracture of distal tibia



Picture 4: Degloving injury of sole



**Picture 5: Weight bearing area covered with cross foot flap.
Rest of the area covered with skin graft**



Picture 6: After flap division

Reverse sural flap with its distal pedicle has reached up to distal leg and foot. The benefit is that it is raised from the ipsilateral leg. Hence, the patients' legs do not have to be fixed to each other as in cross leg flap, which greatly increases the patients' comfort. No flap division is required leading to lesser morbidity and early recovery. However, reverse sural flap is not available in all patients as many a time trauma involves the flap donor site also or for some other reason. Partial and complete necrosis of the reverse sural flap has been described.

For proximal leg defects various muscle, musculo-cutaneous and fascio-cutaneous flaps are available which are raised from ipsilateral side e.g. gastrocnemius muscle and musculo-cutaneous flaps, soleus flap, etc. Ponten described the inclusion of deep fascia in cutaneous flaps.⁹ These fascio-cutaneous flaps have the advantage of better vascular supply. The length to breadth ratio in cutaneous flaps had to be restricted to 1:1 but in fascio-cutaneous flaps the ratio could be 3:1, which increased their reach

leading to their increased use. These flaps may not always be available because of trauma involving the donor site or other reasons, and they may not always succeed.

The development of microsurgery has led to the use of free tissue transfer in lower limb reconstruction with greater success in limb salvage. However, it requires a sophisticated setup and technical expertise, which are not available everywhere. Though failure rates with free tissue transfer have been going down, failures still occur, and alternative options are required.

The cross leg flap has also undergone improvements since it was first described. Initially it used to be harvested as a cutaneous flap, and hence that the length to breadth ratio had to be restricted to 1:1. For larger flaps width needed to be increased accordingly i.e., the base had to be wider. With Ponten giving the concept of inclusion of deep fascia to improve their vascularity the same was applied to cross leg flaps so larger flaps with comparatively narrower bases could be raised. Following detailed anatomical studies it is now possible to raise these flaps on defined vascular supply i.e., perforators from limb vessels. These perforators can be identified by the use of Doppler.¹⁰ However, the use of Doppler is not a must if anatomical guidelines are followed. This has enabled raising large flaps on narrow pedicles. Therefore, large wounds can be covered easily with this flap and this has always been the biggest advantage of this flap. The largest defect covered in our study was 14 cm × 9 cm. Other authors have also reported coverage of large defects by this flap. At the time of division if the defect is large the bridge segment can be utilized to cover part of the defect, otherwise it may be brought back to cover part of donor site.

The main disadvantage of this flap is the discomfort associated with it as the two legs have to be fixed to each other leading to severe restrictions on the patient. Earlier this used to be done by using plaster of paris. This would involve fixing the knee and ankle joints and subsequently the stiffness of these joints. Managing the donor and recipient sites was also tedious. Now the external fixator is used to fix the legs to each other. The dressings and post-operative management has been simplified by its use. It also allows mobility at knee and ankle joints reducing the incidence of joint stiffness and contracture.

We divided the flap in two stages at 3 weeks and 4 weeks. Other authors have described the division of flap in a single stage at 2 weeks. Such early division can greatly alleviate the patient discomfort and morbidity.

The advantages of the cross leg flap are:

1. Provides large amount of tissue

2. Good quality cover
3. Reliability
4. Simple technique, no sophisticated setup or special expertise required
5. No functional deficit of the donor site.

The disadvantages of the flap discomfort and morbidity are largely offset by the above advantages. The cross leg flap therefore still remains an important method of lower limb salvage. It can be done where other option is precluded or have failed. Lu *et al.* have even recommended that cross leg flap procedure be given precedence over free tissue transfer.¹¹

CONCLUSIONS

Though cross leg flap is indicated less and less with the development of other options, it remains a robust option for lower limb salvage. It is easy to perform, reliable and can be done in setups where advanced facilities are not available. It is also an option when other flaps are not possible or have failed.

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Morphometric Study of Temporal Styloid Process and Stylohyoid Ligament Calcification

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Abstract

Introduction: Stylohyoid complex includes styloid process, stylohyoid ligament and hyoid bone, which are derivatives of the second branchial arch. Styloid process varies in length from few mm to 25 mm.

Materials and Methods: 50 skulls and 47 (25 right and 22 left) temporal bones housed in the Department of Anatomy, Thoothukudi Medical College were studied for the length and thickness of the styloid process. The length was measured from the base to the tip of the styloid process using digital vernier caliper and length more than 30 mm was considered as an elongated styloid process.

Results: Nine out of 147 styloid process showed elongation with the incidence of 6.1%. One of the elongated right styloid processes was associated with calcified stylohyoid ligament, the length of the right styloid process was 35.52 mm and the calcified stylohyoid ligament was 23.17 mm with an angle of 30°.

Conclusion: Elongated styloid process and calcified stylohyoid ligament are clinically important as they present with compression symptoms, dysphagia and neck pain on turning to other side. This can be diagnosed by palpation through tonsillar fossa and can be confirmed by panoramic radiographs and three-dimensional computed tomography. Hence, radiologist and surgeons should be aware of the variations of the stylohyoid complex.

Key words: Eagle syndrome, Elongated styloid process, Ossification, Temporal bone

INTRODUCTION

Variations in the length of the bones and ossification of ligaments in our body may result in clinical problems, especially in head and neck. The styloid process, a part of temporal bone projecting anteroinferiorly varies in length from few mm to 2.5 cm. It can be straight or anteromedially curved. Its proximal tympanohyal part is ensheathed by tympanic plate and its distal stylohyal part gives attachment to muscles and ligaments. It is related to important structures such as parotid gland laterally, facial nerve to its base, external

carotid artery crossing its tip and the beginning of internal jugular vein medially.¹ The center for tympanohyal appears before birth and fuses with the petrous part during the 1st year. The center for stylohyal appears after birth, then ossifies slowly and fuses with the upper part after puberty.²

The second arch cartilage has evolved to support jaw, tongue and larynx.³ Reichert's cartilage, the second arch cartilage ossifies to form upper part of body and lesser cornua of hyoid bone distally and styloid process proximally. The unossified cartilage disappears, its perichondrium persists as stylohyoid ligament.⁴

The stylohyoid ligament which extends between the styloid process and the hyoid bone is sometimes ossified at the proximal end to form an abnormally long styloid process or at the distal end to form exaggerated cornua minus. In rare cases, the whole arch may be ossified.⁵ Incidence of elongated styloid process is 14%.⁶

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Variations in the length of the styloid process can lead to many symptoms of head and neck which provoked this study.

MATERIALS AND METHODS

Fifty skulls and 47 (25 right and 22 left) temporal bones housed in the Department of Anatomy, Thoothukudi Medical College were taken for the study. The length and thickness of the styloid process of temporal bone were observed. The length was measured using digital Vernier caliper from the base to the tip of the styloid process. Inferior surface of a temporal bone at the junction of its petrous and tympanic portions was considered as a base. Length more than 30 mm was recorded as an elongated styloid process. The bones were also observed for the calcification of stylohyoid ligament. Length with thickness at the level of its base, angulation and tip were also measured.

RESULTS

Nine out of 147 showed elongated styloid process with incidence of 6.1%.

The length of styloid process ranges between 8.1 mm and 37.96 mm and the mean was 15.6 mm and 13.8 mm on the right and left side respectively. Elongated styloid process was observed bilaterally in one skull (Figure 1), 5 in the right and 2 in the left.

One of the elongated right styloid processes was associated with the calcified stylohyoid ligament. The length of the right styloid process was 35.52 mm and the calcified stylohyoid ligament was 23.17 mm making an angle of 30° with the styloid process. The thickness of the styloid process was 8.27 mm at its base. The thickness of the

ligament at the angulation was 5.02 mm and at its tip was 1.99 mm (Figure 2). The left styloid process was 10 mm in this skull.

The measurements of the elongated styloid process are tabulated (Table 1).

DISCUSSION

The styloid process is a slender pointed process of the temporal bone, which gives attachment to muscles (stylohyoid, styloglossus and stylopharyngeus) and ligaments (stylohyoid and stylomandibular) to stabilize hyoid bone during normal oropharyngeal functions.

According to Saheib *et al.* (2011), the incidence of the elongated styloid process is 3.87%⁷ but the incidence in our study shows 6.1%.

According to our study, the incidence of calcification of stylohyoid ligament is 0.68%. Bengi and Kaan in 2012 stated that the incidence of stylohyoid ligament calcification is higher in females as compared to males and also increases

Table 1: Length of elongated styloid process

Side	Length (mm)
Right	35.52
Right	37.98
Left	33.81
Right	32.49
Left	31.10
Right	30.65
Right	33.52
Right	33.72
Left	34.12



Figure 1: Lateral view of the skull with arrows showing bilateral elongated styloid process

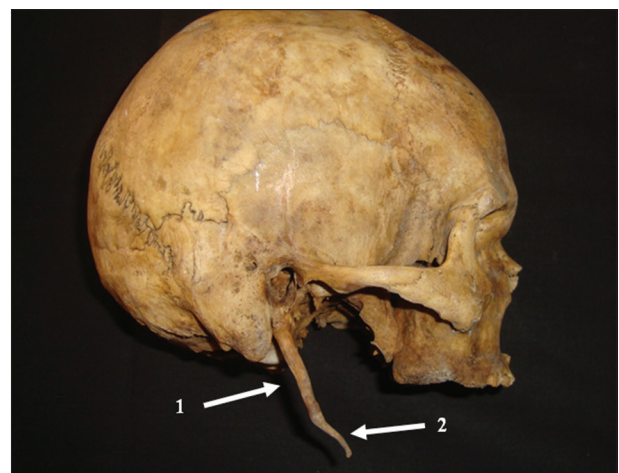


Figure 2: Lateral view of the skull with arrow 1 showing elongated right styloid process and arrow 2 showing calcified right stylohyoid ligament

as age advances, more often seen at 50-59 years. The incidence is also higher in patients with systemic diseases.⁸ O'Carroll in 1984 reported that there was a steady increase in the incidence of calcification in first three decades from 45.3% to 86.2% and 92% in seventh decade.⁹ Calcification of stylohyoid ligament is common in animals, which form separate bony element to form suspensory apparatus.⁵ The average length of the calcified stylohyoid complex was 36.7 mm in 80 years old subjects detected by panoramic radiographs. The length of calcified stylohyoid complex correlates with serum calcium concentration and heel bone density.¹⁰

Eagle syndrome is associated with unilateral or bilateral elongated styloid process or stylohyoid ligament calcification. Eagle described two types of the syndrome, classic styloid syndrome occurring usually after tonsillectomy and characterized by dysphagia, odynophagia, increased salivary sensation, foreign body sensation and sometimes vocal changes. The second stylocarotid syndrome caused by compression of stylohyoid complex exerting pressure on carotid arteries regardless of tonsillectomy and symptoms are caused by stimulation of sympathetic nerve plexus around the blood vessels. Parietal headache, orbital pain can occur. Vision disturbances and syncopal attacks can occur in severe cases.¹¹

Symptoms like pain on turning the head, discomfort on swallowing, pain on protrusion of tongue can occur and may be due to traumatic fracture of styloid process, compression of adjacent nerves or insertion tendinitis of stylohyoid.¹² Calcification of stylohyoid ligament can be a cause for clicking jaw.¹³

The calcified stylohyoid ligament is felt as a solid mass in the tonsillar fossa¹¹ and restricts the movement of the hyoid bone. Stylohyoid ligament calcification should be suspected in difficult intubation.¹⁴ Cases of submandibular gland obstruction and difficulty in yawning were also reported.¹⁵ Sudden death due to mechanical irritation of the carotid sinus by elongated styloid process has been reported.¹⁶

Calcified stylohyoid ligament can be diagnosed by radiographs of lateral view or panoramic view and confirmed by three-dimensional computed tomography

imaging. The symptoms can be relieved by surgical excision of the calcified ligament and elongated process.

CONCLUSION

Elongated styloid process and calcified stylohyoid ligament are clinically important as they present with compression symptoms. Surgeons should exclude the presence of the elongated styloid process before arriving at the final diagnosis in cases with compression symptoms. The radiologist should be aware of the variations of the stylohyoid complex while interpreting.

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Spectrum of Conjunctival Bacterial Flora in Non-Insulin Dependent Diabetics, India

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Abstract

Introduction: Normal microbial flora does an important function of inhibiting the establishment of foreign pathogenic bacteria through antibacterial substances and by also competing for space and nutrients. Common microorganisms of the conjunctiva are coagulase-negative *Staphylococcus*, diphtheroids, micrococcus species, *Staphylococcus aureus*, non-hemolytic *Streptococcus*. In diabetes mellitus, some members of the normal conjunctival flora play a pathogenic role when immune function is compromised, which may result in serious infection.

Purpose: The purpose was to assess the conjunctival bacterial flora in Type II diabetics and to correlate them with the glycemic status and the duration of diabetes mellitus. Design: Cross-sectional study.

Subjects and Methods: Our study comprised 103 Type II diabetics whose glycemic control was assessed by glycated hemoglobin (HbA1c%) status, based on which the subjects were stratified into uncontrolled (HbA1c% >6.5) and controlled (HbA1c% <6.5) diabetics. Complete ocular examination including fundus evaluation was done. Conjunctival swabs were collected by gently rubbing the inferior palpebral conjunctival sac with a sterile cotton-tipped swab which was immediately sent for culture and the results were correlated with HbA1c status. This study included Type II diabetics >5 years of duration and excluded Type I diabetics and patients on topical or systemic antibiotics for the past 1 month.

Results: The frequency of positive conjunctival cultures in uncontrolled ($n = 78$) and controlled ($n = 22$) diabetics were 21.8% and 27.3%, respectively which was not statistically significant ($P = 0.590$).

Conclusion: Thus, there is no correlation between positive cultures and glycemic control among Type II diabetics.

Keywords: Conjunctival flora, Glycated hemoglobin%, Non-insulin-dependent diabetes mellitus

INTRODUCTION

The population of microorganisms that exist within the eye of healthy individuals are called “normal microbial flora.” These normal microbial flora does an important and specific role in maintaining the normal conjunctival function. They

do the function of inhibiting the establishment of foreign pathogenic bacteria through antibacterial substances and by also competing for space and nutrients.¹

The normal microorganisms of the eye are Gram-positive organisms such as coagulase-negative Staphylococci.² Other common microorganisms of the conjunctiva are diphtheroids, *Micrococcus* species, *Staphylococcus aureus*, non-hemolytic *Streptococcus* and *Propionibacterium acnes*. The factors that alter the conjunctival flora are seasonal variations, temperature, age of the person, environmental exposure, ocular injury, surgery, dry eye, contact lens usage, immune compromising diseases, and general hygienic conditions.³

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Gram-positive organisms, particularly coagulase negative Staphylococci are the main flora of normal eye. They are also the predominant cause of post-operative infections.² The systemic complications of diabetes include retinopathy, nephropathy, neuropathy, and involvement of cardiovascular system. Ocular complication includes cataract, glaucoma, nerve palsies, and diabetic retinopathy which can result in blindness. Diabetic patients are prone to develop infections which also may involve the eye.

In diabetes mellitus, some members of the normal conjunctival flora play a pathogenic role when immune function is compromised, which may result in serious infection.⁴ It was reported that diabetic patients have higher levels of glucose in their tears than the non-diabetics, which may contribute to the development of ocular infections.⁵ Various studies have shown that positive conjunctival flora culture varies from 16.6% to 65%.^{6,7} Suto *et al.* found that Gram-positive cocci formed 67% of all isolates.⁸ The conjunctival flora in diabetic subjects may differ from that in non-diabetic subjects. Therefore, this study was done to analyze the bacterial flora of Type II diabetics and describing their variations with respect to glycemic control and duration of diabetes mellitus.

Purpose

To assess the conjunctival bacterial flora in Type II diabetics and to correlate them with the glycemic status and the duration of diabetes mellitus.

SUBJECTS AND METHODS

The study was a cross-sectional study comprising 103 Type II diabetic patients who attended the Department of Ophthalmology, from October 2012 to March 2014. Patients with Type II diabetes mellitus of >5 years duration were included in the study and patients with Type I Diabetes mellitus and also patients on topical or systemic antibiotics for the past 1 month were excluded from the study.

Blood parameters like fasting blood sugar, postprandial blood sugar, and glycated hemoglobin (HbA1c%) were evaluated for all patients. Relevant ophthalmic history including previous ocular surgeries, drug history, family history of diabetes, and presence of other associated systemic diseases were recorded.

Visual acuity was recorded using Snellen's chart for distance and reduced Snellen's chart for near vision. External examination and assessment of ocular motility were

recorded. Slit-lamp biomicroscopy was done to rule out anterior segment infections.

Intraocular pressure measurement by Goldmann's applanation tonometry was performed.

Dilated fundus examination was done by direct and indirect ophthalmoscopy and findings were recorded.

Conjunctival swabs were collected from both eyes of diabetic patients by rubbing the inferior palpebral conjunctival sac with a sterile cotton-tipped swab and immediately sent to the microbiology laboratory. Smear was prepared with one swab from each sample and Gram staining was performed. Second swab was inoculated directly on the culture media. Culture media used were blood agar and MacConkey agar (no special media is required for the isolation of commensals) which were incubated at 37°C for 48 h. After 48 h, all the organisms were identified by standard microbiological procedures namely colony morphology, Gram staining and pigment production. Biochemical tests like catalase, coagulase, mannitol fermentation and bile esculine test for Gram-positive cocci and indole, methyl red, Voges-Proskauer, citrate test (IMViC), triple sugar iron, and sugar fermentation test for Gram-negative bacilli were done to confirm the isolate.

Statistical Methods

According to WHO manual for sample size determination in health studies, with prevalence of positive conjunctival swab in diabetics in previous studies as 17.1% and confidence interval as 95% and precision as 10%, the calculated sample size is 55. Chi-square test was applied for comparison of HbA1c% in uncontrolled and controlled Type II diabetics with culture results.

RESULTS

The survey included 103 samples of which 60 (58.3%) were males and 43 (41.7%) were females (Table 1). The mean age of the participants in the survey was 54.72 years with a standard deviation of 9.78. It ranges between 34 and 80 years, respectively. Though, the participants in this study were selected when the history of duration of diabetes was more than 5 years, the mean was estimated to 8.68 years with standard deviation of 4.75 years. Since the distribution

Table 1: Sex-wise distribution of study group

Sex	Frequency	Percentage
Male	60	58.3
Female	43	41.7
Total	103	100.0

of years of diabetic was more skewed, median is estimated, and it was 7 years in this study.

All Type II diabetics were measured for their HbA1c% to assess their level of control of glycemic status for the past 3 months. The result revealed that only 22.3% of the diabetic patients HbA1c level was at the optimum level of 6.5 or less and the rest 75.7% were above the optimum level of 6.5 (Table 2).

Positive cultures were seen in 24 (23.30%) diabetic patients and the remaining 79 (76.7%) cultures were sterile (Table 3). Among the culture positive samples, different bacteria were isolated, of which coagulase-negative *Staphylococcus* was the most common organism grown. Other organisms isolated were diphtheroids, micrococci, methicillin-sensitive *S. aureus*, non-fermenting Gram-negative bacilli, and non-hemolytic *Streptococcus*.

Statistical analysis was done to correlate duration of diabetes mellitus with culture results which showed $P > 0.05$ which is not significant (Table 4). Therefore, duration of diabetes mellitus does not correlate with positive cultures.

Table 2: HbA1c status in Type II diabetics

HbA1c%	Frequency	Percentage
Good	23	22.3
NA	2	1.9
Poor	78	75.7
Total	103	100.0

HbA1c: Glycated hemoglobin

Table 3: Bacteria isolated by conjunctival cultures

Organism isolated	Frequency	Percent
Coagulase negative <i>Staphylococcus</i>	9	8.7
Diphtheroids	4	3.9
Micrococci	7	6.8
Methicillin sensitive <i>Staphylococcus aureus</i>	1	1.0
Non-fermenting Gram-negative bacilli	2	1.9
Non-hemolytic <i>Streptococcus</i>	1	1.0
Sterile	79	76.7
Total	103	100.0

Table 4: Comparison of duration of diabetes with culture results

	Culture results		Total	Chi-square test
	Sterile cultures	Positive cultures		
Duration of diabetes (years)				
<7 (%)	53 (68.8)	14 (60.9)	67 (67.0)	0.621
>7 (%)	24 (31.2)	9 (39.1)	33 (33.0)	$P=0.431 (>0.05)$
Total	77 (100.0)	23 (100.0)	100 (100.0)	

On a comparison of HbA1c% with culture results by statistical analysis, there was no association between poorly controlled diabetics and positive cultures (Table 5).

DISCUSSION

The most common conjunctival flora in our study was coagulase negative *Staphylococci* (Table 3) which was similar to a study by Martins *et al.* which identified coagulase negative *Staphylococci* as the most common microorganism isolated.⁹ Another study by Karimsab and Razak showed a higher proportion of coagulase negative *Staphylococci* (45.33%) compared to non-diabetic group (16%).¹⁰ Studies conducted by Arbab *et al.* and Nahar *et al.* also showed that *Staphylococcus epidermidis* was the most common prevalent microorganism in the conjunctival flora of diabetic patients.^{11,12} In Fernandez-Rubio *et al.* study of diabetic patients, there was a higher prevalence of *S. aureus*, *Enterococci*, *Streptococci* and *Klebsiella* species.¹³

There was no significant association between diabetics >5 years of duration and the presence of positive cultures (Table 4). Studies conducted by Arbab *et al.* also showed no significant differences in the prevalence of positive cultures when the diabetic group was stratified by disease duration.¹¹ Similar study conducted by Bilen *et al.* had also showed similar results.¹⁴

We also noticed that there was no relationship between poorly controlled (HbA1c% >6.5) and well controlled (HbA1c% <6.5) diabetics and their positive culture results (Table 5). Arbab *et al.* study also showed that there was no association with the hypoglycemic therapy and positive cultures.¹¹

Bilen *et al.* concluded from his study that the conjunctival flora in diabetic patients differ from that in non-diabetic patients and also diabetic patients are more prone to post-operative endophthalmitis.¹⁴ Nahar *et al.* in his study noted that the higher positivity rate in diabetic patients reflects a

Table 5: Comparison of HbA1c status with culture results

	Culture results		Total	Chi-square test
	Sterile cultures	Positive cultures		
HbA1c level				
Good				
<6.5 (%)	16 (72.7)	6 (27.3)	22 (100.0)	0.291
Poor				$P=0.590 (>0.05)$
>6.5 (%)	61 (78.2)	17 (21.8)	78 (100.0)	
Total	77	23	100	

HbA1c: Glycated hemoglobin

more permissive environment for bacterial growth in eyes of diabetic patients.¹² Thus, diabetes mellitus adversely affects the immune system of the host, thereby increasing the risk of infection. And patients with diabetes mellitus are more prone for post-operative endophthalmitis than those without diabetes.¹⁵

CONCLUSION

Our study showed that the most common organism isolated was coagulase negative *Staphylococcus*, and the duration of diabetes mellitus and the glycemic status had no association with the conjunctival flora.

Previously it was thought that diabetics harbored more number of bacteria and also that the conjunctival flora differed from that of non-diabetics. Our study, though of a small number, had shown that the glycemic status was not a factor for the occurrence of pathogenic bacteria. Thus, there was no correlation between positive cultures and glycemic control among Type II diabetics.

Role of commensals is to prevent the colonization of the pathogen. Hence, once the normal flora is absent, the risk of infection is high.

Coagulase negative *Staphylococcus* had been identified as an important causative agent in post-operative endophthalmitis. This should be considered pre-operatively and post-operatively, and appropriate prophylactic and post-operative treatment measures should be administered to diabetic patients.

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Efficacy of Intensive Treatment for Type-2 Diabetes Mellitus at a Tertiary Care Centre: An Observational Study

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Abstract

Introduction: The management of patients with diabetes consists of control of blood glucose along with blood pressure (BP) and dyslipidemia. American Diabetes Association (ADA) based on clinical trials has issued guidelines regarding the management of diabetes causing decrease in morbidity and mortality.

Aims and Objectives: The aim was to study the efficacy of intensive treatment in patients of Type 2 diabetes mellitus (DM) and estimate levels of glycated hemoglobin (HbA1c), serum lipids and urinary albumin excretion at baseline, 3 and 6 months. To estimate the number of patients who achieve levels of mentioned parameters as per ADA guidelines after 6 months of intensive therapy.

Materials and Methods: In 100 patients of Type 2 DM, HbA1c, urinary micro albumin excretion, and lipids at baseline were determined. BP and glucose level was monitored monthly. The treatment was modified according to the existing guidelines. Levels of HbA1c, urinary micro albumin, and serum lipids were estimated at 3 and 6 months.

Results: Among 100 patients, the mean \pm standard deviation age in the study was 59.44 ± 10.5 (years). The mean HbA1c level of patients at baseline was $7.46 \pm 1.50\%$, at 6 months 55% subjects achieved HbA1c $\leq 7\%$. There is an inverse association between duration of diabetes and controlled diabetes at 6 months. At 6 months 30.9% patients had their hypertension under control with good glycemic control, 54.5% of patients attained target triglyceride level and 98.8% patients attained target total cholesterol level. There was no significant difference at baseline and 6 months values of low-density lipoprotein, high-density lipoprotein, and urine for microalbuminuria.

Conclusion: In this study, it was observed that one patient had fulfilled all the recommended parameters for adequate glycemic control at the baseline. At 6 months follow-up, three patients achieved all the recommended targets for adequate glycemic control.

Keywords: American Diabetes Association, Intensive treatment, Type 2 diabetes mellitus

INTRODUCTION

Diabetes mellitus (DM) is a chronic and progressive disease which affects $>10\%$ of adults in developed countries and is increasing highest in Asia.¹ People in South East Asia develop diabetes at younger ages with a lesser degree of obesity. People with Type 2 diabetes are 2-4 times more

likely to develop a cardiovascular disease (CVD) outcome compared with those without diabetes.² Though according to the Framingham study in last 25 years (1976-2001) there has been decline in all-cause (48%) and CVD mortality (62%) rates; both men and women with DM continue to remain at a higher risk of all-cause and CVD mortality.³ The Chennai Urban Rural Epidemiology Study and the Chennai Urban Population Study (CUPS) found that the prevalence of diabetic retinopathy was 17.6%.⁴ The prevalence of nephropathy was 2.2% while of microalbuminuria was 26.9%.⁵ Peripheral neuropathy was seen in 26.1%.⁶ In the CUPS study, coronary artery disease was seen in 21.4%,⁷ and peripheral vascular disease in 6.3% of diabetic subjects.⁸ Increased insulin resistance with decreased

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secretion and progressive pancreatic β -cell dysfunction leads to DM.⁹ Patients with Type 2 diabetes have features of metabolic syndrome like dyslipidemia, hypertension, microalbuminuria, and endothelial dysfunction¹⁰ which contribute to micro and macrovascular complications.

The management of DM has expanded over time. In this regard earliest study was the University Group Diabetes Program which did not show substantive response in reducing the vascular complications when blood sugar was only controlled; rather it showed increased mortality due to the use of biguanides.¹¹ Diabetes Control and Complications Trial and UK Prospective Diabetes Study (UKPDS) were the first trials to demonstrate the advantages of strict control blood glucose in Type 1 and Type 2 diabetes respectively. Both showed a decline in the incidence of microvascular complications, but the effect on macrovascular complication was not impressive.¹² This was translated into official recommendations from the major scientific and professional organizations like American Diabetes Association (ADA) which emphatically stated that the results of the UKPDS mandate that treatment of Type 2 diabetes includes aggressive efforts to lower blood glucose levels as close to normal as possible.¹³

The management of patients with diabetes does not limit to the control of blood glucose; it also includes control of blood pressure (BP).¹⁴ and dyslipidemia.¹⁵ Various professional bodies like the ADA,¹⁶ American Association of Clinical Endocrinologist, and Canadian Diabetes Association have issued guidelines regarding management of diabetes.¹⁷

MATERIALS AND METHODS

Objectives

- To estimate levels of glycated hemoglobin (HbA1c), serum lipids, and urinary albumin excretion at baseline, 3, 6 months in patients of Type 2 diabetes attending endocrinology outpatient department (OPD)
- To estimate the number of patients who achieve levels of mentioned parameters as per ADA guidelines after 6 months of intensive therap.

Methodology

The present study was conducted in a service hospital on patients with Type 2 DM.

Study design: 6 months, observational study.

Study period: The present study was conducted during the period of 1-year.

Source of data: Patients of Type 2 DM, attending OPD of a service hospital.

Sample size: 100 patients of Type 2 DM.

Sampling procedure: 100 patients of Type 2 DM fulfilling the inclusion criteria who attended the OPD of the service hospital were randomly selected.

Inclusion Criteria: Patients with Type 2 Diabetes

Criteria for diagnosis:

- Symptoms of polyuria, polydipsia, weight loss plus random blood glucose concentration >200 mg/dl
- Fasting plasma glucose >126 mg/dl
- Plasma glucose >200 mg/dl following a standard oral glucose tolerance test. Values will be reported twice before a diagnosis of Type 2 diabetes is made.

Exclusion Criteria

- Age >70 years
- Macroalbuminuria or end stage renal disease
- Patients with ischemic heart disease, congestive cardiac failure
- Patients with malignancy
- Severe non-proliferative diabetic or proliferative retinopathy.

Procedure

Totally, 100 patients of Type 2 DM attending OPD of a service hospital would be recruited. Detailed history regarding the duration of diabetes, medicines taken, complications (microvascular and macrovascular) would be taken. At baseline HbA1c, urinary albumin excretion and lipids would be determined. The patients would be followed up monthly with BP recordings and estimation of blood glucose. The treatment would be modified according to the existing guidelines and education on diabetes prevention and control will be provided by providing educational pamphlets. Consultation facilities of a dietician will be provided at visits to OPD. Levels of HbA1c, urinary albumin excretion, and serum lipids would be estimated at three and 6 months. HbA1c will be estimated by high-performance liquid chromatography, urine for albumin will be assessed by DCA 2000, and lipids will be assessed by enzymatic methods.

Statistical Methods

The data were stored, processed, and analyzed with the statistical program SPSS 15.0 for Windows. The Student's *t*-test and analysis of variance were used for the comparison of quantitative variables, and the Chi-square test was used to establish associations between variables by subgroup (controlled patients vs. uncontrolled patients). Models of binary logistic regression were applied using HbA1c levels

(controlled, $\leq 7.0\%$; uncontrolled, $> 7.0\%$) as the dependent variable, and variables significantly associated with the dependent variable in the bivariate analysis as covariables. Statistical significance was set at $P < 0.05$ (confidence interval [CI] 95%).

RESULTS

A total of 100 patients of Type 2 DM were recruited based on the inclusion criteria.

Basic Demographic Characteristics

Gender distribution: In the present study, male subjects comprised of 48 (48%) and female subjects of 52 (52%) respectively.

Age distribution: Most of the subjects were in age group 61-70 years (35%). The mean \pm standard deviation (SD) age of the patients is 59.44 ± 10.5 (years).

Body mass index (BMI) distribution: In the present study, 57% of patients had normal BMI with 35% and 8% being overweight and obese, respectively.

Distribution of Patients with Respect to BP Level

a. Systolic BP (SBP)

In the present study, 39% of the patients had SBP < 130 mm of Hg. At the end of 6 months 50% of the patients reached the target SBP (< 130 mm of Hg) which was significant statistically (using Wilcoxon sign rank test $P = 0.012$ [< 0.05]) (Table 1).

b. Diastolic BP (DBP)

In the present study, 37% of the patients had DBP < 80 mm of Hg. At the end of 6 months follow-up 31% of the patients reached the target of DBP (< 80 mm of Hg) which was not significant statistically (using Wilcoxon sign rank test $P = 0.209$) (Table 2).

Distribution of Patients with Respect to Urine for Microalbuminuria

In the present study, 38% of patients had evidence of microalbuminuria at baseline. However, the number of patients with microalbuminuria did not decrease significantly at the end of 3 months ($P = 0.655$) and at 6 months ($P = 0.414$) of follow-up (Table 3).

Distribution of HbA1c (%) Level at Baseline, at 3rd Month and at 6th Month

In the present study, 45% of patients had HbA1c $< 7\%$ at baseline. At 3 months follow-up, 53% of patients reached target HbA1c level ($< 7\%$) which was statistically significant ($P = 0.021$). There were 55% of patients reaching above target HbA1c level at 6 months which was also statistically significant ($P = 0.012$) (Table 4).

Distribution of Patients with Respect to Lipid Levels

a. Low-density lipoprotein (LDL)

In the present study, 37% of patients had target LDL level of < 100 mg/dl at baseline. At 6 months follow-up, 40% patients achieved the above target LDL level which was not statistically significant ($P = 0.439$) (Table 5).

b. High-density lipoprotein (HDL)

1. For male

In the present study, 26% of male patients had

Table 1: SBP

SBP	Number of patients		
	Baseline	3 rd month	6 th month
≤ 130	39	36	50
> 130	61	64	50
Total	100	100	100

SBP: Systolic blood pressure

Table 2: DBP

DBP	Number of patients		
	Baseline	3 rd month	6 th month
≤ 80	37	37	31
> 80	63	63	69
Total	100	100	100

DBP: Diastolic blood pressure

Table 3: Distribution of patients with respect to urine for microalbuminuria

Urine (MICRAL)	Number of patients		
	Baseline	3 rd month	6 th month
≤ 30	62	63	64
> 30	38	37	36
Total	100	100	100

Table 4: Distribution of HbA1c (%) level of patients at baseline, at 3rd month and at 6th month

HbA1c (%)	Number of patients		
	Baseline	3 rd month	6 th month
≤ 7	45	53	55
> 7	55	47	45
Total	100	100	100

HbA1c: Glycated hemoglobin

Table 5: LDL

LDL	Number of patients		
	Baseline	3 rd month	6 th month
≤ 100	37	33	40
> 100	63	67	60
Total	100	100	100

LDL: Low-density lipoprotein

target HDL level of >40 mg/dl at baseline. At 6 months follow-up 28% patients achieved the above target HDL level which was not statistically significant ($P = 0.617$) (Table 6).

2. For female

In the present study, 43% of female patients had target HDL level of >50 mg/dl at baseline. At 6 months follow-up, the number of patients achieving the above target HDL level remained the same (43%) which was not statistically significant ($P = 1.00$) (Table 7).

c. Triglycerides

In the present study, 49% of patients had a target triglyceride level of <150 mg/dl at baseline. At 6 months follow-up, 59% of patients had achieved the above target level which was statistically significant (Wilcoxon sign rank test $P = 0.008$) (Table 8).

d. Total cholesterol

In the present study, 83% of patients had a target cholesterol level of <200 mg/dl at baseline. At 6 months follow-up, 95% of patients had achieved the above target level which was statistically significant (Wilcoxon sign rank test $P = 0.001$) (Table 9).

Distribution of Patient with Respect to Blood Sugar Level at Baseline, at 3rd Month and at 6th Month

a. Fasting

In the present study, 29% of patients had target Fasting blood sugar level of <130 mg/dl at baseline.

Table 6: HDL (for male)

HDL (for male)	Number of patients		
	Baseline	3 rd month	6 th month
≤ 40	26	30	28
> 40	22	18	20
Total	48	48	48

HDL: High-density lipoprotein

Table 7: HDL (for female)

HDL (for female)	Number of patients		
	Baseline	3 rd month	6 th month
≤ 50	43	49	43
> 50	9	3	9
Total	52	52	48

HDL: High-density lipoprotein

Table 8: Triglycerides

Triglycerides	Number of patients		
	Baseline	3 rd month	6 th month
≤ 150	49	55	59
> 150	51	45	41
Total	100	100	100

At 6 months follow-up, 46% of patients had achieved the above target level which was statistically significant (Wilcoxon sign rank test $P = 0.003$) (Table 10).

b. Postprandial (PP)

In the present study, 28% of patients had target PP blood sugar level of <180 mg/dl at baseline. At 6 months follow-up, 41% of patients had achieved the above target level which was statistically significant (Wilcoxon sign rank test $P = 0.003$) (Table 11).

In this study, it was observed that one patient had fulfilled all the recommended parameters for adequate glycemic control at the baseline. At 6 months follow-up, three patients (3%) achieved the recommended targets for adequate glycemic control.

Bivariate Analysis

Bivariate analysis by subgroup (patients with controlled diabetes (HbA1c $<7\%$) and patients with uncontrolled diabetes (HbA1c $>7\%$) at 6 months.

Duration of diabetes, polytherapy treatment, and use of drugs for comorbid illness was statistically significantly associated with controlled diabetes. There was no statistically significant association between controlled or uncontrolled diabetes patients and age, monotherapy with insulin or metformin.

a. Duration of diabetes versus HbA1c at 6th month

There is association between duration of DM and

Table 9: Total cholesterol

Cholesterol	Number of patients		
	Baseline	3 rd month	6 th month
≤ 200	83	94	95
> 200	17	6	5
Total	100	100	100

Table 10: Fasting blood sugar

Fasting	Number of patients		
	Baseline	3 rd month	6 th month
≤ 130	29	33	46
> 130	71	67	54
Total	100	100	100

Table 11: PP blood sugar

PP	Number of patients		
	Baseline	3 rd month	6 th month
≤ 180	28	34	41
> 180	72	66	59
Total	100	100	100

PP: Postprandial

HbA1c level at 6th month, Chi-square test $P < 0.05$ ($P = 0.020$) (Table 12).

- b. Age versus HbA1c level at 6th month
There is no association between age and HbA1c level at 6th month. By using Chi-square test $P > 0.05$ ($P = 0.789$) (Table 13).
- c. Insulin monotherapy versus HbA1c at 6th month
There is no association between insulin monotherapy and HbA1c level at 6th month. By using Chi-square test $P > 0.05$ ($P = 0.869$) (Table 14).
- d. Metformin monotherapy versus HbA1c level at 6th month
There is no association between metformin monotherapy and HbA1c level at 6th month. By using Chi-square test $P > 0.05$ ($P = 0.132$) (Table 15).
- e. Polytherapy treatment (insulin and metformin or metformin and sulfonylurea) versus HbA1c at 6th month

Table 12: Duration of diabetes versus HbA1c at 6th month

Duration of DM	HbA1c at 6 th month		Total
	≤7 (%)	>7 (%)	
0-5	26 (72.22)	10 (27.78)	36
5-10	12 (44.44)	15 (55.56)	27
11-15	10 (62.50)	6 (37.50)	16
>15	7 (33.33)	14 (66.67)	21

DM: Diabetes mellitus, HbA1c: Glycated hemoglobin

Table 13: Age versus HbA1c level at 6th month

Age group	HbA1c		Total
	≤7 (%)	>7 (%)	
31-50	13 (56.52)	10 (43.48)	23
51-70	36 (56.25)	28 (43.75)	64
71-90	6 (46.15)	7 (53.85)	13

HbA1c: Glycated hemoglobin

Table 14: Insulin monotherapy versus HbA1c at 6th month

Insulin monotherapy	HbA1c		Total
	≤7 (%)	>7 (%)	
Yes	8 (50.0)	8 (50.0)	16
No	47 (55.95)	37 (44.05)	84

HbA1c: Glycated hemoglobin

Table 15: Metformin monotherapy versus HbA1c level at 6th month

Metformin monotherapy	HbA1c		Total
	≤7 (%)	>7 (%)	
Yes	14 (70.00)	6 (30.00)	20
No	41 (51.25)	39 (48.75)	80

HbA1c: Glycated hemoglobin

There is an association between polytherapy treatment and HbA1c level at 6th month. By using Chi-square test $P < 0.05$ ($P = 0.037$) (Table 16).

- f. Use of co-morbidity drugs versus HbA1c level
There is an association between the requirement of the use of co-morbidity drug and HbA1c level at 6th month. By using Chi-square test $P < 0.05$ ($P = 0.012$) (Table 17).

Multivariate Analysis

In the multivariate analysis, the dependent variable was uncontrolled diabetes (HbA1c level >7%) at 6th month and independent variables are co-morbidity drug use, duration of diabetes and polytherapy treatment (Table 18).

By using the binary logistic regression, there is relation between duration of DM, co-morbidity drug usage with HbA1c at 6th month ($P < 0.05$) with odds 1.48 and 0.486.

DISCUSSION

Due to proven benefits of adequate glycemic control in reducing the incidence of complications, the ADA also recommends aggressive management of dyslipidemia and hypertension to further reduce the risk of cardiovascular events. Despite clear target recommendations from the ADA¹⁸ majority of patients fail to attain A1c <7%, LDL

Table 16: Polytherapy treatment (insulin and metformin or metformin and sulfonylurea) versus HbA1c at 6th month

Polytherapy treatment	HbA1c		Total
	≤7 (%)	>7 (%)	
Yes	38 (79.17)	10 (20.83)	48
No	30 (57.69)	22 (42.31)	52

HbA1c: Glycated hemoglobin

Table 17: Use of co-morbidity drugs versus HbA1c level

Co-morbidity drug used	HbA1c		Total
	≤7 (%)	>7 (%)	
Yes	39 (48.75)	41 (51.25)	80
No	16 (80.0)	4 (20.0)	20

HbA1c: Glycated hemoglobin

Table 18: Multivariate analysis

	B	SE	Wald	df	P value	Odds ratio
Comorbidity drug use	-1.209	0.625	3.74	1	0.012	0.486
Duration of DM	0.396	0.192	4.27	1	0.020	1.48
Polytherapy	-0.200	0.436	0.210	1	0.037	0.819
Constant	0.632	0.999	0.400	1	0.527	1.880

DM: Diabetes mellitus, SE: Standard error

<100 mg/dl, or other treatment goals. In addition, due to the progressive nature of Type 2 diabetes, most patients who initially reach target levels of glycemic control will eventually experience deterioration, that results in treatment failure. Consequently, regular follow-up is necessary to ensure that treatment goals are achieved and maintained.

The present study, comprised of 100 subjects of Type 2 DM, out of which, 48 were males and 52 were females. Mean \pm SD of patients age in the study was 59.44 ± 10.5 (years).

The mean HbA1c level of patients at baseline was $7.46 \pm 1.50\%$ with 45 patients having HbA1c $\leq 7\%$ and 55 patients having HbA1c $> 7\%$. It was lower than that reported in study by Spitz *et al.* ($10.3 \pm 1.6\%$).¹⁸

With follow-up at 6 months 55 (55%) subjects achieved HbA1c $\leq 7\%$ ($P = 0.012$). In the EPIDIAP study of Spain, total of 53.1% showed good glycemic control.¹⁹

Similarly, study in China in 2009 showed 56.1% patients had HbA1c $< 7.0\%$.²⁰ In developed and underdeveloped countries, 31.0-49.8%^{21,22} have controlled HbA1c levels.

In this study, the mean HbA1c had fallen from $7.46 \pm 1.50\%$ at baseline to $7.21 \pm 1.61\%$ at 6 months, which was statistically significant ($P = 0.001$).

A cohort study at Netherlands in 1997 also showed the fall of mean from 7.4% to 7.0% in study group with structured diabetes care and good control (HbA1c $< 7.0\%$) was achieved in 54.3% of patients (at entry 43.4%).²³

In 2009, a study by Machado-Alba *et al.* assessing quality and effectiveness of diabetes care in a sample of Colombian diabetes patients, observed various factors associated with glycemic control like adherence to treatment, use of adequate doses of treatment drugs, age, overweight/obesity status, medications for comorbidities, and anti-diabetic monotherapy or polytherapy.²⁴

The present study explored factors including age, duration of diabetes, use of anti-diabetic drugs as monotherapy or polytherapy, use of drugs for comorbidities (anti-hypertensives, lipid-lowering drugs, and anti-platelets) in achieving good glycemic control. In this study, anti-diabetic drugs used were sulfonylurea (16%), metformin (20%), insulin (16%), insulin and metformin (11%), metformin and sulfonylurea (37%). Controlled diabetic patients were more often treated with polytherapy ($P = 0.037$) than monotherapy. The difference was statistically significant based on Chi-square test. In this study, it is observed

that there is an association between duration of diabetes ($P = 0.020$), polytherapy ($P = 0.037$), use of drugs for comorbidities ($P = 0.012$) and controlled diabetes at 6 months. There was no statistically significant association between controlled or uncontrolled diabetes patients and age or monotherapy with metformin.

In Fremantle diabetes study, a prospective study of diabetes care, control, and complications in an urban setting, it was found on multiple linear regression analysis that age was inversely associated with glycemic control whereas duration of diabetes and treatment with either oral hypoglycemic agents or insulin were positively associated with glycemic control. For most age groups, there was a significant worsening of glycemic control with duration of diabetes.²⁵

In a cross-sectional study in Estonia to assess glycemic control and disease-related factors associated with adequate glycemic control longer duration of diabetes were independently found to be associated with adequate glycemic control.²⁶ Duration of diabetes was also found to be associated with glycemic control in studies at China and Spain (EPIDIAP study).

Risk stratification according to individual features, or for concomitant-associated hypertension, dyslipidemia, and microalbuminuria is mandatory for the comprehensive management of patients with diabetes. Patients received additional drugs for each of these comorbidities similar to previous study samples.^{21,27} Taking medications for comorbidities was significantly correlated with lack of control of diabetes ($P = 0.012$), which is probably related to the fact that uncontrolled patients have more complications and are difficult to treat than those who are controlled.²⁸ There was a high rate of diagnosis of hypertension and dyslipidemia reflecting the good quality of care in terms of identification of non-diabetic risk factors. Treatment of these comorbidities was also common resulting in varying degree of success.

In the present study, 30.9% (17 out of 55 patients) of patients with hypertension had their hypertension under control (BP $< 130/80$) along with good glycemic control (HbA1c $< 7\%$) at 6 months, with significant difference in mean SBP at baseline and at 6 months ($P = 0.012$) but with no significant difference in DBP ($P = 0.209$).

Patients with dyslipidemia had shown significant difference in mean triglyceride level of 163.6 mg/dl at baseline and 145.71 mg/dl at 6 months ($P = 0.001$); mean total cholesterol of 167.75 mg/dl at baseline and of 158.11 mg/dl at 6 months ($P = 0.001$).

In the present study, 54.55% (30 out of 55 patients) of patients had target triglyceride level (<150 mg/dl) and 98.8% (54 out of 55 patients) of patients had target total cholesterol level (<200 mg/dl) at 6 months along with good glycemic control (HbA1c <7%). However, there was no significant difference at baseline and 6 months values of LDL, HDL and urine for microalbuminuria,

This was in concordance with study in New Zealand which evaluated changes in clinical measures and differences in proportions of patients achieving HbA1c <7%, an LDL <100 mg/dl, or other treatment goals, between the first and third reviews in 2005 and found significant improvements in total cholesterol, mean BP, and triglyceride levels in Type 2 patients.²⁹

In this study, it was observed that one patient had fulfilled all the recommended parameters for adequate glycemic control at the baseline. At 6 months follow-up, three patients achieved the recommended targets for adequate glycemic control.

This finding is very similar to those in EPIDIAP study in Spain in 2007 which was a cross-sectional epidemiological study of clinical profiles and glycemic control in 679 diabetic patients. A total of 53.1% (CI: 49.3-56.9) showed good glycemic control. Only 3% of the individuals achieved all the objectives recommended by the ADA. In the study at Columbia of Jorge. Machado-Alba *et al.*, 6.9% of patients had achieved the goals for all three risk factors.²⁴ Studies of Grant *et al.* and Lebovitz, observed percentages of 7.3% and 10.0%, respectively for this criterion.^{22,30}

CONCLUSION

In this study, it was observed that one patient had fulfilled all the recommended parameters for adequate glycemic control at the baseline. At 6 months follow-up three patients achieved all the recommended targets for adequate glycemic control. Controlled diabetic patients were more often treated with polytherapy and there is an association between duration of diabetes, use of drugs for comorbidities (anti-hypertensives, lipid-lowering drugs, and anti-platelets), and controlled diabetes at 6 months.

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Antibacterial Activity of Aqueous Extract of *Benincasa hispida* Fruit against Periodontal Pathogens

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Abstract

Introduction: Periodontitis is an infectious disease of polymicrobial etiology. Successful periodontal therapy is aimed at eliminating pathogenic organisms. Due to the challenge of bacterial resistance to antibiotics, various natural products have been tried to treat periodontal disease. *Benincasa hispida* (ash gourd) is one of these natural products having numerous medicinal properties.

Objective: To detect the antibacterial activity of *B. hispida* fruit against *Aggregatibacter actinomycetemcomitans*, *Porphyromonas gingivalis*, *Prevotella intermedia* and *Fusobacterium nucleatum*.

Materials and Methods: Two separate crude aqueous extracts of pulp as well as seeds of *B. hispida* fruit were prepared. The antibacterial efficacy of these extracts were studied against standard ready strains of *A. actinomycetemcomitans* (ATCC 43718), *P. gingivalis* (ATCC 33277), *F. nucleatum* (ATCC 25586), *P. intermedia* (ATCC 25611) using agar well method.

Results: Pulp as well as seed extract of *B. hispida* fruit showed antibacterial efficacy. Zones of inhibition ranging from 6 mm to 20 mm were seen corresponding to varying degrees of volumes of the extracts used. Overall seed extract was seen to be more effective than pulp extract.

Conclusion: Seed as well as pulp extract of *B. hispida* showed growth inhibition of the micro-organisms. Thus, *B. hispida* fruit has an antibacterial action against tested periodontal pathogens.

Keywords: Antibacterial activity, *Benincasa hispida*, Periodontal disease, Periodontal pathogens

INTRODUCTION

Periodontitis is an infectious disease of microbial origin.¹ Some of the most common organisms associated with periodontal diseases are *Porphyromonas gingivalis*, *Prevotella intermedia*, *Bacteroides forsythus*, *Campylobacter rectus*, *Fusobacterium nucleatum* and *Aggregatibacter actinomycetemcomitans*.² These microorganisms play crucial role in pathogenesis of

periodontal disease either directly by causing tissue destruction or indirectly by stimulating and modulating host responses.³ Successful periodontal therapy is aimed at eliminating these pathogenic organisms.⁴ Hence, along with mechanical debridement, adjunctive use of antimicrobials safeguards better clinical improvement.⁵ Though systemic and local antimicrobial therapy is proven to be useful, emerging bacterial resistance has posed a major challenge.^{6,7} Hence, people are returning to natural products with the hope of safety and security.

Many of the routinely used fruits and vegetables have shown to have numerous medicinal properties.^{8,9} *B. hispida*, a member of family Cucurbitaceae is one of them. Originally cultivated in Southeast Asia, it is widely grown in China,

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India and other parts of East Asia.¹⁰ *B. hispida* is commonly called ash gourd or wax gourd (English), Bhuru Kolu (Gujarathi) and Kushmanda (Sanskrit).¹¹

Various plant parts of *B. hispida* are valued in Indian medicine. *B. hispida* is one of the important ingredients of “Kusmanda lehyam” (Ayurvedic medicine) which is used in India to treat gastrointestinal problems, respiratory diseases (cough, asthma), heart diseases, vermifuge, diabetes mellitus and urinary tract diseases.¹² *B. hispida* has shown to have anti-inflammatory,¹³ diuretic,¹⁴ anti-hyperglycemic,^{15,16} anti-alzheimer's,¹⁷ anti-diarrheal,¹⁸ antioxidant,¹⁹ and anti-helminthic²⁰ properties. In ayurveda, *B. hispida* is recommended for the management of peptic ulcer, hemorrhages from internal organs, epilepsy and other nervous disorders. The fresh juice was also effective in preventing morphine withdrawal in mice. Each part of *B. hispida* namely peel, pulp and seed have different properties. The peel has better antioxidant properties whereas pulp and seed have got better antimicrobial and antifungal properties.²¹ The major constituents of *B. hispida* fruit are flavonoids, glycosides, carotenes, vitamins, minerals, etc.,²² Phytochemical analysis of *B. hispida* fruit indicate presence of triterpenes (alnusenol, multiflorenol), flavones (isovitexin) and sterols (lupeol, beta sitosterol).²³

To the best of our knowledge, antimicrobial activity of *Benincasa hispida* has not been tested against periodontal pathogens. Hence, the present study was aimed to detect the antibacterial activity of *Benincasahispida* fruit against *A. actinomycetemcomitans*, *P. gingivalis*, *P. intermedia* and *F. nucleatum*.

MATERIALS AND METHODS

Collection of *B. hispida* Fruit

A fresh fruit of *B. hispida* was collected from the local vegetable market of Dharwad, Karnataka. The authentication was done as per morphological analysis (Figure 1) by experts in Biochemistry department of Sri Dharmasthala Manjunatheshwara Medical College and Hospital, Sattur, Dharwad.

Preparation of Crude Aqueous Extracts

The fruit was washed with distilled water and peeled off to remove the hard green skin. The pulp was grated and seeds were separated from the pulp. The seeds were washed with distilled water and spread on filter paper to dry at room temperature.

Pulp Extract

20.0 g pulp of the *B. hispida* fruit was grated and homogenized with 100 mL distilled water. It was then filtered and the remnant was discarded. Filtered liquid



Figure 1: Section of *Benincasa hispida* fruit

was centrifuged at 5000 rpm for 15 min. To remove any suspended particles. The clear supernatant was used as crude pulp extract.

Seed Extract

The dried seeds were crushed in a mortar to powder. 20.0 g of powder was homogenized with 100 mL distilled water. It was then filtered and remnant was discarded. Filtered liquid was centrifuged at 5000 rpm for 15 min. to remove any suspended particles. The supernatant was used as a crude seed extract.

Both the extracts were used to detect antimicrobial efficacy.

Culture Media and Bacterial Strains

Standard ready strains of *A. actinomycetemcomitans* (ATCC 43718), *P. gingivalis* (ATCC 33277), *F. nucleatum* (ATCC 25586), *P. intermedia* (ATCC 25611) were obtained from LGC Promochem, Bangalore. The active growth culture of microorganism strains were inoculated in a universal bottle containing trypticase soy broth. Turbidity was adjusted equal to that of a 0.5 McFarland turbidity standard (equivalent to 1.5×10^8 CFU/mL). The trypticase soy agar (with 10% sheep blood) plates were inoculated with these organisms and allowed to stand for at least 3 min.

Antibacterial Efficacy Testing

Antibacterial efficacy of crude aqueous extracts of pulp and seed of *B. hispida* fruit was determined by agar well diffusion method. The wells of 5 mm diameter were prepared in pre-inoculated trypticase soy agar (with 10% sheep blood) plates with the test organism. Five wells were made on each plate. 75 μ L, 50 μ L, 25 μ L, 10 μ L and 5 μ L of fruit pulp and seed extracts were added into the respective wells on each plate. The plates were incubated in anaerobic gas pac (Hi Media) for 24 h at 37°C. The sensitivity of the microorganism species to the crude extracts was determined by measuring the size of inhibitory zones

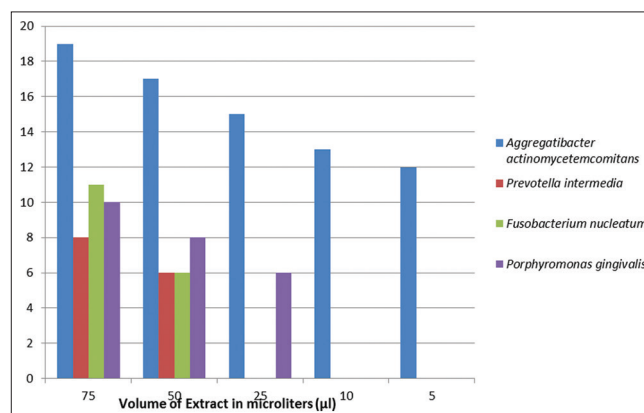
(including the diameter of well) on the agar surface around the well and values <6 mm were considered as not active against microorganisms.

RESULTS

Pulp as well as seed extract of the *B. hispida* showed antibacterial activity. Even 5 µl of seed as well as pulp extract produced 12 mm inhibitory zone against *A. actinomycetemcomitans* (Figure 2). A minimum of 5 µl of seed extract and 25 µl of pulp extract was required for growth inhibition of *P. gingivalis* and produced an inhibitory zone of 6 mm (Figure 3). A minimum of 10 µl of seed extract and 50 µl of pulp extract was needed for growth inhibition of *P. intermedia* as well as *F. nucleatum* and produced inhibitory zone of 6 mm each (Figures 4 and 5). Overall seed extract was seen to be more effective than pulp extract (Tables 1 and 2, Graphs 1 and 2).

DISCUSSION

B. hispida is an easily available fruit in the Indian market. Among pulp and seeds of *B. hispida* fruit, seeds have shown



Graph 1: Inhibition of periodontal pathogens by pulp extract of *Benincasa hispida* fruit



Figure 2: Zones of inhibition produced by seed extract against *Aggregatibacter actinomycetemcomitans*



Figure 4: Zones of inhibition produced by seed extract against *Prevotella intermedia*

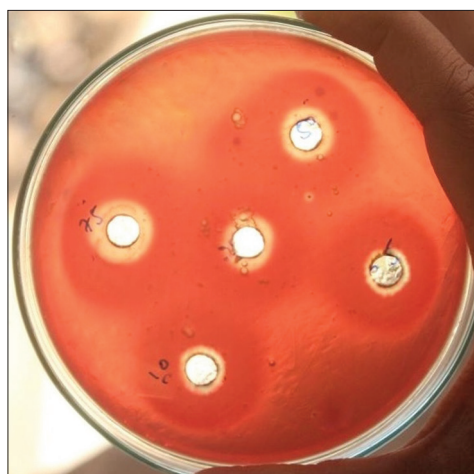
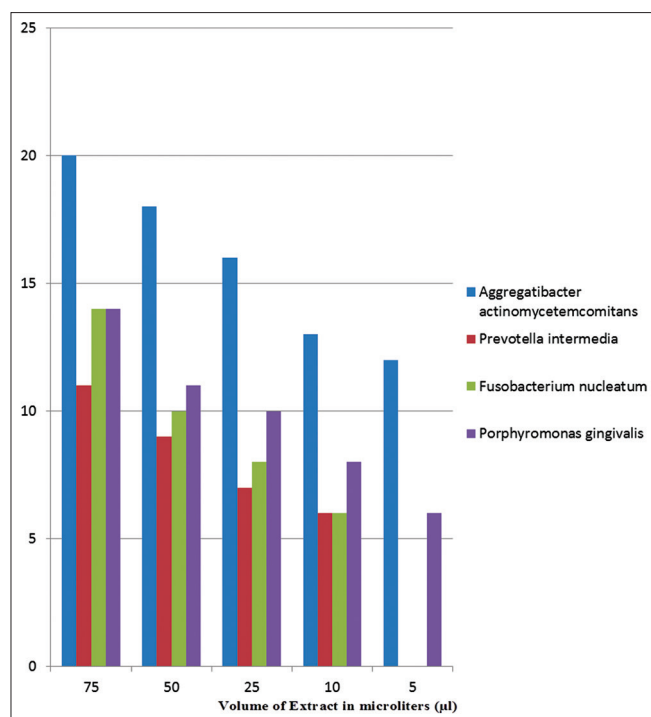


Figure 3: Zones of inhibition produced by seed extract against *Porphyromonas gingivalis*



Figure 5: Zones of inhibition produced by seed extract against *Fusobacterium nucleatum*



Graph 2: Inhibition of periodontal pathogens by seed extract of *Benincasa hispida* fruit

Table 1: Inhibitory zones produced by pulp extract of *B. hispida* fruit against periodontal pathogens

Name of the organism	Volume of extract in microliters (μl) diameter of zone of inhibition in millimeters				
	75 μl	50 μl	25 μl	10 μl	5 μl
<i>A. actinomycetemcomitans</i>	19 mm	17 mm	15 mm	13 mm	12 mm
<i>P. intermedia</i>	8 mm	6 mm	R	R	R
<i>F. nucleatum</i>	11 mm	6 mm	R	R	R
<i>P. gingivalis</i>	10 mm	8 mm	6 mm	R	R

A. actinomycetemcomitans: *Aggregatibacter actinomycetemcomitans*, *P. intermedia*: *Prevotella intermedia*, *F. nucleatum*: *Fusobacterium nucleatum*, *P. gingivalis*: *Porphyromonas gingivalis*, *B. hispida*: *Benincasa hispida*

Table 2: Inhibitory zones produced by seed extract of *B. hispida* fruit against periodontal pathogens

Name of the organism	Volume of extract in microliters (μl) diameter of zone of inhibition in millimeters				
	75 μl	50 μl	25 μl	10 μl	5 μl
<i>A. actinomycetemcomitans</i>	20 mm	18 mm	16 mm	13 mm	12 mm
<i>P. intermedia</i>	11 mm	9 mm	7 mm	6 mm	R
<i>F. nucleatum</i>	14 mm	10 mm	8 mm	6 mm	R
<i>P. gingivalis</i>	14 mm	11 mm	10 mm	8 mm	6 mm

R: Resistant, *A. actinomycetemcomitans*: *Aggregatibacter actinomycetemcomitans*, *P. intermedia*: *Prevotella intermedia*, *F. nucleatum*: *Fusobacterium nucleatum*, *P. gingivalis*: *Porphyromonas gingivalis*, *B. hispida*: *Benincasa hispida*

better antimicrobial efficacy against certain gram-positive and gram negative organisms; especially better inhibition of gram-negative organisms than gram positive.²¹ In Japanese

folk medicine, crude extracts were often thought to be more effective than purified extracts.²⁴ However to the best of our knowledge, no study, yet has evaluated the antimicrobial efficacy of *B. hispida* fruit against periodontal pathogens. Hence, crude aqueous extracts of pulp and seeds of *B. hispida* fruit were used to determine antimicrobial efficacy against periodontal pathogens.

In the present study, crude aqueous extracts of pulp as well as seeds have shown antibacterial properties. Both the extracts showed better efficacy against *A. actinomycetemcomitans* compared to other organisms. The major constituents of this fruit are triterpenoids, flavonoids, glycosides, saccharides, carotenes, vitamins, β sitosterin uronic acid.^{23,25} Triterpenoids, flavonoids, glycosides have shown to have antibacterial properties.²⁶

Crude aqueous extract of seeds was more effective than pulp extract in the present study. Similar results were obtained by Abdullah *et al.* (2012) in a study conducted to evaluate the antibacterial activity of aqueous extracts of peel, pulp and seed of *B. hispida* fruit by disc diffusion method; among which seed extract was proven to be more effective than the remaining two. In the study by Abdullah *et al.* (2012), antimicrobial activity of the extracts showed a better inhibition of gram-negative bacteria (*Salmonella typhimurium*, *Pseudomonas aeruginosa*, *Proteus vulgaris*, *Serratia liquefaciens*, *Cronobacter mytjensis*, *Shigella boydii* and *Serratia marcescens*) compared to gram-positive bacteria.²¹

Compound such as steroid, alkaloids, triterpenoids and saponin especially found in the seed of ash gourd has the specific ability to form pores in cell membranes of bacteria that are able to slow down the growth of bacteria.^{27,28} Seed of *B. hispida* fruit has higher phenolic content and a study by Uchikoba *et al.* (1998) showed that the gallic acid present in seed had a clear inhibitory effect against several pathogenic intestinal bacteria.²⁷ In addition, “Hispidalin,” novel and unknown peptide, purified from seeds of *B. hispida* fruit, showed broad and potent inhibitory effects against various human bacterial and fungal pathogens.²⁹ These could be the reasons for seed extract being more effective than pulp extract.

Thus, pulp and seed extracts of *B. hispida* fruit can be used as an antimicrobial agent to treat periodontal diseases. As it is a natural compound, it is less likely that products incorporating *B. hispida* extracts will produce undesirable side effects.

CONCLUSION

Pulp and seed extracts of *B. hispida* (ash gourd) fruit has an antibacterial action against *A. actinomycetemcomitans*,

P. gingivalis, *P. intermedia* and *F. nucleatum*. Hence, it would be effective in the treatment of periodontal diseases caused by these pathogens.

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Perception of Biomedical Waste Management among Dental Health Care Personnel of Various Dental Colleges in Delhi NCR, India: A Knowledge, Attitude, and Practice Study

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Abstract

Background: Dental practices generate large amounts of biomedical waste (BMW) which are contaminated with blood/body fluids, mainly saliva. Proper disposal of waste should be done by the dental health care personnel to prevent diseases.

Aim: The aim of the study is to assess BMW management perception among dental health care personnel of various Dental Colleges in Delhi NCR, India.

Materials and Methods: A cross-sectional study was conducted using a closed-ended questionnaire. The questionnaire consisted of 22 questions in both English and Hindi language. Forms were distributed to 150 dental healthcare personnel of various Dental Colleges in Delhi NCR, India. The study was approved by Ethical Committee. Confidentiality of the participants in with respect to dental colleges were maintained. The results were analyzed by using ANOVA and Chi-square test.

Results: Significant findings are seen in level of knowledge for color coding of general waste from colleges ($P < 0.05$), types of BMW ($P < 0.05$), agencies which regulate BMW ($P < 0.05$) and color code of BMW, which are to be sterilized, disinfected ($P < 0.05$). In Level of Attitude, for infectious waste which should be sterilized before shredding and disposal ($P < 0.05$), labeling of the container before filling it with waste ($P < 0.01$). In level of practice for BMW color coding segregation ($P < 0.001$), following color coding disposal of BMW ($P < 0.01$) and statements about hazardous waste kept in the container ($P < 0.05$).

Conclusion: Waste should be segregated and disposed of properly to protect the environment and to prevent emergence, occurrence and re-occurrence of various diseases.

Key words: Biological waste disposal, Dental practice management, Dental waste, Waste management

INTRODUCTION

Over the years, there have been tremendous advances in the health care system. One major threat arises from poor biomedical waste (BMW) management practices, which pose a huge risk to the health of the public, patients,

and professionals thus contributing to environmental degradation. BMW is a global issue today.¹

The term “BMW” has been defined as “any waste that is generated during diagnosis, treatment or immunization of human beings or animals, or in the research activities pertaining to or in the production or testing of biological, and includes categories mentioned in Schedule I of the Government of India’s BMW (Management and Handling) rules 1998.”²

The rules make it mandatory for the health care establishments to segregate, disinfect, and dispose their waste in an eco-friendly manner. An important pre-requisite

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and key to successful waste management program is segregation which is the separation of different types of waste as per treatment and disposal option. Segregation and collection of various categories of waste should be done at the source, in separate containers so that each category is treated in a suitable manner to render it harmless.³

It is reported that for the first time the BMW management issue was discussed at a meeting convened by the World Health Organization (WHO) regional office for Europe at Bergen, Norway in 1983. This was fuelled by reports of “beach washing” of medical waste on the coasts of Florida and Gulf, and the “recycling” of disposable articles in developing countries.⁴ The reports and figures available from developed countries indicate that approximately 1-5 kg of waste is generated per bed per day, with substantial inter-country and inter specialty differences.⁵ The data available from developing countries indicate that the range is on a lower side with 1-2 kg/day/bed and in India, it is estimated to be 2.0 kg/bed/day.⁶

These waste materials can cause serious hazards to health and the environment in cases of indiscriminate management. All hospital personnel are at a risk from many potentially fatal infections such as a human immunodeficiency virus (HIV) and hepatitis B (HBV) and C (HCV). To avoid these hazards, a rigorous waste management system should be implemented in hospital infrastructure.⁷

Hospital-acquired infections have been estimated at 10% of all fatal/life-threatening diseases in the South-East Asia region and have been identified as one of the indicators for the management of waste.⁸ Alarming, the WHO reported that 50% of waste are reused materials in India that are syringes and needles, which are meant for single use.⁹ Common producers of BMW contain hospitals, nursing homes, clinics, laboratories, offices of physicians, dental, and veterinarians, house health care, and funeral homes.¹⁰

Dental waste is a subset of hazardous BMW. Dental practices generate large amount of cotton, plastic, latex, glass, sharps, extracted teeth and other materials, much of which may be contaminated with body fluids.²

Almost 85-90% of waste generated in dental health-care establishments is non-risk or general waste, which constitutes paper, cardboard boxes, plastic packaging, and kitchen waste. Infectious waste, including infectious disposable plastic items and sharps (e.g., needles, razors, scalpels), and oral pathological laboratory waste which accounts for only a small fraction, comprising about 8-10% of the total volume of waste generated in a dental hospital. However, this small fraction is of the greatest concern

because it poses a direct threat to the health and hygiene of human beings by transmitting viral, bacterial, fungal or parasitic diseases.¹¹

The absence of proper waste management, lack of awareness about the health hazards from BMW, insufficient financial and human resources, and poor control of waste disposal are the most critical problems connected with dental health care waste.¹² Although there is an increased global awareness among dental health care professionals about hazards and also appropriate management techniques, the level of BMW awareness in India has been found to be unsatisfactory.¹³⁻¹⁵ Therefore, the present study was conducted to assess the level of knowledge, attitude, and practices of BMW management among dental health care personnel of various dental colleges in NCR.

Aim and Objective

The aim of the study is to assess BMW management (BMW) perception among dental health care personnel of various dental colleges in Delhi NCR, India.

The objectives of this study is:

1. To determine the level of knowledge, attitude, and practice of dental healthcare personnel toward BMW management.

MATERIALS AND METHODS

A cross-sectional study was conducted among various dental colleges in Delhi NCR using a closed-ended questionnaire. There are a total 15 dental colleges in Delhi NCR region, out of which, 6 dental colleges were selected for the study by simple random sampling.

Questionnaire forms were distributed to 150 dental healthcare personnel from the selected dental colleges. The questionnaire consisted of 22 questions in both English and Hindi language and was designed to obtain information about knowledge, attitude, and practice of BMW management. The study was approved by the Institutional Ethical Committee and written consent was taken from all the subjects before they were given the questionnaire. The validity of the questionnaire was checked by doing a pilot study on a small group of 30 dental healthcare personnel working in 2 different dental colleges. The total study populations were 150 subjects which includes 59 dentists, 34 post-graduates, 57 dental assistant who were asked to fill the complete questionnaire. Confidentiality of the participants and dental colleges were maintained.

Statistical Analysis

The data so obtained from the study sample was compiled and analyzed using SPSS version 20.0 by

applying chi-square test and ANOVA. The tabulated chi-square values were calculated. The confidence interval was set at 95%.

RESULTS

Among the three groups of dental healthcare personnel assessed the following were the significant findings observed (Table 1).

Level of Knowledge

Almost half 49.1% of dental assistant and 52.7% of dentists to about 63% of post-graduates had a knowledge of agencies that the state bodies regulate the BMW whereas dental assistant in the study population were least aware.

The dentists (60%) had a knowledge of one type of waste whereas post-graduates (26.3%) were least aware. This may be due to dentist are more into clinical practice.

About 54.5% of the dentist had the knowledge of safe transport of BMW and only 47.4% of post-graduates were aware.

It was quite surprising to see that knowledge of the disposal of sharp waste ranged from 27.2% to 36.3%, although there was no clinical significant finding.

About 36.8% post-graduates had the knowledge of the color code of BMW which needs to be sterilized before disposal whereas only 20.9% dental assistant were aware.

The knowledge of approximately proportion of infectious waste generated in healthcare facilities were found to be 36.4% in dentist and only 10.5% in post-graduates less than half of dentist (36.4%) had a knowledge of color code for disposal of general waste whereas post-graduates (26.3%) were least aware.

Graph 1 shows that knowledge of BMW management of dentists are 42.34%, post-graduates are 35.31%, dental assistant are 37.29% only. It was surprising that knowledge of BMW management was slightly more among dental assistant than post-graduates students (Table 2).

Level of Attitude

The dental assistant 44% did not agree that BMW management was teamwork and felt that they were responsible for safe BMW management. They also expressed that safe management efforts by the hospital increase the financial burden on management front and it was an extra burden. More than half i.e., 56.2% of all healthcare personnel would like to attend the classes or CDE program on BMW management organized by

Table 1: Total 7 questions to assess the level of knowledge

Serial number	Questions	% of correct responses			P value
		D	PG	DA	
1.	What are the agencies that regulate BMW?	52.7	63.6	49.1	0.045*
2.	Which statement describes one type BMW?	60.0	26.3	49.0	0.013*
3.	Who regulates the safe transport of BMW?	54.5	47.4	52.6	0.246
4.	How the sharp objects which had caused cuts from needles, burs, etc. are disposed of?	29.1	36.3	27.2	0.710
5.	The color code of BMW to be sterilized, disinfected?	27.3	36.8	20.9	0.046*
6.	The approximately proportion of infectious waste generated from healthcare facilities?	36.4	10.5	28.4	0.056
7.	The color code for disposal of normal waste from college?	36.4	26.3	33.8	0.039*

D: Dentist, PG: Post-graduate, DA: Dental Assistant, * $P < 0.05$ are significant, ** $P < 0.01$ are highly significant, BMW: Biomedical waste

Table 2: A total 9 questions to assess the level of attitude

Serial number	Questions	% of positive response			P value
		D	PG	DA	
1.	Waste management is teamwork/ no single class of people is responsible for safe management?	80.0	89.5	56.0	0.100
2.	Safe management efforts by the hospital increase the financial burden on management?	56.4	68.4	39.7	0.066
3.	Safe management of health care waste is an extra burden on work?	43.6	47.4	41.7	0.078
4.	Do you think that the college should organize separate classes or a continuing dental education program on BMW?	61.8	57.9	49.0	0.093
5.	Will you like to attend a voluntarily program that enhance and upgrade your knowledge about waste management?	63.6	47.4	59.4	0.350
6.	Do you think that infectious waste should be sterilized from infections by autoclaving before shredding and disposal?	56.4	78.9	51.0	0.031*
7.	Do you think that an effluent treatment plant for disinfection of infected water should be set up in dental colleges?	54.5	36.8	40.6	0.150
8.	Do you think it is important to report to the Pollution Control Board of India about a particular institution if it is not complying with the guidelines for BMW management?	67.3	42.1	46.4	0.222
9.	Do you think that labeling the container before filling it with waste is of any clinical significance?	83.6	73.7	45.6	0.003**

D: Dentist, PG: Post-graduate, DA: Dental Assistant, * $P < 0.05$ are significant, ** $P < 0.01$ are highly significant, BMW: Biomedical waste

college and 56.8% of all healthcare personnel would like to attend voluntarily programs to upgrade their knowledge on BMW. 78.9% post-graduates expressed that infectious waste should be sterilized from infections by autoclaving before shredding and disposal. 54.5% dentist, 40.6% dental assistant, and 36.8% post-graduates expressed their positive attitude in setting up of water treatment plant for the recirculation of used water in the dental colleges. Almost half i.e., 52% of all healthcare personnel expressed their willingness on reporting to Pollution Control Board of India about the institutions who is not complying the guidelines for BMW management.

Most of the dentists (83.6%) and post-graduates (73.7%) felt the importance of labeling the container before filling it with waste in clinically practice. Graph 2 shows the level of attitude of BMW management of dentists 63.02%, post-graduates 60.23%, and dental assistant 47.72%. Overall dentist and post-graduates had a better attitude toward BMW management (Table 3).

Level of Practice

Level of practice for color-coding segregation of BMW management was highest among dentist (65.5%), than among all other groups and 58.2% of dentist agreed to follow color coding for BMW.

52.6% post-graduates, 36.7% dental assistant, and 32.7% dentists were agree on the proper waste disposal practiced in the hospital. It was surprising to see that level of practice as measures taken after an exposure with infected blood/body fluids and contaminated sharps was least in all healthcare personnel which ranged from 23.6% to 32.2%.

Table 3: A total 6 questions to assess level of practice

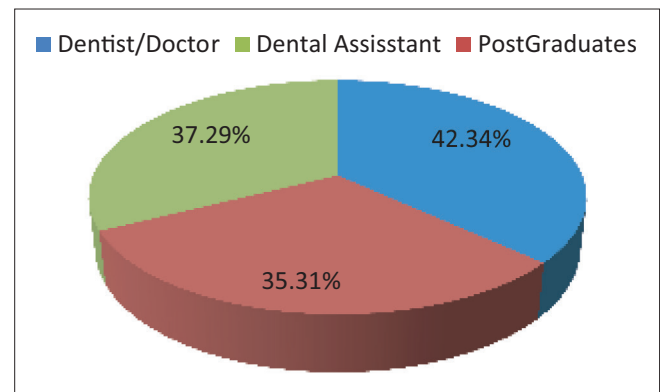
Serial number	Questions	% of positive responses			P value
		D	PG	DA	
1.	Do you know about color-coding segregation of BMW?	65.5	21.0	37.6	0.000***
2.	Do you follow color-coding for BMW?	58.2	26.3	21.3	0.003**
3.	Is the waste disposal practice correct in your hospital?	32.7	52.6	36.7	0.346
4.	What are the steps followed after an exposure with infected blood/body fluid and contaminated sharps?	23.6	26.3	32.2	0.107
5.	Statements about hazardous waste containers are true?	32.7	05.3	23.8	0.012*
6.	Is maintaining BMW records mandatory in your hospital/clinic?	23.6	57.9	23.8	0.071

D: Dentist, PG: Post-graduate, DA: Dental assistant, * $P < 0.05$ are significant, ** $P < 0.01$ are highly significant, *** $P < 0.001$ are very highly significant, BMW: Biomedical waste

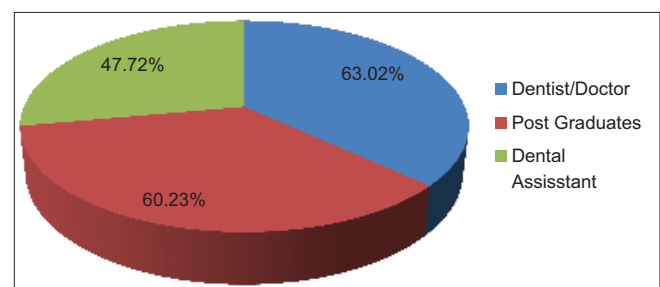
Only 5.3% of post-graduates agreed that statement made about hazardous waste containers are true whereas 32.7% of dentists and 23.8% of dental assistant found the same statement to be true. Only 35.1% of all healthcare personnel agreed that maintaining BMW records mandatory in the hospital/clinic. Graph 3 shows the level of practices of BMW management of dentists 39.4%, post-graduates 31.6%, and dental assistant 29.0%. It was clearly seen that level of practice of BMW management are more in dentist and least in dental assistant.

DISCUSSION

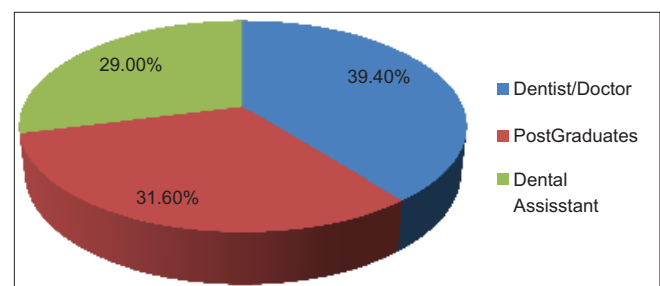
Advances in the healthcare system are increasing significantly but on the other hand less importance is given to BMW management, which is still poor in the country.



Graph 1: The total percentage of level of knowledge of biomedical waste management



Graph 2: The total percentage of level of attitude of biomedical waste management



Graph 3: The total percentage of level of practices of biomedical waste management

According to WHO, “The human’s element is more important than the technology. Almost any system of treatment and disposal that is operated by well-trained, and well-motivated staff can provide more protection for staff, patients and the community than an expensive or sophisticated system that is managed by staff who do not understand the risks, and the importance of their contribution” (WHO, 2000).¹⁶ For effective management of hospital waste, it is essential that personnel have a positive attitude toward care of the environment, occupational health, safety, and teamwork. Hospital waste management has major attitudinal and behavioral components.¹⁷

The results of this study showed that the knowledge of agency which regulates BMW were 63.6% in post-graduates, 52.7% in dentists and 49.1% in dental assistant. A study conducted in Amritsar¹ showed that all the dentists and considerable fewer responses from auxiliary staff (12.5%) regarding awareness of legislation applicable to waste management. In another study conducted in a teaching hospital of New Delhi in 2000 showed only 35.9% of dentists were aware of the legislation.¹⁵

The knowledge of describing a particular type of waste were 60% in dentists and only 26.3% in post-graduates, whereas the knowledge of regulating safe transport of BMW by Pollution Control Board were found to be 54.5% in dentists, and 47.4% in post-graduates. This may be due to the fact that dentists are more into clinical practice and post-graduates shows a lack of knowledge as they are still in learning stage during MDS course.

It was surprising to see that knowledge of disposal of sharp waste, was low in all the dental healthcare personnel which ranged from 27.2% to 36.3%, this shows negligence in handling sharp waste which can lead to infections such as HIV, HBV, and herpes, etc., as these sharp waste need to be properly segregated and disposed of in a different color coded bags.

The knowledge of color code of BMW that needs to be sterilized before disposal were found to be less than half which ranges from 20.9% to 36.8% whereas the knowledge for disposal of general waste in which color coded bag were found to be 36.4% dentist and only 26.3% post-graduates. This shows that the dental healthcare personnel had less knowledge in disposing BMW by using different color coded bags.

All dental healthcare personnel had a positive attitude in the measures for safe BMW management, but 44% dental assistant were not agreeing that BMW management was teamwork and felt that they are responsible for safe BMW management. They also expressed that measures on safe

BMW management by the hospital increase the financial burden on management and is also an extra burden on work. Regarding the safe management of BMW it was noted that an overwhelming percentage of 80% dentists agreed that the safe management of BMW is an issue that needs to be tackled by team-work of doctors and auxiliaries. However, considering the views of the 56% dental assistant, it appears that safe management of BMW can also be recognized as being more a problem of attitude rather than just providing the technology or facilities.¹⁸

More than half i.e., 56.2% of all dental healthcare personnel were showed a positive interest in attending the classes or CDE programs on BMW management and 56.8% showed interest in attending voluntarily programs to increase the knowledge on BMW management, which shows a positive attitude among all dental healthcare personnel.

About 51-78.9% of all dental healthcare personnel expressed that infectious waste should be sterilized, by autoclaving before shredding and disposal.

54.5% dentist, 40.6% dental assistant, and 36.8% post-graduates expressed their positive attitude in setting up of water treatment plant for the recirculation of used water in the dental colleges.

Almost half 51.9% of all healthcare personnel expressed their response to questions on reporting to Pollution Control Board of India about the institutions who is not complying the guidelines for BMW management. This showed positive attitude among dental healthcare personnel in reducing the hazardous effects of BMW management on the health of the personnel involved.

The attitude of dental healthcare personnel regarding the importance of labeling the container before filling it with waste ranges from 45.6% to 83.6%. The importance of labeling the containers reduces hazardous effects for all the personnel involved in handling BMW. The labeling on containers are of two types: (a) Represent the label of biohazards and (b) represent the label of cytotoxic. Hence, it is mandatory to label the color coded bags of waste.

According to National guidelines of BMW rules promulgated by the Government of India,¹⁹ different wastes must be disposed of in different color-coded bags. In the present study, 65.5% of dentists and 37.6% of dental assistant were aware of the above fact which is comparatively less than the study conducted in Amritsar, which shows 85% of dentists and 55% of auxiliary staff were aware of the fact.¹ In another study conducted in Bangkok, only 27.4% of private dentists were aware of different types of waste disposed of in different colored

bags in their practice.²⁰ This shows that the study conducted in Bangkok has least response for the disposal of different wastes in color coded bags as compared to the Indian studies, which may be due to different guidelines for waste disposal in different countries.

58.2% dentists, 26.3% post-graduates, and 21.3% dental assistant agreed to follow color coding for BMW. The level of practice is more in dentists and less in post-graduates and dental assistant which shows that BMW management will be included in the curriculum and regular training will be given to all dental healthcare personnel on it, which is actually required to increase the awareness of BMW management.

52.6% post-graduates, 36.7% dental assistant, and 32.7% dentists were agreed on the proper waste disposal practiced in the hospital. This may be due to the fact that they were less often practicing BMW management in hospitals.

The level of practice for the measures taken after an exposure with infected blood/body fluids and contaminated sharps was less in all dental healthcare personnel which ranges from 23.6% to 32.2%, which shows that they all are less aware of the adverse health consequences caused by BMW.

32.7% dentists, 23.8% dental assistant and only 5.3% post-graduate responded correctly about the hazardous waste were kept in which container whereas in one of the study conducted in hospitals of Gujarat¹³ in 2005, 43% of auxiliary staff had knowledge of this subject.

57.9% post-graduates, 23.8% dental assistant, and 23.6% dentists agreed that maintaining BMW records are mandatory in the hospital, whereas in one of the study conducted in Amritsar¹ (2012) showed that only 15% dentists and 5% auxiliary staff reported that maintaining BMW records are mandatory, which is comparatively lesser than results of current study. According to National guidelines on BMW rules, it is mandatory to maintain the records of BMW management.¹⁹

The literature showed that the knowledge, attitude and practices of BMW management among Dentist, post-graduates had better knowledge than dental assistant (Class IV employees). The results of this study were in accordance with another study conducted in Bangalore city by Rudraswamy *et al.*²¹ which showed that doctors, nurses, and laboratory technicians had a better knowledge than the cleaning (sanitary) staff regarding BMW management. The findings of the present study suggested that there is an urgent need to train and educate all dental healthcare personnel in the dental colleges through extensive training

and re-training programs. Furthermore, it is also suggested that a proper waste management educational program should be included in the curriculum for dental education so as to give due importance to this vital issue. Because the study was confined to one major region of North India, further regional studies are required on a larger population to generalize the results, in the formulation and implementation of BMW guidelines. The topic is very relevant to all countries and it is suggested that all public and private healthcare providers should audit the BMW knowledge and practices of their staff at regular intervals. The results of this study will help the hospital authorities to develop a strategy for improving BMW management. BMW management programs cannot be successfully implemented without the effective knowledge, willingness, motivation, and cooperation from all sections of employees of any health care setting. A “cradle to grave” approach should be followed in regard to the collection, segregation, transportation, treatment, and disposal of BMW. There needs to be a sensitization of employees to the current issue coupled with effective implementation of rules (such as surprise visits from monitoring authorities and performance-based incentives that will facilitate successful implementation of the program), which is vital for better outcome in future.

CONCLUSION

This present study showed that there is a lack of knowledge, attitude, and practices of BMW management among dental healthcare personnel. It presents a grim picture. No appropriate strategy exists for the proper management of BMW. It is imperative that waste should be segregated and disposed of in a safe manner to protect the environment, as well as human health. There is an urgent need to increase awareness about rules, regulations and procedures regarding this vital issue, to prevent an epidemic waiting to happen.

Optimal waste management is at best, a moving target. Usually, dental assistants are responsible for spearheading the waste management initiatives in dental colleges. Waste-handling is left to lower-level workers who operate without any training, guidance, and supervision. Managing waste requires effective management of people who produce the waste and not just those who handle it. BMW program cannot be successfully implemented without the willingness, self-motivation, and co-operation from all sections of employees of any health care setting. It's primarily the dentists who are responsible for waste generation. But currently, as most of us are aware that it is mainly the resistant attitude of dentists that is responsible for poor results on this front. Dentist at the high end of hierarchy

should take this issue which needs to be addressed not as a burden difficult to bear by sensitizing the employees to this issue coupled with effective implementation of rules by surprise visits from monitoring authorities will facilitate successful implementation of the program. It is TIME to ACT.

REMEDIAL SUGGESTIONS

1. Regular monitoring and training regarding BMW management is required at all levels
2. Need for orientation programs for newcomers to understand BMW at the hospital level
3. Need to include training modules of BMW managements in all medical, dental and paramedical courses.

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Knowledge about the Systemic and Oral Effects of Smoking in the State of Jammu and Kashmir

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Abstract

Introduction: Smoking is responsible for 100 million deaths around the world and has been associated with decrease in life expectancy. The prevalence of smoking in Jammu and Kashmir is among the highest in all the states in India. This article is grading the awareness of the masses of Jammu and Kashmir toward smoking and the role of dentists in motivating the people to quitting smoking.

Aim: The study aims at analyzing the knowledge and awareness of oral and systemic side-effects of smoking in general public.

Materials and Methods: This study was conducted by issuing a self-administered questionnaire to 100 patients who visited Indira Gandhi Government Dental College in January 2015. A descriptive data analysis was performed using Chi-square test to check the statistical significance among the awareness of smokers, non-smokers, and ex-smokers.

Results: Among the 100 patients screened there was significant difference among the smokers and non-smokers regarding hair loss ($P = 0.000$), lines on skin ($P = 0.000$), tooth decay ($P = 0.0451$), bad taste in mouth ($P = 0.01$), wound healing ($P = 0.0081$), gum diseases ($P = 0.000$) and oral cancer ($P = 0.000$). About 75% smokers showed willingness to quit if suggested by the dentist.

Conclusion: As dentists we all should be very active in motivating the patient against smoking as it can create a significant improvement in both general and oral health of the patient.

Key words: Knowledge, Perceptions, Prevention, Smoking, Smoking cessation

INTRODUCTION

Smoking is a major risk factor for death through several systemic diseases. It has been proven as a cause of various cardiovascular diseases, respiratory disease.^{1,2} Smoking is cause of 100 million deaths across the globe and 90,000 people die every year in India due to smoking as of 2009,³ it also accelerates the signs of ageing like graying of hair, loss of libido and lines on skin.⁴⁻⁹ Smoking has even been associated with significant decreases in life expectancy of

around 7.5 years.¹⁰ A lot of oral conditions such as halitosis, bad taste, staining of teeth, delay in wound healing, tooth loss and various periodontal problems are also attributable to smoking.¹¹⁻¹⁵ India ranks highest in age adjusted incidence rates of oral cancer and upper aero-digestive tract cancers in the world.¹⁶ According to a survey conducted by World Health Organization tobacco in used in various forms in India, there is a prevalence of 34% using bidis, 31% cigarettes, 19% chewing tobacco, 9% hookah and 7% other forms, respectively.¹⁷ By 2010 India was a home to 12% of total smoking population of the world.³ By 2020, smoking will count 13% of all deaths in India.¹⁸ The cost of treating smoking tobacco attributable diseases in India have been estimated to exceed \$900 million in 2004.¹⁹ In a survey conducted by International Institute of Population Science and Ministry of Health and Social Welfare, Government of India about 26.6% of people in Jammu and Kashmir smoke cigarettes, which is the highest rate in the country

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for any state.²⁰

The present study is aimed at prevention of smoking in the state of Jammu and Kashmir by analyzing the knowledge about the effects of smoking among the general masses. There is paucity of such studies in the Indian scenario. Moreover, in a small state of Jammu and Kashmir in spite of such high smoking incidence there is no similar study conducted, which is in the authors notice. The study focuses on the comparison of difference in the knowledge, awareness and perception of smokers versus non-smokers and quantifies the number of smokers who are willing to quit smoking following dentist's advice thus, highlighting the need for intervening and motivating the smokers by professionals.

MATERIALS AND METHODS

A descriptive study was conducted in January 2015 using a self-administered questionnaire. The questionnaire adopted was originally developed by Terrades *et al.*,²¹ which was later modified in other studies.²² It consisted of a set of eleven questions regarding the knowledge about effects of smoking on general and oral health as well as smokers' willingness to quit and consulting a specialist on dentists' advice. The responses were recorded as yes, no and don't know.

The study population consisted of patients visiting Indira Gandhi Government Dental College and Hospital, Jammu. Ethical clearance was obtained from the institution's ethical clearance committee. Study sample 100 was randomly selected from the study population. Inclusion criteria consisted of subjects 18 years and above and ability to read questionnaire. Written informed consent was obtained from study subjects.

Data obtained were tabulated and analyzed using statistical package social sciences software version 20 (SPSS Inc., Chicago, IL, USA). Chi-square test was applied to test the significance in the difference between smokers and non-smokers. Statistical significance was set at $P < 0.05$.

RESULTS

This study was a descriptive study conducted to assess perceptions of dental patients visiting Indira Gandhi Government Dental College and Hospital about smoking cessation as a part of oral health care delivery. All 100 subjects completed the questionnaire, with a response rate of 100%. Of the 100 subjects, 94 were male and 6 were female. Majority (63%) of the study subjects were current smokers.

Knowledge about the effects of smoking on general and oral health depending upon the smoking status was assessed through a set of 11 questions. Overall patients had good awareness about lung cancer, staining of teeth, halitosis and cancer of mouth. There was further categorization as smokers and non-smokers and the response was analyzed by observing a statistically significant difference ($P < 0.05$).

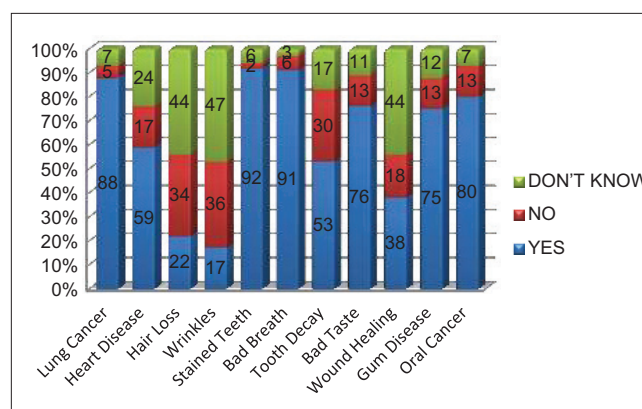
Data thus obtained has been provided in Table 1 and Graph 1.

It was also seen that 75% (47) of the smokers agreed to stop smoking if advised by a dentist.

DISCUSSION

The present descriptive study assessed patients' knowledge about the effects of smoking, perceptions about the role of the dentist and willingness of smokers to quit following dentists' advice. Current smokers constituted 62% of the study sample which was higher compared to other similar studies.²¹⁻²³ The reason being high incidence of smoking in the state of Jammu and Kashmir, India. Response rate for the present study was 100%. The results provide general and comparable information about what population Jammu and Kashmir thinks about ill effects of smoking and even to grade the difference in awareness of smokers and non-smokers on various pressing questions regarding smoking.

In spite of high prevalence of smoking in Jammu and Kashmir the effects of smoking were very well acknowledged by the masses. The trend regarding oral awareness, which was noticed in the study clearly showed that general population was more aware about the esthetic results of the smoking i.e., staining of teeth (92%) and bad breath (91%) than delaying wound healing (38%), periodontal problems (75%) and oral cancer (80%). Surprisingly, the awareness about esthetic results



Graph 1: Stacked percentage bar graph showing relative knowledge between groups regarding effects of smoking

Table 1: Knowledge about effects of smoking on general and oral health depending upon smoking status

Questions and responses	Non-smokers N (%)		Smokers N (%)	Total N	P value
	Never smokers	Ex-smokers			
Smoking causes lung cancer					
Yes	32	2	54	88	0.96
No	1	0	4	5	
Don't know	2	0	5	7	
Smoking causes heart disease					
Yes	24	1	34	59	0.86
No	4	1	12	17	
Don't know	7	0	17	24	
Smoking causes hair loss					
Yes	7	1	14	22	0
No	6	0	28	34	
Don't Know	22	1	21	44	
Smoking causes lines on the skin*					
Yes	8	1	8	17	0
No	7	0	29	36	
Don't know	20	1	26	47	
Smoking causes stained teeth					
Yes	34	2	56	92	0.335
No	0	0	2	2	
Don't know	1	0	5	6	
Smoking causes bad smell from the mouth					
Yes	33	2	56	91	0.9194
No	0	0	6	6	
Don't know	2	0	1	3	
Smoking causes tooth decay					
Yes	25	0	28	53	0.0451
No	2	1	27	30	
Don't know	8	1	8	17	
Smoking causes bad taste					
Yes	26	1	49	76	0.01
No	3	1	9	13	
Don't know	6	0	5	11	
Smoking can affect healing of wound					
Yes	13	0	25	38	0.0081
No	2	0	16	18	
Don't know	20	2	22	44	
Smoking causes gum disease					
Yes	29	0	46	75	0
No	3	0	10	13	
Don't know	3	2	7	12	
Smoking causes cancer of mouth*					
Yes	31	2	47	80	0
No	4	0	9	13	
Don't know	0	0	7	7	

*Test used Chi-square, $P < 0.05$

of smoking was higher than lung cancer (88%) and cardiovascular diseases (59%). The reason, which can be

attributed to this is self-noticing of these signs as they can be easily evident.

The awareness of oral cancer was less than that of lung cancer which is in accordance with Terrades *et al.*²¹ 53% agreed that smoking causes dental caries. Similar and conflicting results have been reported in other studies.^{21,24,25} Recent research indicates that smoking creates favorable conditions for dental caries thus causing loss of teeth.²⁶⁻²⁸ It has been demonstrated that cigarette smoke impairs salivary function and hence leads to dental caries. 75% patients in this study believed that smoking can cause gum diseases which is comparable to studies done by Al-Shammari *et al.*²⁵ and Terrades *et al.*²¹ (76% and 80% respectively). 80% patients agreed that smoking causes oral cancer, while 16% did not know the above fact. The knowledge about the oral cancer was comparatively good when compared to that reported by Rikard-Bell *et al.*²⁹ and Al-Shammari *et al.*²⁵ (74% and 62% respectively) and comparable to 85.5% reported by Terrades *et al.*²¹ Moreover 76% believed that smoking caused bad taste from the mouth which was comparative with other studies.²¹ Finally, 38% agreed smoking can cause delayed wound healing which is higher than earlier studies.^{22,25}

As low as 22% and 17% were aware of smoking causing hair loss and lines on skin respectively. Similar unawareness can be seen in the study by Sood *et al.*²²

Statistically significant difference among the awareness of smokers and non-smokers regarding hair loss ($P = 0.000$), lines on skin ($P = 0.000$), tooth decay ($P = 0.0451$), bad taste in mouth (0.01), wound healing ($P = 0.0081$), gum diseases ($P = 0.000$) and oral cancer ($P = 0.000$). 75% of the smokers agreed to quit smoking if advised by a dentist. This is less than that reported by Sood *et al.* i.e., 89%.²²

This data clearly show that smokers can be made more aware and encourages such studies. The esthetic effects of smoking should be used by oral health workers as motivation to quit smoking. In a state like Jammu and Kashmir, which has highest smoking incidence in the entire country, it is the need of hour for the dentists to make masses fully aware of more lethal aspects of smoking.

CONCLUSION

The study reflects relatively good knowledge of the cohort of dental patients visiting a government hospital about the general and oral effects of smoking. A 100% response rate is an encouraging sign showing the willingness of patients to participate and learn about this potential risk factor for various diseases. A major proportion of the studied subjects were found to be willing to even follow the dentist's advice

about quitting smoking. This study clearly highlights the fact that dentists can play a major role at the forefront in the war against smoking. They should apprise all patients about the ill-effects of smoking and encourage smokers to quit, thereby taking up a much more active role in bettering the society as a whole.

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Thyroid Dysfunction in Subjects with Metabolic Syndrome: A Cross Sectional Study

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Abstract

Introduction: Metabolic syndrome and thyroid dysfunction both are associated with increased risk of atherosclerotic heart disease.

Aim: The present study was conducted with the aim to estimate the proportion of thyroid dysfunction in metabolic syndrome and to find the significance correlation between the metabolic syndrome and thyroid function parameters.

Materials and Methods: The sample of 60 subjects was considered for this study. The detailed case history was taken, and fasting blood sample was analyzed for total triiodothyronine (T3), total thyroxine (T4), thyroid-stimulating hormone, lipid profile, and blood glucose.

Results: In our study, the prevalence of thyroid dysfunction was found to be 16.7%. Sub clinical hypothyroidism was found to be highly prevalent 11.7%, hypothyroidism was found to be prevalent in 3.3% of metabolic syndrome patients and sub clinical hyperthyroidism was found to be 1.7% prevalent. Overt hyperthyroidism patients were not found in our study.

Conclusion: The study concludes that the prevalence of thyroid dysfunction in metabolic syndrome patients is higher as compared to normal subjects. Every sixth patient with metabolic syndrome had hypothyroidism either overt or subclinical. This finding indicates a need for investigating the presence of thyroid dysfunction during managing metabolic syndrome patients.

Key words: Hyperthyroidism, Metabolic syndrome, Thyroid dysfunction

INTRODUCTION

The “deadly quartet” also known as “metabolic syndrome” and “syndrome X,” the insulin resistance syndrome, the plurimetabolic syndrome, Reaven’s syndrome, dysmetabolic syndrome, beer belly syndrome and atherothrombogenic syndrome, is the cluster of metabolic abnormalities where in people are obese, and have hypertension, high triglyceride levels, low high-density lipoproteins and abnormal fasting glucose levels.^{1,2} People with metabolic syndrome are at high risk for developing cardiovascular disease³ and are twice likely to die from and 3 times as likely to have a myocardial infarction, stroke compared

with people without this syndrome. Insulin resistance is supposed to be the central pathophysiological phenomenon underlying the clustering.⁴

Thyroid disease is associated with the atherosclerotic cardiovascular disease.^{5,6} This association may be in part be explained by thyroid hormones regulation of lipid metabolism and its effects on blood pressure. Thyroid hormones have ubiquitous effects and influence the function of most organs. This hormone appears to serve as a general pacemaker accelerating the metabolic process and may be associated with metabolic syndrome.

Both metabolic syndrome and thyroid dysfunction are associated with increased risk of atherosclerotic heart disease. Little is known about the relationship between metabolic syndrome and thyroid dysfunction.^{7,8} A study on thyroid dysfunction in metabolic syndrome population may help us to know the magnitude of overlap of these two groups and may highlight the importance of thyroid function tests in identifying hypothyroid population from

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metabolic syndrome. This can lead to proper planning and adequate management strategies, resulting in significant reduction in cardiovascular morbidity and mortality in metabolic syndrome by effective thyroid replacement therapy.

Objectives of this study are:

1. To estimate the proportion of thyroid dysfunction in subjects with metabolic syndrome
2. To find the significance correlation between the metabolic syndrome and thyroid function parameters.

MATERIALS AND METHODS

Based on the prevalence of metabolic syndrome with effect size 10% and level of significance 5% using estimation approach the sample size of 60 subjects, who were newly diagnosed as metabolic syndrome by International diabetes federation⁹ and of more than 18 years of age, getting admitted to medical wards in K R Hospital Mysore during the period of December 2011 to August 2013. Subjects under treatment for thyroid disorders, diabetes mellitus, hypertension, dyslipidemia, HIV were excluded from the study. Subjects were selected on convenience basis for the study. Ethical Committee clearance of the institution was taken. Informed written consent was taken from each subject. Cross-sectional study design was adopted.

Detailed history of medication, and anthropometric measurements like height, weight, waist circumference were noted in a semi-structured pro-forma. Blood pressure was recorded in the right upper limb in sitting posture. After 8 h of fasting, 10 ml of venous blood drawn under aseptic precaution for fasting blood sugar, lipid profile and thyroid assay in a single sitting. Blood samples were sent to central laboratory and results were noted down. The fasting blood sugar was done by an enzymatic calorimetric method using semi auto analyzer. The high-density lipoprotein cholesterol and triglycerides were done enzymatically on XL-300 ERBA fully automated clinical chemistry analyzer. The thyroid hormone assay (thyroid-stimulating hormone [TSH], T3 and T4) was done by chemiluminescence immunoassay using ADVIA Centaur equipment.

Euthyroidism is defined as TSH - 0.4 mU/L to 4.5 mU/L, T4 - 5.4 µg/dl to 11.7 µg/dl, sub clinical hypothyroidism TSH - 4.51 mU/L to 10.0 mU/L, T4 - 5.4 µg/dl to 11.7 µg/dl hypothyroidism TSH - >10.0 mU/L, T4 - <5.70 ng/dl, sub clinical hyperthyroidism TSH - 0.1 mU/L to 0.4 mU/L, T4 - 5.4 µg/dl to 11.7 µg/dl and hyperthyroidism TSH - <0.1 mU/L, T4 - >11.7 µg/dl (Williams textbook of endocrinology).

Baseline characteristics of study participants were expressed in percentage. Under the normality assumption and equality of variance, a correlational analysis was done using Pearson correlation and *t*-test for correlation to know any significant relationship between the components of metabolic syndrome and TSH and T4 level. Student's *t*-test is used for to test for the equality of distribution of various metabolic syndrome parameters among thyroid levels of subjects. *P* < 0.05 was considered statistically significant. SPSS 12 and excel were used for data analysis.

RESULTS

Among the 60 patients included in our study, 27 patients were men accounting for 45% of the total cases. The remaining 33 patients were (55%) women. According to the age, patients' between 30 and 39 years of age were 15 in number (25%). The majority of the patients were in the age group between 40 and 49 years - 28 patients (47% of study population) were in this group. 11 patients (18%) were between the age of 50 and 59 years. 6 patients (10%) were above the age of 60 (Tables 1-4 and Figure 1).

Table 1: Thyroid dysfunction

Group	N (%)	Male	Female
Euthyroid	50 (83.33)	26	24
Hypothyroid	2 (3.33)	1	1
Subclinical hypothyroidism	7 (11.67)	0	7
Subclinical hyperthyroidism	1 (1.67)	0	1
Hyperthyroidism	0 (0)	0	0

Table 2: Distribution of thyroid dysfunction

MS parameters	Euthyroid		Others		P value
	Mean	SD	Mean	SD	
WC	97.16	6.98	98.57	8.32	0.626
SBP	139.88	14.14	140.29	14.40	0.944
DBP	89.52	7.28	88.29	9.20	0.689
FBS	158.28	51.04	141.43	37.82	0.405
HDL	43.46	6.25	43.43	4.58	0.990
TGL	234.20	170.18	185.57	93.75	0.434

P > 0.05 not significant at 5% level. WC: Waist circumference, SBP: Systolic blood pressure, DBP: Diastolic blood pressure, FBS: Fasting blood sugar, HDL: High-density lipoprotein, TGL: Triglycerides level, SD: Standard deviation

Table 3: Correlation between T4, TSH and metabolic syndrome parameters in euthyroid subjects

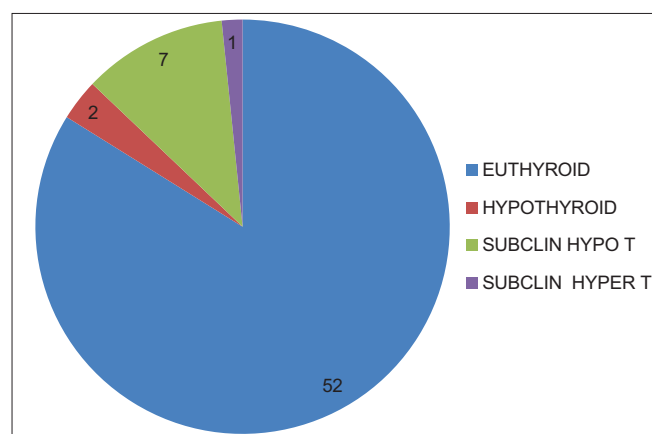
MS parameter	T4	P value	TSH	P value
WC	0.243	0.08	-0.029	0.839
SBP	0.078	0.59	0.076	0.60
DBP	0.125	0.38	-0.416	0.77
FBS	0.175	0.22	-0.095	0.59
HDL	0.067	0.64	-0.108	0.45
TGL	0.056	0.69	-0.066	0.30

P > 0.05 not significant at 5% level. TSH: Thyroid-stimulating hormone, WC: Waist circumference, SBP: Systolic blood pressure, DBP: Diastolic blood pressure, FBS: Fasting blood sugar, HDL: High-density lipoprotein, TGL: Triglycerides level

Table 4: Correlation between T4, TSH and metabolic syndrome parameters in subjects with thyroid dysfunction

MS parameter	T4	P value	TSH	P value
WC	6.5	0.11	-0.577	0.17
SBP	5.14	0.23	-0.511	0.24
DBP	-4.9	0.91	0.060	0.89
FBS	7.41	0.05	-0.576	0.17
HDL	4.6	0.29	-0.249	0.58
TGL	-4.04	0.82	-0.134	0.77

P>0.05 not significant at 5% level, TSH: Thyroid-stimulating hormone, WC: Waist circumference, SBP: Systolic blood pressure, DBP: Diastolic blood pressure, FBS: Fasting blood sugar, HDL: High-density lipoprotein, TGL: Triglycerides level

**Figure 1: Thyroid dysfunction**

As there were small number of patients with very high variants, statistically significant results were not found. Correlation coefficient values between T4, TSH and metabolic parameters are not significant in our study, because of limited number of study subjects and variants are high.

DISCUSSION

This study was conducted in 60 cases of metabolic syndrome, who had been admitted to K R Hospital attached to Mysore Medical College and Research Institute, Mysore, which is a representative of the general population at large in usual clinical practice.

In this study, thyroid dysfunction prevalence is 16.7% among metabolic syndrome patients. Hypothyroidism is 15% prevalent in metabolic syndrome patients (overt hypothyroidism 3.3% and subclinical hypothyroidism 11.7%). The prevalence of thyroid dysfunction and hypothyroidism in metabolic syndrome patients are higher than the prevalence in normal population, which is 5.9% for thyroid dysfunction and 4.6% for hypothyroidism (0.3% overt and 4.3% subclinical hypothyroidism).¹⁰

In this study, subclinical hypothyroidism is highly prevalent - 11.7%. The hypothyroidism is 3.3% prevalent in metabolic syndrome patients (one patient had TSH levels of more than 150 mU/L) and subclinical hyperthyroidism is 1.7% prevalent. There were no overt hyperthyroidism patients in our study.

In this study, one-sixth of metabolic syndrome patients or every sixth patient with metabolic syndrome has hypothyroidism. It is well-known and proven that, by treating with levothyroxine replacement in all overt or clinical hypothyroid patients, we can reduce all the metabolic parameters and cardiovascular risk.¹¹ The risk of progression from subclinical hypothyroidism to overt hypothyroid is 2-5% per year.¹² A meta-analysis report shows that levothyroxine therapy in individuals with subclinical hypothyroidism lowers mean serum total and low-density cholesterol concentration significantly, and the reduction in serum cholesterol may be larger in individuals with higher pre-treatment cholesterol levels.¹³

Another double-blind placebo-controlled trial (basal thyroid study) shows that an important risk reduction of cardiovascular mortality of 9-31% possible by an improvement in low-density lipoprotein cholesterol in subclinical hypothyroidism patients treated with levothyroxine therapy.^{14,15} Col *et al.*, Recommends treating subclinical hypothyroidism associated with Type 2 diabetes and hypertension in his scientific review.¹² As the metabolic syndrome patients had hyperlipidemia, diabetes, hypertension and increased cardiovascular risk, its look logical to treat metabolic syndrome patients having subclinical hypothyroidism by levothyroxine replacement therapy. While there appear to be no adverse effects of initiating levothyroxine treatment in this setting, inadvertent overtreatment occurs in 14-21% of levothyroxine treated patients,¹⁶ carrying potential risks of osteoporosis and atrial fibrillation when serum TSH falls below 0.1 mU/L.¹⁷ These patient need frequent thyroid function tests to avoid this complication. This study shows that the prevalence of thyroid dysfunction in metabolic syndrome patients is higher than in normal subjects. One-sixth of metabolic syndrome patients or every sixth metabolic syndrome had hypothyroidism either overt or subclinical. This finding indicates a need for investigating the presence of thyroid dysfunction during managing metabolic syndrome patients. As shown in previous evidences, managing these hypothyroid in metabolic syndrome patients are rewarding by improvement in the metabolic parameters and reducing cardiovascular risk.

CONCLUSION

There is a significant association between hypothyroidism and metabolic syndrome. Every sixth metabolic syndrome

patient had hypothyroidism either overt or subclinical. It is advisable to assess the thyroid function in all metabolic syndrome, for better outcome.

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Management and Outcome in Empyema Thoracis in a South Indian Teaching Hospital: A Clinical Study

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Abstract

Background: Empyema thoracis is a pyogenic or suppurative infection of the pleural space. Empyema is the most common exudative type of pleural effusion. Empyema is never a primary disease, often it is difficult to arrive at the primary focus of infection.

Materials and Methods: A total of 100 patients diagnosed with empyema thoracis were selected as sample for this study. Investigations such as complete blood picture, chest X-ray, sputum for Gram's and acid-fast bacilli (AFB) staining, and culture sensitivity (qualitative and quantitative) for bacterial and AFB, diagnostic aspiration of empyema were done and sent for culture and sensitivity. The clinical course and response of each patient was noted, and the final surgical management was recorded.

Results: Various parameters we considered and calculated such as age, sex, role of various antibiotics, and various methods for treating empyema were obtained.

Conclusion: Empyema thoracis is difficult to manage but still presents as a challenge at referral tertiary care hospitals. Co-morbid factors such as diabetes and immunosuppressive retroviral diseases may be implicated as the etiological reasons for the resurgence of empyema in the present era of new and effective antibiotics.

Key words: Decortication, Morbidity, Thoracoscopy

INTRODUCTION

Pyothorax also known as empyema thoracis is the accumulation of pus within the pleural cavity. The pus is usually thick, creamy, and malodorous. If empyema occurs in the setting of underlying suppurative lung disease, i.e., pneumonia, lung abscess or bronchiectasis, it is referred to as a parapneumonic empyema which is found in of about 60% of cases.¹⁻⁴ Other causes of thoracic empyema are surgery (20%), trauma (10%), esophageal rupture, other chest wall or mediastinal infections, bronchopleural fistulae, extension of a subphrenic or hepatic abscess, instrumentation of the pleural space (thoracentesis, chest tube placement, etc.), and rarely hematogenous seeding

from a distant site of infection. Pyothorax is the end stage of pleural infection for any reason. It can occur as a complication of any thoracic operation.⁵⁻⁷ It may be associated with pus under the diaphragm. Empyemas are divided into three phases based on their natural history; acute exudative, fibrinopurulent, and chronic organizing. The complications of empyema thoracis are classified in two ways, as acute and chronic.

Acute complication are bronchopleural fistula, septicemia, empyema necessitans, and chronic complications are suppurative pericarditis, endocarditis, myocarditis and arthritis, mediastinal abscess, thoracic deformity, calcification in the pleural space, amyloid disease, metastatic cerebral abscess, massive gangrene of chest wall anemia.⁸⁻¹⁰

MATERIALS AND METHODS

One hundred patients diagnosed with empyema thoracis were admitted in Government Hospital, Kakinada during the period of September 2012-September 2014 were

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randomly selected as the sample for this study (Figures 1 and 2). Ethical clearance was obtained from hospital ethical committee and informed consent from patients was taken. Certain investigations such as complete blood picture, chest X-ray, sputum for gram's and acid-fast bacilli (AFB) staining and culture sensitivity (qualitative and quantitative) for bacterial and AFB, diagnostic aspiration of empyema were done and sent for culture and sensitivity. The clinical course and response of each patient was noted and the final surgical management was recorded.

RESULTS

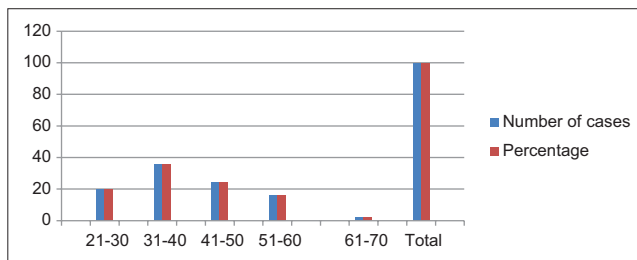
The study was conducted on 100 samples.

Age Distribution

In this study majority of cases were in the age group of 31-40 years (4th decade) constituting 36%, followed by the 41-50 year group constituting 24. Together in 21-50 years age interval, 80% of the total patients have been diagnosed and treated (Table 1 and Graph 1).

Sex Distribution

In this study, 86% of patients were male constituting the majority (Table 2).



Graph 1: Age distribution



Figure 1: Right sided empyema

Symptoms

In the present study, the most common presentation of empyema thoracis was cough (84%), followed by fever (76%), chest pain (60%), dyspnea (52%), sputum production (40%), and weight loss (40%) (Table 3).

Microbiology

Most common microbiological organism isolated was staphylococcus in 28 (28%) patients followed by *Streptococcus viridians* in 8 (8%), *Pneumococcus* in 4 (4%), *Klebsiella pneumonia* in 18 (18%), *Pseudomonas* in 20 (20%), *Escherichia coli* - 7% and were isolated individually in one such case each. In (15%) cases, no organism could be grown (Table 4).

Table 1: Age distribution

Age group (years)	Number of cases	Percentage
21-30	20	20
31-40	36	36
41-50	24	24
51-60	16	16
61-70	2	2
Total	100	100

Table 2: Sex distribution

Sex	Number of cases	Percentage
Males	86	86
Females	14	14
Total	100	100

Table 3: Symptom analysis

Symptoms	Number of cases	Percentage
Cough	84	84
Fever	76	76
Chest pain	60	60
Dyspnea	52	52
Sputum	40	40
Weight loss	40	40

Table 4: The microbiological organism cultured in the pleural aspirate

Microbiological organism	Number of cases	Percentage
<i>Staphylococcus</i>	28	28
<i>Streptococcus viridians</i>	8	18
<i>Pneumococcus</i>	4	4
<i>K. pneumoniae</i>	18	18
<i>Pseudomonas</i>	20	20
<i>E. coli</i>	7	7
No growth	15	15
Total	100	100

E. coli: *Escherichia coli*, *K. pneumoniae*: *Klebsiella pneumoniae*,
S. viridians: *Streptococcus viridians*

Etiology

The most common etiology was pneumonia (66%), followed by lung abscess in 16% and tuberculosis in 12%. There was 1 case of empyema thoracis caused by thoracentesis, 1 case of post-exanthematous fever, and 1 case of trauma (Table 5).

In this study various groups of antibiotics were studied about their efficacy depending upon their duration of time taken to get the complete resolution in the empyema thoracis patients:

1. Imipenem has shown that complete resolution after 12 days and followed by oral antibiotics
2. Sulbacef - for 12 days followed by oral antibiotic-resolution after 15 days
3. Tazobactam-piperacillin - for 12 days resolution at 15 days
4. Ceftriaxone - for 10 days resolution after 16 days
5. Cefotaxime - for 8 days plus oral antibiotics for 7 days resolution at 17 days
6. Amikacin + Amoxy-clav - 7 days followed by oral ciprofloxacin resolution at 18 days
7. Injection ciprofloxacin 100 cc IV bd - 10 days followed by oral tablets-resolution at 20 days
8. Injection gentamicin - for 7 days-got-partial resolution, again treated with higher antibiotic and discharged the patient after resolution (Table 6).

The treatment of empyema thoracis includes intercostal drainage procedure as the mainstay of the treatment; along with intercostal tube (ICT) drainage various modalities were studied. In this study, out of 100 patients ICT tube drainage along with antibiotics given for 51 patients showed best outcome shown by 44 members - 7 members showed medium outcome.

ICT tube with antibiotic and pleural toilet showed 22 - members with best outcome 20 and - 2 members with medium expansion. Antibiotics with aspiration for 2 members - good expansion in one patient-medium expansion in another-drainage tube with ATT for 9 patients - 6 members showed excellent re-expansion. Drainage with - ART for 5 patients - 2 members yields good results. Drainage tube + antibiotics + ART + ATT + plural toilet done in 11 members of HIV patients - 5 patients got good expansion (Graph 2).

Role of this study has conducted on 100 patients. The duration of illness before ICT tube has taken as the parameter in this study. It has shown that prolonged ill before ICT tube gave poor results where early diagnosis and prompt intubation yielded excellent results, it has been established that early diagnosis and prompt intubation

have best outcome when delayed intubation and delayed diagnosis yielded poor results.

The underlying disease in empyema thoracis was chiefly, tuberculosis, HIV, diabetes mellitus, hypertension, and anemia their management was very essential in decreasing the morbidity of the disease. Of 100 cases, tuberculosis are 38% and HIV carries 24%, diabetes mellitus in 17%, hypertension in 8%, and anemia in 13% (Table 7 and Graph 3).

In this study, delayed diagnosis may be due to delayed presentation due to neglect or poverty whereas early diagnosis and prompt IC tube intubation along with antibiotics has shown best results (Table 8 and Graph 4).

DISCUSSION

Empyema thoracic commonly affects males. Apart from the clinical assessment X-ray chest is an important and

Table 5: The etiology of empyema thoracis

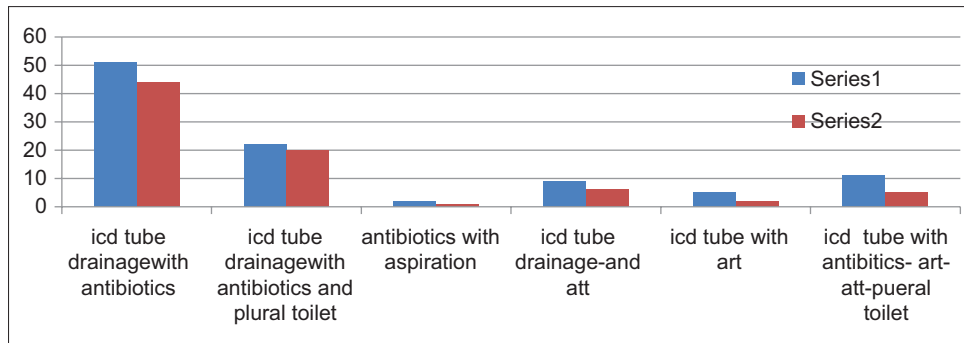
Etiology	Number of cases	Percentage
Pneumonia	66	66
Lung abscess	16	16
Tuberculosis	12	12
Post-thoracentesis	2	2
Post-exanthematous	2	2

Table 6: Role of antibiotics in treatment of empyema thoracis

Name of antibiotic	Number of days given	Complete resolution after number of days
Imipenem	10	12
Sulbacef	12	15
Tazobactam-Piperacillin	12	15
Ceftriaxone	10	16
Cefotaxime	8	17
Amikacin+Amoxy-clavu	7	18
Ciprofloxacin	10	20
Gentamicin	7	Partial resolution

Table 7: Role of underlying diseases and their management

Underlying disease	Number of patients	Percentage	Management
Tuberculosis	38	38	Antibiotics+ATT
HIV	24	24	Antibiotics+ART
Diabetes mellitus	17	17	Antibiotics, anti-hyperglycemics
Hypertension	8	8	Antibiotics, and anti-hypertensives
Anemia	13	13	Antibiotics, iron folic acid tab/blood transfusion



Graph 2: Treatment modalities - analysis

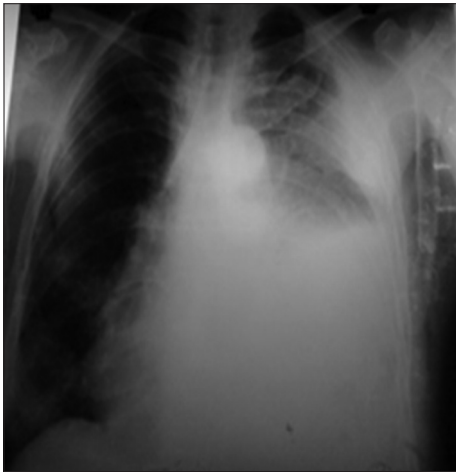
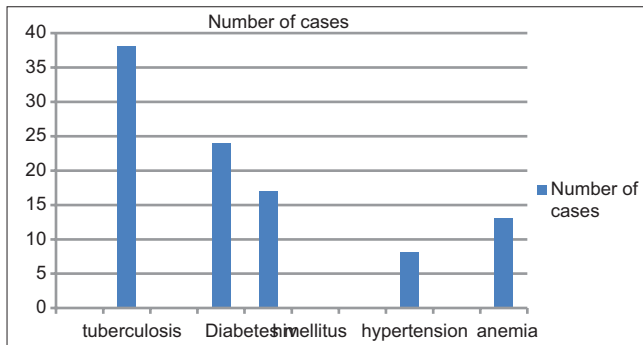
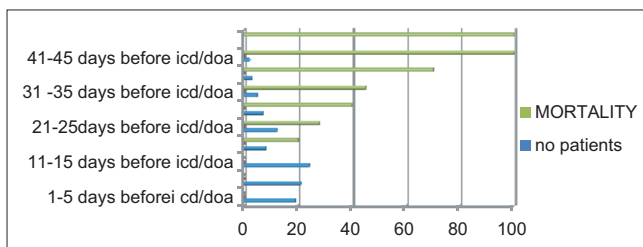


Figure 2: Left sided empyema



Graph 3: Underlying diseases analysis



Graph 4: Treatment in empyema thoracis and mortality

simple investigation to detect empyema thoracic. Timely intervention cures the diseases in most patients with tube drainage but in case of its failure other options are also

Table 8: Role of treatment in decreasing mortality and morbidity

Duration PF illness, before-doa-ICT	No patients	Outcome	Mortality
1-5 days before ICT/DOA	19	Excellent-re-expansion	0
1-5 days before ICT/DOA	21	Good-re-expansion	0
11-15 days before ICT/DOA	24	Normal re-expansion	0
16-20 days before ICT/DOA	8	Delayed re-expansion	20
21-25 days before ICT/DOA	12	Partial re-expansion	28
26-30 days before ICT/DOA	7	Organized	28
31-35 days before ICT/DOA	5	Refer for decortication	45
36-40 days before ICT/DOA	3	BPF-developed	70
41-45 days before ICT/DOA	2	Expired after ICT	100
More than 45 days			100

ICT: Intercostal tube

Table 9: Role of and antibiotic as mainstay of empyema thoracis¹¹

Drainage procedure	50 cases	Percentage	Present study for 100 cases
Drainage+antibiotics	16	32	51
Drainage+antibiotics+ pleural toilet	5	10	22
Pleural aspiration+antibiotics	1	2	2
+ATT	22	44	4
+ART	0	0	5
+ATT+ART+Pleural toilet	0	0	11
Referred for decortication	6	12	2

Table 10: Role of treatment in decreasing the mortality and morbidity¹²

Mortality at by Asif Nadeem and Bilal Peshawar study	Morbidity at Peshawar study	Present study-mortality	Present study morbidity
7.60%	13.30%	10%	17%

available. Our current study is compared with several other studies (Tables 9 and 10).

CONCLUSIONS

Empyema thoracis is difficult to manage but still presents as a challenge at referral tertiary care hospitals. Co-morbid factors such as diabetes and immunosuppressive retroviral diseases may be implicated as the etiological reasons for the resurgence of empyema in the present era of new and effective antibiotics. High index of suspicion with careful monitoring and pleural fluid aspiration of non-responding pneumonia and pleural effusion cases helps to identify cases of pyothorax at the earliest possible time. Culture sensitivity based antibiotics and repeat culture tests will offer the best antibiotic choice. ICT Drainage with underwater seal is the best and most effective method of management for its simplicity and specificity. Major procedures of rib resections and open thoracotomies have been reduced due to minimally invasive thoracoscopic approach with improved rates in morbidity and mortality.

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Comparative Study of Survival of Short Length Implants with that of Long Length Dental Implants

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Abstract

Background: The common problem in oral implantology is a lack of sufficient bone height to harbor an implant that can meet functional and esthetic demands successfully over a long period of time. The possibility of using short implants in clinical practice could be considered as an alternative to avoid lengthy surgical procedures.

Purpose: The purpose was to evaluate and compare the survival of short length dental implants with that of long length dental implants.

Materials and Methods: A total of 5 patients were consecutively enrolled in this study and treated with implant-supported fixed restorations. 20 titanium screw type-2 staged Alpha Biocare implants-Alpha Tec Dual Implants system with 10 long and 10 short length dental implants were placed in these patients in similar bone conditions.

The follow-up period of 1 year was taken for observation. Statistical analysis using Mann-Whitney's test and Chi-square test was performed for evaluating five parameters of dental implant survival namely pain, probing depth, stability, radiographic crestal bone loss, and peri-implant bone loss.

Results: Survival based on the stability of implants was evaluated by a non-invasive device based on the principle of resonance frequency assessment using Osstell. All short length and long length implants were equally stable with the stability above 55 N. One-year survival rates were similar for long and short sized dental implants. Implant length did not influence the survival.

Conclusion: Short length dental implants represent a reliable treatment option in cases with limited bone height.

Key words: Implant stability, Implant survival, Long length dental implants, Short length dental implants

INTRODUCTION

High clinical success rate of endosseous implants in the treatment of different forms of edentulism has been well-documented. Several studies have clearly demonstrated the efficacy of implants in the replacement of missing teeth.¹⁻⁴

Available bone height is often the determining factor for implant placement. The posterior regions of the jaws

usually have the least height of existing bone. In maxilla, maxillary sinus and in the mandible, the mandibular canal is ≥ 10 mm above the inferior border of the mandibular body limits the available height of bone for long length implant placement. In such cases, use of short dental implants, 6-8 mm in length, instead of the standard range of 10-16 mm, by simplifying the treatment and shortening the treatment time.⁵

From a biomechanical point of view, the rationale for the use of short implants is well-documented.⁶ Therefore, this study is undertaken to evaluate the clinical survival rate and use of short length dental implants compared to the long length dental implants in patients with similar bone conditions, using five parameters of the survival of dental implants namely pain, probing depth, radiographic crestal bone loss, and peri-implant bone loss.

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MATERIALS AND METHODS

A total of 20 titanium screw-type 2 staged Alpha Biocare implants-Alpha Tec Dual Implants (ATID) system were placed in a total of 5 patients consecutively enrolled in this prospective study and treated with Implant supported fixed restorations. Prior to the commencement of implant surgery, detailed medical history of the patients was carefully recorded. The patients were apprised about the potential risks and benefits, and an informed consent was obtained on the prescribed format. The follow-up period was till 1 year after the crown prosthesis loading.

Sample Collection

Inclusion criteria

1. Patient must have healthy, well-maintained oral hygiene, stable remaining dentition, and supporting tissues.
2. Patient within the age group 18-60 years of age.
3. Posterior maxillary and mandibular partially edentulous arches where the patient is willing to get implants placed.
4. Placement of the implant in patients with minimal 8-12 months of post extraction period.
5. Patient with an available alveolar bone height of 7 mm or more.
6. Adequate patient's availability to meet the follow-up schedule.

Exclusion criteria

Local factors:

1. Insufficient inter-arch distance.
2. Unfavorable implant - axis orientation.
3. Intraoral draining sinus at proposed site of implant placement.
4. Perforation and/or loss of labial bony plate following tooth removal.
5. Patients with any mucosal disease e.g. lichen planus, etc.
6. Patients with periodontal disease.
7. Patients with temporomandibular joint disorders.

Systemic factors:

1. History of any medical concern like uncontrolled diabetes, blood dyscrasias, severe renal or liver disease, severe osteoporosis, and immunocompromised patient.
2. Patient with a psychiatric disorder.
3. History of chemotherapy and/or head and neck radiation therapy.
4. Smoking habit and/or history of drug or alcohol abuse.
5. Patients with para-functional habits.

The study consists of two groups: Group A and Group B
Group A: Includes 10 implants of length 6-8 mm.

Group B: Includes 10 implants of length 10-16 mm.

These groups were evaluated with 5 set parameters and their survival rates were compared.

Implant Protocol

After a through medical history, radiographs (intra oral peri apical/orthopantomogram/cone beam computed tomography [CBCT]) were taken 2 days prior to implant placement and the ideal receptor site was identified (Figure 1).

Pre-operative and Post-operative Guidelines

1. All patients were advised scaling 3-4 days prior to surgery.
2. Mouthwash containing chlorhexidine gluconate 0.2%, Na fluoride 0.05%, ZnCl₂ 0.09% was started 3 days prior to surgery and 3-4 times per day for 2 weeks.
3. Antibiotic containing 500 mg of amoxicillin and 125 mg of potassium clavulanate was prescribed one night before the surgery, then 1-h prior to surgery and daily for 5 days post-operatively.
4. Anti-inflammatory medication containing diclofenac sodium 50 mg, paracetamol 500 mg, serratiopeptidase 15 mg was prescribed one night before the surgery, then 1 h prior to surgery and daily for 5 days post-operatively.
5. Antacid medication omeprazole 20 mg was prescribed one night before the surgery, then 1 h prior to surgery and daily for 5 days post-operatively.
6. Patients were instructed to apply ice pack at the operated site (10 min on - 20 min off) for 3-4 h.
7. Soft and cold diet for first 2 days.
8. Patients were discouraged from spitting and rinsing for first 24 h.
9. Patients were recalled after 7 days for suture removal.

Surgical Protocol

Patients were shifted to the minor operation theater and seated comfortably on the dental chair. Site of operation

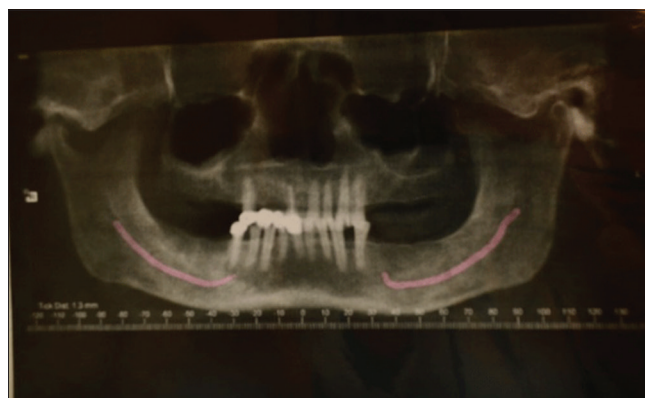


Figure 1: Cone-beam computed tomography before implant placement in posterior maxillary and mandibular region

was scrubbed with 5% povidone iodine solution. Proper draping of the patient was done, exposing the area to be operated strictly adhering to the aseptic protocol. Physiodispenser, autoclaved instruments and implant kit was arranged on the working table.

Local anesthesia was achieved in the required area using 2% lidocaine with 1:80,000 epinephrine injection solutions.

Surgery was planned using two-staged procedure. The insertion of implants followed standard procedure.

Mid crestal incision was made with 15 no. surgical blade with Bard Parker handle and full thickness mucoperiosteal flap was elevated. The implant site was prepared using a reduction handpiece with irrigation and ditch by a round bur was made marking the position of the implant before starting the implant bed shaping, followed by 2.0 mm pilot drills also called the twist drill, to reach the desired depth. Drilling in bone tissue was performed under constant and profuse irrigation with cold sterile saline. The drilling sequence was done to achieve maximum implant insertion torque. The cortical bone and cancellous bone of the implant sites were enlarged with 2.8/3.75/4.2 step drills to avoid over compression of bone. 10 long implants placed were 4.2 mm in width and 13 mm in length and 10 short implants placed were of 5 mm in width and 8 mm/6 mm in length. One implant system was used, i.e., Alpha Biocare-ATID implant system was used in present study. Implants inserted were hollow cylindrical implants. The drill speed was kept low (700-1000 rpm) to avoid overheating and necrosis of alveolar bone.⁷ The correct drill depth, the long axis of prepared osteotomy and parallelism was checked with a depth gauge and paralleling pin which has markings corresponding to the implant lengths available. Manual placement of implants into their final position in implant bed was done with the ratchet. All implants were inserted with insertion torque in the range of 32-50 N cm. Implants were not forced into the socket with excessive force as that could have led to micro cracks in surface bone resulting in improper osseointegration. Cover screws were then placed and tightened with hex screwdriver (Figure 2). Flaps were re-adapted and sutured back into position with 3-0 Vicryl ETHILON™ Nylon Suture - A non-absorbable, sterile, surgical, and monofilament suture. All sutures were removed after 7 days of placement. Post-operative instructions included ice packs, soft high nutrients diet, post-operative medications, and through rinsing with mouthwash was advised.

A second stage surgical procedure was performed 3-6 months after the first procedure precisely after 18 weeks in all patients, and all 5 evaluation parameters were assessed. An incision was made at the crestal level to remove the

cover screw and to place the healing collar with the help of hex driver. The healing collar was then removed 2 weeks later i.e., after 20 weeks and again 5 evaluation parameters were assessed. After 2 weeks of healing i.e., after 20th week, abutment implants were restored with a crown prosthesis (Figure 3). The impression made with a closed mouth technique using implant analog and transfer coping and the final crown prosthesis was loaded (Figure 4).



Figure 2: Cover screws after implant placement



Figure 3: Abutments placed in lower jaw



Figure 4: Final prosthesis of right upper and lower posterior jaw

The follow-up period was 1-year after implant placement with recall visits every 3 months for 1-year.

Methods of Evaluation

Patients were evaluated clinically at each planned visit from the time of implant placement (18 weeks, 20 weeks and 72 weeks) and radiologically 5 parameters described by Buser *et al.* 1990⁸ pain, implant stability, probing depth, radiographic crestal bone loss, and peri-implant bone loss (at the time of implant placement, 18 weeks, 20 weeks, and 72 weeks). Implants were examined for survival based on the health scale for dental implants by International Congress of Oral Implantologists (ICOI), Pisa, Italy, Consensus Conference, 2007. Based on this health scale, each implant was classified as “satisfactory survival,” “Compromised survival” or “failure.”

Various time intervals at which periapical radiography, panoramic radiography, and/or CBCT were taken:

- Prior to treatment.
- Post implants insertion (Figure 5).
- Post placing the gingival former/healing collar (18 weeks).
- Post final prosthesis placement (20 weeks).
- Post 1 year of final prosthesis loading (72 weeks) (Figure 6).

Pain was recorded on a scale of 1-10 based on visual analog scale.

Probing depth was recorded with a periodontal probe, from the crest of gingival margin to the base of the peri-implant sulcus at mesial, distal, facial and lingual surfaces using a periodontal probe, with measurement of 0.5 mm ball tip and millimeter markings and their average reading was noted.

Device Osstell implant stability quotient (ISQ) was used to evaluate the stability of implants (Figure 7). A total of 6 readings were taken at each recall visit; two in bucco-lingual direction, two in mesio-distal, and two in an apical direction. The average of the six readings was considered. ISQ value of above 55 in two consecutive sessions was considered to be a favorable sign for loading.

Radiographic crestal bone loss was measured radiographically by a standardized 1mm grid to the intra oral peri apical film. Crestal bone loss was measured by counting the millimeter squares on the X-ray, thus eliminating errors arising from image elongation or shortening.

Peri-implant bone loss was evaluated on the standardized intra oral periapical radiographs using intra oral long cone paralleling technique.

RESULTS

In our study, of the 5 patients, 2 were males (40%), and 3 were females (60%). The mean age of the sample group was 47 years with a range of 20-60 years. 60% of the subjects were between the ages of 51 and 60 years.

A total of 10 implants were placed in the maxilla including 5 short and 5 long while 10 implants in the mandible- 5



Figure 5: Orthopantomogram after immediate implant placement



Figure 6: Orthopantomogram after 1 year of implant loading



Figure 7: Osstell reading at the time of healing screw placement 18th week (evaluation of stability)

short and 5 long. Most common size (diameter \times length) of implant fixture in short implants was 5 mm \times 8 mm and in long implants 4.2 mm \times 13 mm. Implant sizes were chosen depending on the dimensions of the tooth and the bone available.

The short- and long-sized implants were compared in 2 Groups as Group A and Group B respectively. Mann-Whitney's test was applied in the statistical analysis for data of all parameters except for the peri-implant bone loss for which Chi-square test was used.

Statistical Analysis

Considering these values as constant i.e.,

Null hypothesis: There is no significant difference in the score recorded between the two implants i.e. $\eta_1 = \eta_2$

Alternate hypothesis: There is a significant difference in the score recorded between two implants i.e. $\eta_1 \neq \eta_2$

Level of significance: $\alpha = 0.05$

Decision criterion: We compared the P value with the level of significance. If $P < 0.05$, we reject the null hypothesis and accept the alternate hypothesis. If $P \geq 0.05$, we accept the null hypothesis.

Computations: Tables 1-5 give us the various computations and the P value.

Graph 1-5 represents a mean evaluation of five parameters at various time intervals.

Tables 1-5 show no significant difference was observed between Group A and Group B with respect to the score of all five parameters at any of the time intervals ($P > 0.05$).

According to the criteria of success by Buser *et al.*, all implants in both Group A and B qualified as "successfully integrated" except one long implant, this was marked as "Early failure" during the healing period.

Implants were examined for survival based on the health scale for dental implants by ICOI, Pisa, Italy, Consensus Conference, 2007. Based on this health scale, each implant was classified as "satisfactory survival," "Compromised survival" or "failure (Table 6)."

In Group A, all ten implants qualified as "satisfactory survival." In Group B, 9 implants were classified as "satisfactory survival" and only one as "failure."

According to the above-mentioned criteria for implant survival, an overall survival rate of 95% was observed. The

survival rate for short sized implants was 100% whereas that of long implants was 90% (Graph 6).

DISCUSSION

The common problem in oral implantology is a lack of sufficient bone height to harbor an implant that can meet functional and esthetic demands successfully over a long

Table 1: Comparison of probing depth-MD between the implants at different time intervals

Time interval	Implant	n	Mean	SD	SEM	Mean difference	Z	P value
18 weeks	Short	10	0.00	0.00	0.00	0.000	0.000	1.000
	Long	10	0.00	0.00	0.00			
20 weeks	Short	10	0.30	0.48	0.15	-0.300	-0.922	0.357
	Long	10	0.60	1.90	0.60			
72 weeks	Short	10	0.00	0.00	0.00	0.000	0.000	1.000
	Long	9	0.00	0.00	0.00			

MD: Mesio-distal, SD: Standard deviation, SEM: Standard error of the mean

Table 2a: Comparison of probing depth-MD between the implants at different time intervals

Time interval	Implant	n	Mean	SD	SEM	Mean difference	Z	P value
18 weeks	Short	10	0.15	0.24	0.08	-0.350	-0.141	0.888
	Long	10	0.50	1.25	0.39			
20 weeks	Short	10	0.25	0.35	0.11	0.028	0.000	1.000
	Long	9	0.22	0.26	0.09			
72 weeks	Short	10	0.45	0.37	0.12	0.006	-0.044	0.965
	Long	9	0.44	0.39	0.13			

MD: Mesio-distal, SD: Standard deviation, SEM: Standard error of the mean

Table 2b: Comparison of probing depth-BL between the implants at different time intervals

Time interval	Implant	n	Mean	SD	SEM	Mean difference	Z	P value
18 weeks	Short	10	0.20	0.26	0.08	-0.250	-0.271	0.786
	Long	10	0.45	1.09	0.35			
20 weeks	Short	10	0.30	0.26	0.08	0.189	-1.621	0.105
	Long	9	0.11	0.22	0.07			
72 weeks	Short	10	0.35	0.24	0.08	0.017	-0.281	0.778
	Long	9	0.33	0.35	0.12			

BL: Bucco-lingual, SD: Standard deviation, SEM: Standard error of the mean

Table 3: Comparison of stability score between the implants at different time intervals

Time interval	Implant	n	Mean	SD	SEM	Mean difference	Z	P value
At implant placement	Short	10	74.80	2.25	0.71	-0.500	-0.838	0.402
	Long	10	75.30	5.19	1.64			
18 weeks	Short	10	75.30	3.20	1.01	3.600	-0.038	0.970
	Long	10	71.70	11.26	3.56			
20 weeks	Short	10	75.60	4.09	1.29	-0.622	-0.741	0.459
	Long	9	76.22	4.99	1.66			

SD: Standard deviation, SEM: Standard error of the mean

Table 4: Comparison of radiographic crestal bone loss between the implants at different time intervals

Time interval	Implant	n	Mean	SD	SEM	Mean difference	Z	P value
18 weeks	Short	10	0.20	0.26	0.08	-0.200	-0.764	0.445
	Long	10	0.40	0.52	0.16			
20 weeks	Short	10	0.30	0.35	0.11	-0.089	-0.631	0.528
	Long	9	0.39	0.33	0.11			
72 weeks	Short	10	0.55	0.55	0.17	-0.172	-0.727	0.467
	Long	9	0.72	0.51	0.17			

SD: Standard deviation, SEM: Standard error of the mean

Table 5: Association between peri-implant bone loss and the implant type at different time intervals: (Chi-square test)

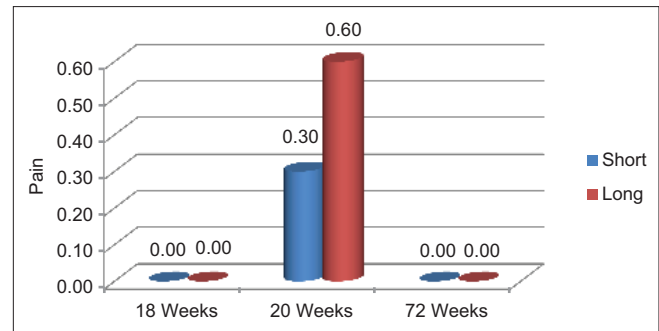
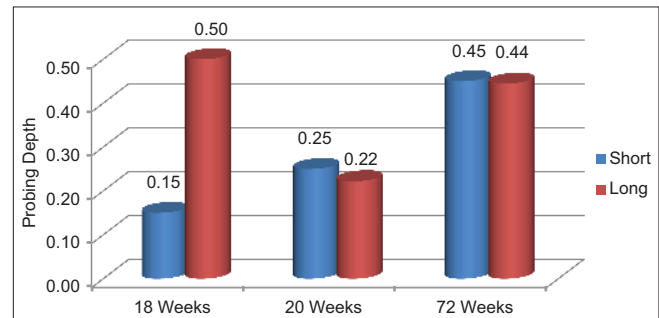
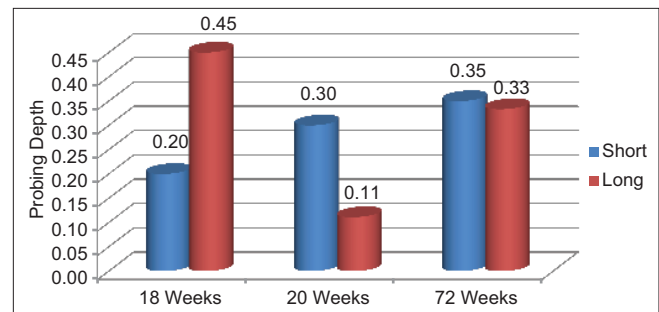
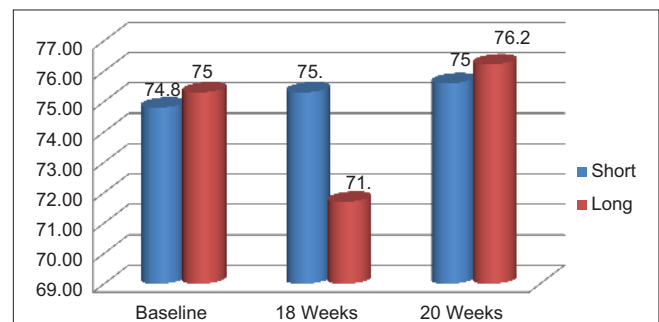
Time interval	Bone loss	Short		Long		χ^2	P value
		n	%	n	%		
Implant placement	Absent	10	100	10	100	-	-
	Present	0	0	0	0		
18 weeks	Absent	10	100	9	90	1.053	0.305
	Present	0	0	1	10		
20 weeks	Absent	10	100	9	100	-	-
	Present	0	0	0	0		
72 weeks	Absent	10	100	9	100	-	-
	Present	0	0	0	0		

Table 6: Health scale for dental implants

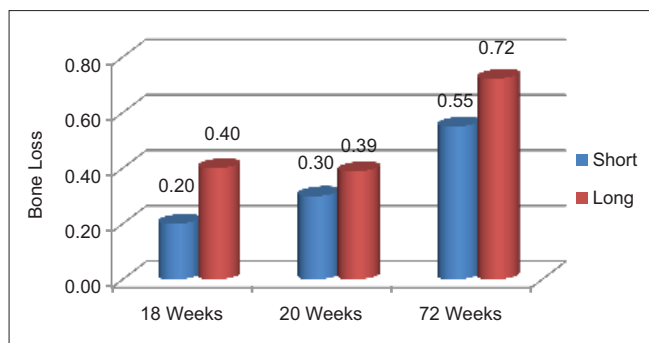
Implant quality scale group	Clinical conditions
Satisfactory survival	a. No pain on function b. 0 mobility c. 2-4 mm radiographic bone loss d. No exudates history
Compromised survival	a. May have sensitivity on function b. No mobility c. Radiographic bone loss 4 mm (less than 1/2 of implant body) d. Probing depth 7 mm e. May have exudates history
Failure (clinical or absolute failure)	Any of following: a. Pain on function b. Mobility c. Radiographic bone loss 1/2 length of implant d. Uncontrolled exudate e. No longer in mouth

period of time. The possibility of using short implants in clinical practice could be considered as an alternative to avoid surgical procedure such as bone grafts, sinus lift, inferior alveolar nerve repositioning, and their related disadvantages.

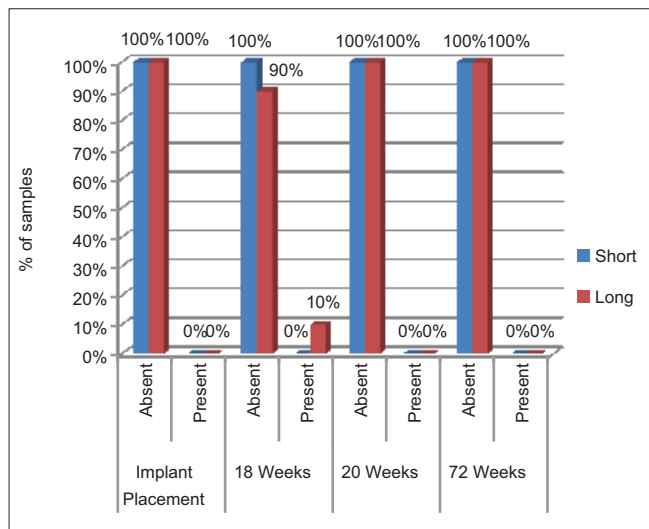
The present study evaluates the survival of short implants used predominantly in the treatment of posterior partial edentulism compared to that of the long implants.

**Graph 1: Mean pain recorded at different time intervals****Graph 2a: Mean probing depth-(mesio-distal) at different time intervals****Graph 2b: Mean probing depth-bucco-lingual at different time intervals****Graph 3: Mean stability at different time intervals**

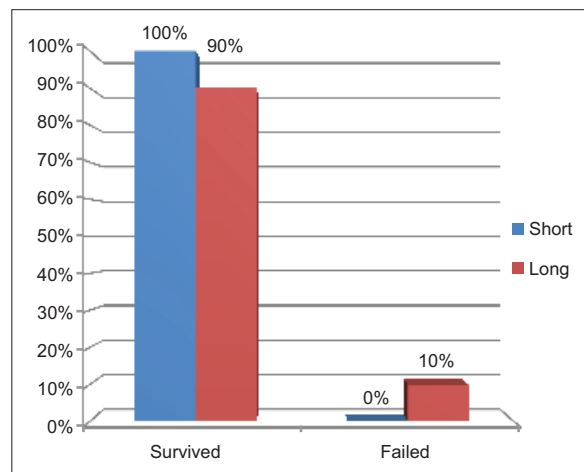
In the present study, both long and short implants were placed in similar bone quality and quantity, and their comparison was done. Uniformity was maintained when selecting the length and width of the long and short



Graph 4: Mean crestal bone loss at different time intervals



Graph 5: Peri-implant bone loss at different intervals



Graph 6: Survival rate of short and long implants

implants to be placed. All 10 implants used in the long category were of the same width and length (4.2×13) and similarly in short category all 10 short implants were of similar width and length (5×8) and (5×6).

All implants were placed in healed sockets (at least more than 8-12 months old extractions) of the posterior region of maxilla or mandible.

The failure of the long sized implant occurred in the mandibular region and was attributed to thermally induced bone necrosis after implant drilling i.e. overheating of the bone because of long drilling time and inadequate irrigation deep inside the bone with external irrigation used with the handpiece while drilling during Stage I surgery, in the present study.

Thermally induced bone necrosis during implant surgery is a contributing factor to implant failure. The frictional heat generated at the time of surgery causes a certain degree of necrosis of the surrounding differentiated and undifferentiated cells. The bone necrosis mostly occurs in the mandible, leading to a soft tissue lesion, pain, and peri-implant bone loss after surgery.¹⁰

Pain should not be associated with implant after healing. Once the implant has achieved primary healing, the absence of pain under vertical or horizontal forces is a primary subjective criterion. After healing, if the pain is present, it is more often due to an improper fitting prosthetic component or pressure on soft tissue from the prosthesis. Percussion and forces up to 500 g (1.2 psi) may be used clinically to evaluate implant pain or discomfort. Usually, pain from the implant body does not occur unless the implant is mobile and surrounded by inflamed tissue or has rigid fixation but impinges on a nerve.

Pain during function from an implant body is a subjective criterion that places the implant in the failure category. Sensitivity from an implant during function may place the implant in the survival criteria, and may warrant some clinical treatment according to Misch.

In our study, the mean pain score in Group A and B was higher at the time of loading final prosthesis i.e. at 20th week. In Group A, mild pain was recorded in 3 implant sites at 20th week due to loading of the final crown prosthesis as the crowns were pushing on the soft tissues. In Group B, the implant failed, and final loading of the crown prosthesis was not initiated. The pain was relieved by bite correction in 20-30 min.

Probing depths around the teeth are an excellent proven means to assess the past and present health of natural teeth, but probing depths around implants may be of little diagnostic value, unless accompanied by signs e.g., radiographic radiolucency, purulent exudate, bleeding, and/or symptoms of discomfort and pain. Increasing probing depths over time may indicate bone loss but not necessarily indicate disease for an endosteal implant. Stable, rigid, fixated implants have been reported with pocket depths ranging from 2 to 6 mm. Lekholm *et al.*¹¹ found that the presence of deep pocket was not associated with bone loss. The “correct pressure” for probing has not been

defined for implants, but may be less important than with teeth, because there is no connective tissue attachment zone next to the implant. The potential for damage to the fragile attachment or marring of the implant surface may exist during probing.¹²

Sulcus depths greater than 5-6 mm around the implants have a greater incidence of anaerobic bacteria and in the presence of inflammation or exudate may require intervention (e.g. surgery, antibiotic regimens).¹³ Probing not only measures pocket depth but also reveals tissue consistency, bleeding and presence of exudate.¹⁴ As such, in the ICOI Pisa Consensus Criteria, probing depths are not assessed in the success or satisfactory health conditions of the implants, but are included in the compromised survival condition of the implants. In Group A, the mean probing depth mesiodistally and buccolingually was 0.15 mm, 0.25 mm, and 0.45 mm and 0.20 mm, 0.30 mm, and 0.35 mm, respectively, which shows increase in mean probing depth with time. In Group B, the mean probing depth was 0.50 mm, 0.22 mm, and 0.44 mm.

This study shows no mobility occurred in Group A at any time interval and in Group B, mobility was present at one implant site at 20th week. The mobility was due to lack of osseointegration between the implant and the bone. The respective implant was classified as failed based on that.

Primary stability at the time of implant placement has been recognized as an important prerequisite for the achievement of osseointegration. The establishment and maintenance of direct contact at the bone-implant interface are requirements for long-term implant success. Implant mobility is an indication of lack of osseointegration. Even if the peri-implant disease has progressed relatively far, implant may still appear immobile because of residual direct bone-to-implant contact. Several investigators have shown that the ISQ value of a stable osseointegrated implant increases with time, suggesting an increase in the bone-implant contact area.¹⁵

Several factors, such as implant geometry, preparation technique, quality and quantity of local bone influence primary stability, and primary implant stability is one of the main factors influencing implant survival rates (Friberg *et al.*, 1991; Meredith, 1998, Turkeyilmaz and McGlumphy, 2008). In our study, the stability readings in each implant were above acceptable stability range of 55 ISQ. Mean stability was evaluated using Osstell (resonance frequency device). In Group A, the mean stability evaluated at the time of implant insertion, 18th week i.e., at the time of placing healing collar, 20th week at the time of final loading of prosthesis and 72nd week i.e., 1 year post-operative from

the time of loading of implant, was 74.80, 75.30, and 75.60. In Group B, the mean stability was 75.30, 71.70, and 76.22.

This study shows no mobility occurred in Group A at any time interval and in Group B, mobility was present at 1 implant site at 20th week. The mobility was due to lack of osseointegration between the implant and the bone. The respective implant was classified as failed based on that.

On comparing survived implants, no significant difference was observed between the 2 Groups with respect to the stability score at any of the time interval.

The marginal bone around the implant crestal region is usually a significant indicator of implant health. The level of the crestal bone may be measured from the crestal position of the implant at the initial implant surgery. The most common method (in the literature) to assess bone loss after healing is by radiographic evaluation. Conventional radiographies only monitor the mesial or distal aspect of bone loss around the implant body. Several studies report yearly radiographic marginal bone loss after the first year of function in the range of 0-0.2 mm.^{11,16,17}

Each implant should be monitored as an independent unit when assessing bone loss for a clinical evaluation of success, survival, or failure. The bone loss measurement should be related to the original marginal bone level at implant insertion. Although this only determines the mesial and distal bone loss, it is a time-tested method.

In our study, the mean radiographic crestal bone loss was evaluated using intraoral periapical radiographs with standardized 1 mm × 1 mm grid graph. In Group A the mean value evaluated at 18th week i.e. at the time of placing healing collar, 20th week at the time of final loading of prosthesis and 72nd week i.e. 1 year post-operative from the time of loading of implant, was 0.20, 0.30, and 0.55. In Group B, the mean value evaluated was 0.40, 0.39, and 0.72. In Group B, the one implant that failed showed significant increase in radiographic crestal bone loss at the time of placing healing screw and the implant was removed after the final crown prosthesis loading i.e. after 20th week. On comparison study showed no significant difference was observed between the 2 groups with respect to the radiographic crestal bone loss at any of the time intervals.

Peri-implant bone loss was evaluated on intraoral periapical radiographs at 18th, 20th, and 72nd week. Peri- implant radiolucency is a sign of failure of the implant. Group A did not show any peri-implant radiolucency while in Group B patients, there was evidence of peri-implant radiolucency. On comparison, no significant difference was observed between 2 groups.

CONCLUSION

The results of this study confirmed that short implants (Group B - 6-8 mm in length) can produce clinical results comparable to those achieved with longer implants. The short implants used in this study would appear to be successful if the accurate surgical procedures are employed. Despite the limited number of cases, these preliminary results demonstrate the predictability and safety of such implants when used with careful treatment planning and an appropriate clinical protocol. The possibility of using short implants in clinical practice should be considered as an alternative to avoid surgical procedure such as bone grafts, sinus lift, inferior alveolar nerve repositioning or the like, and their related disadvantages. The information obtained from this study might help clinicians improve their decision-making with the aim of enhancing implant success, and it might provide them with suggestions regarding operative possibilities.

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Morbidity Pattern among School going Children in Urban Area of Dehradun

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Abstract

Introduction: Children are not only divine gifts but also the mirror of a nation and hope of the world. They are the country's biggest human investment for development. It is rather unfortunate that even after 67 years of independence.

Aims and Objectives: (1) To find out common health problems assess personal hygiene status among school going children in urban area of Dehradun, (2) to find out the morbidity pattern and prevalence of common diseases in school going children.

Materials and Methods: Selection of population: The school children in age group of 6-18 years from both the sexes were screened from SGRR schools of different locations at Dehradun, after taking approval from principal and the parents. Each child was given a reference number and a questioner performa was given on prior day to the class teacher to fill it by parents and teachers them self. Next day the enrolled students were examined in the outpatient department by a specialist and complete the performa.

Results: In the present study of 1271 children, 59.5% were boys and 40.5% were girls. It was observed that children of age group 11-14 years were maximum in both the sexes that is 748 (58.9%). Among various disease patterns in present study, the most prevalent disease was dental caries 24.86% followed by fluorosis 13.06% and pallor 12.67%. All diseases were more prevalent in boys than girls ($P < 0.01$) except pallor, which was more prevalent among girls but was not statistically significant ($P > 0.05$). In the present study, poor oral hygiene is a significant health problem in school going children.

Conclusion: Health is a key factor in school entry provided that the defect or disease is detected and remedied early by a well-organized school health program.

Key words: Morbidity, School children, Urban area

INTRODUCTION

Children are not only divine gifts, but also the mirror of a nation and hope of the world. They are the country's biggest human investment for development. It is rather unfortunate that even after 67 years of independence, our country had made a little progress in improving the health condition of our school children when compared to the developed countries. Quality of life of school children, by

all standards continues to be poor more so in rural areas and urban slums.¹

The present position with regard to the health and nutritional status of the children in our country is very unsatisfactory. Mortality in this age bracket is low, but morbidity and physical defects constitute heavy burden. Extensive surveys have been carried out in different parts of the country and the findings show that sickness, morbidity and mortality rates in India are among the highest in the world.² Health problems of school children vary from one place to another. Surveys carried out indicate that the main emphasis will fall in malnutrition, infectious diseases, intestinal parasites, diseases of skin, eye and ear and dental caries.³ These health problems can make learning difficult and may seriously hamper the educational process and the child's intellectual growth and may also handicap

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the child for life. Keeping all these facts in view, a need was felt to carry out a survey of the health status of school children in various urban areas of Dehradun city with the following objectives - Children in the school-going age group (6-18 years) represent 25% of the population in the developing countries.⁴

Aims and Objectives

1. To find out common health problems assess personal hygiene status among school going children in urban area of Dehradun
2. To find out the morbidity pattern and prevalence of common diseases in school going children.

MATERIALS AND METHODS

Selection of Population

The school children in age group of 6-18 years from both the sexes were screened from SGRR schools of different locations at Dehradun, after taking approval from principal and the parents.

Each child was given a reference number and a questioner Performa was given on prior day to the class teacher to fill it by parents and teachers them self. Next day the enrolled students were examined in outpatient department by a specialist and complete the performa. Simple percentage was calculated. Chi-square statistical test was performed.

RESULTS

The study includes total 1271 children, out of which 757 (59.5%) were boys and 514 (40.5%) were girls. It was observed that children of age group 11-14 years were maximum in both the sexes that is 748 (58.9%) (Table 1 and Figure 1).

Among various disease pattern in present study the most prevalent disease was dental caries 316 (24.86%) followed by fluorosis 166 (13.06%) and pallor 161 (12.67%) (Table 2 and Figure 2).

It was observed that all disease were more prevalent in boys than girls ($P < 0.01$) except pallor which was more prevalent among girls but was not statistically significant ($P > 0.05$) (Table 3 and Figure 3).

DISCUSSION

In present study, males were 59.5% as compared to females 40.5%. As per age distribution, number was

Table 1: Age and sex wise distribution of children

Age	Boys (%)	Girls (%)	Total (%)
7-10 year	181 (23.9)	157 (30.5)	338 (26.6)
11-14 year	464 (61.3)	284 (55.3)	748 (58.9)
15-18 year	112 (14.8)	73 (14.2)	185 (14.5)
Total	757 (59.5)	514 (40.5)	1271

Table 2: Prevalence of various diseases

Disease	Number	Percentage
Pallor	161	12.67
L.N	64	5.04
Bitot spot	62	4.88
Worm infection	67	5.27
Scabies skin infection	83	6.53
Ear discharge	71	5.59
Fluorosis	166	13.06
Carries	316	24.86

Table 3: Sex-wise distribution of disease

Disease	Male (%)		Female (%)		Total
	Yes	No	Yes	No	
Pallor	93 (12.3)	664 (87.7)	68 (13.12)	446 (86.88)	$P > 0.05$
L.N	51 (6.6)	706 (93.4)	13 (2.5)	501 (97.5)	$P < 0.01$
Bitot's spot	49 (6.5)	708 (93.5)	13 (2.5)	501 (97.5)	$P < 0.01$
Worm infection	54 (7.1)	703 (92.9)	13 (2.5)	501 (97.5)	$P < 0.01$
Scabies and skin infection	64 (8.5)	693 (91.5)	19 (3.7)	495 (96.3)	$P < 0.01$
Ear discharge	55 (7.3)	702 (92.7)	16 (3.1)	498 (96.9)	$P < 0.01$
Fluorosis	115 (15.2)	642 (84.8)	51 (8.9)	463 (91.1)	$P < 0.01$
Carries	218 (28.8)	539 (71.2)	98 (19.05)	416 (80.95)	$P < 0.01$
Total	757		514		1271

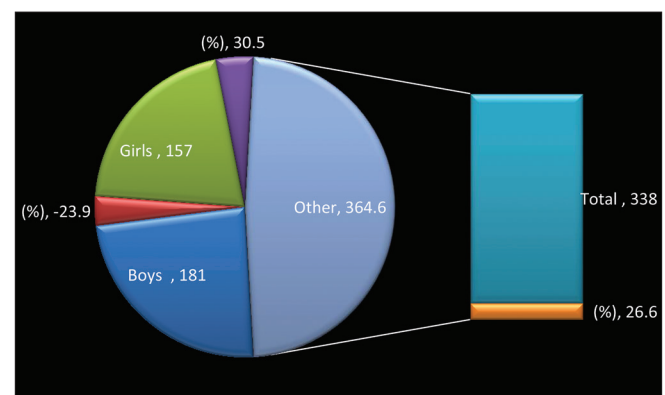


Figure 1: Age and sex wise distribution of children (pie-diagram)

highest in 11-14 years age group irrespective of sex. In a study of Dambhare *et al.*,¹ 68.97% were boys and 31.03% were girls.

When seen the distribution of various diseases it is seen that dental carries is most common 24.86%, followed by fluorosis 13.06%, pallor 12.67%, skin infection 6.53% ear

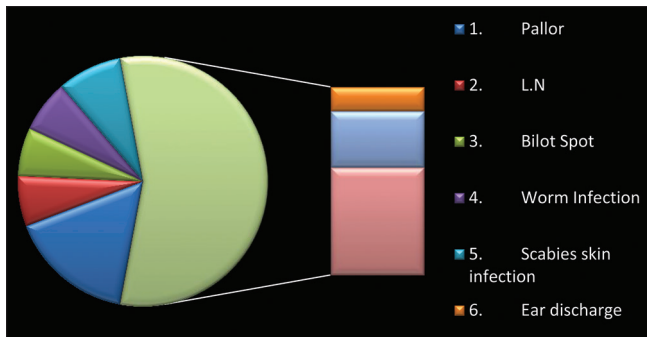


Figure 2: Prevalence of various diseases (pie-diagram)

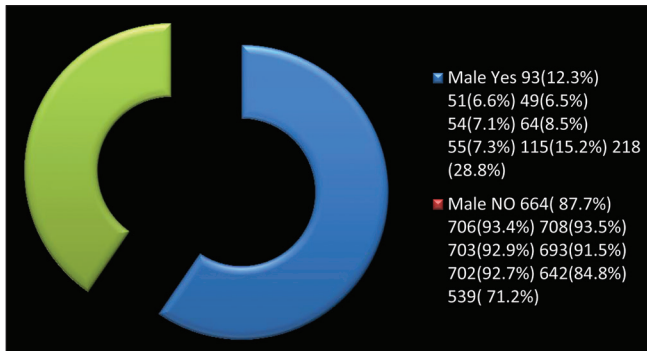


Figure 3: Sex-wise distribution of disease (Doughnut appearance)

discharge 5.59%, worm infestation 5.27%, lymphadenopathy 5.04%, bitot spots 4.88%, and over all morbidity is 77.9%.

The study done by Saluja *et al.*² found 67.8% morbidity in children while in the present study morbidity came out to be 77.9%. In this study, the lymph node enlargement was found in 8.3%, ear related ailments 11.4% disease of oral cavity 44.7% and skin infection 14.3%. The results were lower In present study in which lymph nodes enlargement were found in 5.04%, ear discharge in 7.1% and two disease of oral cavity together (fluorosis and caries) contributed 37.92% and skin infection 6.53%.

In a study done by Dambhare *et al.*¹ 35.34% adolescents had dental carries and 28.45% adolescents were found to be suffering from anemia.

In a study done by Chauhan and Trivedi³ at Ahmedabad on vitamin A deficiency 2.1% cases of bitot spots were found. In another study at west Bengal by Arlappa *et al.*,⁴ 0.6% prevalence of bitot spots was seen among children. Pediculosis was reported 6.5% in a study done by Tulsyan *et al.*⁵ in a school survey of dermatological disorders in Lucknow.

When sex-wise distribution of various ailments were seen carries was 28.8% in male and 19.05% among females, uniformly high in both sexes.

Among males fluorosis 15.2%, pallor 12.3%, skin infection 8.5%, ear discharge 7.3%, worm infestation 7.1%, lymph node enlargement 6.6%; bitot spots 6.5%. Among female children after carries the pallor was 13.12%, fluorosis 8.9%, skin infection 3.7%, ear discharge 3.1% lymph node enlargement, bitot spots, and worm infestation are 2.5% each.

In a study conducted by Singh *et al.*,⁶ scabies was seen more in males $N = 40/285$ as compared to females. $N = 23/276$, in present study it was again more in males 8.5% and less in females 3.7%, similarly carries were.

In a study done by Saluja *et al.*² pediculosis was more in females 75/1000 and in males 40/1000. Nutritional anemia was higher in females 113/1000 and males 81/100. Dental carries 100/1000 in males and 77/1000 in females lymph nodes enlargement in 23/1000 males and 22/1000 females.

In a study done by Brahman *et al.*,⁷ 16.7% boy had dental carries and 18.29% girls. Worm infestation was 1.83% in boys and 2.51% in girls. Scabies 3.61% in males and 0.71% in females, otitis media 3.77% boys and 3.98% females, anemia in 6.23% boys, and 10.21% in females.

In a study done by Dambhare *et al.*¹ overall 28.45% of school going adolescents had anemia with girls suffering significantly more 38.89% as compared to boys 23.75%. 35.34% adolescents had dental carries.

CONCLUSION

Health is a key factor in school entry, as well as continued participation and attainment in school. Most of the defects and diseases that are seen among the school children are preventable and the health of the child can be preserved and improved, provided that the defect or disease is detected and remedied early by a well-organized school health program and also helps to state and local health authorities to lay down policy for the benefit of children among that geographical area.

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Hormonal Pathogenesis of Acne - Simplified

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Abstract

Acne vulgaris is a common chronic inflammatory disease of the pilosebaceous unit. General pathogenesis is well known to all. With increasing incidence of polycystic ovarian disease and other hormonal disorders due to stress and lifestyle changes, the incidence of acne resistant to regular antibiotics and retinoids is increasing, with increasing need for hormonal therapy in acne as well. There are numerous hormones responsible for the eruption of acnes, with androgens playing mainly an influence role in sebum production in acne formation. Proper understanding of the hormonal pathogenesis of acne helps us in better management. This article reviews the essentials of hormonal influence in acne pathogenesis, discusses the hormonal therapies most utilized in the treatment of acne.

Keywords: Acne vulgaris, Hormones, Pathogenesis

INTRODUCTION

Acne vulgaris is a common disorder of the pilosebaceous unit. It means prevalence in adolescence is estimated to be 70-87%.¹ Its cutaneous manifestation is well known to clinicians and have been amply described. The endocrine causes and associated disease states are less commonly described. Hence, the hormonal pathogenesis of acne is well emphasized in this article.

Sebaceous glands and sebum production play a central role in the development of acne. Sebaceous gland is hormonally regulated which in turn affects the pilosebaceous unit. Let us discuss the role of hormones one by one.

Androgens

Perhaps the most preformed and well known effect of hormones on the pilosebaceous unit is the one caused by androgens, more specifically:

1. Sebaceous gland enlargement
2. Sebocyte proliferation
3. Lipid metabolism^{2,3}

Majority of the circulating androgens are produced by gonads and the adrenal gland, but they are also locally produced, in sebocyte from dehydroepiandrosterone (DHEA) sulfate, an adrenal precursor hormone.

Androgen receptors are expressed in the basal layer of the sebaceous gland and in the outer root sheath keratinocytes of the hair follicle.^{4,5} When free testosterone enters the cell. It is quickly reduced to 5-dihydrotestosterone (5-DHT) by the 5 α -reductase enzyme. The activity of 5 α -reductase is increased in the sebaceous gland in proportion to the size of the gland.⁶ DHT is ~5-10 times more potent than testosterone in its interaction with the androgen receptor. On binding to its receptor protein, DHT is translocated to the nucleus and initiates the transcription of androgen-responsive genes. DHT increases the mRNA of proteins involved in fatty acid, triglyceride squalene, and cholesterol synthesis. This effect is mediated by sterol response element binding proteins (SREBP's). By inhibiting SREBP's effect with 25-hydroxy cholesterol, there was a 50% decrease in lipid synthesis increase by DHT alone.⁷ Androgens exert their effect on sebaceous glands by increasing the proliferation of sebocytes and increasing lipid production through SREBP's.

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It is now clear that pilosebaceous units possess all the steroid metabolizing enzymes needed to convert DHEA sulfate (DHEAS) to the mid potent androgen, DHT including 3β -hydroxysteroid dehydrogenase⁸ and 5α -reductase.⁹ Type-1 isoenzyme of 5α -reductase and Type-2 isoenzyme of 17β -hydroxysteroid dehydrogenase are predominant in sebaceous gland,^{10,11} infundibular keratinocytes, and epidermis.

Furthermore, sebocytes have the biosynthetic capacity to produce their own androgen from cholesterol through the Cyp450 side-chain cleavage system (P450 Scc).¹² Along with its cofactors adrenodoxin, adrenodoxin reductase, and the transcription factor, steroidogenic Factor 1, P450 scc converts cholesterol to pregnenolone, which is also the precursor for estrogen synthesis. Conclusion from this theory is that the skin has its own capacity to metabolize androgens suggesting that skin exercises local control over the ultimate effects of circulating androgen on the target tissue.

Estrogens

The most potent estrogen is estradiol, which is produced from testosterone by the action of the enzyme aromatase. Aromatase is active in the ovary, adipose tissue and other peripheral tissues. Estradiol can be converted to the less potent estrogen, estrone by the action of the 17β -hydroxysteroid dehydrogenase enzyme. Both aromatase and 17β -hydroxysteroid dehydrogenase are present in the skin.¹³ Various mechanism of the role of estrogens on sebum production are: (A) Inhibition of gonadal testosterone production through negative feedback suspension of gonadotrophin,^{14,15} (B) increased production of (sex hormone-binding globulin [SHBG]) by the liver, thereby decreasing free serum testosterone,^{14,16,17} (C) direct opposition of androgen within the sebaceous gland,^{14,16} (D) gene regulation of sebaceous gland growth and lipid production.^{14,16}

Growth Hormone (GH)

GH is secreted by the pituitary gland and stimulates the production of insulin-like growth factors (IGF's) in the liver and peripheral tissues. GH receptor is found in hair follicles and the acini of sebaceous glands.¹⁷ clinical observations suggest that GH may influence acne formation.^{14,17} In a pattern similar to androgen, the natural course of acne from its onset to puberty to its peak in mid-adolescence and subsequent decline corresponds to GH levels. Furthermore, conditions of GH excess, such as acromegaly, are associated with acne development and sebum overproduction.

IGF-1

GH stimulates IGF-1 production women with acne have significantly higher levels of IGF-1 compared with women

without acne. IGF plays a role in acne through its effects on androgens, sebaceous gland growth, and lipogenesis. These roles are supported by the following scientific evidence:

1. IGF-1 has the ability to stimulate adrenal averages synthesis and inhibit the production of hepatic SHBG which leads to subsequent increase in the androgen¹⁸
2. IGF-1 induces sebocyte proliferation by stimulating DNA synthesis.¹⁹ IGF-1 receptors are expressed in hair follicles and peripheral cells of the sebaceous gland. Because these receptors are located where basal highly mitotic cells of the gland beside, there is a possibility that IGF-1 may directly stimulate the sebaceous epithelium by acting as atrophic factor
3. IGF-1 stimulates sebaceous gland lipogenesis by increasing expression of the transcription factor SREBPs which regulates key genes involved in lipid biosynthesis.¹⁸

Insulin

Insulin is structurally related to IGF-1 and can bind To IGF-1 receptor.¹⁹ although it most likely acts as a mixed IGF-1 agonist/antagonist, its direct effects on sebocytes are distinct from IGF-1. In very high doses, insulin up-regulates GH-receptors expression on sebocytes, thereby potentiating GH-induced differentiation. In addition, insulin may act as a key regulator of lipid biosynthetic enzymes by stimulating ovarian and adrenal androgen production and inhibiting hepatic SBHG production. Insulin decreases IGF binding protein, which maximizes free IGF-1 concentrations to act on target tissues²⁰ and increases testosterone bioavailability and DHEAS concentrations. High foods with high glycemic load elevate plasma insulin concentrations, which regulate levels of androgens, IGF-1 and IGF binding protein, promotes unregulated tissue growth and enhances androgen synthesis.

Corticotrophin Releasing Hormone (CRH)

CRH is secreted by the hypothalamus and binds to receptors of the anterior pituitary, which in turn synthesizes proopiomelanocortin (POMC). POMC is degraded into adrenocorticotrophic hormone (ACTH) and melanocyte-stimulating hormone (MSH) and ultimately regulates cortisol production.²¹

In the skin, a complete GRH, GRHBP and CRH receptor system has be found *in-vivo* studies²² CRH is released by dermal nerves and sebocytes in response to pro-inflammatory cytokines and stimulates its receptors in paracrine and autocrine fashions. The main cutaneous target of CRH is the sebaceous gland. It inhibits sebaceous proliferation, promotes sebaceous differentiation and induces sebaceous gland lipogenesis by enhancing androgen bioavailability.²³ It also interacts with testosterone and GH through complex regulatory systems and stimulates the conversion of DHEA to testosterone.

Melanocortins

POMC is produced by the anterior pituitary in response to CRH from the hypothalamus. POMC is broken down into the melanocortins ACTH and MSH. Human sebocytes express the melanocortin receptors MC-1R and MC-5R, through which ACTH and MSH regulate various effects on sebaceous gland.²⁴⁻²⁶ MC-1R is involved in immunoregulation of interleukin-8 (IL-8) and MC-5R is involved in sebocyte differentiation and lipogenesis.²⁷

Glucocorticoids

Cortisol, a stress hormone under the direct regulation of ACTH promotes sebocytes proliferation and differentiation mediated through steroid - induced activation of toll-like receptor-2, a pro-inflammatory mediator.²⁸

CONCLUSION

Pathogenesis of acne involves a complex interplay of most of the hormones in the Body, which are affected by various endogenous and exogenous stress factors. Hence, a thorough evaluation of the hormonal profile must be done in resistant acne and acne associated with systemic diseases keeping in view the hormonal pathogenesis of acne.

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Evidence and Existence of Dental Education System in India

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Abstract

India is a vast country with a population of over 1.1 billion people. Dental education in India was established 91 years ago, when the first dental college began in Calcutta, which was introduced by Dr. Ahmed in 1920. However, in the present date, nearly 290 dental colleges exist in our country producing over 25,000 dentists each year. Dentistry in India is currently being challenged to maintain the professionalism. This is partly a result of pressures applied to the education system. The purpose of this review article is to throw light on the evidence and existence of dental education system in India.

Keywords: Dental education, Dentistry, India

INTRODUCTION

Dental education in India has made tremendous progress and is heading towards advancement in every aspect, bringing revolutionary changes in the present scope and sphere of oral health. Like other branches of medical education, dental education in India has also received incredible recognition and acclamation over the years. Thanks to the passion and fervor of the pioneers who have toiled hard for the betterment of this noble profession. The Historian Dental Act was passed by parliament in the year 1948 and since then dental education has received accolades and approbation from all the corners. I take this opportunity to salute Dr. Rafuddin Ahmed, "Father of dentistry in India." It is his dedication and hard work that, we stand today as the oral health care providers.¹

Today we are ranked number one as far as the growth of dental college is concerned, but the scenario is not pleasing. In spite of 289 colleges in India, producing about 30,000 graduates every year (Dental Council of India's

[DCI] - 30,570/year), oral health of our citizens does not measure up to the mark, especially among those living in rural areas. This has resulted in severe imbalance and disparity between urban and rural population as well as rich and poor. Majority of dental surgeons passing every year are interested in practicing in urban areas only, for securing better prospect and better income.¹

PAST EVENTS

The presiding deity of Bastar (The Goddess of the tooth - Danteshwari): Danteshwari is a temple in the town Bastar of Jharkhand. It is believed that the tooth of Sati fell here where this temple is located today.² Lord Krishna in Mahabharata wanted to test the "dana veerata" of dying Karan in the battlefield of Kurukshetra disguised as a Brahman, Krishna asks for gold in donation and Karan proved his worth by donating his gold filled tooth. This part of the epic indicated the existence of dentistry even around 2500 BC, where defective teeth were restored with gold.² In 1924, the 1st Dental College of India was established in Calcutta by Dr. R Ahmed. In 1933, the Nair Dental College and Hospital came into existence. In 1938, the Govt. Dental College, Bombay, was started and thereafter, there was no looking back.²

Facts and Figures

When we compare the dentist: Population ratio in India to that of America, America has a population of nearly

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33 crores, and there were 108 dental colleges. However, considering the dentist: Population ratio and excluding the number of fresh dentists graduating every year, the number of dental colleges in America has now been reduced to 58. Thus, comparing to the ratio of dentist: Population of America, India should have only 119 colleges against 289. WHO recommends the dentist: Population ratio to be 1:7500. Dentists-to-population ratio of India, which was 1:300,000 in the 1960's, stands at 1:10,000 today.²

Present Scenario Regarding Number of Dentists in India

A very critical question to be answered is that are we in reality facing a shortcoming of the dentists. For answering this question, we should know the distribution of dentists in India. The problem lies at the level of distribution rather than the number of dental surgeons. The majority of the dentists work in major cities in India. However, the majority of the population resides in rural areas. A very meager percentage of oral care services are provided in the rural areas. However, oral health seeking behavior is also very low, especially among the rural population, thus resulting in a very miserable equation. In spite of the vast workforce of qualified dentists in our country, the most fundamental oral health education, and simple interventions are also not available to a vast majority of the population and this is the misery of the whole scenario.² Consumption of tobacco in various forms is high and is on the rise. High incidence of oral cancer, dental caries, (decayed, missing, and filled teeth <3) and periodontal problems has been observed. Many areas have high fluoride in drinking water; this has been used by anti-fluoride lobby to prevent any national policy on the use of fluorides for controlling dental caries.³

DENTAL COLLEGE SYSTEM IN INDIA

DCI was established as a result of the Dentist Act of 1948, which was intended to regulate the dental practice and promote scientific advances. DCI is still the premier governing body of dental education of India. Its responsibilities include the regulation of dental education, profession, and ethics and liaising with the government to obtain administrative approval for dental colleges and higher educational courses. Dental colleges of India fall into one of the three chief categories: (a) Government dental school, as a part of a government university, (b) private dental school affiliated with a government university, and (c) private dental college as a part of private university.⁴

LICENSE FOR DENTAL PRACTICE IN INDIA

India does not employ a uniform, nationwide dental licensure examination such as the NBDE in the United

States. At the time of graduation, all students in Indian dental schools receive both a B.D.S. diploma from the University and a certificate of successful completion of the 5-year curriculum from the dental school all together with state-approved dental licensure. Successful completion of the 5-year curriculum implies that the dental students have passed professional examinations at the end of each of their 4 years. In this sense, professional study, which include both theory and practical/clinical elements, comprise the dental licensure examination in India. In addition, dental school graduates must register with a state and national governments by submitting the aforementioned certificate and applicable fees. Dental licenses are issued by the state government and helps in regulating the dental practice through state law under the supervision of Ministry of Health and Education of the respective state.

Dental Education Model

Innovation is the key to success and therefore boosting research culture among students is important. Invention and creativity are the basic elements of the fundamental research. This is required to be pursued by the educational institutions. Series of publications are coming up divulging novelties in dental education. The quest for knowledge has taken man to the uncharted domain of ages. In modern set up, feeding the embodiment of research leads to new invention and discoveries that enrich the life of a human being in different ways. The upcoming dental graduates need to be prepared for ideal dental practice as well as genuine dental research. Hence, the availability of clinical material is of paramount importance. The dental faculty should dwell into exploring ways and mean of incorporating clinical training and amalgamation of dental education and research so that young graduates can become self-sufficient, self-reliant, confident in discharging their moral duties to the nation. Indian dental students at an undergraduate level may need additional education and clinical training. The change in dental education metrics and practice regulations makes it difficult to develop a set of globally acceptable standards for curriculum and outcomes. Our aim is to be primarily educational and secondarily vocational. Primary goals include the development of a knowledge base for problem-solving, fostering of an inquiring mind, and a critical appreciation of new development. Secondary goals include knowledge of human behavior, and skill in patient management, assessment, diagnoses and treatment planning. The educators must formulate policies that will approach challenges in a positive manner and provide a realistic reasonably sound solution. Some concepts that if executed will provide good results are as follows: Globalization of dental education; introducing new dental colleges in rural areas; initiating new venues for practice

in three tier cities and rural areas; state government to integrate dental health plan in their scheme as a matter of prime concern and create framework for dental clinics at civil hospitals, primary health center, sub-centers as referral hospitals in rural areas; and check with dentist: Population ratio.⁵

CONCLUSION

On the other hand, continuing education is a proceeding approach that allows clinicians to upgrade their theoretical knowledge and practical skill on the endowment of long term clinical practice. There is a continuous need, and we have to overcome the difficulty to ensure that a range of courses is proposed at the appropriate academic and clinical level.⁵ India surely is developing to be a country of “Science and Spirits” and would be a nucleolus of all

global standards in dentistry. In short, keyword for future is dentistry India.⁶

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Hemoglobin D-Punjab Trait of Non-Punjabi Heritage in Karnataka, South India: An Exceptionally Rare Occurrence

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Abstract

Hemoglobin-D (Hb-D) is an uncommon and abnormal structural Hb variant. The present case study is an eye opener that though Hb-D Punjab trait is one of the important differential diagnoses to be considered in the areas where Hb-D is known to be prevalent, its possibility however cannot be ignored even in the areas where its prevalence has not been identified or documented. We report one such extremely rare case of Hb-D Punjab trait in a 1-year old child of South Indian heritage hailing from Karnataka. To the best of our knowledge, this is probably the first case to be reported and documented from the Southern part of our country since extensive literature search did not reveal any documented case till date from South India.

Key words: Hemoglobin variant, Heterozygous, High performance liquid chromatography

INTRODUCTION

Hemoglobin-D (Hb-D) is an uncommon and abnormal structural Hb variant. Its prevalence has been reported in North eastern part of India and Iran. A small number of cases of this entity have been reported and documented in literature. Hb-D is due to amino acid substitution for glutamic acid at codon 121 of the β globin gene. The heterozygous form of Hb-D is clinically silent, but its co-inheritance either with HB-S or Hb-F produces clinically significant conditions with moderate severity. Hb-D Punjab which is synonymous with Hb-D Los Angeles has an incidence of 2-3% among Sikhs in Punjab, 1% in Gujaratis and 0.37% in Bengalis in India and has been found all over the world with a variable incidence rate. Extensive literature search did not yield any reported incidence of Hb-D Punjab in Southern parts of India.^{1,2}

CASE REPORT

A 1-year old south Indian male child was admitted to the pediatric ward with history of fever for 1 week. There was no significant past or family history. There was no history of consanguinity. Both the parents and the sibling brother were clinically healthy. There was no history of previous blood transfusion or medication.

General physical examination revealed depressed nasal bridge, severe pallor and icterus.

Systemic examination revealed abdominal distension, hepatomegaly (3 cm), and splenomegaly (6 cm).

Routine hematological investigations were carried out using an automated cell counter. The results showed a very low Hb value of 4.4 g/dl, reduced packed cell volume at 12.2%, reduced red blood cell (RBC) count at 1.28 million/cumm. The absolute indices were decreased with mean corpuscular volume at 64.2 fl, mean corpuscular Hb (MCH) at 20 pg and MCH concentration at 36.1%. The reticulocyte count and red cell distribution width were increased being 5% and 49.6%, respectively. The white blood cell (WBC) and platelet counts were within

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normal limits. Peripheral blood smear examination showed marked anisopoikilocytosis and dimorphic blood picture with a near equal population of microcytic hypochromic and macrocytic RBCs. A few target cells, spherocytes, and tear drop cells were seen. Occasional intermediate normoblasts (8/100 WBCs) and fragmented RBCs were seen. A few macropolycytes were also seen. Occasional red cells showed basophilic stippling and Howell–Jolly bodies. WBCs showed a mild shift to the left by the presence of band neutrophils, metamyelocytes, and myelocytes. A few hyper segmented neutrophils were also seen (Figure 1).

The impression was found to be leukoerythroblastic/dimorphic blood picture associated with features of hemolysis.

In view of the clinical and hematological pictures suggesting hemolytic anemia, high performance liquid chromatography (HPLC) was undertaken to investigate for abnormal Hb. HPLC revealed near normal fetal Hb (Hb-F) and Hb-A₂. Hb-D was markedly abnormal at 36.7% (normal value - 0%) and Hb-A was markedly reduced to 55.1% (normal value - 94.3-98.5%).

Osmotic fragility test was within normal limits.

Biochemical assays revealed markedly elevated lactate dehydrogenase levels at 4500 IU/L (normal reference range 225-450 IU/L). Serum bilirubin level was within normal limits.

Hematological screening of parents and sibling did not reveal significant abnormalities. The final diagnosis was given to be Hb-D Punjab trait.

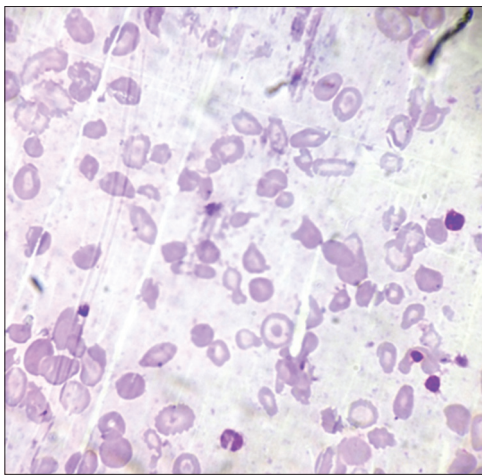


Figure 1: Hemolytic blood picture in hemoglobin D Punjab disease (Leishman stain, x100)

DISCUSSION

Hb-D is an abnormal variant of Hb being the fourth most common variant discovered and described till date.

Hb-D has a wider distribution among the various races of the world than any other type of abnormal Hb.¹

Areas of Hb-D prevalence have been encountered in Algerian Muslims and Indians of North central India which is the Punjab belt of Sikh origin.^{2,3} In the Punjab region of India, the heterozygosity is reported at 3%.⁴

Four clinical stages of Hb-D syndromes have been reported namely heterozygous Hb-D trait, mixed heterozygous state in combination with Hb-S (Sickle cell - Hb-D disease), homozygous Hb-D disease⁵ and Hb-D in combination with thalassemia.⁶

There are several variants of Hb-D Punjab which is also known as Hb-D Los Angeles named after the city where it was first discovered. The abnormal Hb-D Punjab/Los Angeles has glycine substituting for glutamic acid at codon 121 of β chain.⁷ It has been suggested that genetic mutation responsible for Hb-D may have arisen from several ethnic groups rather than from a single one.¹ Studies among affected families prove that Hb-D is an allele of Hb-A, S and C.

No specific abnormalities related to presence of abnormal Hb are associated with Hb trait and no well-defined hematological criteria have been formulated for diagnosis Hb trait.

The hematological picture in patients with Hb-D trait may range from entirely normal with absent hemolytic picture to mild hemolytic anemia associated with moderate splenomegaly⁸ similar hematological findings have been reported in the other heterozygous forms of Hb-D.¹ The patients with mixed co-inheritance of Hb-D along with either Hb-S or Hb-F may show a certain degree of clinical variability.⁸ Parab *et al.* observed in their study that homozygous state of Hb-D presents with mild hemolytic anemia and mild to moderate splenomegaly. They opined that Hb-D Punjab trait is a harmless condition showing normal Hb and RBC indices.⁹ In contrast to this, though our case belonged to the heterozygous Hb-D Punjab trait as diagnosed by HPLC, its clinical and hematological features like jaundice, hepatosplenomegaly, and mild hemolytic anemia were deviant from the usual presentation.

Dolai *et al.* opined that hypochromia rather than microcytosis was a consistent finding in their study on Hb-D trait.¹⁰ They also observed that anisocytosis was consistently absent in Hb-D trait. Chernoff reported microcytosis in their cases of Hb-syndromes.¹ In striking contrast, we observed severe anisocytosis in our case. The other exceptional feature in the present case was the hemolytic blood picture which has almost never been reported in heterozygous Hb-D trait.

The clinical and hematological profiles of Hb-D have not been specifically described anywhere, except in a few published case reports.¹¹ The data available in these case reports suggest that the hematological profile in Hb-D trait may be variable.

Some of the studies conducted have concluded that Hb-A is always more than 50% in Hb-D trait but Hb-D is within 40% of total Hb.¹⁰ Similar was the observation in our case.

In a study from West Bengal, the authors have concluded that hypochromia is a consistent feature in Hb-D disease. These authors also opined that red cell indices and Hb electrophoresis were sufficient in screening for Hb-D Punjab trait in a resource-poor setting.¹⁰

Pandey *et al.* opined that HPLC may not be the gold standard for diagnosing Hb-D Punjab trait and that the confirmation should be by molecular analysis.⁸

CONCLUSION

The present case study is an eye opener that though Hb-D Punjab trait is one of the important differential diagnoses to be considered in the areas where Hb-D is known to be prevalent, its possibility however cannot be ignored even in the areas where its prevalence has not been identified or documented.

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Plummer–Vinson Syndrome: A Case Report

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Abstract

Plummer–Vinson syndrome (PVS) is a triad of dysphagia, iron deficiency anemia, and esophageal webs seen more often in middle aged females. It is also known as Patterson-Brown-Kelly syndrome. PVS is not seen commonly amongst adult males, children and adolescents. We present a case of a 44-year-old male presenting with dysphagia. He was found to be anemic on evaluation. Barium study showed evidence of an esophageal web. Patient was diagnosed with PVS. He underwent endoscopic dilatation of esophageal web with correction of anemia. Patient has been on regular follow-up with no recurrence of symptoms.

Key words: Anemia, Dysphagia, Plummer–Vinson syndrome, Web

INTRODUCTION

Plummer–Vinson syndrome (PVS) is defined as the classical triad of dysphagia, iron deficiency anemia, and esophageal webs. Known by other eponyms as Paterson-Kelly syndrome, Paterson-Brown Kelly syndrome, Waldenstrom-Kjellberg syndrome, sideropenic dysphagia.¹ It was first described in 1912 by Henry Stanley Plummer.² It is common in middle aged females, in fourth to seventh decade of life.^{3,4} It is characterized by dysphagia, usually due to upper esophageal webs, anemia, and other features like angular cheilitis and glossitis and koilonychia and also other anemia related features such as weakness, pallor, fatigue, and tachycardia. Up to 3-15% of the affected individuals are at risk of developing esophageal or pharyngeal carcinoma.

CASE REPORT

A 44-year-old male presented to our hospital with complaints of inability to swallow solid food since the past 1½ years. The patient reported this symptom to be gradually progressive to reach the present stage where he

was dependent on liquids solely which posed no dysphagia. Any attempt to take solids whatsoever even in the form of medication would result in immediate expulsion of the same. The patient had also noted a gradual decline in his health over the past 2 years.

Examination revealed a thin built, middle-aged male of height 165 cm, weight 55 kg and body mass index of 20.2 kg/m². Patient had pallor with ridging of nails and a glossy tongue. No other evidence of gross malnutrition like muscle wasting was noted.

Investigations revealed hemoglobin of 9.4 g/dl. Blood smear showed a hypochromic microcytic blood picture. Serum iron was low at 51 µg/dl with an increased iron binding capacity of 467 µg/dl and transferrin saturation of 10.9%. Vitamin B₁₂ and folate levels were normal. None of the other lab tests showed any abnormalities.

Upper gastrointestinal (GI) endoscopy showed a narrowing in the upper esophagus about 16 cm from the incisors with inability to negotiate the scope beyond the narrowing (Figure 1). Etiology of the stricture was debatable. Even a computed tomography thorax showed the same pathology.

Patient was taken up for a barium study which revealed it to be a esophageal web (Figures 2 and 3). Based on the above findings, a diagnosis of PVS was made.

Patient was taken up for endoscopic dilatation (Figures 4 and 5). Following procedure patient was able to take soft

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Figure 1: Esophageal narrowing

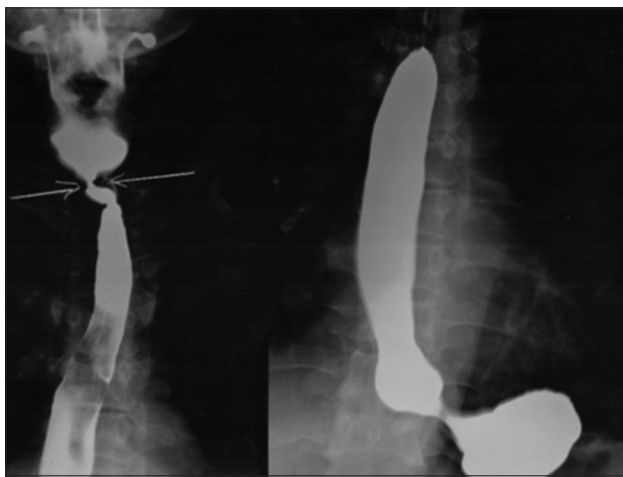


Figure 2: Barium study showing esophageal web

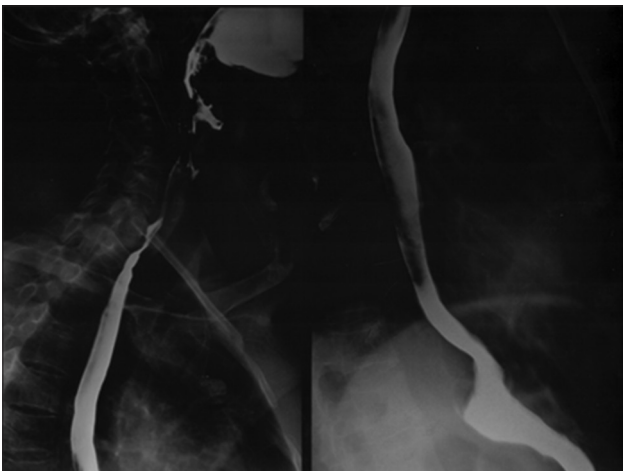


Figure 3: Barium study lateral view

diet and was discharged with medication for correction of iron deficiency anemia.

Patient has been on regular follow-up and has remained symptom free over the last 48 months.

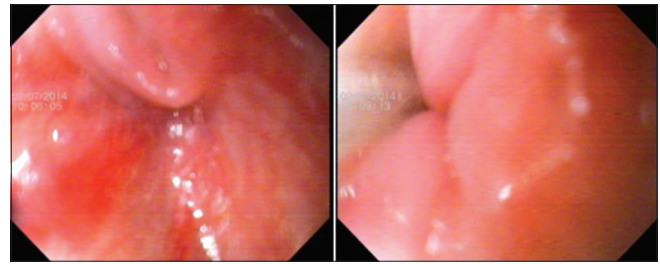


Figure 4: Before endoscopic dilatation

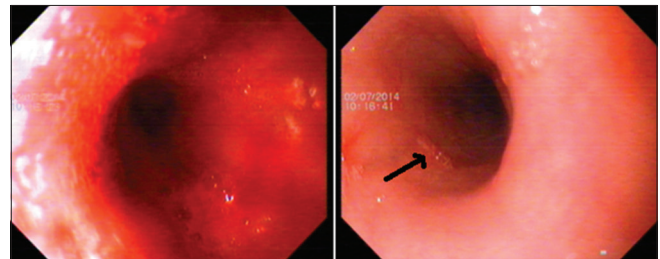


Figure 5: Post endoscopic dilatation (note remnant of esophageal web)

DISCUSSION

PVS has been described to have a prevalence of $<1/1,000,000$.¹ Middle aged females form the majority of the cases with the ratio of male to female being reported 4:1 or higher.^{3,4} This disease is also reported to have a higher incidence amongst Europeans.² A number of studies also describe the incidence of PVS in children and adolescents but it is a rare presentation.^{5,6}

The patients present with anemia and a variety of symptoms like dysphagia, soreness of mouth, weakness, palpitation, paresthesia, dyspnea, giddiness. The dysphagia is usually painless, progressive over years, usually limited to solids and may be associated with weight loss. Patients may have glossitis, angular cheilitis and koilonychia, and even thyromegaly or splenomegaly have been observed.^{2,7}

The pathogenesis of this disease has not been elucidated completely though a number of authors consider iron deficiency anemia as being the cause. The finding that correction of anemia leads to resolution of the dysphagia in some patients has been the root of this belief. Other etiologic factors including malnutrition, genetic predisposition or even autoimmune processes have been proposed⁸ as PVS has been reported in patients with concomitant celiac disease, thyroid disease and rheumatoid arthritis.²

Diagnosis is established by confirmation of iron deficiency anemia with demonstration of web in barium studies, video fluoroscopy or upper GI endoscopy.²

Management of these cases consists of correction of anemia which has shown to resolve dysphagic symptoms in

a number of patients. The esophageal web can be managed with endoscopic dilatation, balloon dilatation, endotracheal dilatation, and incision of web.^{2,4,9} On occasion, more than one sitting may be required. Patients however require follow-up given the incidence of squamous cell carcinoma in up to 15% of the cases.^{10,11} Repeat endoscopy on an annual basis may be done in the initial period of follow-up.

CONCLUSION

PVS is a rare presentation among middle-aged males. It is a diagnosis that must be considered in patients presenting with dysphagia with associated anemia. Correction of anemia appears to prevent disease recurrence.

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Leech in Urinary Bladder and its Management: A Case Report and Review of Literature

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Abstract

Leech is an invertebrate having the tendency to enter the body through natural orifices. Bleeding as a result of a leech in male urinary bladder is very rare. Removal of leech from urinary bladder can be done by bladder lavage facilitated by infusion of normal saline, cystoscopic removal or suprapubic bladder exploration. We describe a 58 years male who had leech in the bladder. The patient presented with painless hematuria with retention of urine. Lavage of the bladder was done with normal saline through a three way Foley catheter but hematuria persists. Cystoscopic removal of the clot was done and a leech was found.

Key words: Hematuria, Leech, Management, Urinary bladder

INTRODUCTION

Leech infestation is commonly seen in tropical countries especially in rural areas due to abundant ponds and swamps. Previously, leeches have been used in medicine during the time of Hippocrates (460-377 BC) or even earlier.¹ Hirudiniasis is an unusual symptom and is caused by accidental introduction of leeches through natural orifices. Leech is an invertebrate and has tendency to enter the body through natural orifices. Internal hirudiniasis has been reported in few studies. Vesical leech infestation is considered as an unusual cause of profuse hematuria.² Leech can be detached by applying gurgled saline and also can be removed cystoscopically.^{2,3} We present one case of vesical hirudiniasis causing painless hematuria in a male patient.

CASE REPORT

A 58-year male, fisherman presented with sudden onset of painless hematuria for 1day . He had no

history of coronary artery disease, hypertension, or bleeding disorders. All the systemic examination was unremarkable. All the routine blood investigation was normal including bleeding time, clotting time, prothrombin time. Ultrasound of abdomen and pelvis showed clot in lumen of urinary bladder with thickened urinary bladder wall and Grade-I enlarged prostate (Figure 1). X-ray of kidney, ureter, and bladder was normal. Patient was catheterized with three way Foley's catheter and normal saline lavage was done. But due to clots, recurrent obstruction of the catheter occurred. Patient was planned for cystoscopic removal of the

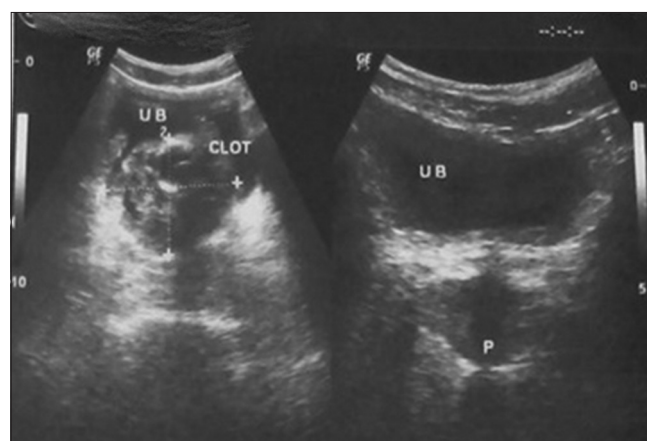


Figure 1: Ultrasound examination showing clots in the urinary bladder

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clots. After removal of some clots through cystoscopy, a dead leech was found in the urinary bladder (Figure 2). With the help of grasper the leech was removed by holding the head (Figure 3). Simultaneously, the patient was treated with hematinics for 5 days. After completion of the treatment, the patient was recovered.

DISCUSSION

Leech belongs to Kingdom - Animalia, Phylum - Annelids, Class - Citellata, and Subclass - Hirudinea. They have two suckers, one at each end (anterior and posterior). Majorities are found in fresh water environments and few species live in terrestrial and marine environment.⁴ Leeches are sanguivorous hermaphrodite. The body is soft, elongated, vermiform, dorsoventrally flattened, slippery, and difficult to grasp. The anterior and posterior suckers of the leech serve as organs of locomotion and provide firm adhesion to the host's body at the time of feeding. This parasite has the habit of entering into

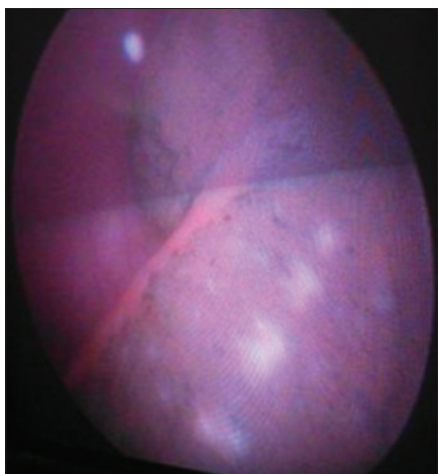


Figure 2: Cystoscopic view showing dead leech inside the urinary bladder



Figure 3: Dead leech

anatomical orifices, such as the urethra, anus, vagina, nose, and throat.⁵ Usually, the hungry leeches rest at the edge of ponds and swim with accuracy toward sources of waves.⁶

Saliva of the leech contains many chemicals including hirudin (functions as a potent anticoagulant), hyaluronidase, collagenase, fibrinase, hemetin, plasminogen activators, bdellins, elgins, elastase, cathepsin-B, antihistamines, and apyrase. These secretions maintain access to blood and prevent clotting. Hirudin inhibits thrombin catalyzed conversion of fibrinogen to fibrin.⁷ The bite site in case of leech manifestation may bleed for 24-48 h.^{3,6} The host is usually not aware to its attack since the leech secretes anesthetic chemicals during movement as in the present case.⁸ The body surface of the leech is slippery due to wide distribution of slim glands and on grasping it slips frequently.⁵ Hematemesis, hemoptosis, epistaxis, hematuria, and rectal bleeding are possible symptoms according to site of manifestations.^{5,9}

Sonography is an effective modality of imaging for the diagnosis of a leech in the urinary bladder. The degree of echogenicity of a foreign body depends on the difference in acoustic impedance between the foreign body and its surrounding tissues.¹⁰ The exact location of a foreign body, its relationship with surrounding structures, and associated soft tissue injuries can be better delineated well on sonography. It shows a short, tubular, echogenic structure with a relatively hypoechoic center and a more echogenic wall.^{10,11}

Removal of a leech from skin can be facilitated by applying salt, alcohol or vinegar to it.

If necessary a flame may be held near the parasite.⁵ Bites may bleed more than a normal wound after the leech is removed due to the secretion of hirudin.¹² The mean duration of bleeding from a leech bite wound is 10 h (range 6.5-23 h). Due to the stronger attachment of the leech by its suckers and a soft and slippery body surface that ruptures easily, it is difficult to hold and remove a leech with force. Rapid removal of the leech may cause the jaws to remain behind and will cause continuous bleeding from that site. Therefore, rapid removal should be avoided. Leeches can be loosened by local application of cocaine and lidocaine.¹³

Removal of leech from urinary bladder can be facilitated by infusion of 50 ml normal saline in the bladder and kept saline inside catheter by clamping for 3 h and released thereafter.³ The leech becomes anaesthetized, shrunk, and eroded or destructed and easily passed while attempted to micturate. This procedure is simple, safe, and

inexpensive and can be practiced by medical personnel anywhere. Cystoscopic removal of the leech is more ideal in a well-equipped center and should be done only by an urologist.⁵ Various invasive procedures are used in leech removal such as endoscopy, laryngoscopy, cystoscopy.⁵ Removal of leech may require suprapubic bladder exploration and control of bleeding under direct vision.^{5,9} Few cases of vesical leech infestation have been reported in literature and all cases were from Asian countries. A series of 43 subjects from Bangladesh had been reported.³ All the patients in the study were treated with intravesical instillation of normal saline and spontaneous expulsion of dead leeches per urethra.³

CONCLUSION

Leech may be a possibility in the patients from tropical countries with complaining of hematuria and should be properly investigated. Careful removal of leech should be done to avoid unnecessary bleeding and infection. Post-leech bite bleeding and infection is potentially fatal. For removal of the leech non-invasive procedures takes priority over invasive procedures.

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Spontaneous Eruption of Permanent Incisors after Removal of Tuberculate Supernumerary Tooth: A Case Report

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Abstract

Permanent teeth sometimes become impacted due to the presence of supernumerary teeth in their eruptive pathway. Early diagnosis and management is important to prevent extensive orthodontic intervention. This case report describes the spontaneous eruption of permanent maxillary right incisors in an 11-year-old boy with retained primary maxillary central and lateral incisors. Radiological investigations revealed the presence of unerupted permanent incisors and supernumerary teeth in between two incisors. These retained primary incisors were extracted along with surgical extraction of supernumerary tooth. Supernumerary tooth was diagnosed as tuberculate type on the basis of its shape. The patient was kept on clinical and radiological follow-up to observe spontaneous eruption of the permanent teeth. Spontaneous eruption of rotated permanent incisors occurred after 2 months and derotation was done under orthodontic consultation.

Key words: Delayed eruption, Supernumerary, Tooth

INTRODUCTION

Impaction of maxillary permanent incisors is a well-reported entity, yet it is not commonly found in dental practice. Hence, its treatment becomes challenging because these teeth are important for facial esthetics.¹ An impacted central incisor is usually diagnosed accurately when there is delay in the eruption of tooth.²

Supernumerary teeth are the extra teeth formed due to disturbances during the initiation and proliferation stages of tooth development.²

There are various causes of their impaction which includes supernumerary teeth, trauma to primary dentition, retained primary incisors, tooth malformations, tooth agenesis, dilacerations, lack of space or presence of cyst.³

Supernumerary teeth are the main cause of impaction and of which 50-60% of pre-maxillary supernumerary teeth cause impaction of permanent incisors.⁴

Finding of supernumerary teeth may indicate the occurrence of various syndromes, including: Cleft lip and palate, cleidocranial dysostosis, Gardner's syndrome, Fabry Anderson's syndrome, Ellis Van Creveld syndrome, Ehlers Danlos syndrome, and trichorhinophalangeal syndrome.³

Therefore, presence of supernumerary teeth in the arch affects the general form and function of the dentition. The present case report depicts the surgical extraction of impacted supernumerary tooth above primary right incisors due to which permanent right central and lateral incisors were impacted.

CASE REPORT

An 11-year-old boy reported to the Department of Pedodontics and Preventive Dentistry of I.T.S Dental College and Hospital, Greater Noida with a chief complaint of small right upper front teeth since 5-6 years (Figure 1). Intraoral examination revealed the presence

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of maxillary primary central and lateral incisors on the right side and decayed maxillary permanent first molar on left side. On palpation, the gingiva over the maxillary incisors was found to be very hard. No bulging was seen during primary inspection. Radiographic examination i.e. orthopantomogram (OPG) revealed the presence of 51 and 52 with impacted 11 and 12. Occlusal radiograph showed (Figure 2) the presence of one supernumerary tooth in between permanent central and lateral incisors and above the primary incisors which was not clearly visible on OPG.

Treatment

Having achieved profound local anesthesia, primary central and lateral incisors were extracted. After that, a full thickness labial flap was raised in the region of 11 and 12 and extraction of supernumerary tooth (Figure 3) was done with surgical primary anterior forcep. Sutures were then placed and instructions were given not to disturb the surgical field till healing (Figure 4).

At 2 months recall, spontaneous eruption of 11 and 21 were seen (Figure 5) but they were rotated. Hence

orthodontic correction of rotated central and lateral incisors was planned. The derotation of 11 and 21 was done and it was corrected within 3 months time (Figure 6).

DISCUSSION

During primary and mixed dentition stages, supernumerary teeth are the most significant dental anomaly.⁴ The best way of its detection is achieved by both clinical and radiographic examination. There are diverse treatment protocols available for management of permanent teeth that get impacted due to supernumerary teeth. They are:

1. Removal of supernumerary tooth/teeth only and allow spontaneous eruption of impacted tooth/teeth (conservative management)
2. Removal of supernumerary teeth and bone overlying impacted teeth (closed exposure)
3. Incision of fibrous tissue over the alveolar ridge to promote the eruption with or without orthodontic traction (open exposure).³

Extraction of supernumerary tooth/teeth during the early mixed dentition period will allow normal eruptive forces to promote spontaneous eruption of the permanent central



Figure 1: Pre-operative intra-oral photograph showing retained primary right central and lateral incisors

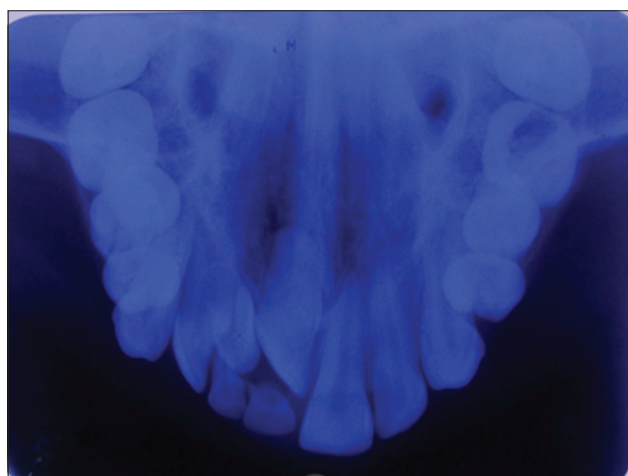


Figure 2: Occlusal radiograph showing impacted right primary incisors and supernumerary tooth in between



Figure 3: (a) Supernumerary tooth being extracted, (b) extracted supernumerary tooth, (c) surgical site with sutures



Figure 4: Spontaneous eruption of 11 and 12 after 2 months



Figure 5: Patient after orthodontic correction of 11 and 12

incisors following extraction.⁵ This early treatment may also result in appropriate alignment of the teeth and curtail the need for orthodontic treatment.⁶

According to Di Biase's hypothesis which states that as long as there is sufficient space available, a tooth will erupt on its own. He also recommended early removal of tuberculated and inverted conical forms of supernumerary teeth which interfere with the eruption of adjacent teeth.⁷

Smailiene *et al.* observed that 64% of impacted incisors erupted spontaneously when there was sufficient space in the dental arch after removal of supernumerary teeth. He also reported the average time of spontaneous eruption of impacted maxillary central incisors after the supernumerary tooth/teeth removal was 16.05 ± 9.3 (standard deviation [SD]) months. He also considered many factors that can affect the spontaneous eruption of impacted maxillary central incisors, being the vertical position of impaction will be the most important indicator.⁸

According to Mason *et al.*, 72% of impacted immature teeth erupted spontaneously after removing the supernumerary teeth within a mean (SD) age of 9 years 3 months.⁹

According to Mitchell and Bennett, 78% of impacted teeth erupted spontaneously, with a median eruption time of 16 months after removal of the supernumerary.¹⁰

Combining all the factors which can be used to determine whether successful alignment of an impacted tooth can take place are:¹¹

1. The position and direction of the impacted tooth/teeth
2. The degree of dilacerations
3. The degree of root completion and
4. The presence of space for the impacted tooth.

Taking into considerations various findings and experiences, as much as 90% of such teeth will spontaneously erupt in wrong position, thus further necessitating orthodontic management of erupted teeth.⁸

In the present reported case, due to adequate arch space available and immature roots of the permanent incisors, it was decided to monitor the teeth for spontaneous eruption after surgical removal of supernumerary teeth. A 2-month post-operative clinical examination revealed an erupting permanent maxillary right central and lateral incisor but they were rotated, hence orthodontic intervention was required.

CONCLUSION

Hence, early diagnosis of the maxillary incisor impactions and surgical removal of supernumerary teeth as well as adequate space for it maintained in the dental arch may facilitate the spontaneous eruption of these impacted incisors.

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Unilateral Incomplete Bifid Ureter Presenting with Calculus in Right Kidney with Hydronephrosis: A Rare Case Report

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Abstract

The anomalies associated to the duplications of ureter and kidneys result from an early division of ureteric diverticulum. The extent of duplication is decided by level of the division of ureteric diverticulum and metanephric blastema. In this case report, a bifid ureter was found on the right side of a male patient. Based on the available literature, the present case is very rare. Usually, it is detected at autopsy or as radiological finding if associated with a wide variety of clinical manifestations. The knowledge of this anomaly should be borne in mind, to deal with a case of repeated urinary infections, urinary reflux disorders, hydronephrosis or urinary calculi.

Key words: Bifid ureter, Calculus, Duplex ureter, Malformation

INTRODUCTION

Out of congenital anomalies of the abdominal masses found in neonates, congenital anomalies of the kidney and urinary tract (CAKUT) account for more than 50% and involve about 0.5% of all pregnancies.¹ Malformations of the urinary system are common and comprise about 3% of live births. These various malformations include ectopia, malrotation and other morphological variations such as number of kidneys, ureters, etc. Out of various malformations, Duplex ureter is reported 1 in 125 cases or 0.8% of a non-selected population. Duplex ureter is more common in females, with female to male ratio of 1.6:1 or 62% of females.² Duplication of the ureter might be complete or incomplete. If the duplication of a ureter is incomplete, then it has been known as the bifid ureter. Lowsley and Kirwori (1956), reported the incidence of

an incomplete duplicate ureter to be 18 out of a series of 4215 autopsies studied. Amongst these 2 were the bilaterally incomplete duplicate, 7 were a unilaterally incomplete duplicate and 8 were the unilaterally complete duplicate.³ According to recent studies by Russel *et al.*, (2000), intravenous pyelograms showed ureteral duplication in an average 3%, on routine examination.⁴ Presence of a bifid ureter is often associated with congenital hydronephrosis,⁵ or sometimes with contralateral quadrafid ureter,⁶ etc.

CASE REPORT

Here, we present a case with a unilateral bifid ureter. This male patient aged 34 years, presented with pain in the abdomen and on sonography showed calculus in the right kidney with hydronephrosis. In the present case, intravenous pyelography showed dilated right system and normal left functioning system. The right system showed prompt excretion of contrast, double moiety; lower moiety was hydronephrotic with calculus in the ureter. During operation retrograde pyelography and DJ, stenting was performed on the right side. Later, for follow-up, magnetic resonance imaging (MRI) of the person, showed a clear bifid ureter on the right side, with no other associated

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congenital anomaly. For calculus, extracorporeal shock wave lithotripsy was performed, and the calculus was totally fragmented. After confirming that we have achieved total clearance, DJ stent was removed.

In our case, the right-sided ureter had two limbs for most of its length. Later, the limbs joined at about a distance of 4 cm from the bladder wall as seen in MRI (Figure 1). The two limbs of this ureter showed their respective pelvis, coming out as separate entities from the hilum. The hilum was relatively longer than the hilum of left kidney. The pelvis of the upper limb had its exit at the upper end of the hilum and that of the lower limb at the lower limit of the hilum. The opening of the ureter into the bladder did not show any abnormality. During MRI examination, no other gross morphological abnormalities of thoracic, other structures of abdominal and pelvic viscera were revealed.

DISCUSSION

In the previous studies, bifid ureter had been detected in association with various congenital anomalies and defects. It has been associated with Goltz's syndrome⁷ high cephalad kidney, duplication of pelvis,⁸ and unilateral pulmonary hypoplasia.⁹ Bifid ureter has also been reported in association with complete duplication of the contralateral ureter (Tundidor Bermúdez, 1999; Borrego *et al.*, 1995).¹⁰

Many of the investigators have reported this anomaly in association with other disease conditions. Isolated anomalies of the ureter are reported by only few authors. But in this present case, the unilateral incomplete bifid ureter of the right side was associated with no other abnormality.

Developmental Basis

At about 4th week of gestation, evaginations arise from the distal mesonephric duct. These evaginations are

ureteric buds, which later interact with their surrounding mesenchyme called metanephric blastema. This interaction between ductal system and mesenchyme is very important and plays a major role in branching of the ureteric bud and subsequent development of the ureter, pelvis, and calyceal system up to collecting tubule of kidney.¹¹

Molecular Basis Related to CAKUT

As with most organs, differentiation of the kidney involves epithelial mesenchymal interactions. Epithelium of the ureteric bud from the mesonephros interacts with mesenchyme of the metanephric blastema (Figure 2a).¹² The mesenchyme expresses WT1, a transcription factor that makes this tissue competent to respond to induction by the ureteric bud. Transcription factor WT1 is responsible for production of glial-derived neurotrophic factor (GDNF) and hepatocyte growth factor (HGF, or scatter factor) by the mesenchyme. Later, these GDNF and HGF stimulate branching and growth of the ureteric buds (Figure 2a). The epithelium of the ureteric buds, synthesizes tyrosine kinase receptors RET for GDNF and MET for HGF, by establishing signaling pathways between the two tissues.¹³ In turn, the buds induce the mesenchyme via fibroblast growth factor 2 and bone morphogenetic protein 7 (Figure 2b). Both of these growth factors stimulate proliferation of the metanephric mesenchyme while maintaining production of WT1. Conversion of the mesenchyme to an epithelium for nephron formation is also mediated by the ureteric buds through expression of WNT9B and WNT6, which upregulate PAX2 and WNT4 in the metanephric mesenchyme. PAX2 promotes condensation of the mesenchyme preparatory to tubule formation, while WNT4 causes the condensed mesenchyme to epithelialize and form tubules (Figure 2b). Because of these interactions, modifications in the extracellular matrix also occur. These modifications are fibronectin, collagen I, and collagen III are replaced with laminin and Type IV collagen, characteristic of an epithelial basal lamina (Figure 2b). In addition, the cell adhesion molecules essential for condensation of the



Figure 1: Magnetic resonance imaging

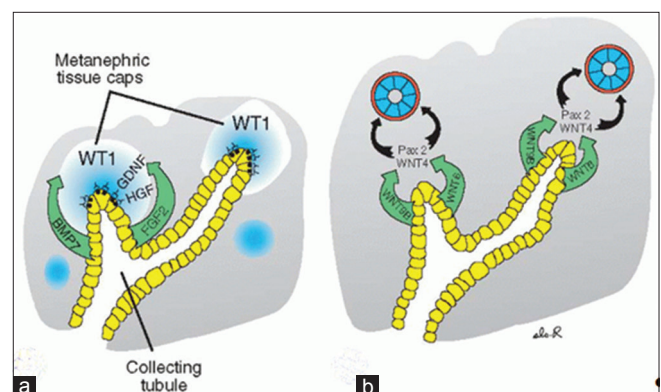


Figure 2: (a and b) Molecular basis of development of excretory system¹²

mesenchyme into an epithelium, syndecan, and E-cadherin, are synthesized.

The crucial event in kidney development is the first signaling process that induces the outgrowth of the ureter from the mesonephric duct.¹⁴ Proteins like Forkhead box protein C1, slit homologue 2, and its receptor round about homologue 2¹⁵ have been reported to confine GDNF expression to the caudal part of the nephric cord in mice studies, and mutations in genes encoding these proteins lead to an expansion of GDNF expression to the rostral part, resulting in multiple ureters.¹⁶

CONCLUSION

The anomalies pertaining to the duplications of the ureter and kidneys result from an early division of ureteric diverticulum. The extent of duplication depends on level of the division of the ureteric diverticulum and metanephric blastema. The variation reported in our case could be due to incomplete division of right ureteric bud in the cranial part.¹² The two limbs of this bifid ureter are having their respective pelvis coming out as separate entities from the hilum. The hilum of right kidney was relatively longer than the left kidney. The pelvis of the upper limb had its exit at the upper end of the hilum and that of the lower limb at the lower limit of the hilum. As the lower limb of the bifid ureter is dependent part of the system, it is more prone to calculus formation and later infection.

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Sertoli–Leydig Cell Tumor of Ovary an Incidental Finding: A Rare Case Report

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Abstract

Sertoli–Leydig cell tumor (SLCT) is a group of tumors composed of variable proportions of Sertoli cells, Leydig cells, and sometimes heterologous elements. Most tumors are unilateral, confined to the ovaries, and are seen during the second and third decades of life. These tumors are characterized by the presence of testicular structures that produce androgens. Hence, many patients have symptoms of virilization depending on the quantity of androgen production. We are presenting a case of incidental finding of ovarian tumor in a 54-year-old lady who underwent hysterectomy with bilateral salpingo oophorectomy for dysfunctional uterine bleeding. A diagnosis of SLCT of ovary was rendered for the same.

Key words: Androgen secreting neoplasm, Sertoli–Leydig cell tumor, Virilizing ovarian tumors

INTRODUCTION

Sertoli–Leydig cell tumor (SLCT) is a rare ovarian tumor that belongs to the group of sex-cord stromal tumors. These constitute <0.1% of ovarian tumors.^{1,2} The tumor is subdivided into many different subtypes. The most typical is composed of tubules lined by Sertoli cells and interstitial clusters of Leydig cells. Patients with SLCT present with signs of defeminization followed by masculinization. Age of the patient, stage of the disease and degree of tumor differentiation based on morphology are the most important factors to consider in the management of the case.³

CASE REPORT

Multiparous 54-year-old lady presented with dysfunctional uterine bleeding. History of dilatation and curettage done twice and showed an anovulatory endometrium with no atypia or malignancy. Pelvic ultrasound showed no significant

findings. Pap smear of cervix showed inflammation with no intraepithelial lesion. Later, total abdominal hysterectomy with bilateral salpingo oophorectomy was performed.

Gross Examination

Panhysterectomy specimen received in 10% formalin (Figure 1a). Cut section of cervix was unremarkable and uterus showed myometrial hyperplasia with coarse trabeculations. Cut section of left ovary showed a single cyst measuring 0.5 cm in diameter and right ovary showed a well-circumscribed tumor measuring 1.5 cm × 1 cm with lobulated tan yellow solid and micro cystic areas. Solid areas were firm in consistency (Figure 1b).

Microscopic Examination

Showed chronic cervicitis with nonsecretory proliferative endometrium and adenomyosis with myometrium showing few thick walled blood vessels. The left ovary showed ovarian tissue with a cyst with features of paraovarian cyst.

Right ovary showed ovarian tissue with a tumor composed of tubules and glandular structures lined by Sertoli like cells (Figure 2a) separated by stroma with nests of Leydig type cells (Figure 2b).

The diagnosis of right ovarian lesion was SLCT, (well-differentiated) Immunohistochemistry (IHC) was suggested for confirmation. IHC report showed, (Figure 3).

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Figure 1: (a) Panhysterectomy specimen with right ovary showing a neoplasm, (b) C/S of right ovary showing a well circumscribed tumor measuring 1.5 cm x 1 cm with lobulated tan yellow solid areas and micro cystic spaces

Inhibin: Positivity.

Calretinin: Positivity.

Epithelial membrane antigen (EMA): Negativity.

CK 20: Negativity.

CK 7: Negativity.

CD10: Negativity.

Therefore, a final diagnosis of SLCT – well-differentiated (Meyer's Type I) was made.

DISCUSSION

The SLCT (androblastoma, arrhenoblastoma) is a gonadal tumor of sex-cord- stromal type in which the components to a greater or lesser extent recapitulate the cells of the testis at various stages of development.⁴ WHO defines them as tumors containing various combinations of Sertoli–Leydig (S–L) cells and cells resembling rete epithelial cells and fibroblast in variable degrees of differentiation.⁵

SLCTs are uncommon tumors of ovary - accounting for <0.1% of all ovarian neoplasms. The majority of these patients are seen during the second and third decades of life, with the average age at diagnosis being 25 years. It is very rare after menopause. Some are diagnosed during pregnancy.⁶ 50% of cases come to clinical attention because of progressive defeminization, virilization, and pelvic mass. Androgenic excess is manifested by defeminization, like amenorrhea, breast atrophy, loss of subcutaneous tissue deposits and later by masculinization like deepening of the voice, hirsutism, temporal alopecia and hypertrophy of clitoris and acne. Non-virilized patients present with non-specific symptoms like abnormal vaginal bleeding, abdominal distention, abdominal mass, or abdominal pain. Serum levels of testosterone and urine levels of 17-ketosteroids

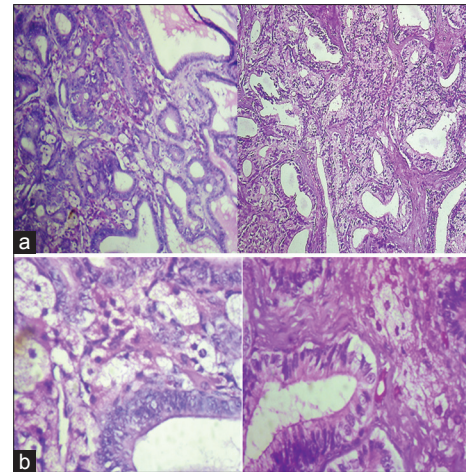


Figure 2: (a) Sertoli cells arranged in hollow tubules and glands with clumps of Leydig cells present in an edematous background. Another area showing clusters of Sertoli cells with clear cytoplasm lining the tubules with little intervening stroma (H and E stain, x100 magnification), (b) Intermixed Leydig and Sertoli cells in the loose stroma at a higher magnification (H and E stain, x400)

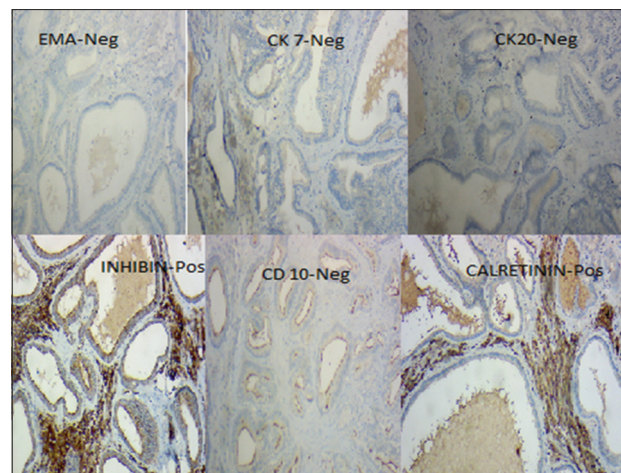


Figure 3: Immunohistochemistry – right ovarian tumour

are increased in virilized pts. Some cases with foci of heterologous hepatic differentiation are associated with elevation of serum alpha fetoprotein (AFP).⁷ Rarely SLCTs are discovered in asymptomatic women.⁷ Our patient who was 54-year-old multiparous lady had an uncommon presentation as it was an incidental finding and she had abnormal vaginal bleeding. The abnormal vaginal bleeding is due to the estrogen and progesterone imbalance created by the tumor.⁶

Gross appearance of the tumor is predominantly solid and partly cystic. Well-differentiated tumors are unilateral, solid and encapsulated (average size 5 cm). Intermediate and poorly differentiated tumors are larger (average size 15 cm) with areas of cystic change and necrosis. Papillae are sometimes visible in tumors with retiform differentiation.⁷

Microscopically they have an extremely variable histological pattern. Five categories are distinguished.⁸ Meyer has graded this tumor according to differentiation into three types. Well differentiated (Meyer Type I) 11%, intermediate (Meyer Type II) - 54%, poorly differentiated (sarcomatoid, undifferentiated, Meyer Type III) - 13%. Other two categories include those with heterologous elements (teratoid androblastoma) - 22% and retiform - 15%.⁸ Heterologous elements are represented by endodermal elements such as cysts and glands and mesenchymal elements such as bone, cartilage or skeletal muscle. The SLCT with heterologous mesenchymal elements are usually poorly differentiated in contrast to neoplasms with endodermal elements, which typically are of intermediate differentiation.⁹ Retiform pattern simulates rete testis with highly branching ribbon like tubules with formation of papillary structures with hyalinized core.¹⁰

Differential diagnosis of SLCTs varies with differentiation. Well-differentiated ones have to be ruled out from gonads of the testicular feminization syndrome. Because of their wide range of morphologic patterns they may be confused histologically with a variety of other primary as well as metastatic ovarian tumors. Important differentials include sertoliform endometrioid carcinoma and metastatic carcinoma, especially adenocarcinoma. Those with heterologous elements, intermediate and sarcomatoid pattern have to be differentiated from teratoma, malignant mixed mullerian tumor, carcinosarcoma, malignant mesodermal mixed tumor, and carcinoid tumors (especially trabecular variant of carcinoid).¹¹

IHC

S-L cells stain positive for inhibin alpha, calretinin, AFP (if heterologous hepatoid cells are present), testosterone, estradiol, CK (weak positivity), CD99 (membrane positivity) and WT-1. Recently, SLCTs are being added into the list of WT-1 positive tumors. They are negative for EMA, placental alkaline phosphatase, carcinoembryonic antigen, CA19.9, CA-125, S-100. These help to rule out other metastatic malignancies. From the practical viewpoint, the most helpful immunohistochemical findings are the negative staining of sex cord tumors for EMA, and positive staining for inhibin and calretinin; findings that are converse to those seen in endometrioid carcinomas of the ovary, which commonly have formations that may simulate sex cord tumors.¹²

Recent studies have shown that many cases of SLCT of the ovary are caused by germline mutations in the DICER1 gene. These hereditary cases tend to be younger, often have a multinodular thyroid goiter and there may be a personal or family history of other rare tumors such as pleuropulmonary blastoma, Wilms tumor and cervical rhabdomyosarcoma.^{13,14}

Prognosis and treatment correlates with stage and degree of differentiation of tumor.⁶ Well-differentiated tumors are benign with no recurrence after complete excision.⁷ The most reliable indication of malignancy is evidence of local extraovarian spread or metastases at the time of staging laparotomy.⁶ The incidence of clinical malignancy in Sertoli stromal cell tumors is 18%. Well-differentiated tumors have 0% chance of malignancy and intermediate have 11%, poorly differentiated tumors are 59%, clinically malignant. 19% of tumors with heterologous elements, and 25% of retiform tumors with intermediate differentiation behave clinically malignant.⁶ Treatment for young women with Stage I tumors are unilateral salpingo-oophorectomy. If poorly differentiated elements or heterologous elements are present, adjuvant therapy with radiation or combination chemotherapy is indicated. Stage II or higher require total abdominal hysterectomy with bilateral salpingo-oophorectomy. Adjuvant therapy may be considered according to differentiation.⁷

CONCLUSION

SLCTs are uncommon tumors of ovary which as an incidental finding in old age group without history of mass, abdominal pain, abdominal distention, masculinization, and infertility is very rare and this case is presented for its rarity.

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Gigantic Solitary Dumbbell Spinal Neurofibroma Causing Gastric Outlet Obstruction: Anesthesia Management

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Abstract

Neurofibromatosis (NF) has been described greatly in literature and is broadly categorized into NF1 and NF2. The former NF1 is more common and is a heterogeneous condition and up to 38% of patients may present with spinal NF of which, 5% may have clinical problems. The latter is however, characterized by central nervous system tumors, particularly bilateral acoustic Schwannoma with or without other manifestations. Multiple spinal NF are very common in NF1. We report a solitary gigantic spinal NF of the dorso-lumbar region encroaching the abdominal cavity and causing gastric outlet obstruction and its anesthetic management, which to our knowledge has not been reported before in literature.

Key words: Dumbbell tumor, Extra spinal portion, Gastric outlet obstruction, Nerve sheath tumor, Neurofibromatosis Type 1

INTRODUCTION

Neurofibromatosis 1 (NF1) was first described by Freidrich von Recklinghausen in 1882 and there is a familial disposition for this condition with an incidence of 1:3300.¹ Clinical diagnosis is established by the presence of the following: Café au late spots (CLS), axillary and inguinal freckling, lisch nodule, optic glioma, cognitive disorders, scoliosis, bony skull defects, and spinal or paraspinal NF.^{1,2} Anesthesia considerations are numerous and should be kept in mind before the practitioner attempts such cases as they are vital to patient safety.

CASE REPORT

An 18-year-old boy presented to neurosurgery outpatient department with vague abdominal discomfort and

paresthesia of both the lower limbs, for the past 2 years. The patient had complaints of mild, dull pain abdomen predominantly in the left hypochondrium, flank and vomiting after having meals. On examination, inspection revealed distension on the left side, however no prominent veins or any visible peristalsis were present. Palpation revealed huge lump in the abdomen on the left side, well-rounded, well-defined, non- pulsatile, extending from left hypochondrium to left iliac crest. Rest of the physical examination was essentially normal. A magnetic resonance imaging (MRI) scan showed a large lobulated heterogeneous intra-dural extramedullary space occupying lesion (SOL) of the dorso-lumbar region, extending from D12-L4 vertebra without any intracranial lesions (such as optic or hypothalamic gliomas or meningiomas) (Figures 1-3). The dumbbell mass was encroaching the spinal canal through the enlarged intervertebral foramina and extending anteriorly into abdominal cavity and causing a gastric outlet obstruction (GOO) type phenomenon. A provisional diagnosis of NF1 was made and it was planned for complete surgical excision through lateral approach after thorough workup.

Pre-anesthetic checkup revealed that the boy did not have any systemic illness, allergies or prior hospitalization and work up for pheochromocytoma was negative. The

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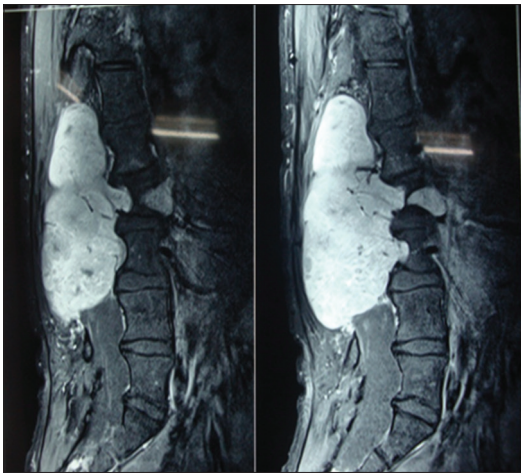


Figure 1: Magnetic resonance imaging scan showing a large lobulated heterogeneous intradural extramedullary mass noted in the dorso-lumbar region

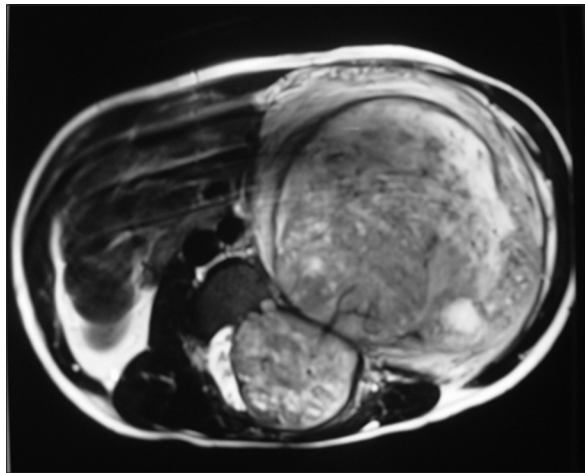


Figure 2: Magnetic resonance imaging scan showing a “dumbbell” spinal neurofibroma, with large with the extraspinal part being larger than the intraspinal portion

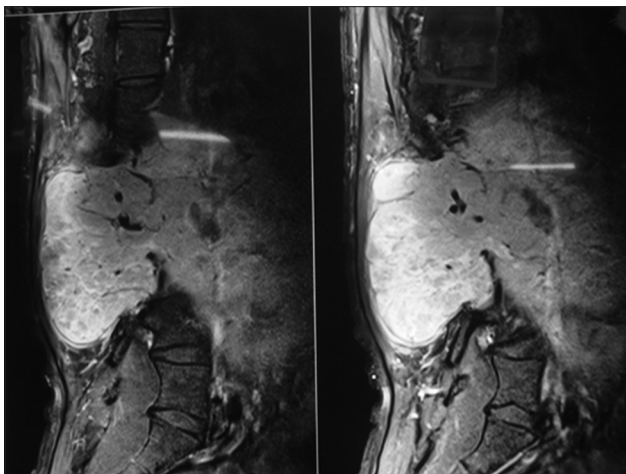


Figure 3: Magnetic resonance imaging scan again illustrating the same as in Figure 1

airway examination was routine and did not show any cause for concern. Blood grouping and cross matching

were done and adequate blood products were arranged. His weight was 65 kg and pre-operative hemoglobin was 13.5 g%. The patient was pre-medicated with lorazepam 2 mg PO, on the night before surgery and an overnight fast was ordered. Aspiration prophylaxis was given with pantoprazole 40 mg PO and metoclopramide 10 mg PO, as well. Written informed consent was taken from the patient. On the day of surgery, patient was taken inside the operating room and monitors as per American Society of Anesthesiologists standards were applied (electrocardiogram, non-invasive blood pressure, SPO₂, TEMP after intubation, end-tidal CO₂ [ETCO₂]). A wide bore intravenous (IV) cannula (16 G) was inserted and a balanced IV solution was started. After pre-oxygenation with 100% oxygen for 5 min, anesthesia was co-induced with midazolam 1 mg IV, followed by fentanyl 150 µg and thiopental 550 mg IV. After the cessation of spontaneous breathing and loss of eyelash reflex, succinylcholine 100 mg was given and cricoid pressure was applied. Patient was intubated with an 8.5 ID armored tube after 45 s and cuff was immediately inflated. Tube position was confirmed with ETCO₂ and auscultation and it was secured snugly with Durapore tape. Foley's catheter was inserted and urine output was monitored throughout the procedure. A triple lumen central venous catheter (7 French) was inserted in the right internal jugular vein followed by an “art” line in the left radial artery. This was based on discussion with surgeons, who had warned that the SOL was vascular and may lead to serious bleeding. After securing all invasive lines and endotracheal tube, patient was carefully position in the right lateral position (left side up). The patient was given 4 mg of vecuronium after he came out of the effect of succinylcholine and started breathing spontaneously. Anesthesia was maintained with oxygen and nitrous oxide and isoflurane titrated to depth of anesthesia. Muscle relaxation was maintained with vecuronium (intermittent dosing) monitored by neuromuscular monitoring.

Initial surgical approach from the surface was uneventful however when the superficial lobe was lifted up to gain access to the deeper one, substantial hemorrhage occurred. About 3 L of blood were lost, and this was replaced by crystalloids, colloids, and then packed red blood cells (PRBC). Four units of PRBC were transfused with eight units of fresh frozen plasma. Serial arterial blood gases were done and acid base balance and electrolyte disturbances were corrected, during the procedure. After a tough time, the tumor was removed in Toto and hemostasis was achieved. The size of the tumor was about 14” × 8” and it weighed about 4100 g (Figures 4 and 5). The patient did not require any inotropic support or any vasopressors, but as a result of massive blood transfusion and associated fluid therapy he had become hypothermic and hence, he was ventilated overnight in the neurosurgery Intensive



Figure 4: The intraoperative image of the mass upon removal, along with sponge holding forceps to get an idea of the size



Figure 5: The mass having dimensions of 14" x 8" and weight 4.1 kg

Care Unit. On the following morning, he was extubated uneventfully, after he was assessed to be awake and breathing spontaneously and adequately. Post-operative course was uneventful and he was discharged from the hospital after 9 days, without any neurological deficit.

DISCUSSION

NF1 is a multisystem disorder that may virtually involve any organ in the body and the clinical presentation depends on the organ involved.^{1,2} Otherwise known as "von Recklinghausen disease" or "peripheral NF," it comprises 90% of all NF cases. It is a type of phakomatosis which is inherited in an autosomal dominant fashion.^{1,2}

The anesthesiologist should know that there may be airway involvement (NF of larynx, supraglottic area or aryepiglottic fold) with potential for loss of control over the airway, cervical NF, hypertension secondary to

pheochromocytoma or renal artery stenosis and vocal cord dysfunction.³⁻⁸

This case report, illustrates a solitary, dorso-lumbar spinal NF without the classical signs of NF1 such as CLS, iris Lisch nodules and cutaneous NF, causing GOO phenomena.⁹

NF in the spinal canal frequently invade the peripheral segment of the nerve through the intervertebral foramen and develop a dumbbell shape.¹ The extraspinal portion of the tumor is larger than the intraspinal portion in such cases, and it is this extraspinal portion that gets attached to surrounding structures and may leading to extensive bleeding as in our case.¹ There may be areas of degeneration in the extraspinal portion, as seen in the MRI of our patient.

The dumbbell tumor by virtue of mass effect on the thoracic or abdominal cavities may cause respiratory embarrassment or gastrointestinal dysfunction, respectively.¹ This was seen in our case as after the surgery, the patient had relief from features of GOO and lower limb paresthesia. Other cases of NF have been described that caused GOO, however they were arising from the stomach or other parts of the gastrointestinal tract.¹⁰⁻¹² This is the first case to describe GOO from an extraspinal portion of a dumbbell NF.

The extraspinal portion was occupying a large part of the abdominal cavity, retroperitoneally, leading to the theoretical risk of aspiration secondary to impaired gastric emptying due to mass effect. Hence, aspiration prophylaxis was given with pantoprazole 40 mg PO and metoclopramide 10 mg PO, (on night before surgery and 2 h prior to surgery) and modified rapid sequence intubation with cricoid pressure was done in this case to circumvent this issue.

CONCLUSION

We successfully managed a huge dumbbell, spinal NF in the dorso-lumbar region causing GOO. Going into the literature, we understand that the anesthesia considerations are mainly as follows: (1) Bleeding from the extraspinal portion of the dumbbell tumor due to its adhesions, and (2) problems from the "mass" i.e., "mass effect" (in our case GOO, in others respiratory embarrassment). Therefore, we were prepared to manage the hemorrhage (blood products, invasive monitoring, and vascular access) and modified rapid sequence intubation for general anesthesia. To our knowledge, there has been no report of a similar case in literature.

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Pulmonary Alveolar Microlithiasis: A Case Report

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Abstract

Pulmonary alveolar microlithiasis (PAM) is a rare disorder characterized by diffuse bilateral filling of the pulmonary alveoli by numerous calcific concentrations known as calcispherites. The radiological lesions in PAM closely resemble miliary tuberculosis. PAM should be suspected in cases when the radiological lesions do not correlate clinically. This may reduce the need for invasive procedures in a limited resource setting. A 40-year-old male agricultural laborer, never smoker presented with 10 months history of cough with expectoration and exertional breathlessness. He had completed 6 months of anti-tuberculosis treatment for the same complaints 4 months back. His general physical examination was unremarkable and he was not hypoxic at room air. On auscultation of the respiratory system, he had fine crackles in the left axillary region. Chest X-ray revealed bilateral diffuse nodular lesions with translucent band in bilateral upper zone (black pleura sign). Possibility of PAM was considered and it was confirmed with high resolution computed tomography of chest. Fiberoptic bronchoscopy was done. The bronchial brushings and washings revealed numerous calcific concretions of alveolar macrophages. Calcispherites were also demonstrated by percutaneous lung biopsy.

Key words: Biopsy, Calcispherites, High resolution computed tomography, Pulmonary alveolar microlithiasis

INTRODUCTION

Pulmonary alveolar microlithiasis (PAM) is a rare disease with unknown etiology. The disease is characterized by diffuse bilateral filling of the alveoli by calcific concentrations known as calcospherites. The radiological picture of PAM is often mistaken for miliary tuberculosis, and there are instances of being treated with a full course of anti-tubercular drugs.¹ We describe a patient with PAM who was misdiagnosed as miliary tuberculosis. The correct diagnosis was established by computed tomography (CT) of the thorax and by percutaneous lung biopsy.

CASE REPORT

A 40-year-old gentle man, agricultural laborer by occupation presented with 10 months history of cough with minimal expectoration and exertional breathlessness. The breathlessness was non-progressive and occurred on moderate to severe exertion. There was no restriction of his routine activities. He had consulted elsewhere 8 months back. A chest X-ray (CXR) and sputum examination were done and he was diagnosed as miliary tuberculosis and started on anti-tubercular drugs. He had completed 6 months of anti-tuberculosis treatment (ATT) for the same 4 months back. His symptoms continued to persist and hence he visited our hospital. On presentation, his general physical examination was unremarkable. He maintained saturation at room air. Respiratory examination showed a normal air entry and vesicular breath sounds bilaterally with fine crackles in the left axillary region. CXR was done which revealed bilateral diffuse nodular lesions with translucent band

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in bilateral upper zone? Black pleura sign (Figure 1). Possibility of PAM was considered and patient was subjected to a high resolution CT (HRCT) scan of the thorax. HRCT showed bilateral diffuse micronodular opacities which were distributed predominantly over the lower lobes and posterior regions with thickening of interlobar septa (Figure 2). A high suspicion of PAM was considered and a fiber optic bronchoscopy was done and bronchial brushings and washings were done. The bronchial washings showed calcific concretions of alveolar macrophages. Percutaneous lung biopsy was also done, which revealed numerous calcospherites, which confirmed our diagnosis (Figures 3 and 4). The patient's blood biochemistry including calcium and phosphorous levels were normal. His younger brother was also subjected to chest radiograph but was found to be normal. There was no similar illness in the patient's

family. His spirometry showed a mild restriction pattern and he had no evidence of pulmonary hypertension. He is currently managed symptomatically and has not worsened till the last contact.

DISCUSSION

PAM is a rare disease of unknown pathogenesis, characterized by the formation of widespread laminated microliths or calcospherites in the alveolar spaces with no underlying disorder of calcium metabolism. PAM was first reported by Harbitz in 1918² and was earlier known as Harbitz' syndrome. The name PAM was coined by Ludwig Puhri in 1933. Though sporadic in occurrence, a familial autosomal recessive pattern of inheritance has been described particularly in Italy and Turkey.³⁻⁵ PAM occurs in both sexes with a slight predominance among males. Although, PAM is seen in all age groups, it is most frequently diagnosed from birth

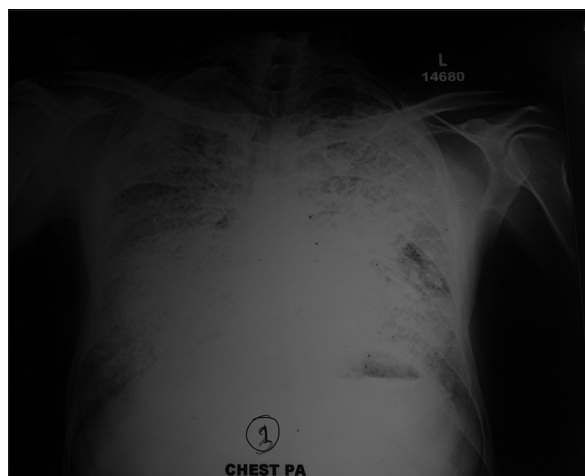


Figure 1: Chest X-ray showing bilateral diffuse nodular opacity involving all zones

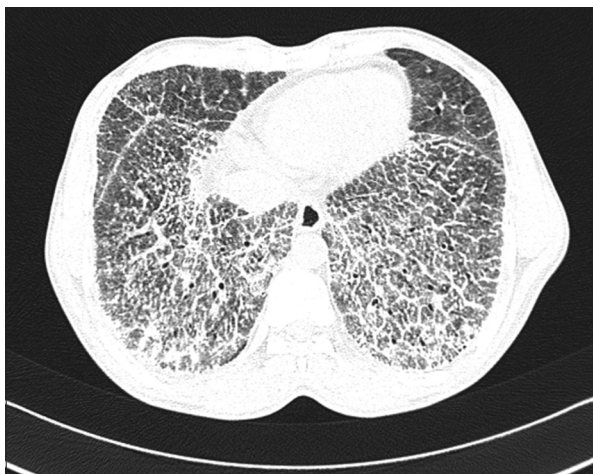


Figure 2: High resolution computed tomography thorax showing bilateral diffuse micronodular opacities with predominant lower lobes involvement and posterior regions with thickening of interlobar septa

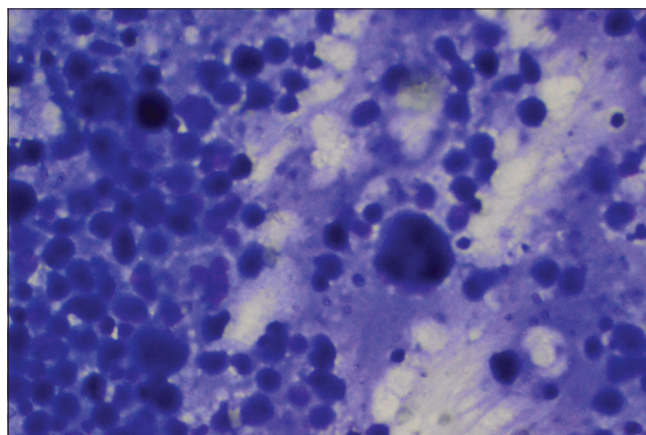


Figure 3: Smear showing sheets of macrophages and multinucleated giant cells in proteinaceous background, May-Grünwald-Giemsa stain, x200

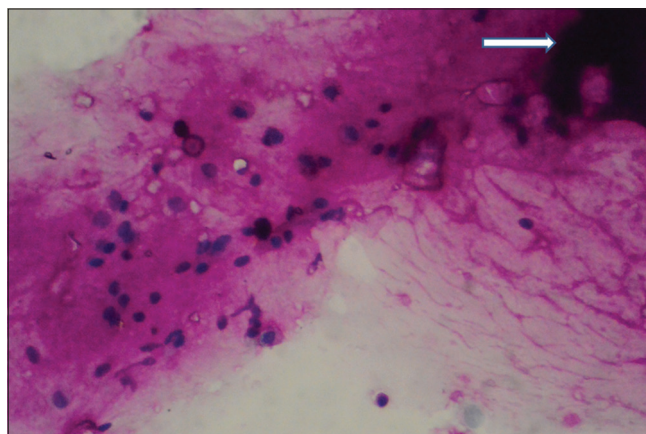


Figure 4: Smear showing numerous macrophages in a background of strong periodic acid-Schiff (PAS) positive proteinaceous material with calcified debris (arrow), PAS stain, x200

to 40 years of age. The first case in India was reported by Viswanathan *in*.⁶

The exact cause for this abnormal microlith formation has not been ascertained. Studies have shown the possible mutation of the of the solute carrier family 34 (sodium phosphate), member 2 gene (the SLC34A2 gene), which encodes a sodium/phosphate cotransporter as a possible cause of the disease.^{7,8} Defect in this cotransporter results in the inability of the alveolar type II cells to clean up the phosphorus ion from the alveolar space resulting in its accumulation and forming of microliths rich in calcium phosphate. Jönsson *et al.* have also identified possible variation in the gene mutation.⁹

The majority of the patients are asymptomatic despite extensive radiological lesions. Symptoms of dry cough and progressive dyspnea manifest in the third to fourth decade. A few cases of expectoration of microliths have been reported.¹⁰ The progressive disease leads to development respiratory fibrosis and cor pulmonale. Pulmonary function remains normal or only slightly impaired initially. As the disease process advances, the alveolar walls become fibrotic and a restrictive ventilator defect with a reduced diffusion capacity develops. Extrapulmonary calcifications have been reported including nephrolithiasis, testicular calcification and sympathetic chain calcification.¹¹⁻¹³

PAM is usually suspected radiologically. On CXR, there is bilateral diffusely distributed small intraparenchymal nodules predominantly in the lower zones and paracardiac zones. These nodules are smaller than 1 mm and well-defined (sandstorm appearance). HRCT is more sensitive than CXR for detecting the severity and extent of the disease. HRCT may show a wide variety of lesions like bilaterally distributed micronodules, subpleural nodules, nodular fissure, calcification along the interlobular septa, dense consolidations, paraseptal and centrilobular emphysema, subpleural cysts, black pleural lines, diffuse ground-glass attenuation areas, mosaic pattern and apical bullae. Diffuse interstitial involvement and mosaic pattern are usually seen in end stage disease.¹⁴

Histopathological diagnosis of PAM require an open lung biopsy, needle biopsy or transbronchial biopsy. Lung biopsy remains the most definitive procedure for confirmation of PAM. In centers where open lung biopsy is not feasible, a transbronchial biopsy may be performed. The pathological features are mostly limited to the lungs, and the microliths are almost invariably intralveolar. The microscopic picture shows alveolar spaces containing typical laminated calcific microliths with fibrosis and thickening of the alveolar walls.

A number of conditions can resemble PAM radiologically. These include miliary tuberculosis, metastatic calcification, amiodarone lung toxicity, and amyloidosis. It is always advisable to confirm the diagnosis of nodular lesions on CXR by a CT scan of the chest.

There is no specific treatment available for PAM. Unlike pulmonary alveolar proteinosis broncho alveolar lavage of the whole lung is not effective for PAM. The calcium embedded microliths are not easily dislodged by BAL. Home oxygen therapy may be necessary for patients with respiratory failure. Disodium etidronate, which inhibits the micro-crystal growth of hydroxyapatite has been tried in some patients.¹⁵ Lung transplant may be needed for end-stage disease.

CONCLUSION

PAM though is a rare disorder, should be considered as one of the possible differential diagnosis of nodular opacities on CXR. In a tuberculosis endemic country like India, there are chances for wrong treatment with ATT. Whenever possible a HRCT thorax should be performed.

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Diagnosis of Inguinal Bladder Hernias: Current Role of Sonography

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Abstract

Compared with digestive or omental hernias, inguinal bladder hernias (IBHs) are less common. When they do occur they are usually small and asymptomatic and hence as such they do not cause any clinical problem. However when volume increases, problems can arise, often requiring surgical intervention. The vesical component in hernia pathology must be detected as it ensures conservation of the vesical wall at herniorrhaphy. Since the advent of high-frequency equipment, ultrasonography has become the essential method of diagnosing vesical hernias as it is widely available. Ultrasound is the modality of choice to pinpoint IBH in the differential diagnosis of inguinoscrotal swellings. It should be preferred to other imaging techniques because it is non-traumatic, cost-effective and saves time. We are reporting a case of inguinal bladder hernia detected with sonography in an adult patient.

Key words: Bladder, Hernia, Ultrasonography

INTRODUCTION

Inguinal bladder hernias (IBHs) are rare. When they do occur, they are usually small and asymptomatic and hence as such they do not cause any clinical problem. When volume increases, problems arise, often requiring surgical intervention. The vesical component in hernia pathology must be detected as it ensures conservation of the vesical wall at herniorrhaphy. Ultrasound (US) is the modality of choice to pinpoint IBH in the differential diagnosis of inguinoscrotal swellings. It should be preferred to other imaging techniques because it is non-traumatic, cost-effective and saves time.

CASE REPORT

A 60-year-old male patient was referred to the US department for evaluation of a left inguinal bulge. Using

a 5-2 MHz curvilinear probe (Sonolisa 32) at the pelvis level, we noticed that the left anterosuperior angle of the bladder was drawn toward the ipsilateral inguinal area (Figures 1 and 2). Using a high-frequency (7-5 MHz) linear transducer the inguinoscrotal area was further examined. It demonstrated an ovoid, anechoic mass which was depressible and surrounded by a thick even

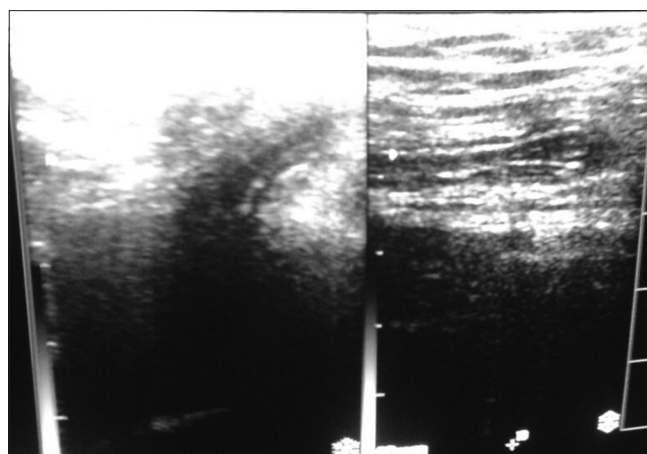


Figure 1: Examination of the inguinoscrotal area by means of a high-frequency (7-5 MHz) linear transducer showing an oblong, depressible, anechoic mass limited by a few millimeters thick even wall

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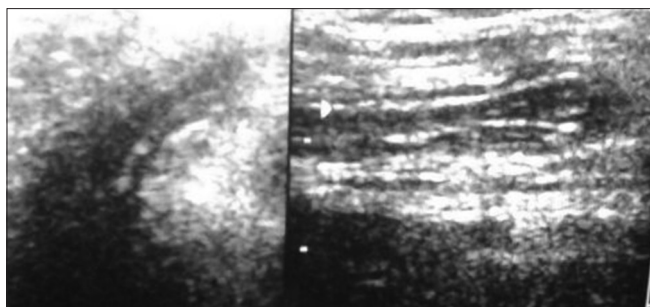


Figure 2: Close relation and continuity between the left vesical angle and fluid filled mass

wall (Figures 1 and 2). The fluid-filled mass was in close relation to and continuous with the left vesical angle. A provisional diagnosis of vesical hernia was suspected and was confirmed by operative findings. Operative findings confirmed the diagnosis of inguinal herniation of bladder.

DISCUSSION

Compared with digestive or omental hernias, IBHs are less common. Bladder herniation occurs in an acquired direct inguinal hernia with the bladder pulled into hernia together with a sheath of peritoneum, which forms its sac. The bladder is involved in only 1 to 4% of groin hernias.¹ The figure is higher and could be more than 10% in patients older than 50.^{2,3} According to the opinion of Mazketli *et al.* this could be an overestimation. In a series where 675 operations were done in cases of inguinal hernias, they found a single case of vesical herniation.⁴ Massive IBHs, described as those where more than 50% of the bladder has left the pelvic position, are extremely rare, <120 cases having been reported in the literature.⁵ In the 14 century vesical hernias were described by the French surgeon Guy de Chauliac.⁶ They appear in 75% of the cases at the inguinal level.⁵ They are frequently unilateral on the right side with 70% male predominance.⁷ Bilateral instances have also been described. Second in frequency come crural vesical herniation (23%), occurring mainly in female patients.⁵ Exceptional localizations make up the last percents namely obturator foramen, linea alba, ischiorectal fossa, incisional site or post-traumatic tear area.^{2,6} IBHs are classified into three subgroups according to their relationship with the peritoneum.⁸ 30% of all are extra-peritoneal, very rarely they are totally intra-peritoneal while most cases (60%) are paraperitoneal with the herniated bladder only partly accompanied by peritoneum. The relative position of the bladder to the peritoneum is very important. The peritoneal tissue can hide an adjacent vesical wall and thereby lead to unintentional injury to the bladder during the repair operation.^{3,5,9} Loss of bladder muscle tone and slackening of the abdominal wall are two main factors contributing to the formation of a bladder hernia.^{5,6,8} The presence of a

sub vesical obstruction or a bladder neoplasm enhances the hernia formation specially in obese patients and in patients with local trauma or incisional scar.^{3,5,6,8} Patients exposed to tamoxifen could also be more frequently affected by IBHs.⁶ Vesical hernias are usually asymptomatic for a long time since they remain small.² They are first suspected when indirect symptoms linked with a prostatic obstruction appear i.e. frequency, nocturia, dysuria.² Mery's syndrome, also known as two-stage micturition, occurs pretty late and can lead to perforation.⁹ The ipsilateral ureter can be pulled and deviated leading to obstruction and hydronephrosis. Since the phenomenon hardly ever affects both sides, acute kidney failure remains an exception.⁴ Neoplastic degeneration is also encountered very rarely.^{4,10} The various common differential diagnosis of inguinoscrotal swellings are easily ruled out on US. Hernias of the digestive tract show presence of intestines with intraluminal air and peristaltic movements. Omental hernias and pre-inguinal lipomas are characteristically hyperechoic.³ Other causes of anechoic inguinoscrotal swellings like hydroceles, herniated vesical diverticula and giant cysts of the epididymis and spermatic cord are also easily distinguished using US by presence or absence of a clear wall and by their anatomic relationships.^{3,4,6,11-13} Intravenous urography and cystography are not the best choice in examining IBHs because of their low level of sensitivity. In supine position the density of the contrast medium causes it to remain in the dependent part of the bladder and prevents it from flowing into the hernia.² Indirect signs like ipsilateral ureteral displacement, small volume of the bladder and incomplete visualization of the bladder base have been described but they may not be conspicuous.^{5,6,11} Upright positioning of the patient together with a voiding test are the only techniques to demonstrate the presence of a hernia by forcing the contrast medium to flow into it as a result of higher intravesical pressure.^{6,11} US is nowadays the first-choice diagnostic imaging modality for IBHs as it is completely atraumatic and cost-effective. With the advent of high-frequency transducers with the excellent resolution, it is possible to accurately demonstrate a vesical hernia as a soft anechoic mass with a wall, which is connected to the bladder.^{3,9} It is also possible to distinguish a direct herniation from an indirect one using color Doppler to locate the lateral or medial position, respectively, of the inferior epigastric vessels.¹⁴⁻¹⁶ The presence of hydronephrosis or a possible outlet obstruction can also be easily ascertained on US. Contrast-enhanced computed tomography (CT) scans can also accurately demonstrate vesical hernias specially after the bladder has been insufflated with gas.^{2,10} Just like US, it helps study a subvesical problem and quantifies hydronephrosis.⁹ CT is however considered to be disproportionately expensive.

CONCLUSION

Although the incidence of vesical hernia is not high, preoperative identification of IBH is essential, to prevent iatrogenic trauma. IBHs should, therefore, be systematically ascertained mainly in older patients presenting symptoms of prostatic obstruction. US proves to be the first choice of diagnostic imaging technique. It not only permits a differential diagnosis of inguinoscrotal swellings, but also studies the anatomic relationships most accurately and immediately displays distal abnormalities without being expensive at all.

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Deep Vein Thrombosis in Post-partum Case of Caesarean Section: A Case Report

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Abstract

Deep vein thrombosis (DVT) is one of the causes of maternal morbidity and mortality. Its incidence is about 1 per 1000 deliveries, of which 1-2% are fatal. In pregnancy, the risk of DVT increases by 5-10 times and in caesarian section the risk further increases by 5-10 folds. The risk of thrombosis was highest in the third trimester of pregnancy and in the immediate postpartum period. Clinical features associated with lower limb thrombosis are: Edema, tenderness, positive Homan sign. Ultrasound is more useful in the diagnosis of proximal DVT (femoral and popliteal veins). We are reporting a case of 33-year-old female presented to our hospital with complaints of 38 weeks pregnancy with labor pains. She had no personal or family history of thromboembolism. For fetal distress, her caesarian section was performed. On the 3rd post-operative day, she developed swelling, tenderness, edema and redness in the right lower limb. Color Doppler ultrasound showed thrombosis of external iliac, femoral, popliteal and tibial vein. Antithrombotic therapy was started, and compression bandage was done and patient responded to the therapy. Early ambulation in post-operative period is crucial to prevent such deadly complication.

Key words: Post-partum, Thrombosis, Vein

INTRODUCTION

Deep vein thrombosis (DVT) is one of the causes of maternal morbidity and mortality. Its Incidence is about 1 per 1000 deliveries, of which 1-2% are fatal.¹ In pregnancy, the risk of DVT increases by 5-10 times and in caesarian section the risk further increases by 5-10 folds. The risk is highest during labor and in the immediate postpartum period.^{1,2} In the post-partum period the risk of DVT is five times greater than during pregnancy.³

The risk of DVT is between 0.5 and 3.0 per 1,000 women during pregnancy. Due to the prevalence and severity of DVT pregnant women at risk should be offered anticoagulant therapy. Hyper-coagulable state in pregnancy is due to changes in the coagulation system. About 50% of

women during pregnancy who have thrombotic event have congenital or acquired thrombophilia. In approximately 50% of patients with a hereditary thrombophilia, the initial thrombotic event occurs in the presence of an additional risk factor such as pregnancy, oral contraceptive use, orthopedic trauma, immobilization, or surgery.¹

CASE REPORT

We report a case of a 33-year-old primiparous women admitted to our hospital with complain of 38 week pregnancy with labor pains. She had no personal or family history of thromboembolism. For fetal distress emergency caesarian section was performed. The caesarian was performed without any complication. On 3rd day of operation patient developed swelling, redness, pain in the right lower leg. Homan sign (pain on passive dorsiflexion of the foot) was positive. Doppler ultrasound of right leg showed thrombosis of the external iliac vein, femoral vein, popliteal vein, and tibial vein. Her hemoglobin-9 g%, platelet count-1,50,000, prothrombin time-5.06 (0.8-1.2), partial thromboplastin time ratio-2.21 (0.8-1.2), fibrinogen-866 mg/dl (200-400), ATIII-81 (80-120), D-dimer-.3376 ug/L (0-550). Patient was treated

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with low molecular weight heparin (LMWH) (Enoxaparin 1 mg/kg body weight twice daily) and compression bandage. Patient responded to anticoagulation therapy and was discharged with an advice to attend the follow-up clinic for long-term anticoagulation advice for next 6 months to prevent a recurrent thromboembolic episode. Patient was discharged with anticoagulation treatment (Coumadin, maintaining INR between 2 and 3).

DISCUSSION

DVT is one of the important cause of maternal deaths.⁴ In pregnancy, there is the alteration between prothrombotic and anticoagulant factors, that increases fibrin deposition and decreases fibrinolysis, resulting in a procoagulant state.⁵ In the third trimester of pregnancy the flow velocity in the lower limb is reduced by approximately 50%,⁶ and 50% of DVT in pregnancy are associated with inherited or acquired thrombophilia.⁷ The most important risk factors are multiparity, puerperium, post-operative periods, infections, neoplasm, systemic lupus erythematosus and hypercoagulability states.¹

Diagnosis can be made by compression ultrasonography that has a sensitivity of 97-100% and a specificity of 98-99%,⁸ while contrast-enhanced computed tomography and magnetic resonance imaging may confirm the diagnosis and quantify thrombosis extension. Pulmonary embolism (PE) occurs in 13% of cases.⁹ Broad-spectrum antibiotics and intravenous heparin or LMWH should be started immediately. Anticoagulants must be continued for 3-6 months. Despite the use of LMWH, DVT and embolism may develop.¹⁰

Caval filter is recommended in extensive DVT and whenever discontinuation of anticoagulation might carry a high risk of PE.¹¹ There are no studies regarding the use of graduated elastic compression stockings (GCS) in pregnant women. However, it is likely that stockings could be beneficial.

Hence, the recommendation from the Royal College of Obstetricians and Gynecologists is that GCS (knee-length

with compression strength of 30-40 mm Hg) should be applied to help prevent post-thrombotic syndrome.

CONCLUSION

This leads to the conclusion that all women should be assessed for the risk factors of DVT in early pregnancy and that the assessment should be repeated if the woman is admitted to a hospital or develops intercurrent problems. The assessment should be repeated anyway intra-partum or immediately postpartum.

In our reported case, the complications could be prevented if early ambulation were advised to the patient. Early ambulation in the post-operative patient can prevent such a deadly complication.

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Alocasia macrorrhiza: A Decorative but Dangerous Plant

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Abstract

Alocasia macrorrhiza also known as giant taro, elephant's ear is a member of Araceae family. It is commonly used as a decorative plant. It is also used in many parts of the world as traditional herbal medicine in diverse ailments. The plant is toxic to animals and the principal toxic ingredient is insoluble calcium oxalate. Few cases of human toxicity have been reported worldwide. We report this case of plant poisoning after ingestion of leaves of *A. macrorrhiza* in 1½-year-old male child and his father to sensitize medical fraternity regarding the toxicity of this household decorative plant.

Key words: *Alocasia macrorrhiza*, Decorative plant, Poisoning

INTRODUCTION

Alocasia macrorrhiza is commonly used as a household decorative plant. It is a tall succulent herbaceous plant that can reach up to 4.5 m. It has a large elongated stem, around 0.9 m long and arrow-shaped leaves with shallow and rounded lobes. The leaves point upward forming a straight line with the main axis of the petiole.

They have a conspicuous midrib and are green in color. The leaves are nearly peltate. The caudex is well developed.¹ Most commonly used part of the plant is tuber having chemical constituents of alomacrorrhiza A and allocasin. The detoxified tuber is used to treat influenza, high fever and malaria; diarrhea and typhoid fever, rheumatic; pulmonary tuberculosis and tuberculous lymphadenopathy; headache; abscesses and ring worms; venomous bite of snake, dogs and insects, leukorrhea.¹ In Hawaii, it is used in the treatment of severe burns and acute abdominal pain.¹

The rootstock is used as mild laxative, diuretic; used in inflammation and diseases of the abdomen and skin.¹ It has been tried in the treatment of scorpion sting among the Indian traditional practitioners.¹

The leaves have been used as an astringent and anti-tumor medication. Root and leaf are used as a rubefacient. A local application of leaves in different forms is used for the treatment of skin conditions such as itching and burns, varicose veins, wound healing and rheumatic pains.¹

The underground stem of the plant is used as a household remedy for gout and rheumatism.¹

Pharmacology

The principal toxic ingredient is insoluble calcium oxalate.² The edible parts of this plant exhibit potent antioxidant properties especially the diethyl ether extract from all parts and the hydroalcoholic extract from the leaves.^{3,4}

The ethanolic extract of leaves also has anti-nociceptive, anti-inflammatory and hepato-protective properties.⁴

Allocasin isolated from the tuber of *A. macrorrhiza* has antifungal, weak hemagglutinating activity and reduces the activity of human immunodeficiency virus 1 reverse transcriptase enzyme.⁵

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Sapotoxin is a neurotoxin which leads to neurological symptoms (severe pain and numbness in the perioral area and throat).⁶

CASE REPORT

A 1½-year-old male child was brought by a grandfather with complaints of excessive cry, irritability immediately after eating leaves of a household plant known locally as Arbi/Hathikan (Figure 1). He developed redness of buccal mucosa and tongue after 2-3 min of eating leaves and excessive drooling of secretion from the mouth after half an hour. Out of curiosity, father also tasted leaves of the plant following which inflamed painful blister on the tip of the tongue and perioral numbness developed immediately. It was not relieved by home remedies (sweetened fluids) and lasted for 8-10 h. On examination at the time of admission (after 1 h of eating leaves), child was very irritable with an inconsolable cry and had salivary drooling. Lips and tongue were swollen and reddened. He had dysphagia. On 2nd day, leaves and tuber were brought by parents, which after consultation with botany department, were from a decorative home plant called *A. macrorrhiza*. Patient was put on intravenous fluids, ranitidine, antacids, local antiseptic and anesthetic mouth gel. Healing occurred by 3rd day and patient was discharged. He was asymptomatic on follow-up after 1 week.

DISCUSSION

A. macrorrhiza is a very commonly used decorative plant in India without knowing that the ingestion of any part of the plant is toxic.⁷ Children can unknowingly come in contact to these plants and ingest some part of it leading to toxicity. In our study, the child developed excessive cry, irritability, redness of buccal mucosa and tongue, drooling of secretion from mouth, which was similar to a case reported by Chan and Chan, who reported a case of poisoning due to consumption of tuber of *A. macrorrhiza*. However, our case had ingested leaves of the plant instead of tuber.⁸

Goonasekera *et al.* had reported 2 cases of fatal poisoning following the ingestion of the fruit of *A. macrorrhiza*. The clinical manifestations simulated those of cyanogenic glycoside poisoning.⁷

A systemic review of cases reported of poisoning due to *A. macrorrhiza* attributed the symptoms to calcium oxalate crystals and sapotoxin. The reviewer noted that among 27 cases, 1 had eye contact another one had skin contact and rest all poisonings were due to ingestion of either leaf

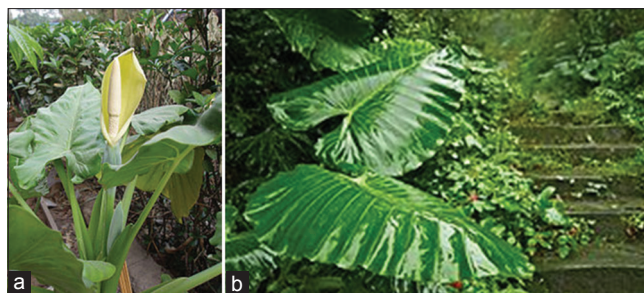


Figure 1: (a and b) *Alocasia macrorrhiza*^{10,11}

or tuber, raw or cooked. Sore throat with numbness of oral cavity, salivation, dysphonia, abdominal pain, airway obstruction, hoarseness, and ulcers of the oral cavity, dysphagia, thoracodynia, chest tightness and swollen lips were the commonly reported symptoms.⁹ There is no danger of systemic oxalate poisoning as the calcium oxalate is insoluble.⁶

The illness is self-limiting in most cases and requires only supportive treatment, however; throat pain, abdominal pain, excessive salivation and dysphagia do interfere with the daily activity and can be very stressful especially to small children.

CONCLUSION

We recommend that people should be educated about these problems so as to prevent further poisonings and decrease use of this plant for decorative household purposes.

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Cytology of Granular Cell Ameloblastoma of Jaw: A Rare Case Entity

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Abstract

Ameloblastoma is a benign neoplasm of odontogenic epithelium occurring more commonly in the mandible than the maxilla. The granular cell variant of ameloblastoma is a rare condition, accounting for 3.5% of all ameloblastoma cases. It is known to be locally more aggressive, with a higher chance of recurrence compared with other subtypes. Though fine-needle aspiration cytology of the jaw lesions are rarely done, it provides a means of rapid initial evaluation and offers reliable pre-operative cytological diagnosis. This case report illustrates the diagnosis of granular cell ameloblastoma based on correlation of clinico-radiologic and cytologic features.

Key words: Ameloblastoma, Basaloid cells, Cytology, Granular cell

INTRODUCTION

The odontogenic tumors constitute a heterogeneous group of lesions that arise from the epithelial and/or mesenchymal elements of tooth germ.¹ Ameloblastoma is a benign but locally aggressive tumor affecting the jaw bones. It occurs most often in the posterior mandible in the region of the third molar. There is no definite sex predilection and is seen most commonly in 4th and 5th decades.²

The most common clinical presentations are painless slow-growing swelling, which is often accompanied by facial deformity, malocclusion, tooth loss, and pain and paresthesia of the affected region.¹

Radiologically, ameloblastoma presents as an expansile uni or multiloculated lytic lesion, with thin internal septations giving the classic “soap bubble” appearance. They may be associated with resorption of roots of adjacent teeth. The internal septations represent differential cortical resorption, rather than true compartmentalization of tumor tissue.³

Histologically the tumor exhibits diverse patterns. The morphologic spectra include follicular, plexiform, acanthomatous, granular cell, desmoplastic and basal cell patterns, the most common being follicular form. The granular cell ameloblastoma (GCA) is one of the rarest entities and accounts for only 5% of all ameloblastomas.¹ Only around 30 cases of GCA's have been reported in English literature.²

On histopathology, GCA is characterized by a granular change of stellate-like cells located in the central portion of the epithelial islands. The periphery of these islands shows palisading tall columnar cells.¹ This granular change is attributed to accumulation of lysosomal granules within the cytoplasm of stellate reticulum like cells.⁴ With increasing age, the lysosomes lose their ability to digest unwanted cellular material and their aggregates impart a granular appearance to the cytoplasm.⁵

Whereas histopathological and radiological findings for ameloblastomas have been extensively studied, fine-needle aspiration cytology (FNAC) reports are rare with poor documentation in the literature.⁶ However, studies show that FNAC is an excellent diagnostic aid for the pre-operative diagnosis of jaw lesions. We discuss here a case of GCA of the mandible, which was diagnosed based on characteristic clinical, radiological and cytomorphological features.

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CASE REPORT

A 42-year-old male patient presented to us with a painless swelling over the right side of the lower jaw. He had first noticed a small swelling 2 years back. Since then the swelling had grown slowly to its present size. There was no associated difficulty in opening the mouth, chewing or articulating.

On physical examination, there was a firm to hard, non-compressible, non-tender mass measuring 6 cm × 5 cm located at the angle of the right side of the mandible. The overlying skin was stretched, normal in color and texture and not adherent to the mass. No sinus or discharge was observed. Intraoral examination revealed a diffuse swelling in the posterior mandibular region on the right side, irregular in shape and firm to hard in consistency.

Computed tomography scan of the face revealed a uniloculated, expansile, lytic lesion of size 5.7 cm × 5.3 cm in the ramus of right mandible extending up to the angle of mandible, showing multiple areas of cortical dehiscence with associated heterogeneous soft tissue (Figure 1a-d). The radiological differentials were ameloblastoma and odontogenic keratocyst.

Aspiration of the swelling yielded thick reddish brown material. Air-dried smears were stained with May-Grunwald Giemsa. The smears showed moderate cellularity. There were sheets and clusters of uniform appearing basaloid cells with peripheral palisading. The basaloid cells showed scant, poorly defined cytoplasm, elongated nuclei, finely distributed chromatin and inconspicuous nucleoli. Closely admixed with these cellular fragments were large cells seen

in loosely arranged groups as well as scattered singly. The cells showed abundant granular pale eosinophilic cytoplasm with ovoid nuclei and vesicular chromatin (Figure 2 a-d).

DISCUSSION

GCA is an uncommon variant of the many types of ameloblastomas. Though it possesses distinctive cytomorphological features, there are very few documented cases in the literature which have been diagnosed based on FNAC. Deshpande *et al.*,⁷ had described two cases of GCA diagnosed based on cytology and had stated that “recognition of large cells with abundant cytoplasm exhibiting eosinophilic granules dispersed singly or in loosely cohesive groups along with individual tightly cohesive basaloid epithelial cell clusters might facilitate its diagnosis in cytology.” These cases were subsequently confirmed on histopathology lending credibility to their observation.

On cytology, the characteristic triad of ameloblastoma consists of cohesive sheets of basaloid cells with peripheral palisading, squamous metaplastic cells and cells resembling stellate reticulum.⁸ Fragments of basaloid cells with peripheral palisading intermixed with numerous large granular cells were seen in the present case, representing the classic features of GCA.

In regards to the tumor location, the various differentials considered in our case were salivary gland tumors such as mucoepidermoid carcinoma, warthin's tumor, oxyphilic adenoma/carcinoma, acinic cell carcinoma and granular cell tumor.

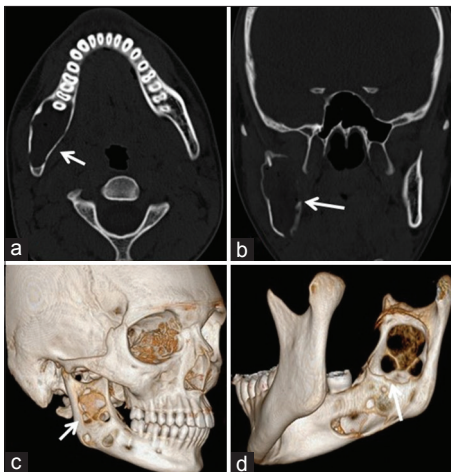


Figure 1: Computed tomography scan face and mandible. Coronal (a), axial (b) and three-dimensional reconstruction images (c,d) show a large expansile lytic lesion (arrow) involving the right mandibular ramus extending up to the angle of mandible, with areas of cortical dehiscence

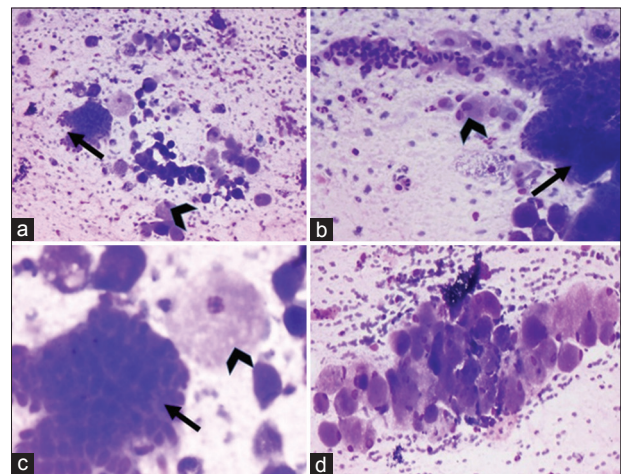


Figure 2: (a-c) Epithelial islands of basaloid cells with peripheral palisading (arrow) along with large granular cells (arrow head), (a) Giemsa, x40, (b) Giemsa, x100, (c) Giemsa, x400, (d) Cluster of granular cells, Giemsa, x200

In mucoepidermoid carcinoma, there is an admixture of mucin-secreting columnar cells, intermediate cells and squamoid cells in a dirty background of mucus and debris. Smears of warthin tumor aspirate show sheets of oncocytes with sharp cytoplasmic borders and abundant granular cytoplasm in a lymphocyte rich dirty granular background. Oxyphilic adenoma/carcinoma arising from salivary glands exclusively show clusters of oncocytes. Acinic cell carcinoma exhibits cells with abundant basophilic granular cytoplasm with eccentric nuclei often arranged in acinar-glandular pattern with frayed borders and a centrally placed vessel.⁹ The granular cell tumors of the jaw predominantly show granular cells in tight clusters and scattered singly.¹⁰ However, all the above lesions can be reliably distinguished from GCA based on the presence of basaloid cell clusters showing peripheral palisading, admixed with large granular cells.

The pre-operative diagnosis of GCA is important as it enables the surgeon to plan a more radical surgery instead of a conservative approach. This is important as GCAs are known to be more aggressive and are associated with a high recurrence rate.¹¹ A radical surgery is warranted in cases of GCA as their extension within the cancellous bone tends to exceed their macroscopic and radiologic boundaries. Simple enucleation or curettage may lead to recurrence of the tumour.⁶

CONCLUSION

To conclude, in the presence of appropriate clinico-radiologic findings, FNAC provides a simple, low-cost, rapid and reliable pre-operative diagnosis. A meticulous

search for basaloid clusters and large granular cells can aid in making a cytological diagnosis of GCA with reasonable accuracy thus avoiding unnecessary surgical biopsy and ensuring an adequate surgical excision in a planned manner.

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Ellis–van Creveld Syndrome with Developmental Delay

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Abstract

Ellis–van Creveld (EVC) syndrome also known as chondro-ectodermal dysplasia or meso-ectodermal dysplasia, is a rare autosomal recessive syndrome. EVC belongs to the short rib-polydactyly group. The genetic defect is located at chromosome 4p16. Two different mutations EVC1 and EVC2 have been identified. All embryonic layers appear to be involved in EVC syndrome. This syndrome is characterized by skeletal and ectodermal dysplasia. The principal features of this syndrome are chondroectodermal dysplasia, polydactyly and congenital heart defects. We report a 10-month-old female child with EVC syndrome with all the classical features and developmental delay, which has not yet been reported with this syndrome.

Key words: Common atrium, Developmental delay, Ellis–van Creveld syndrome, Oral anomalies

INTRODUCTION

Ellis–van Creveld (EVC) syndrome also known as chondro-ectodermal dysplasia or meso-ectodermal dysplasia was first described by Ellis of Edinburgh and Simon van Creveld of Amsterdam in 1940.¹ It is a rare autosomal recessive disease resulting from a genetic defect located at chromosome 4p16. Two different mutations EVC1 and EVC2 have been identified.²⁻⁴ This syndrome is most prevalent in the Amish population occurring in 1/5000 live births and the birth prevalence in non-Amish population is estimated to be 7/10,00,000.^{5,6} The principal features of this syndrome are chondroectodermal dysplasia, polydactyly, and congenital heart defects. The patients have a small stature, short limbs, fine sparse hair and hypoplastic fingernails. Oral manifestations include multiple musculo-fibrous frenula, dental transposition, conical teeth, hypoplasia of the enamel, hypodontia, and malocclusion. The teeth can erupt and exfoliate prematurely.^{2-4,7,8}

CASE REPORT

A 10-month-old female was the first child born of a non-consanguineous marriage presented with hyperdynamic precordium since birth, sweating on the forehead, decreased activity and delayed developmental milestones. Perinatal history was normal except she had natal teeth that were later shredded. Family history was normal.

On examination she had weight 6.5 kg, length of 62 cm, occipitofrontal circumference of 41 cm, chest circumference of 39 cm, upper segment/lower segment ratio of 1.57:1, long narrow dysplastic chest and abdomen (Figure 1), fusion of upper lip to underlying gums (Figure 2), abnormal upper and lower gums (Figure 3), postaxial polydactyly of both hands and hypoplastic nails (Figure 4), small pelvic bones, and genu valgum (Figure 5). A wide space is seen between the hallux and other toes (Figure 6). X-ray hip showed small pelvic bones. Chest X-ray showed pulmonary plethora (Figure 5). Electrocardiogram showed superiorly oriented QRS axis with left axis deviation (Figure 7). 2D-echocardiography showed single atrium. No anomalies in the analytic tests including routine blood and ultrasound abdomen were found. No genetic study had been made. All these findings confirm EVC syndrome. Patient was diagnosed as EVC syndrome with congenital heart disease.

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Figure 1: Long narrow dysplastic chest and abdomen

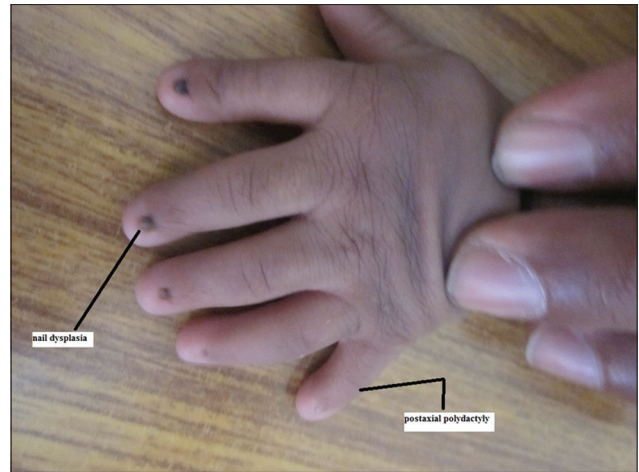


Figure 4: Child with Ellis-van Creveld syndrome showing postaxial polydactyly and nail dysplasia

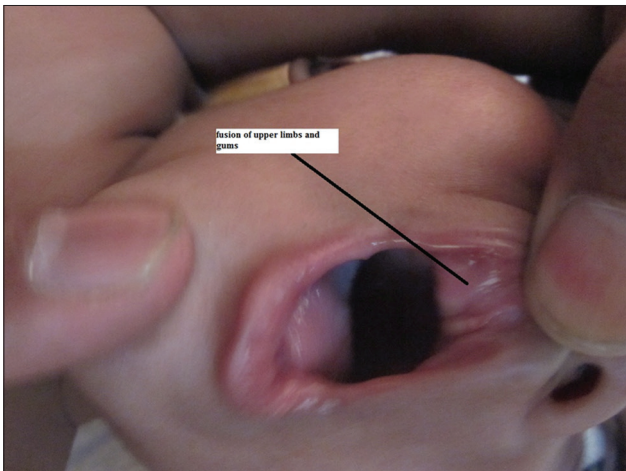


Figure 2: Child with Ellis-van Creveld syndrome showing fusion of upper lip to gums

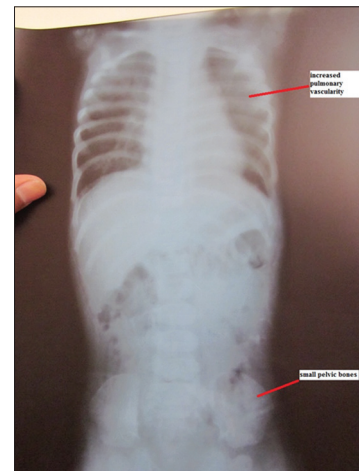


Figure 5: X-ray showing increased pulmonary vascularity and small pelvic bones

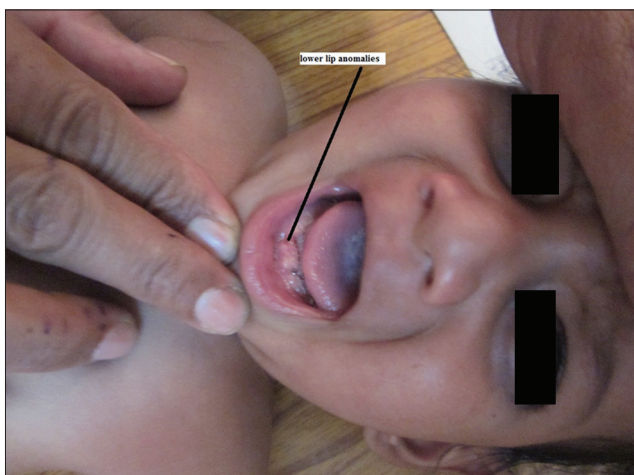


Figure 3: Child with Ellis-van Creveld syndrome showing lower lip anomalies

with congestive heart failure with development delay and was treated and discharged.

DISCUSSION

EVC syndrome also known as chondro-ectodermal dysplasia is a skeletal and an ectodermal dysplasia. All embryonic layers appear to be involved in EVC syndrome. The signs of ectodermal dysplasia are usually limited to nails, teeth and gums, although some cases with eye and neural involvement have been described. Abnormalities of the skeletal system and the heart and in some patients of the kidneys indicate the mesodermal involvement. Endodermal involvement is not very common.⁹ The syndrome can be diagnosed during the prenatal period, starting from the 18th week of gestation, by ultrasonography, or later by clinical examination after birth.

The skeletal dysplasia presents at birth with short limb, especially the middle and distal segments (acromelic and mesomelic), postaxial polydactyly, wide hands and feet, sausage-shaped fingers of hands and fingernail dysplasia



Figure 6: Wide gap between hallux and toes

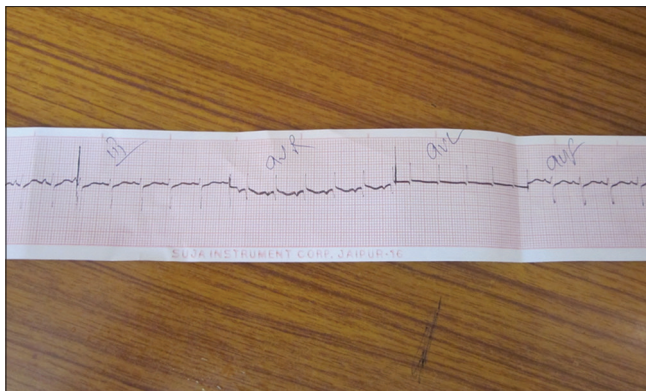


Figure 7: Electrocardiogram showing left axis deviation and superior QRS axis

are seen. The thorax is usually narrow with pectus excavatum, lumbar lordosis and genu valgum. A wide space is often seen between the hallux and other toes. The hair is sparse and fine. All the above mentioned skeletal features were present in our case. Adult height ranges from 109 cm to 152 cm.

Oral manifestations seen are dental anomalies including neonatal teeth, absent eruption, delayed eruption, premature loss of teeth, malocclusion, hypodontia, and appearance of conical teeth, hypoplasia of the enamel and multiple musculo-fibrous frenula and upper lip defects which matched our case.

Common congenital heart malformations include atrial septal defect, single atrium or common atrium and rarely ventricular septal defect, patent ductus arteriosus, hypoplasia of aorta. Our case had common atrium, which is seen in 40% of cases.

The cognitive and motor developments of patients affected by EVC syndrome are normal.^{2,4} However in our case, there was a significant developmental delay in all 4 aspects.

Skeletal radiograph reveal short tubular bones with clubbed ends, especially the proximal tibia and ulna. Carpal bones display extra ossification centers and fusion.

EVC belongs to the short rib-polydactyly group (SRP). These SRPs are all autosomal recessive disorders that have been classified into types (Saldino-Noonan syndrome, Type I; Majewski syndrome, Type II; Verma-Naumoff syndrome, Type III; Beemer-Langer syndrome, Type IV; and Jeune dysplasia). They are characterized by hypoplastic thorax due to short ribs, short limbs, frequent polydactyly and visceral abnormalities, and are discussed prenatally. Radiographically and histologically, SRP III (Verma-Naumoff syndrome) most resembles some forms of EVC.^{10,11}

About 30% patients die of cardiac or respiratory problems during infancy. The management of EVC is multidisciplinary. Symptomatic management is mostly required in the neonatal period, including treatment of the respiratory distress due both to the narrow chest and heart failure. Neonatal teeth should be removed because they may impair the feeding. In infancy and early adulthood, general and specialized pediatric follow-up are also required: The short stature is considered resulting of chondrodysplasia of the legs and the possible treatment with growth hormone is considered ineffective. The possibility of bones deformity, especially knee valgus and dislocation of the patella, needs regular orthopedic follow-up.¹²

CONCLUSION

EVC syndrome is a skeletal and an ectodermal dysplasia. Dentists play an important role in the control of dental and oral manifestations. Dental treatment must be performed under prophylactic antibiotic coverage with consideration for the high incidence of cardiac defects in EVC patients.

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Bicornuate Uterus with Pregnancy: A Case Report and Review of Literature

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Abstract

The incidence of uterine malformations in general population is estimated to be about 3-5% and 5-10% in women with poor reproductive outcome. Fertility and evolution of pregnancy depends on the type of uterine anomaly. Many of them are asymptomatic but it is important to consider this diagnosis in recurrent miscarriages - early and late, preterm labors, malpresentations, intrauterine growth restrictions and menstrual disturbances like menorrhagia, dysmenorrhea. Septate and arcuate uterus represent approximately 75% of malformations while bicornuate, didelphys and unicornuate comprise the remaining 25%. Cases of pregnancy in a bicornuate uterus are still of sufficient interest and rarity to justify being reported. We report a case of bicornuate uterus with two successful pregnancies and diagnosed at 30 weeks gestation in third pregnancy with intrauterine demise by ultrasound examination.

Key words: Bicornuate uterus, Pregnancy, Uterine malformation

INTRODUCTION

Abnormal fusion of mesonephric duct (mullerian duct) during embryonic life results in a variety of congenital uterine malformations.¹ The incidence of uterine malformations in general population is estimated to be about 3-5% and 5-10% in women with poor reproductive outcome.²⁻⁴ Precise diagnosis requires diagnostic modalities like ultrasonography (USG), magnetic resonance imaging hysterosalpingogram, hysteroscopy and laparoscopy. Pregnancies occurring in the malformed uterus are relatively rare, and many of them are asymptomatic, but should be suspected in patients with recurrent miscarriages and malpresentations. Airolidi *et al.* reported that high-risk obstetric intervention did not significantly increase the fetal survival rate for uncorrected uterine anomalies.⁵ Reproductive outcomes can be improved with early diagnosis and close follow-up with better treatment.

CASE REPORT

A 33-year-old lady G₃P₂L₂ with 20 weeks gestation came for her first antenatal checkup. Her first delivery was a normal vaginal delivery at term with growth restricted female baby weighing 2 kg and is now alive and healthy. Second was a caesarean section for breech, oligohydramnios, intrauterine growth restriction (IUGR). She delivered a female child weighing 1.75 kg, alive and healthy. Third is present pregnancy. Targeted imaging for fetal anomalies was done at 20 weeks, which showed a SLF of 20 w 6 d gestational age with no fetal structural abnormality. USG was repeated at 30 weeks as the height of uterus was less than a period of gestation and uterus appeared deviated to the right. USG showed a SLF of 30 w 2 d gestation in bicornuate uterus in breech presentation with AFI 7 and EF 1200 g. Doppler's study revealed head sparing wave form in fetal middle cerebral artery, high resistance flow pattern and mid diastolic notching in left uterine artery. Doppler wave form in right uterine artery normal, utero placental insufficiency. USG repeated 2 weeks later in view of absent fetal heart which showed intrauterine fetal demise with Spalding sign. Patient went into spontaneous labor 2 days later. Before going into active labor she developed vaginal bleeding. Screening USG showed abruptio placenta with retroplacental clots and repeat emergency lower

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segment caesarean section was done. Operative findings were - Bicornuate uterus with fetal head in the right horn and breech in the lower uterine segment toward the left side. Left horn empty. Figure 1 and 2 show the dominant right horn seen during caesarean section.

Delivered a dead macerated baby as breech. Placenta was posterior and on the septum which was separated with a rectoplacental clot of about 100 g. Both tubes and ovaries were normal. Patient was stable post-operatively and was discharged on 6th post-operative day with an advice to go for total abdominal USG to rule out any renal abnormalities.

DISCUSSION

The mullerian ducts originate from the coelomic epithelium at 5 weeks of embryonic age and fuse with the uro-genital sinus at 8 weeks. Abnormalities in the

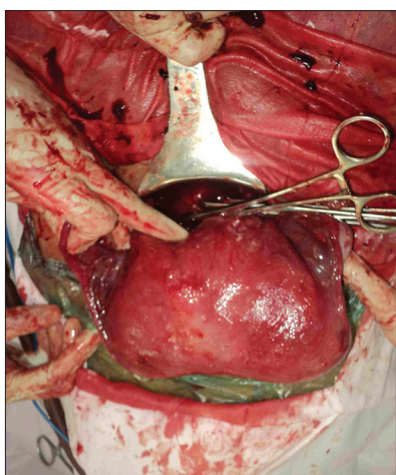


Figure 1: Bicornuate uterus anterior view after delivery of the baby. Ring forceps on the myometrium between the two horns



Figure 2: Bicornuate uterus posterior view after the delivery of the baby

formation and fusion of mullerian ducts can result in a variety of abnormalities of uterus and vagina. Failure of development of mullerian duct is associated with failure of development of uretric bud from the caudal end of the Wolfian duct. Thus, an entire kidney can be absent on the side ipsilateral to the agenesis of a mullerian duct.⁶ An effort to determine a genetic relationship in the development of disorders of the mullerian ducts has shown a polygenic or multifactorial inheritance. Rock and Breech have suggested a modification of American Fertility Society classification of uterovaginal anomalies that comprises four groups based on embryological considerations.⁶ Our case fits into Class III B. Though Golan *et al.* have emphasized on the need for cervical encircage in patients with uterine anomalies, in present case it could not be done as the diagnosis of bicornuate uterus was done at 30 weeks gestation and also the cervical length USG was normal and there was no funneling.⁷ Ravasia *et al.* described the incidence of uterine rupture in a cohort of woman with mullerian duct anomalies who attempted vaginal birth after caesarean delivery (VBAC).⁸ They concluded that vaginal delivery is common among women with mullerian duct anomalies who attempt VBAC but the rates of uterine rupture and other complications are high (8% compared to 0.61% without mullerian duct anomalies). The authors proposed several mechanisms for the greater incidence of uterine rupture in this population: abnormal development of lower uterine segment, previous scar similar to a vertical or classical incision and the possibility of abnormal traction on the uterine scar during labour. Our patient was given a short trail of labor in view of her first normal delivery. Petrozza *et al.* attempted to determine inheritance pattern in patients with uterine anomalies and concluded that the inheritance is most likely a polygenic mechanism and not inherited commonly in a dominant fashion.⁹ The most likely cause of IUGR and intrauterine fetal death in the instant case could be due to implantation of the placenta in the myometrium of the partial bicornuate uterus where only the upper portion of the uterus dips into the chamber.

CONCLUSION

Congenital uterine malformations are relatively common and often asymptomatic. Clinicians must suspect uterine malformations in cases with recurrent miscarriages and adverse obstetric outcomes and should utilize the opportunity to inspect the uterus in the cesarean section in such cases. Urinary tract imaging should be performed because of frequent associated anomalies. A bicornuate uterus does not always lead to complications and may carry a pregnancy to term. It is necessary to establish a prenatal diagnosis to ensure proper care and prevent complications.

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Twenty Nail Dystrophy in 12-year-old Male Child: A Case Report

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Abstract

Twenty nail dystrophy of childhood or trachyonychia is a rare acquired disorder. It is usually idiopathic and can be associated with other diseases. It is characterized by excessive longitudinal ridging, brittleness and thickening of nail plates involving 1-20 nails. We report an interesting case of a 12-year-old adolescent boy who presented to us with rough, opaque and lusterless nails, without any systemic involvement. Histopathological examination revealed the typical spongiosis described with this disease. This report also highlights the rationale for a nail biopsy and challenges faced for investigation of the underlying cause. A conservative approach was successful in our patient.

Key words: Dystrophic nails, Longitudinal ridging, Nail biopsy, Trachyonychia, Twenty nail dystrophy

INTRODUCTION

Trachyonychia was first described by Alkicwicz in 1950 and was termed twenty nail dystrophy (TND) of childhood in 1977 by Hazelrigg *et al.*¹ The term trachyonychia is derived from the Greek word trakos, which means rough, to describe rough nail seen in this condition.² In few patients the abnormality is less severe and only characterized by numerous, small superficial pits, which gives a shiny appearance to the surface of the nail (shiny trachyonychia).³ When the trachyonychia involves all the 20 nails, it is termed as TND.³ It has an insidious onset commonly affecting males with a peak age of 3-12 years.² TND is usually associated with several diseases such as vitiligo, atopic dermatitis, alopecia areata, lichen planus and psoriasis.⁴

Trachyonychia can run in families in an autosomal dominant fashion.⁵ Isolated idiopathic trachyonychia is much less common hence only few case are reported in the literature.⁶ Determining the cause of trachyonychia is quite challenging as most of the times the diagnosis is

straightforward, it could be perplexing at times as, in this case, where nail biopsy became mandatory to know the underlying cause and confirm the diagnosis.

CASE REPORT

A 12-year-old boy presented to our outpatient clinic with discoloration of all the 20 nails since 4 months. The child was apparently asymptomatic till 6 months back, when he first noticed changes in the fingernails followed by similar involvement of the toenails.

There was no history of any trauma, rashes over the body, drug ingestion or previous blood transfusion. There was no family history of any allergies or autoimmune disorder. A detailed clinical examination was done. General examination revealed no evidence of any neurocutaneous markers, skin lesions or mucosal involvement. Systemic examination was unremarkable. Nail examination was quite conspicuous in revealing longitudinal ridging, lack of luster and muddy grayish white discoloration involving all the nails (Figure 1a and b). The child was thoroughly evaluated where complete blood picture and urine examination was normal. Potassium hydroxide preparation and nail culture for fungal growth were negative.

A biopsy specimen of the nail matrix was obtained and sent for histopathological examination, which showed

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focal spongiotic changes in the nail matrix reflecting the clinical appearance of nail plate surface (Figure 2). After the diagnosis was established the child along with his parents was counseled, reassured and explained about the benign nature of the condition and its self-limiting course. He was started on vitamin supplements, biotin and a moisturizer was prescribed. The child was advised to follow-up regularly at the outpatient clinic.

DISCUSSION

The idiopathic type of TND begins insidiously in early childhood. This is usually a self-limiting condition that usually resolve slowly as the child grows. Familial types are usually more severe and dystrophic changes present at birth and usually are persistent.⁷ Our patient is a classic example of idiopathic TND. In our patients, there was involvement of all the 20 nails but in few patients one or a few may be spared.

Early diagnosis and treatment are essential to avoid permanent scarring of nails associated with some conditions like lichen planus.

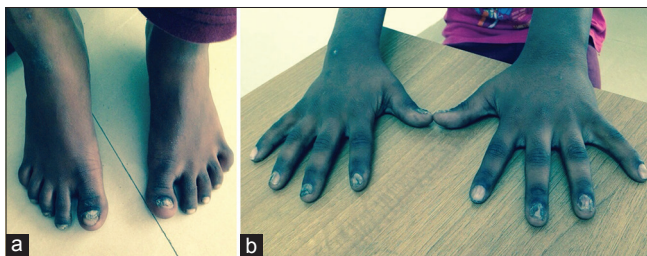


Figure 1: (a and b) The dystrophic nails involving all the 20 nails

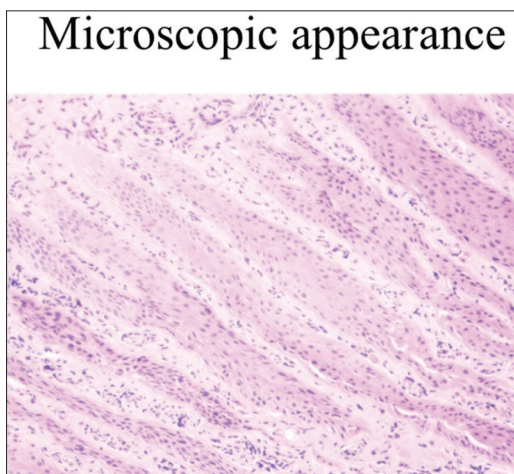


Figure 2: The spongiotic changes in the nail demonstrated on nail biopsy

Treatment of trachyonychia is unsatisfactory and usually unrewarding. Various modalities of treatment have been tried viz., griseofulvin, systemic, topical and intralesional corticosteroids,⁸ but they have been found largely unsuccessful. In a single case oral methyl prednisolone was found to be successful.⁹

A comprehensive review of the literature reveals that there is no single evidence based treatment for trachyonychia. It resolves spontaneously as it is self-limiting and treatment should be given only when deemed essential. Vitamin supplements: Biotin, iron and zinc are helpful and the beneficial effects usually start after 2-3 months of supplementation.¹⁰ Moisturizers help in providing keratin to hold each nail together.

CONCLUSION

Trachyonychia is a chronic clinical condition that may present as an idiopathic finding or in association with other conditions. While the diagnosis can most often be made based on distinguishing clinical symptoms, it could be challenging at times and calls for a need to do a nail biopsy to establish a prompt diagnosis. However, there is no specific therapy for TND and in most cases nail signs improve spontaneously and reassurance to the patient and family remains the mainstay of management.

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Unusual Shunt Migration: A Case Report

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A rare complication of ventriculo peritoneal shunt is the disconnection of the ventricular end of shunt tube and migration¹ of shunt tube into the contralateral lateral ventricle. Ventriculo peritoneal shunt is one of the most common procedure and with varied complications in neurosurgical practice throughout the world. A female child presented to casualty with generalized seizures and altered sensorium. A review of earlier records revealed that she underwent ventriculo peritoneal shunt procedure on the right side for communicating hydrocephalus at the age of 1-month. Non contrast computed tomography scan of the brain was done, it revealed communicating hydrocephalus with displaced²⁻⁴ proximal ventricular end to the left lateral ventricle. Shunt tube with connector was lying outside the cranium on the right side. Right parietal burr hole used for shunt tube closed spontaneously (got obliterated by ossification and calcification occurring post fibrosis). Shunt tube markings were noted over the right side of the cranium. Considering poor Glasgow Coma Scale of the patient, emergency external ventricular drainage followed by endoscopic trans ventricular removal of disconnected shunt tube was done. After the patient's condition had improved left, ventriculo peritoneal shunt was performed. Patient recovered well. This is a rare and unusual case of ventriculo peritoneal shunt failure, due to disconnection of shunt tube and spontaneous migration of shunt tube into the contralateral lateral ventricle (Figures 1-3).



Figure 1: Three-dimensional reconstruction of computed tomography imaging demonstrates migrated ventricular end of shunt tube in the left lateral ventricle with right sided obliterated burrhole with disconnected shunt tube lying outside the cranium



Figure 2: Computed tomography scan brain demonstrating dilated lateral ventricles and ventricular end of shunt in the left lateral ventricle, partly in the parenchyma

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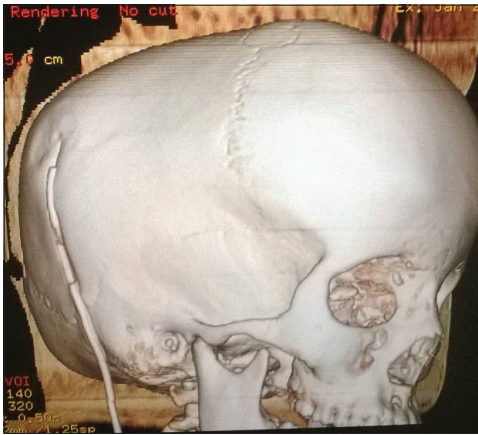


Figure 3: Three dimensional reconstruction of computed tomography scan showing the shunt tube lying outside the cranial cavity with evidence of obliterated burrhole on right side

Points to Ponder

1. Intra cranial migration of ventriculo peritoneal shunt

is one of the rare complication and affects 0.1-0.4% of shunt procedures

2. This is the first reported case of disconnection of the ventricular end of shunt tube and migration of shunt tube into contralateral lateral ventricle following the spontaneous closure of burrhole.

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Idiopathic 20 Nail Dystrophy Treated Successfully with Topical 0.1% Tacrolimus Ointment

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20 nail dystrophy or trachyonychia is a term used to describe the roughness of all 20 nails. It can be a manifestation of a pleomorphic group of disorders such as alopecia areata, lichen planus or can be idiopathic.¹ There is no universally accepted treatment for this chronic disorder. Various modalities of treatment have been tried for this condition such as griseofulvin, systemic, topical, intralesional corticosteroids and are found largely unsuccessful.²

A 41-year-old male patient, a businessman by occupation, otherwise apparently normal, presented with chief complaint of yellowish discoloration and roughness of all of his fingernails and toenails simultaneously since 3 years. The roughness of the nails gradually increased over the years. At the time of presentation, the nails were dull, yellow, lustreless, and opaque with excessive longitudinal ridging and had a rough surface. There were no skin lesions elsewhere on the body. Potassium hydroxide smear and fungal culture of the nail scrapings revealed dermatophyte growth, for which topical and systemic anti-fungal was given for 6 months. There was no response with anti-fungal. A 5 mm punch biopsy from the nail matrix of the left ring finger was taken. The biopsy sections showed epidermis displaying compact orthokeratosis, focal hypergranulosis, irregular acanthosis and minimal spongiosis and subepithelial chronic inflammation. There were no interface changes. Sections did not stain positive for fungal elements. Subsequent fungal cultures were negative. All other blood investigations are within normal limits. Since the underlying cause could not be identified, we considered it to be idiopathic trachyonychia.

After explaining the chronic and unpredictable course of the disease and that there is no definitive treatment to this condition, we decided to treat the patient with 0.1% tacrolimus ointment twice daily. In 2 months, we could notice the growth of normal looking healthy nails in proximal one-third of the nails. In 4 months, there is decreased roughness of all the nails (Figures 1 and 2).

Points to Ponder

- Tacrolimus is a topical immunomodulator used in a



Figure 1: (a) Nail dystrophy in hands: Before treatment, (b) after treatment with topical 0.1% tacrolimus ointment: In hands



Figure 2: (a) Nail dystrophy in legs: Before treatment, (b) after treatment with topical 0.1% tacrolimus ointment: In legs

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variety of dermatological conditions including nail lichen planus

- Tacrolimus could prove to be a safer, cost-effective treatment option in trachyonychia with no side effects as the systemic absorption of the drug is very minimal.

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Penis Strangulation due to Hard Round Nut around it: A Case Report

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It is known in males and females in young age to get sexual pleasure by putting things in the urethra, in the vagina and over the penis. People get nut (metal) stuck around penis in various parts of the world and some or other way by cutting ring or removing part of the penile skin, etc., it may be treated.¹

A 20 years young, unmarried male was brought to causality with pain, blackening of penis, with retention of urine due to hard, metal round nut stuck around penis (due to psycho-sexual perversion), at mid penile area and strangulated, and edematous skin in distal penis² (Figure 1). He came with severe pain in penis and trocar S.P.C. were done. We removed it with great difficulty. We wish to share the way it is removed. This type of thing is not mentioned in the literature. The management involves various ways. We report the various procedures attempted and failed by so many doctors on duty.

He was taken to the operation theatre and the following things are attempted.

1. Thread technique - we have applied twine thread around the distal penis to reduce edema, but we failed
2. Saw cutting - an axe blade was brought and penis was covered with cloth and for 40 min it was tried to cut but nothing happened
3. Fire department - they were called to cut the nut but failed
4. Gold smith - He came and tried but failed
5. Gas cutter - This gas cutter was brought to theater and abandoned because it gives 160° heat and fire and if we apply he will lose his penis
6. Welder - a welding shop fellow was brought by me and

an opinion was taken regarding the management of hard nuts. He said there are two methods

- A. By applying welding rod heat and cut which is not possible in this case
- B. By breaking the nut over an iron pedestal and hammer it (Figures 2 and 3).



Figure 1: Round nut around strangulated penis



Figure 2: Penis with nut on iron pedestal with hammer

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Figure 3: Broken nut with iron pedestal with hammer

The last point was taken and his penis with nut was put on the iron pedestal and the nut was hammered (Figure 4). Luckily the nut was broken into two pieces and totally penis became normal.

Points to Ponder

- Nut round the penis is not uncommon in young male people and on and off it is seen in literature and treatment is individualized



Figure 4: Pieces of nut and joined pieces together

- These types of cases are difficult to manage. Such patients should be given adequate sex counseling.

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A New Internal Urethrotomy Blade

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INTRODUCTION

Urethral stricture disease is common entity in urology. Lot of instruments is available to tackle this problem. We have invented this blade useful for endoscopic internal urethrotomy.

We have invented new urethrotomy blade for stricture urethra with narrow opening in urethra. In 1530 perri of naples used cutting sound. In 18th century Jeal Civiale and Guller used blind urethrotome. In 1972 Sachse used visual urethrotome.

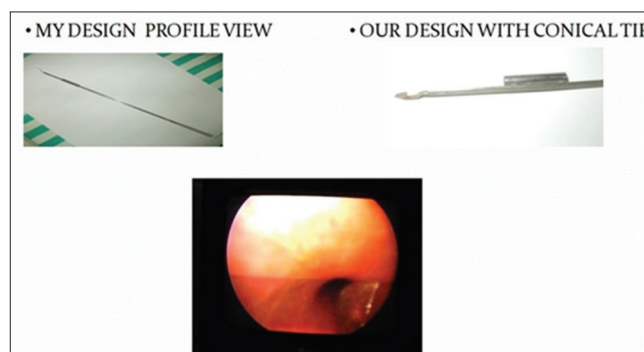
DESCRIPTION

It is a new blade, and the formula is filiform dilatation with urethrotomy. Conical tip of the blade as the filiform tip of new blade and rest as urethrotome blade. We found it useful as it is innovative, and it cuts and dilates. It has been tried for the last 2 years in >40 cases. There is no alteration in the stricture pattern, and the things are made easy. It is very much useful for the urologists. It is not yet given for manufacturer. It is useful like any other urethrotomy blade.

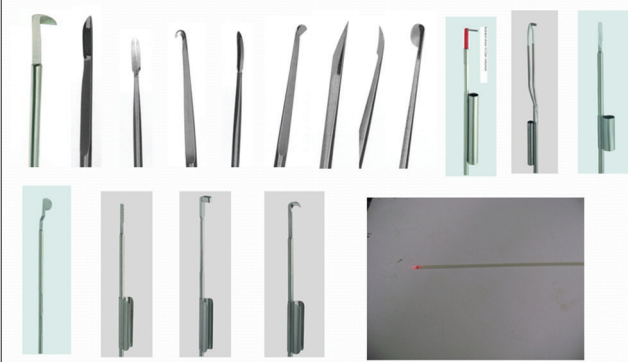
METHODS

It is a routine optical urethrotomy with this new blade.

The other blades available are displayed above.



OTHER AVAILABLE BLADES



RESULTS

Their results are excellent and matchless.

CONCLUSION

Our new urethrotomy blade is useful and better than available standard blades used in the market for stricture urethra.

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