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Needs Assessment Study for Introduction of Clinically Oriented Anatomy Sessions for 1st year Medical Students

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Abstract

There has been a paradigm change in the teaching of anatomy to medical students in the past decade. In anatomy teaching for the 1st year medical students, more emphasis has to be given for clinical anatomy rather than loading them with minute anatomical details, which will help them apply their anatomical knowledge for understanding clinical conditions in their clinical years. The department of anatomy set out to assess the felt need of students for the introduction of clinically oriented anatomy sessions for the 1st year medical students, from the students who had completed their anatomy course and are in their clinical years so that a modification of the current teaching can be achieved. A total of 150 1st year MBBS students of 2013–14 batch in a Private Medical College in Chennai who had completed their basic anatomy course were the participants of the study. A validated questionnaire consisting of questions on their opinion on the need for exposure to clinical anatomy in the 1st year, the opportunities, advantages, disadvantages, and method of learning clinical anatomy in the 1st year was administered to students. Feedbacks obtained from students were studied and the results were tabulated. In our study, 70% of the students felt that learning clinical anatomy in the 1st year helped them apply their anatomical knowledge during the clinical years. Furthermore, all the students responded that clinical anatomy must be taught by live demonstration of clinical cases or using a paper case or by both ways. This study showed that a majority of the students wanted to have an early exposure to clinical cases in the 1st year itself, as it will not only help them learn anatomy better but also will enhance their practical knowledge. The feedback obtained from students has clearly established the need for a clinically oriented anatomy teaching in the 1st year of medical curriculum.

Key words: Clinical Anatomy, Feedback, Curriculum

INTRODUCTION

There have been major changes in the teaching of anatomy to medical students in the past decade. During this period, there has been information explosion in medical research and technology and as access to internet is more abundant, effective health-care provision always requires a sound anatomical base.^[1] The main aim of medical education is to train students to become physicians.^[2] The World

Federation for Medical Education's Global standards for basic medical education insists that medical institutions should make sure that vertical integration of clinical sciences with basic biomedical and behavioral and social sciences occurs.^[3] There is too much information overload in a discipline-based anatomy curriculum without clinical relevance.^[4]

In anatomy teaching for the 1st year medical students, more emphasis has to be given for clinical anatomy rather than loading them with minute anatomical details, which will help them apply their anatomical knowledge for understanding clinical conditions in their clinical years. Our question was whether the current teaching in 1 year anatomy course for the 1st year medical students, giving more emphasis to clinical anatomy? What are the perceptions of students on the current teaching in anatomy course and do they really

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feel that a more clinically oriented approach to teaching anatomy will make them prepared for clinical years? With these questions in mind, the department of anatomy set out to assess the felt need for introduction of clinically oriented anatomy sessions for the 1st year medical students from the students who had completed their anatomy course and are in their clinical years so that a modification of the current teaching can be achieved.

MATERIALS AND METHODS

A total of 150 1st year MBBS students of 2013–14 batch in a Private Medical College in Chennai who had completed their basic anatomy course were the participants of the study. Informed consent was obtained from the participants after explanation of the details of the study. A validated questionnaire consisting of questions on their opinion on the need for exposure to clinical anatomy in the 1st year, the opportunities, advantages, disadvantages, and method of learning clinical anatomy in the 1st year was administered to students. Feedback obtained from students was studied and the results were tabulated.

RESULTS

The results of the study are summarized below.

Question 1: What is the need for the first MBBS students to be exposed to clinical anatomy?

It was observed from Figure 1 that 65 (43%) students felt that clinical anatomy exposure in the 1st year will help them learn anatomy better, while 50 (33%) of students felt it will provide them an enhanced practical knowledge. However, 35 (24%) felt it was too early an exposure.

Question 2: Do you think that there was enough opportunity given to learn clinical anatomy in the 1st year?

From Figure 2, it is observed that nearly two-thirds of the students felt that there was not enough opportunity for them to learn clinical anatomy during the 1st year MBBS course.

Question 3: How do you think that learning clinical anatomy during the first MBBS will help?

It is observed from Figure 3 that on questioning on the relevance of learning clinical anatomy during their 1st year of the MBBS course, 105 (70%) responded by saying it helped them in applying their anatomical knowledge in learning about clinical conditions once they entered their clinical years and 45 (30%) felt that it made understanding of anatomy easier.

Question 4: How do you think that clinical anatomy has to be taught to the first MBBS students?

It is noted from Figure 4 that 120 (80%) felt that live demonstration of clinical cases should be the method of teaching clinical anatomy; however, 13 (9%) felt that a clinical case presentation should be the teaching methodology and 17 (11%) felt that both methods can be used for teaching clinical anatomy to the 1st year students.

Question 5: What do you think are the advantages in learning clinical anatomy in the first MBBS?

From Figure 5, it shown that 88 (59%) students felt that learning clinical anatomy in their 1st year made their clinical postings easier, 50 (33%) felt it made learning anatomy interesting, while 12 (8%) felt that it helped in easier learning of anatomy.

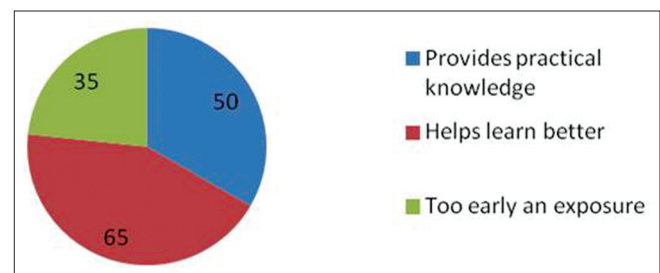


Figure 1: Need for exposure of the first MBBS students to clinical anatomy

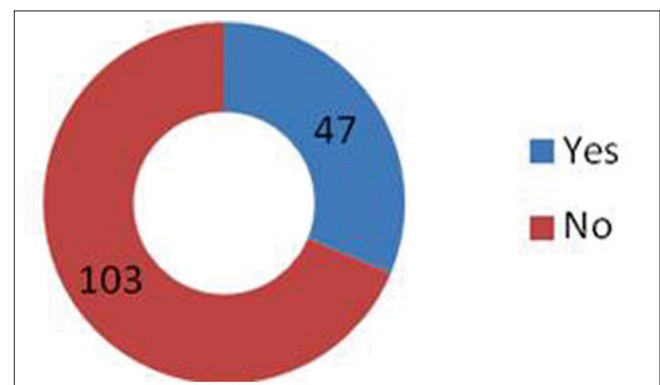


Figure 2: Opportunity to learn clinical anatomy in the 1st year

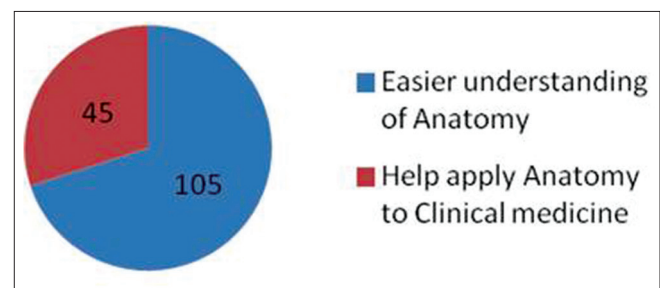


Figure 3: How do you think that learning clinical anatomy during the first MBBS will help?

Question 6: What do you think are the disadvantages in learning clinical anatomy in their first MBBS?

On questioning about the disadvantages in learning clinical anatomy in the 1st year MBBS, it is shown from Figure 6 that 43 (29%) felt it was time consuming, 32 (21%) felt getting orientated to clinical anatomy was difficult, and 19 (13%) found it stressful. However, 56 (37%) felt that there were no disadvantages.

DISCUSSION

Anatomy is regarded as the cornerstone of medical education. A sound knowledge of anatomy is essential

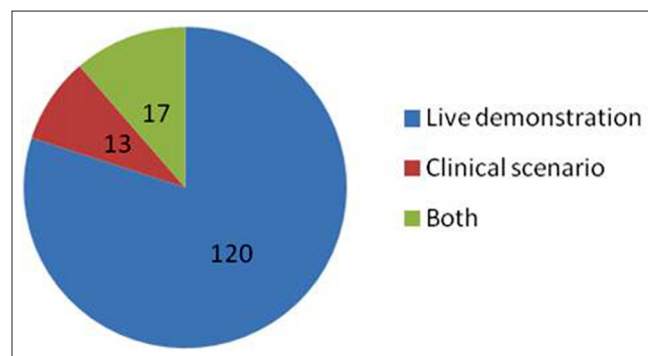


Figure 4: Teaching methodology of clinical anatomy to the first MBBS students

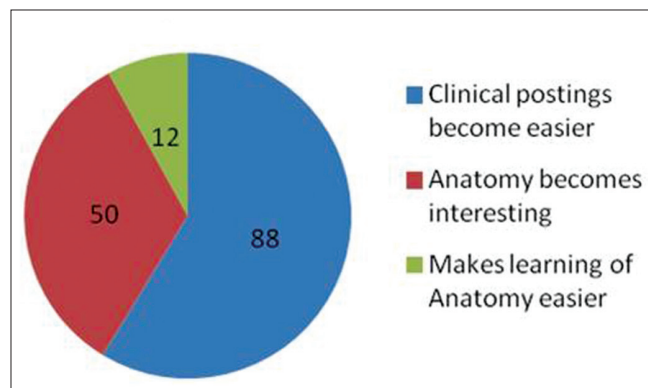


Figure 5: Advantages perceived by students in learning clinical anatomy in the first MBBS

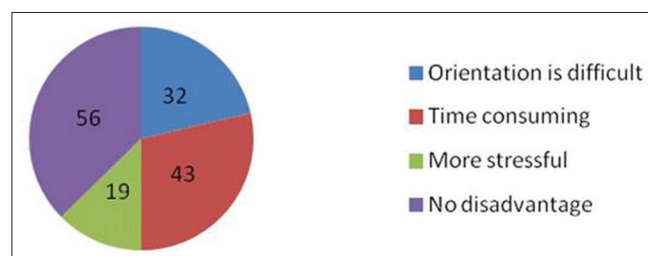


Figure 6: Disadvantages perceived by students in learning clinical anatomy in their 1st year MBBS

for surgeons and also for other medical professionals for examination of a patient, diagnosis, for undertaking interventional procedures, and also for carrying out imaging techniques.^[5] There are several challenges faced by the curriculum planners in anatomy education such as reduced teaching hours, technological advances, cost involved in the purchase of cadavers, need for interactive learning, integration with clinical subjects, and reduction in the number of teaching faculties. This has led to remodeling of the mode of instruction of the subject to the medical students.^[6] Lectures are the main mode of delivering a large amount of information to the students till date. Traditional anatomy teaching tends to focus more on the details rather than its clinical relevance. Traditional gross anatomy teaching in the 1st year of medical education focuses more on the minute anatomical details rather than the relevance of what is being taught. There are several advantages of learning clinically oriented anatomy with multimedia sources.^[7]

In an interview-based survey conducted by Nayak *et al.*, on the amount of anatomy that has to be taught to medical undergraduate students, it is suggested that minute details of anatomy should be avoided and anatomy should be made more clinically oriented. This is in line with our study where our students felt the need for clinically oriented anatomy.

In a study conducted by Holla *et al.*, most students felt that more emphasis should be given to clinically oriented anatomy teaching which is similar to our study findings. In our study, 70% of students felt that learning clinical anatomy in the 1st year helped them in applying their anatomical knowledge during the clinical years. Furthermore, all the students responded that clinical anatomy must be taught by live demonstration of clinical cases or using a paper case or by both ways. Thus, this is in line with Medical Council of India recommendation that early clinical exposure (ECE) has to be introduced as a teaching strategy in the 1st year of medical curriculum.

As suggested by Turney *et al.*, anatomy should change its image of being old fashioned and must incorporate more clinical relevance, IT revolution, models, body paints, and radiographic images and that whatever stimulates interest in the subject should be introduced. In our study, students felt that a clinically oriented anatomy teaching helped them apply anatomical knowledge in the clinical years and also made anatomy learning interesting and easier.

This study shows that majority of the students felt the need for early clinical exposure (ECE) in the first year, which will help them correlate anatomical knowledge with the clinical conditions. The students felt that there was not

enough opportunity for them to learn clinical anatomy in the 1st year. This may be because of the reduction in time in the duration of 1st year anatomy course from 1½ years to 1 year. The authors suggest that carefully planned clinical anatomy sessions with paper cases or with live demonstration of cases will help students understand the anatomical basis of clinical conditions and will train them to be physicians with sound anatomical knowledge.

CONCLUSION

Since our study was done on students who had completed their basic anatomy course, and the feedback obtained from students has clearly established the need for a clinically oriented anatomy teaching and since Medical Council of India insists on ECE, modifications in the form of live demonstration of clinical cases or clinical anatomy lectures can be introduced in the anatomy teaching for the 1st year medical students so that teaching can be made more

clinically relevant, and this will benefit the future generation of students of anatomy course who will be trained to be physicians with sound anatomical knowledge.

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Neurovascular Variations of Sphenoid Sinus: Impact on Transsphenoidal Surgery

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Abstract

Aim: The aim of the study was to analyze the variations of neurovascular structures located in the sphenoid sinus in the form of optic canal (OC), vidian canal (VC), and foramen rotundum (FR), and carotid canal (CC) protrusion. The location of FR and VC from midline in relation to the lateral recess pneumatization (LRP).

Materials and Methods: Computed tomography images, 1mm thin axial sections for 100 patients (50 male and 50 female) over the age of 18 years, obtained for any reason at our hospital were evaluated retrospectively with coronal and sagittal reconstructions. Patients with craniofacial trauma and any pathology (sinonasal malignancy, rhinosinusitis, and nasal polyps) distorting the normal anatomy were excluded. The type of sphenoid sinus in the axial, coronal and sagittal sections, the variations in the form of protrusions, and location from midline as a function of the LRP was analyzed.

Results: The sellar (98%) and greater wing (31%) types were common in sagittal and coronal types. The LRP was not impacted by age. The FR was laterally placed on the left side ($P < 0.001$) when compared with the right. Bilaterally, the mean distance of FR from midline was compared, and the patients with LRP had significantly laterally placed FR (Left and Right - $P < 0.001$). This difference was not present in the VC location (Left-value = 0.205, right $P = 0.266$). The protrusion of the OC was associated with the anterior clinoid process (ACP) pneumatization, FR and VC protrusion with LRP was significantly associated ($P < 0.001$). OC and CC dehiscence was 16% and 3%.

Conclusion: The LRP displaces the FR laterally than the VC. The protrusion of the VC, FR is significantly associated with the LR pneumatization as such as OC and ACP. Thus, the pre-operative analysis of the neurovascular structural variations would bring down the complication rates and help plan for the extended approaches.

Key words: Carotid canal, Dehiscence, Foramen Rotundum, Lateral recess Pneumatization, Optic canal Dehiscence, Optic canal protrusion, Protrusion, Vidian canal.

INTRODUCTION

The sphenoid sinus pneumatization is divided into Presellar, Sellar, and conchal type traditionally. This classification is based on sagittal extent of the pneumatization. Recently, Wang *et al.* have classified the sphenoid sinus based on the pneumatization in the coronal plane into sphenoid body type, greater wing type, and pterygoid type, and full lateral type.

The neurovascular structures in relation to sphenoid sinus, namely the optic canal (OC), carotid canal (CC), vidian canal (VC), and foramen rotundum (FR), the dehiscence and protrusion are affected by the extent of pneumatization.

The location of the neurovascular structures from the midline also varies. We intended to study these variations in the distance as a function of pneumatization in the lateral recess (LR).

Aim

The aim of the study was to analyze the variations of neurovascular structures located in the sphenoid sinus in the form of OC, VC, and FR, and CC protrusion

The location of FR and VC from midline in relation to the lateral recess pneumatization (LRP).

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MATERIALS AND METHODS

A retrospective cross-sectional study of 100 patients (50 male and 50 female) was done. The patients who underwent CT evaluation for PNS or temporal bones for any reason were included in the study. All the patients were evaluated at Government Rajaji Hospital, Madurai, India. 1 mm thin sections were obtained using 16 slices Toshiba scanner. The coronal and sagittal reconstructions made. Measurements were done using Radiant Dicom software.

The patients who had craniofacial fractures, Sinonasal malignancy or polyposis, disruption of the skull base and rhinosinusitis altering the anatomy were excluded.

The type of the sphenoid sinus in the axial, sagittal, and coronal planes was analyzed. The lateral extent of pneumatization was analyzed separately between the right and left side and also between the male and female gender. The impact of age on lateral pneumatization was analyzed as a function of FR and VC distance from the midline.

We divided the patients into two groups. The patients with greater wing, pterygoid, and full lateral type were grouped into one as they corresponded to LRP. The second group of patients had the only sphenoid body type of sinus, i.e. without LRP. The location of the FR and VC from the midline was compared between the left and right side in the two groups.

The protrusion is defined as the bulging of the canal or foramen into the sphenoid sinus exposing 50% or more of the structure, with or without bony wall defects.^[5] Dehiscence is defined as the absence of the bony wall in part or full.

The protrusion and dehiscence of the OC, CC, FR, and VC were noted. The association between the OC, FR, VC, and CC protrusions with the lesser wing, greater wing, pterygoid, and full lateral types was analyzed.

Measurements

- Distance from the midline to VC - Right and left side.
- Distance from the midline to FR - Right and left side.
- Distance between the Two FR and VC.
- Direct distance between the FR and VC.

Statistical Analysis

All data were entered into Excel 2007, and statistical analysis was performed using the statistical software SPSS 16.0. Data were expressed as percentages, mean values (with standard deviations). Independent sample *t*-test was used to calculate the difference between means and Pearson's Chi-square test was used for proportions. Pearson's correlation coefficient was used to find the correlation between

continuous variables. Results were defined as statistically significant when *P* value (2-sided) was <0.05.

RESULTS

The sellar type of the sphenoid sinus was the most common (98%), and no conchal type was present in the study. The distribution of the sphenoid sinus type is shown in Table 1.

The lateral pneumatization as in the greater wing (31%), pterygoid (33%), and full lateral (27%) types were common in the left side. The lesser wing pneumatization was common in the right side (24%) as shown in Table 2.

There is no correlation between age and lateral pneumatization as shown in Table 3. Figure 2 showing the graphical representation.

The FR on the left side was placed laterally when compared with the right side. The mean distance was statistically significant ($P < 0.001$). The mean distance for the VC did not achieve statistical significance when compared between the left and right side ($P = 0.078$) Figure 1.

Table 1: Distribution of the sphenoid types in the axial and sagittal sections in the study

Parameter	Total (%)	Male (%)	Female (%)
Sellar	95	47 (94.0)	48 (96.0)
Presellar	5	3 (6.0)	2 (4.0)
Conchal	0	0	0
Anterior	37	14 (28.0)	23 (46.0)
Dorsal	4	4 (8.0)	0
Sub dorsal	22	14 (28.0)	8 (16.0)
Occipital	36	17 (34.0)	19 (38.0)

Table 2: Distribution of the sphenoid sinus pneumatization in coronal sections. All values are expressed in percentages

Parameter Types	Right			Left		
	Total	Male	Female	Total	Male	Female
Lesser wing	24	26	22	18	9	9
Greater wing	26	12	14	31	17	14
Pterygoid	27	12	15	33	15	18
Full lateral type	23	10	13	27	13	14

Table 3: The correlation between age and the distance of FR and VC from midline

Parameter	Correlation coefficient (r)	P
Age versus VC - right	-0.044	0.666
Age versus VC - left	-0.060	0.556
Age versus FR - right	-0.124	0.221
Age versus FR - left	0.021	0.834

VC: Vidian canal, FR: Foramen rotundum

The distance of the FR from the midline was more in the group of patients who had lateral pneumatization than in the sphenoid body type. The p value was significant for both the left ($P < 0.001$) and right side ($P < 0.001$). When analyzed for the VC there was no statistically significant difference between the both groups on either side. Left - $P = 0.205$, right $P = 0.266$ as shown in Table 4.

The OC protrusion was significantly associated with the lesser wing type corresponding to the anterior clinoid process (ACP) pneumatization ($P < 0.001$). The FR, VC, and CC protrusion was significantly associated with the



Figure 1: Full lateral type of pneumatization bilaterally with optic canal, foramen rotundum and vidian canal protrusions

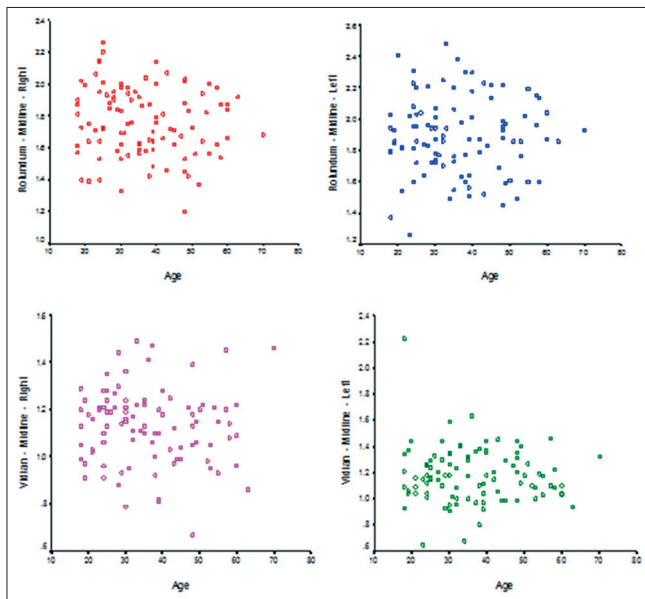


Figure 2: Scatter plot between the age and distance of foramen rotundum (FR) from the midline (top left - age vs. FR on the right side), top right - age versus FR on the left side, bottom - scatter plot between the age and distance of vidian canal (VC) from the midline. (Bottom right - Age vs. VC on Right side, Bottom Left - Age vs. VC on Left side). There was no significant correlation between age and lateral pneumatization

greater wing ($P < 0.001$), pterygoid ($P < 0.001$), and full lateral ($P < 0.001$) types bilaterally.

Further, when the association between the FR, VC protrusions, and pneumatization was compared between the sphenoid body and the lateral type groups, they were more significantly associated with the lateral pneumatization group ($P < 0.001$) bilaterally as shown in Table 5.

DISCUSSION

The development of the sphenoid sinus starts mainly after the puberty. The sinus is present mostly at birth as small cavities. The pneumatization proceeds from the presellar area to begin with and expands to the sellar and postsellar areas progressively.^[1] This accounts for the classification in the sagittal plane. The pneumatization also expands laterally in the coronal plane. This may extend up to the VC or with the LRP between the VC and the FR.

The pneumatization extent alters the location of neurovascular structures inside the sphenoid sinus. This reminds us of the position of the facial nerve in relation to the pneumatization of the temporal bones.^[1] The important structures in relation to the sphenoid sinus are the OC, VC, and FR, and CC protrusion. The location varies in terms of the distance from the midline or the amount of protrusion or dehiscence of the canal.

The transsphenoidal surgeries to approach the sellar, middle cranial fossa, Meckel's cave, posterior ethmoid, or sphenoid sinus *per se* are increasingly used. The variations in the sphenoid sinus are common than being an exception. The anatomical evaluation preoperatively helps to reduce complication rates.

Table 4: The comparison of distance of VC and FR from midline between the sphenoid body and LRP on both sides

Parameter	Right			Left		
	Sphenoid	Lateral	P	Sphenoid	Lateral	P
VC	1.12±0.2	1.16±0.1	0.266	1.16±0.2	1.22±0.2	0.205
FR	1.69±0.2	1.91±0.2	<0.001	1.82±0.2	2.02±0.2	<0.001

VC: Vidian canal, FR: Foramen rotundum, LRP: Lateral recess pneumatization

Table 5: P values when protrusion was compared between sphenoid and lateral types

Protrusion	Right	Left
OC	0.014	0.072
VC	<0.001	<0.001
FR	<0.001	<0.001
CC	0.092	0.021

VC: Vidian canal, FR: Foramen rotundum, OC: Optic canal, CC: Carotid canal

Optic Nerve Protrusion

The optic nerve protrusion is defined as the bulging of the OC into the sphenoid sinus exposing more than 50% of its circumference, with or without bone defects^[5] OC dehiscence is defined as the absence of the bony wall. The OC protrusion and dehiscence increased with sphenoid sinus pneumatization.^[4]

In our study, OC protrusion is 16% as with Sirikci *et al.* (31%)^[5] and Unal *et al.*^[6] The OC dehiscence was in the intermediate range as 15% when compared with Unal *et al.*^[6] 8%, Fuji *et al.* (4%), and Hewaidi and Omami (30%)^[7] we also observed that the bone separating the canal was thin in patients having OC protrusion.

Optic nerve is divided into four segments. The intracranial part is the least nourished. The optic nerve can be injured rendering the patient blind by the surgical procedure or due to the sinus infection after the surgery. The mechanism has proposed to be ischemia or venous congestion.^[2,3]

The lesser wing type of pneumatization has the sphenoid sinus pneumatization extending into the ACP thus encircling the OC. We had a significant association in patients with ACP pneumatization having OC protrusion ($P < 0.001$). Thus, as the pneumatization extends, protrusion or dehiscence of the OC increases.

Internal Carotid Artery Protrusion and Dehiscence

The carotid artery protrusion and dehiscence are described in the same way as OC. The CC protrusion exposes more than 50% of the circumference of the artery and dehiscence as the absence of the bone. The carotid artery can be just covered by the sinus mucosa when the bone is dehiscence. The above anatomical variations increase the iatrogenic injury risk. Tackling the bleeding is difficult and would lead to neurological sequelae.

In our study, the CC protrusion was 17% in the right side and 16% in the left side. When compared with other studies having a very wide variation from 67% in Asian cadavers [Tan and On^[9]] to 26.1% [Sirikci *et al.*^[5]] and 30.3% [Unal *et al.*^[6]] in Turkish population. The protrusion was more in Asian population.

The CC dehiscence in our study is 3%. It ranged from 1.5% by Kazkayasi *et al.*^[10] to 22% in Sirikci *et al.*^[5]

FR and VC

In our study, the FR distance from the midline more in the left side when compared with the right. The VC distance between the left and right from the midline did not differ significantly [Table 6].

Table 6: Comparison of distance from midline

Parameter	Right	Left	P
	mean±SD (n=100)	mean±SD (n=100)	
VC	1.13±0.2	1.18±0.2	0.078
FR	1.76±0.2	1.89±0.2	<0.001

VC: Vidian canal, FR: Foramen rotundum, SD: Standard deviation

When the location of the FR was analyzed as a function of the lateral pneumatization, the distance of the FR was significantly placed distant from the midline in all three types of LRP, namely greater wing type, pterygoid type, and full lateral type. The distance on both left and right side achieved significance when analyzed as a function of pneumatization.

In the study by Vaezi *et al.*,^[11] in 2015, showed that the distance measured directly between the FR and VC increased as the pneumatization extended laterally. The lateral pneumatization was analyzed as a function of depth and surface area of the LR.

In the study by Kasemsiri *et al.*,^[11] the distance from the midline to the left FR was significantly more than the right side. Similar results were obtained by the Mohebbi *et al.*^[12]

CONCLUSION

The pneumatization of the sphenoid sinus causes the variations in the location of the neurovascular structures. Pre-operative analysis of the LRP will help in analyzing the location of neurovascular structures and in the planning of surgical procedure to the sphenoid sinus, and its extensions in the transpterygoid and Meckel's cave approaches. The complication rates can be brought down with thorough anatomical knowledge.

Our study has shown that the protrusion is more when the LR is pneumatized for FR, VC, and CC exposing to risk of surgical injury.

Furthermore, when the LR is pneumatized, FR is laterally placed increasing the access to the middle fossa and Meckel's cave.

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A Prospective Study Comparing Two Clinical Doses of Fentanyl as an Adjuvant to Isobaric Ropivacaine 0.75% in Intrathecal Block

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Abstract

Aim: Subarachnoid block is the simple technique of regional anesthesia commonly employed for infraumbilical surgeries. Neuroaxial administration of fentanyl along with local anesthetics improves the quality of intraoperative analgesia, reduces the need for sedation, and also provides post-operative pain relief for longer duration. This study was designed to compare the two doses of fentanyl with isobaric ropivacaine in spinal anesthesia in terms of analgesic efficacy, hemodynamic stability, and effect on sensory and motor characteristic.

Method: This prospective randomized, double-blind study involving 20 patients in each group. Group A received injection isobaric 0.75% ropivacaine 4.0 ml + 1 ml cerebrospinal fluid (CSF), Group B received injection isobaric 0.75% ropivacaine 4.0 ml + fentanyl 12.5 µg (0.5 ml) + CSF 0.5 ml, and Group C received injection isobaric 0.75% ropivacaine 4.0 ml + fentanyl 25 µg (0.25 ml) + CSF 0.75 ml. On set time, onset of sensory and motor block, highest dermatomal level blocked, duration of sensory and motor block, and quality of motor block were noted. Vital parameters and adverse effects were also noted perioperatively. Data analysis was done with unpaired *t*-test, one-way ANOVA, and *post hoc* Tukey test.

Results: Onset of sensory block was comparable. Onset of motor block, duration of sensory, and motor block were statistically prolonged in Group B and Group C.

Conclusion: About 12.5 µg fentanyl with isobaric ropivacaine provides better hemodynamics, early onset of sensory and motor block, and prolonged period of analgesia without undesirable side effects.

Key words: Fentanyl, Ropivacaine, Subarachnoid block

INTRODUCTION

Subarachnoid block is well-established technique, for providing anesthesia for lower limb surgeries, pelvis, perineum, urological, gynecological, and obstetrical procedures.^[1] Among various local anesthetic drugs, bupivacaine is most commonly used intrathecal local anesthetic, already have undergone many researches.

Ropivacaine is purely S-isomer imparting less toxicity to the cardiovascular^[2] and central nervous systems^[3] though producing less intense motor blockade and postoperative analgesia.^[4] Therefore, studies were conducted with addition of different adjuvants to isobaric ropivacaine^[5,6] such as clonidine,^[7,8] fentanyl,^[9] or dexmedetomidine.^[10] Fentanyl is an opioid that has shown to improve analgesic potency of ropivacaine and prolong postoperative analgesia for spinal anesthesia.^[11] In this study, we decided to evaluate effect adding of two different doses of fentanyl as an adjuvant to 0.75% isobaric ropivacaine on onset, duration of sensory and motor blockade, and quality of motor block in subarachnoid block for lower abdominal and lower limb surgery.

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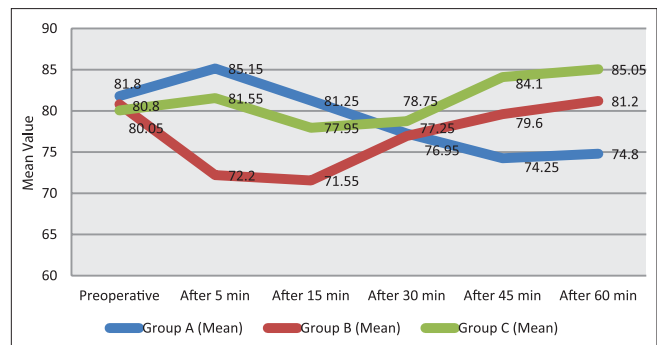
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MATERIALS AND METHODS

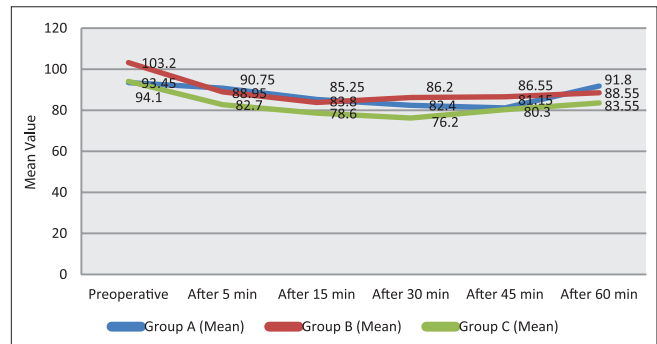
After obtaining approval from the Ethics Committee and written informed consent, this prospective double-blind randomized clinical study was conducted on 60 ASA Grade I and Grade II patients, of either sex aged between 20 and 60 years, undergoing elective surgery (of < 120 min) on lower abdomen and lower limb under spinal anesthesia. Patient's refusal, history of sensitivity to local anesthetic, patient on anticoagulant therapy or with abnormal bleeding or coagulation profile, infection at the site of injection, spinal abnormalities, previous spine surgery, and presence of comorbid diseases contraindicating spinal block were excluded from this study. Detailed pre-anesthetic examination was done and anesthetic procedure was briefly explained to the patient. Patients were randomly allocated into three groups of 20 patients in each, using computer-generated randomization chart: Group A (Control group) - Injection 0.75% isobaric ropivacaine – 4.0 ml + 1 ml cerebrospinal fluid (CSF), Group B - Injection 0.75% isobaric ropivacaine – 4.0 ml + fentanyl 12.5 µg (0.5 ml) + CSF 0.5 ml, and Group C - Injection isobaric 0.75% ropivacaine – 4.0 ml + fentanyl 25 µg (0.25 ml) + CSF 0.75 ml.

The patients were kept nil orally for 8 h before surgery. After shifting the patient on the OT table, routine monitors such as non-invasive blood pressure (NIBP), pulse oximeter (SpO₂), and continuous electrocardiogram were applied. Baseline heart rate (HR), BP, respiratory rate (RR), and SpO₂ were recorded. A wide bore intravenous access was secured and preloading with 10 ml/kg ringer lactate was done. Under strict aseptic precautions, lumbar puncture was performed by midline approach in lateral position using 25G quincke spinal needle at L3–L4 intervertebral space. After performing successful lumbar puncture, isobaric ropivacaine 0.75% with or without fentanyl was administered according to assigned study groups. Operator and investigator were blinded about the drug which was prepared by independent investigator. Table was kept in neutral position and all patients were made supine immediately following the injection. The completion of injection was taken as time zero of induction of anesthesia. After spinal anesthesia, the patient's HR, MAP, RR, and SpO₂ were recorded at 0 min, 5 min, 10 min, 15 min, 20 min, 25 min, and 30 min and then every 15 min till the end of the procedure. Postoperatively, HR, NIBP, and SpO₂ were recorded every 2 h until the sensory and motor functions were back to normal.

The sensory and motor blockade parameters were assessed after spinal anesthesia at 2 min intervals until



Graph 1: The mean pulse rate has been shown in line graph



Graph 2: The mean arterial pressure has been shown in line graph

the surgical anesthesia was achieved, and postoperatively, every 15 min until the sensory and motor functions were back to normal. Time of onset of sensory and motor block, highest dermatomal level of sensory block achieved, and duration of sensory and motor block were noted. Onset time of sensory blockade was defined as the interval between intrathecal administration of drug and loss of pinprick sensation at T10 level. Level of sensory block was assessed by loss of pinprick sensation using 24G hypodermic needle bilaterally along midclavicular line at L1, T12, T10, T8, T6, and T4 levels. Duration of sensory block was defined as the interval from intrathecal administration to the point of regression of sensory blockade from T10 to S1, was noted by pinprick with 24G hypodermic needle on posteromedial aspect of thigh.

Onset time of motor blockade was defined as the time interval intrathecal administration of drug and the Bromage score 3 recorded. Motor block was assessed using 3 points modified Bromage scale.^[11] Grade 0 = no weakness, Grade 1 = can flex knees but can not raise legs, Grade 2 = only foot movements, Grade 3 = complete paralysis. Duration of motor blockade was defined as interval from intrathecal administration to the point in which the Bromage score was back to zero recorded. Duration of pain-free period, the time interval from intrathecal injection of drug till demands of first rescue dose of analgesic.

Level of sedation was assessed using the sedation score described by Chernik *et al.*^[12] Score 0 = wide awake, Score 1 = sleeping comfortably, responding to verbal commands, Score 2 = deep sleep, but arousable, and Score 3 = deep sleep, not arousable. It was assessed pre-operative then after 15 min, 30 min, 45 min, 60 min, and 120 min.

The occurrence of adverse events that include bradycardia, hypotension, pruritus, respiratory depression (RR/min and SpO₂), sedation, shivering, and nausea and vomiting were recorded and managed accordingly.

On patient's demand for analgesia, Injection diclofenac 75 mg IM was given.

Statistics

Data were compiled and analyzed using software SPSS version 16. $P < 0.05$ was considered statistically significant. The means of groups were compared using unpaired *t*-test while the means between more than one group was compared using one-way ANOVA and *post hoc* Tukey test. The final data were represented using Tables and Graphs.

RESULTS

Spinal anesthesia was successful in all the patients. The mean age, sex, height, weight, and duration of surgery were similar in all groups [Table 1].

The mean onset time of sensory block in Group A was 4.09 ± 1.08 min, in Group B was 3.64 ± 1.00 min, and in Group C, it was 3.24 ± 1.05 min. ($P > 0.05$). All values were comparable. Highest sensory level was recorded in Group A was T6-T12/T6 while in Group B and Group C, it was T4-T12/T4. In almost, all three groups T8-T12 level dermatomal analgesia was achieved satisfactory and distribution appeared to be uniform.

Table 2 shows Group C had lowest time of onset of motor block whereas longest duration of sensory, motor block, and period of analgesia among the three groups where fentanyl 25 µg was added to ropivacaine which was statistically found significant ($P < 0.05$) using unpaired *t*-test.

DISCUSSION

Subarachnoid block has been used in both elective and emergency procedures.^[13] Recently, ropivacaine is being getting used commonly as local anesthetic of choice.^[14] Fentanyl as adjuvant to ropivacaine enhances analgesic effect of local anesthetic drug without intensifying motor and sympathetic block in spinal anesthesia, thus leading to lower incidences of hypotension, early recovery, and mobilization, with additional benefit of decreasing total dose of local anesthetic drug needed.^[1]

Khaw *et al.*^[14] concluded that during spinal anesthesia in lateral position hyperbaric solution tends to spread more in cephalic direction while isobaric solution tends to concentrate at lumbar segments which were similar to our study showing comparatively lower segmental analgesic distribution with isobaric ropivacaine. Isobaric ropivacaine produces less intense, unpredictable, and variable height of block when given intrathecally for spinal anesthesia,^[6] but in our study, not a single patient felt any discomfort during surgery did not require any analgesic supplementation.

In our study, we found that following subarachnoid block changes in HR, MAP, and RR as shown in Graphs 1 and 2, were not clinically significant similar to study done by Nuray and Berrin with intrathecal ropivacaine with fentanyl. They did not find any significant difference with respect to hemodynamic parameters.^[15] The mean onset time of sensory block in Group A was 4.09 ± 1.08 min, in Group B was 3.54 ± 1.00 min, and in Group C, it was 3.65 ± 1.05 min and compared with each other. Our results were similar to study conducted by Boztug *et al.*^[16] who studied the effects of intrathecal isobaric ropivacaine 10 mg and intrathecal ropivacaine 8 mg with fentanyl 25 µg for outpatient arthroscopic knee surgery. The onset for T10 level of blockade was faster in Group R compared to Group RF (3.60 ± 1.84 min vs. 5.25 ± 2.04 min), but the results were not statistically significant. Chaudhary *et al.*^[17] observed the same results of onset of sensory block when compared isobaric ropivacaine 15 mg (0.75%) and isobaric ropivacaine 13 mg (0.75%) with fentanyl 10 µg given intrathecally.

Table 1: Showing demographic data: Mean±SD

Demographic data	Group A	Group B	Group C	P value
Age (years)	38±10.8	42±11.21	41±9.8	NS
Sex (M/F)	16/4	18/2	17/3	NS
Weight (kg)	58.5±8.47	56.3±10.22	60.3±8.28	NS
Height (cm)	151±10.54	153±8.25	156±20	NS
Duration of surgeries (min)	92.50±28.72	78.50±29.11	87.25±20.23	NS

NS: Non significant $P > 0.05$, SD: Standard deviation

Table 2: Sensory and motor characteristics in all groups (mean±SD)

Characteristics	Group A	Group B	Group C
Onset of sensory block (min)	4.09±1.08	3.64±1.00	3.24±1.05
Highest dermatomal level	T6(T6-T12)	T4(T4-T12)	T4(T4-T12)
Duration of sensory block (min)	227.3±62.5	324.45±43.78	383.6±49.7
Onset of motor block	12.01±1.57	9.05±1.05	7.88±1.00
Duration of motor block	202.3±64.1	281.35±36.16	318.50±31.70
Period of analgesia	237.8±63.8	347.7±59.6	407.7±52.6

SD: Standard deviation

Table 3: Comparison of sedation score between the groups

Groups	After 15 min	After 30 min	After 45 min	After 60 min
Group A	0.15±0.37	0.25±0.44	0.10±0.31	0.05±0.22
Group B	0.10±0.31	0.20±0.62	0.15±0.49	0.00±0.00
Group C	0.20±0.41	0.30±0.66	0.05±0.22	0.05±0.22
P value	0.687, NS	0.862, NS	0.679, NS	0.609, NS

Table 3B: Post-hoc**Tukey test**

Group pairs	After 15 min ("t," P value)	After 30 min ("t," P value)	After 45 min ("t," P value)	After 60 min ("t," P value)
Group A–B	0.43, P=0.901	0.27, P=0.960	0.44, P=0.898	0.87, P=0.664
Group B–C	0.43, P=0.901	0.27, P=0.960	0.44, P=0.898	0.00, P=1.000
Group C–B	0.87, P=0.662	0.55, P=0.849	0.88, P=0.653	0.87, P=0.664

One-way ANOVA was applied to find out the statistical significance among the groups. Non-significant P values were obtained for all time intervals. Post hoc Tukey shows the significance between different pairs of groups for different time intervals

Table 4: Complications seen in all the three groups

Complications	Group A	Group B	Group C
Uneventful	14	15	8
Nausea and vomiting	1	0	1
Hypotension	2	3	4
Mild pruritus	0	0	3
Bradycardia	2	2	4
Pain	1	0	0

As shown in Table 4, incidence of complications was less in Group A and B as compared to Group C

Highest sensory level was recorded in Group A was T6-T12/T6 while in Group B T4-T12/T4, and Group C, it was T4-T12/T4. Parlow *et al.*^[18] established the fact that hypocricity influenced the extent of subarachnoid block and explained high cephalic levels of sensory block when fentanyl was added to isobaric local anesthetic solution.

In the present study, sensory level of T4 was observed in Group C and Group B, but in Group A the extent of sensory block reached only up to T6 dermatome, which is similar to Gupta *et al.*^[1] where they showed maximum dermatomal involvement was T6 (T6-T10) in Group RC and T4 (T4-T10) level in Group RF. Seetharam and Bhat^[19] also reported T6 level (T4-T9) with 19.5 mg ropivacaine plus 20 µg of fentanyl was used.

In the present study, duration of sensory block was maximum in Group C. Statistically when Group A was compared with B; Group B was compared with C and Group A when compared with Group C, the difference was highly significant ($P < 0.05$). Higher dose (25 µg) of fentanyl appears to be more promising to increase the duration of sensory block. Seetharam and Bhat^[19] reported in their study that duration of sensory block is prolonged by addition of fentanyl 25 µg to isobaric ropivacaine 18.5 mg in subarachnoid block as compared to isobaric ropivacaine alone. They observed the duration of sensory analgesia of 341.6 ± 15.03 min in fentanyl group and 240.4 ± 13.08 min in the control group. Gupta *et al.*^[20] and Yegin *et al.*^[21] reported in a study that duration of sensory block was prolonged significant ($P < 0.05$) in Group RF (ropivacaine with fentanyl) as compared to Group R (control) in different surgeries.

Jagtap *et al.*^[22] showed that adding fentanyl improved the quality and duration of analgesia when they compared fentanyl plus ropivacaine with fentanyl plus bupivacaine alone for spinal anesthesia in minor urological procedures. Similarly, Seetharam and Bhat,^[19] Boztug *et al.*,^[16] Sanli *et al.*,^[23] and Layek *et al.*^[24] found that time for analgesic requirement prolonged in fentanyl group compared to the control group.

This study had shown statistical significant difference among all three groups. Isobaric ropivacaine plus 25 µg fentanyl offered rapid onset than ropivacaine alone and with 12.5 µg fentanyl. Our results were similar to studies conducted by Gupta *et al.*^[1] and Chaudhary *et al.*^[17] Boztug *et al.*^[16] and Seetharam and Bhat.^[19] reported that onset of motor block was faster in Group RF than Group R, but results were statistically insignificant.

In the present study, duration of motor block was prolonged significantly ($P < 0.05$) by addition of fentanyl in both groups ($P < 0.05$). Results of the present study are comparable to results of Seetharam and Bhat.^[19] and Gupta *et al.*^[1]

Mean duration of post-operative analgesia was 237.8 ± 63.6 min in Group A, 347.7 ± 59.6 min in Group B, and

407.7 \pm 52.6 in Group C. Statistically the changes in duration of postoperative analgesia were highly significant ($P < 0.05$). Yegin *et al.*^[21] reported in the study that duration of pain relief from intrathecal fentanyl administration until the first request for supplemental analgesia was significantly prolonged: 213.0 \pm 29.3 min (Group F- hyperbaric ropivacaine 15 mg with fentanyl 10 mcg) as compared to other group (Group S - hyperbaric ropivacaine 15 mg) it was 161.2 \pm 32.6 min. Similarly, study done by Seetharam *et al.*^[22] observed same thing.

Seetharam and Bhat.^[19] reported S2 regression time (Group R vs. Group RF, 240.4 \pm 13.087 min vs. 341.6 \pm 15.032 min) and Sanli *et al.*^[23] reported time to regression to L5 (Group S vs. Group F, 150.3 \pm 13.4 min vs. 168.3 \pm 17.3 min) were prolonged significantly in fentanyl group. These finding were similar to our results showing prolongation of analgesia duration in Group C.

Degree of muscle relaxation: In the present study, all patients achieved Bromage score 3 except in two patients of Group A, it was score 2.

Group A - Bromage score of 3/3 in (90%) of cases.

Group B - Bromage score of 3/3 in (100%) of cases.

Group C - Bromage score of 3/3 in (100%) of cases.

In Group B and Group C, all the 20 (100%) patients were having Bromage scale of 3 and are well comparable in two groups.

The sedation score as per Chernick's score in the present study was 0 to 2 [Table 3]. However, it is not statistically significant ($P > 0.05$). Sedative effect of fentanyl is due to systemic absorption of lipid-soluble opioid, although cephalad migration of opioid in the CSF and subsequent interaction with opioid receptors located in the ventral medulla may also be responsible.

As shown in Table 4, hypotension was recorded in four cases of Group C and three cases of Group B and two cases of Group A. Bradycardia was seen two cases in Group A, two cases in Group B, and four cases in Group C. The incidence of vomiting was in one case each in Group A (5%) and Group C (5%). Hence, it is very obvious that higher doses of fentanyl not only enhance the beneficial effects of isobaric ropivacaine but also increase the number of side effects as compared to isobaric ropivacaine with 12.5 μ g fentanyl. Complications were not clinically significant and could be managed easily. A dose of 12.5 μ g fentanyl appears to be safe as an adjuvant to achieve rapid onset and long duration of analgesia with least possible acceptable complication and side effect.

Limitation of this study: There were differences in injection technique, amount of dilution with CSF, speed of injection, brand of drug used, and differences in drug concentration.

CONCLUSION

Addition of 12.5 μ g fentanyl to isobaric ropivacaine for spinal anesthesia prolongs the duration of sensory block and duration of analgesia without significantly affecting hemodynamics and onset of sensory block. Thus, it improves the overall quality of anesthesia of ropivacaine, at the same time preserves its benefits like good hemodynamic stability as compared to plain ropivacaine and 25 μ g fentanyl with ropivacaine combination.

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Outcome of outborn Babies Admitted with RH Isoimmunization with Mild-to-Moderate Bilirubin Encephalopathy

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Abstract

Objective: The objective of this study was to study the outcome of outborn babies admitted with Rh isoimmunization with acute bilirubin encephalopathy (ABE).

Patients and Methods: All babies born outside the institute (outborn) admitted with neonatal hyperbilirubinemia were screened for Rh isoimmunization and ABE. Infants with G6PD deficiency were excluded from the study. Babies were followed till discharge. Number of double volume exchanges, age at the first exchange, time taken for the first exchange, number of blood transfusions, and neurological status at discharge were noted in a structured per forma.

Results: A total of 1661 babies were admitted with neonatal jaundice, of which 107 (6.4%) had Rh isoimmunization. 30/107 (28%) babies had mild-to-moderate ABE. All babies underwent double volume exchange transfusion. 20 babies (66%) required the second exchange and only one baby required the third exchange (3.3%). 27 babies (90%) were discharged, of which 20 (74.1%) had intact neurological outcome. 2 (6.7%) babies died due to severe sepsis and 1 (3.3%) left against medical advice. Overall, intact neurological outcome was seen in 66.6% (assuming case of worst case scenario)

Conclusion: The incidence of Rh isoimmunization and ABE is still high in our population. These babies require multiple exchange transfusion during admission. The outcome of the babies in ABE can be improved with prompt intervention.

Key words: Bilirubin, Encephalopathy, Isoimmunization

INTRODUCTION

Rh isoimmunization is one of the preventable neonatal diseases. Anti-D alloantibody is the most common cause of Rh isoimmunization. Before the introduction of anti-D immunoprophylaxis, anti-D immunization affected 1% of neonates and was the cause of death of one in every 2200 babies born.^[1] With the advent of anti-D, the incidence in the western world has come down to 0.4 per 1000 live births.^[2]

As compared to western world, the Rh isoimmunization is still common in India. Moreover, due to poor antenatal, perinatal, and neonatal care, the neonates presenting late in acute bilirubin encephalopathy (ABE) are still common. Rh isoimmunized newborns presenting to the health-care facilities are only tip of the iceberg, with many dying *in utero* due to lack of adequate maternal care. Therefore, it is difficult to calculate the true incidence of Rh isoimmunized newborn. Still, hospital surveys serve the purpose of highlighting problem of the preventable disease.

METHODS

The study was conducted in newborn unit of the Department of Pediatrics, Shri Maharaja Gulab Singh Hospital, Jammu (a level 3 newborn care facility in Northern India) over a period of 1 year from April 2015 to March 2016 after taking consent from the Institutes Ethical Committee. All outborn newborn admitted with

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neonatal jaundice were screened for Rh isoimmunization and mild-to-moderate ABE. Rh isoimmunization was defined as “Rh-positive babies born to mother with Rh-negative blood group with positive direct Coombs test.” ABE at admission was assessed using BIND score.^[3] G6PD deficient neonates were excluded from the study.

Culture positive sepsis (systemic evidence of infection associated with positive blood culture), culture negative clinical sepsis (systemic evidence of infection+negative blood culture + positive sepsis screen (at least one of the following: C-reactive protein>10 mg/L, micro-ESR>10 mm in 1 h, abnormal absolute neutrophil count^[4] elevated total leukocyte count and immature: Total neutrophils ratio >0.16).

After taking informed consent, all the characteristics were noted in prestructured per forma. Gestational age was calculated primarily based on mothers last menstrual period (LMP). In cases where LMP was unreliable, either an early dating scan or clinical postnatal assessment by new Ballard score was used to calculate the gestational age. Babies were followed till discharge.

Descriptive statistics were used to describe variables. Mean, median, and mode were used as measures of central tendency depending on the distribution of continuous variable. All analyses were done using IBM-SPSS v.20 and Microsoft Excel. Risk factors for combined outcome of death and abnormal neurological status at discharged were assessed using binary logistic regression.

RESULTS

A total of 1661 neonates with neonatal jaundice were admitted over a period of 1 year, of which Rh isoimmunization was seen in 107 (6.4%). 30 neonates were diagnosed with Rh isoimmunization and ABE with mild-to-moderate severity. Demographic variables are illustrated in Table 1.

Characteristics during the hospital stay are illustrated in Table 2. All babies underwent double volume exchange transfusion and started on double surface phototherapy according to the American Academy of Pediatrics guidelines.^[5] 20 babies (66%) required the second exchange and only one baby required the third exchange (3.3%). Median time taken from admission to the first exchange was 8.5 h. No major complications occurred during exchange transfusion.

Two babies developed blood culture-positive sepsis (*Enterococcus faecium* and *Klebsiella pneumonia*). One baby

developed NEC Stage IIA. 4 (13.3%) babies required blood transfusion for anemia. 27 babies (90%) were discharged, of which 20 (74.1%) had intact neurological outcome. 2 (6.7%) babies died due to severe sepsis and 1 (3.3%) left against medical advice. Overall, intact neurological outcome was seen in 66.6% (assuming case of worst case scenario).

Risk factors age of admission, admission first exchange interval, and total serum bilirubin at admission (decided *a priori*) were assessed against the combine binary outcome of death and abnormal neurological outcome at discharge and found not be significant [Table 3]. This might be due to small sample size in our study.

DISCUSSION

The study highlights the magnitude of problems in our population. The true incidence of Rh isoimmunization is difficult to assess due to admission and selection bias. Bhutani *et al.* estimated the risk of Rh isoimmunization at 0.36% live birth.^[6] The incidence of Rh isoimmunization

Table 1: Baseline characteristics

Mean gestation (in weeks)	38±1.4
Mean weight at admission (in grams)	2872±508
Sex	
Male (%)	23 (76)
Female (%)	7 (23)
Age at admission (in hours) (median IQR)	46 (19–67)
Antenatal ICT titers	
Not done (%)	15 (50)
Positive (%)	15 (50)
Mean serum bilirubin at admission (mg/dl) (mean±SD)	22±5
Mean packed cell volume at admission (%) (mean±SD)	37±4

SD: Standard deviation

Table 2: Characteristics of babies during hospital course

Severity of ABE at admission	
Mild (%)	22/30 (74)
Moderate (%)	8 (26)
Median time taken from admission to exchange in hours (Median-IQR) (%)	8.5 (5–13.5)
Number of double volume exchange transfusion	
Two	20/30 (66)
Three	1/30 (3.3)
Duration of phototherapy (Median-IQR) (hours)	120 (96–120)
Sepsis	
Suspected	19/30 (63)
Proven	2/30 (6.7)
Meningitis	3/30 (10)
NEC (%)	1/30 (3.3)
Median (IQR) duration of hospital stay (in days) (%)	8 (6.7–12)
Outcome	
Discharged (%)	27/30 (90)
Death (%)	2 (6.7)
Left against medical advice (%)	1 (3.3)

ABE: Acute bilirubin encephalopathy

Table 3: Risk factors assessing the combine binary outcome of death and abnormal neurological status at discharge

Risk factor	Odds ratio	95% confidence interval
Age at admission	0.98	0.96–1.01
Total serum bilirubin at admission	0.91	0.74–1.1
Time taken from admission to the first exchange transfusion	0.97	0.83–1.1

as the cause of jaundice was more (6.4%) in our study as compared to the period a study by Narang *et al.* and Cheng *et al.* at 2.9%.^[7,8]

The median (IQR) age at admission 47 (19–67) h of these outborn babies is a point of concern. Most of these babies were from the far-flung hilly areas where antenatal, natal, and postnatal care is inadequate. Moreover, it also reflects the shortfalls in transportation of sick newborns.

An important aspect to highlight is the delay in conducting double volume exchange transfusion (median delay of 8.5 h from admission). Rh isoimmunization with ABE is neonatal emergency, and any delay may worsen the neurological outcome. Further, quality improvement studies are required to minimize the delay.

27 (90%) babies were discharged successfully, of which 7 (23.3%) had abnormal neurological outcome at discharge. In a study conducted in Taiwan, only two of 83 babies developed kernicterus.^[9] Our results are more consistent with a study by Bhutani *et al.* who estimated the incidence of kernicterus around 13%.^[6]

The major shortcoming in our study is that we could not follow-up babies post discharge to know about the long-term outcome. Moreover, our study suffers from admission bias. In spite of these shortcomings, our study tries to bridge the gap in the knowledge about them magnitude of the problem in the current era. The favorable short-term outcome might still be expected in mild-to-moderate ABE if the treatment is prompt (66.6% of babies had intact neurological outcome at discharge).

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Role of First-Trimester Uric Acid Level in Prediction of Gestational Diabetes Mellitus

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Abstract

Background: The aim of this study is to analyze the relationship between first-trimester uric acid levels and the risk of developing gestational diabetes mellitus (GDM).

Method: A prospective study was conducted in 100 antenatal women <12 weeks gestation, blood sample for serum uric acid was taken. They were subjected to oral glucose challenge test and oral glucose tolerance test to analyze the association of GDM.

Results: GDM complicated 10% of the patients included in the study. Out of 43 patients with serum uric acid with more than 3.6 mg/dl, 13 patients had deranged blood sugar screening, and out of these eight patients developed GDM ($P < 0.05$).

Conclusion: This study demonstrates a positive association between elevated first trimester uric acid and GDM.

Key words: First trimester, Gestational diabetes mellitus, Uric acid

INTRODUCTION

Diabetes complicating pregnancy has become more common worldwide, around 3–10% pregnancies.

The reason for this rise in the prevalence of diabetes is mainly change in the lifestyle, dietary habits older age at first conception polycystic ovarian disease and obesity.

Uric acid is associated with insulin resistance in non-pregnant women. In pregnancy, uric acid is correlated with insulin resistance in women with gestational hypertension and gestational diabetes mellitus (GDM). Uric acid is also higher in non-pregnant women with H/O GDM independent of body mass index (BMI).

Since insulin resistance is correlated with elevated uric acid, we can predict the development of diabetes. Pregnancy is a unique physiological condition. It is a diabetogenic

condition due to progressive increase in the insulin resistance.

The diabetogenic effects of pregnancy are as follows:

1. Insulin resistance
2. Increased lipolysis
3. Changes in gluconeogenesis
4. Uric acid causing insulin resistance.

Uric acid increase with increased protein intake, alcohol consumption, decreased excretion, or increased endogenous production.

Aim

The aim of this study is to analyze the relationship between first-trimester uric acid levels and prediction of developing GDM.

Uric acid is the end product of urine metabolism. Uric acid are obtained from both dietary sources and breakdown of body protein liver kidneys. Kidneys excrete two-thirds of the uric acid daily and remaining one-third in the stool.

Reference values

Adult males: 2.0–7.5 mg/dl

Adult females: 2.0–6.5 mg/dl.

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In early pregnancy, uric acid levels fall by about one-third but rise to non-pregnant levels by the term.

The normal range for urinary uric acid is between 250 and 750 mg over a 24 h period hyperuricemia is seen in gout, renal disease, and renal failure.

Uric acid concentrations decreased significantly by 8 weeks when compared to pre-pregnant values. This level maintained until about 24 weeks.

Then, the concentrations increased such that by the term, they were greater than the pre-pregnancy values in the majority of patients and remain elevated till 12 weeks after delivery.

Uric acid in the first trimester likely approximates preconception uric acid level. Elevated uric acid may identify women who are predisposed to metabolic syndrome with the risk of developing GDM. Lind *et al.* studied the changes in serum uric acid concentrations during normal pregnancy.^[1] He found that compared with pre-pregnancy values uric acid concentrations decreased significantly by 8 weeks gestation, and this reduced level was maintained until about 24 weeks. Thereafter, the concentrations increased such that by the term, they were greater than the pre-pregnancy values in the majority of patients and remained elevated until at least 12 weeks after delivery.

Pregnancy status	Uric acid
Non-pregnant adult	2.5–5.6
First trimester	2.0–4.2
Second trimester	2.4–4.9
Third trimester	3.1–6.3

MATERIALS AND METHODS

A total of 100 antenatal women attending OPD at the first trimester were included in the study after satisfying inclusion and exclusion criteria. Informed consent was obtained from all patients height, weight, and BMI were measured, and gestational age was confirmed by ultrasonography.

Inclusion Criteria

Antenatal women with gestational age <12 weeks.

Exclusion Criteria

- Pregnant women >12 weeks
- Overt DM
- Or who received steroids in any form
- Gout
- Other endocrine disorder
- Chronic renal disease

- Connective tissue disorder
- H/O thromboembolism
- Liver disease, cardiovascular disease.

Measurement of Plasmauric Acid

Venous blood sample was withdrawn from antenatal women with gestational age <12 weeks. The samples were centrifuged and stored at -70°C . Uric acid measured using colorimetric assay with detection limit of 10 mg/dl. The coefficient was 0.9%.

Screening for GDM

All antenatal mothers were followed up around 24–28 weeks for routine GDM screening with 50 g of oral glucose challenge test (GCT). Those antenatal mothers with plasma glucose level after 1 h ≥ 140 mg/dl, are considered high risk and are subjected to oral glucose tolerance test.

RESULT

In our study the frequency is high around above 11 weeks [Figure 1].

Among total 43 patients with elevated uric acid 19 of them from 21 to 25 years of age 15 of them 26–30 years of age [Table 1].

In our study of the total patients 43 with elevated uric acid, 13 patients had positive GCT - constituting 37% and those with normal uric acid of 57 patients 12 were positive for GCT (21%) [Table 2].

In our study among the 43 patients with elevated uric acid, 8 patients were positive for GTT. And the remaining 35 negative for GTT. And among the 57 patients with normal uric acid only 2 were GTT Positive. Hence elevated uric acid in the first trimester strongly associated with GTT ($P < 0.05$) [Table 3].

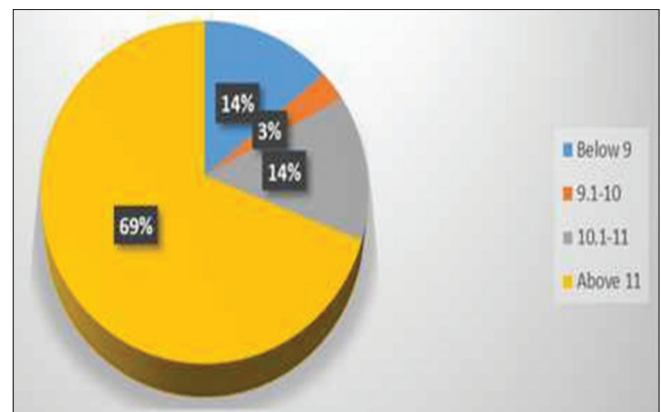


Figure 1: Gestational age in weeks

DISCUSSION

Pregnancy induces progressive changes in maternal carbohydrate metabolism. As pregnancy advances insulin resistance and diabetogenic stress increases due to placental hormones. When this compensation is inadequate gestational diabetes develops.

It is possible that the association of uric acid with insulin resistance is causal. Two mechanisms have been hypothesized by which uric acid can cause insulin resistance. Nakagawa *et al.*^[2] proposed that uric acid causes endothelial dysfunction and decreases nitric oxide production by the endothelial cell.^[3] Another mechanism by which uric acid may induce insulin resistance may be that uric acid causes inflammation and oxidative stress in adipocytes, which is a contributor to the development of metabolic syndrome.

In our study of the total 100 antenatal, 10 were developed GDM. Out of 10, eight had elevated serum uric acid in first trimester, which constitutes about 16.7%. Moreover, among two GDM mothers with normal serum, uric acid constitute

about three with $P < 0.001$. Among those with normal uric acid, GCT was positive among 12 mothers (constituting 21%). Of the elevated serum uric acid, GCT was positive among 13 mothers (constituting 66.7%) with significant $P < 0.001$.

Although uric acid was strongly associated with BMI, the risk of gestational diabetes was increased among women with elevated first-trimester uric acid independent of BMI.

Our findings are consistent with the association of uric acid with insulin resistance in the non-pregnant population.^[4] In a large cross-sectional study of 53,477 non-pregnant adults, serum uric acid was positively correlated with fasting serum glucose and insulin resistance, as well as features of the metabolic syndrome, including waist circumference, low HDL cholesterol, hypertriglyceridemia, hypertension, and fasting glucose ≥ 110 mg/dl.

A study by Di Cianni *et al.* in which serum uric acid was measured at a median of 16 months postpartum in women who had pregnancies complicated by gestational diabetes.^[4] Uric acid was significantly higher in women with metabolic syndrome (4.8 ± 1.2 mg/dl) versus women without metabolic syndrome (4.1 ± 0.8 , $P < 0.01$), independent of BMI, and metabolic syndrome is a known risk factor for developing type 2 diabetes.

According to Dehghan *et al.*, hyperuricemia has also been demonstrated to be a risk factor for developing type 2 diabetes.^[5]

This study demonstrates a striking association between first-trimester uric acid and risk of developing gestational diabetes. Women who have a pregnancy complicated by gestational diabetes have up to a 50% chance of developing type 2 diabetes in their lifetime. It would be interesting to know whether these were the women with elevated uric acid in the first trimester.

The relationship of uric acid elevation in early pregnancy does indicate that metabolic state may affect adverse pregnancy outcomes. With the increase in both metabolic syndrome and obesity, more women are entering pregnancy with these conditions. It is possible that of the women who develop GDM, those with elevated first-trimester uric acid are the women who are at risk to develop type 2 diabetes, and this warrants future investigation.

Thus, we postulate that elevated first-trimester serum uric acid helps in the prediction of GDM and also to identify those at risk of developing type 2 DM and follow-up; and to counsel the patient about the short-term and long-term outcomes.

Table 1: Distribution of maternal age with elevated uric acid

Age	Number (elevated uric acid)
Upto 20	5
21–25	19
26–30	15
>30	4
Total	43

Table 2: Serum uric acid *GCT cross tabulation

OGCT		
Uric acid	OGCT normal	OGCT abnormal
Normal	45	12
Abnormal	30	13

OGCT: Oral glucose challenge test

Uric acid	n	Mean	Standard deviation	Correlations co-efficient	P value
	100	3.50	1.21	0.209	0.036
OGCT	100	114.90	31.79		

OGCT: Oral glucose challenge test

Table 3: Serum uric acid *GTT cross tabulation

GTT			
Uric acid	Normal	Abnormal	P value
Normal	55	2	0.041
Abnormal	35	8	

GTT: Glucose tolerance test

CONCLUSION

The objective of implementing an antenatal screening test for GDM is to identify pre-symptomatic women who will subsequently develop complications of pregnancy and implement efficacious treatment to reduce morbidity and mortality. Currently, complications of pregnancy due to GDM are not diagnosed until mid-late gestation.

Many health professionals advocate the need for an earlier diagnostic/predictive test for GDM, one among them is “the first-trimester serum uric acid.”

A pregnant woman with high-risk factors as marked obesity, strong family history of type II DM, previous history of GDM, impaired glucose metabolism or glucosuria, history of neonatal death, history of fetal macrosomia, and along with >3.6 mg/dl is at risk of developing GDM.

The use of first-trimester serum uric acid as a predictor of GDM is simple, inexpensive, non-invasive, and easy

to perform. This can be used as a screening test for the prediction of GDM.

Hence, in routine antenatal care with predictive test such as first-trimester serum uric acid can be applied as a screening test for all women, so we can predict GDM and diagnosed in time.

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Histopathological Study of Gastrointestinal Tumors

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Abstract

Introduction and Purpose: This study was conducted to determine the relative frequency of various histopathological types of gastrointestinal (GI) tumors, to evaluate them in relation to age and sex of patients, and to get proportion of benign and malignant tumors and location of tumors.

Methodology: Histopathological study of 91 cases of GI tumors was carried out at NHL Municipal Medical College, Ahmedabad, from August 2013 to June 2015.

Results: Of total 91 cases, peak age distribution was in the sixth decade and male-to-female ratio was 2.03:1. GI tumors were more common in esophagus (28.57%), followed by the large intestine (23.07%), stomach (19.78%), rectum (15.4%), small intestine (9.89%), appendix (2.20%), and anal canal (1.09%). Benign and malignant tumors comprised 10.99 and 89.01%, respectively. Among malignant tumors, adenocarcinoma was the most common type (55.6%), followed by squamous cell carcinoma (32.09%), exclusively seen in esophagus.

Conclusion: GI tumors show a wide variation in the morphology. Hence, histopathological examination is mandatory for the diagnosis.

Key words: Benign, Gastrointestinal tumors, Histopathological study, Malignant

INTRODUCTION

Gastrointestinal (GI) tumors are one of the most common neoplasms that are increasing annually world over and most commonly encountered problems in clinical practice with a high degree of morbidity and mortality. There is a great difference in incidence, behavior, treatment options, and prognosis of malignant neoplasms within the component sites of GI tract, as well as between various histological variants within the same morphological sites.^[1] The microscopic analysis of these tumors and determination of histological types is thus helpful in predicting prognosis, deciding treatment options, conducting epidemiological studies and research.^[2] This study was

undertaken to determine the relative frequency of various histopathological types of GI tumors, to get proportion of benign and malignant tumors, and to analyze the data on the basis of various parameters such as age, sex, location, and histopathological type.

MATERIALS AND METHODS

A total of 91 histopathological reports of surgical specimens of gastrointestinal tumors obtained at Pathology Department, NHL Municipal Medical College, Ahmedabad, from August 2013 to June 2015 were analyzed. A detailed history of each patient regarding age, sex, chief complaints, and other relevant findings was taken. The specimen was fixed in 10% formalin. Each specimen was examined grossly and representative tissue bits were sampled. Tissue bits were processed by routine paraffin embedding technique. Tissue sections of 4–5 µm thickness were cut and stained by hematoxylin and eosin stain. Special stains were performed whenever required. Histopathological diagnosis was given and statistical analysis was done.

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RESULTS

Gastrointestinal tumors were more common in the esophagus (28.57%), which was followed by large intestine (23.07%), stomach (19.78%), and rectum (15.4%). Anal canal (1.09%) and appendix (2.2%) were the least commonly involved locations. GI malignant tumors (89.01%) were more common than benign tumors (10.99%) [Figure 1]. Benign tumors were common in children and adults, whereas malignant lesions were common after 50 years of age. The highest incidence of GI tumors, i.e. 24.17% and 15.38% was observed in the 5th–6th decade for male and female, respectively [Table 1]. In the category of benign GI tumors, the prevalence of villous adenoma (30%) was the highest, followed by hamartomatous (Peutz-Jeghers) polyp (20%) and tubular adenoma (20%). The cystic lymphangioma of stomach (10%), tubulovillous adenoma of small intestine (10%), and juvenile rectal polyp (10%) had the same incidence. The prevalence of adenocarcinoma (55.6%) was the highest, followed by squamous cell carcinoma (32.09%). Majority of adenocarcinomas were found in the large intestine (42.2%) followed by stomach (33.3%). Of these 45 adenocarcinomas, 28 (62.22%) were moderately differentiated. Signet-ring adenocarcinomas were found in the stomach (13.3%) than colon (2.2%), while mucinous adenocarcinomas (4.4%) were found only in the large intestine. Squamous cell carcinoma was found exclusively in esophagus with moderate (80.77%) and poor (19.23%) differentiation. Other tumors encountered were GIST, carcinoid tumor, and non-Hodgkin's lymphoma (extranodal marginal zone MALT type) and basaloid carcinoma of anal canal [Table 2].

DISCUSSION

In the present study, the highest distribution of GI tumors was observed in the 6th decade. Similar age distribution is observed in the studies of Devi and Suvarna.^[3] However, in the studies of Prabhakar *et al.*^[4] and Mohammad and Makaju,^[5] the peak age distribution was in the 5th and 7th decade, respectively. Clear-cut male preponderance was found in the present study, which is consistent with the studies of Prabhakar *et al.*,^[4] Mohammad and Makaju,^[5] and Jamal *et al.*^[6]

In our study, the most common site of GI tumors was the colorectal region (38.46%), followed by esophagus (28.57%). The studies performed by Thomas and Sobin^[7] and Jamal *et al.*^[6] also showed higher incidence of colorectal tumors.

Malignant tumors outnumbered the benign tumors. In the present study, most of the benign tumors were adenomatous polyps. Malignant tumors in the esophagus, SCC were the predominant tumor. Similar finding is noted in the studies of Jamal *et al.*^[6] and Thomas and Sobin,^[7] which showed

proportion of SCC to be 91% and 76%, respectively. In the present study, not a single case of esophageal adenocarcinoma was found. This could possibly be explained by the variability of predisposing factors among different population.

Among the gastric tumors, adenocarcinoma was the most predominant type. These findings were in conformity with studies conducted by Devi and Suvarna,^[3] Mohammad and Makaju,^[5] and Lavanya and Sreelatha,^[8] whereas higher incidence of lymphoma observed in study conducted by Lavanya and Sreelatha^[8] as compared to our study.

The small intestine is an uncommon site for tumor despite its great length and vast pool of dividing cells. We found GIST to be the predominant tumor in small intestine which is closely correlated with Mohammad and Makaju^[5] study. As compared to Zhou *et al.*,^[9] we found only one case of lymphoma in small intestine. Carcinoid tumor is commonly seen in small intestine and appendix.

In our study, colorectal adenocarcinomas comprised (86.67%; 26/29) colorectal malignant tumors which are consistent with the studies of Abdulkareem *et al.*^[10] and Lavanya and Sreelatha^[8]

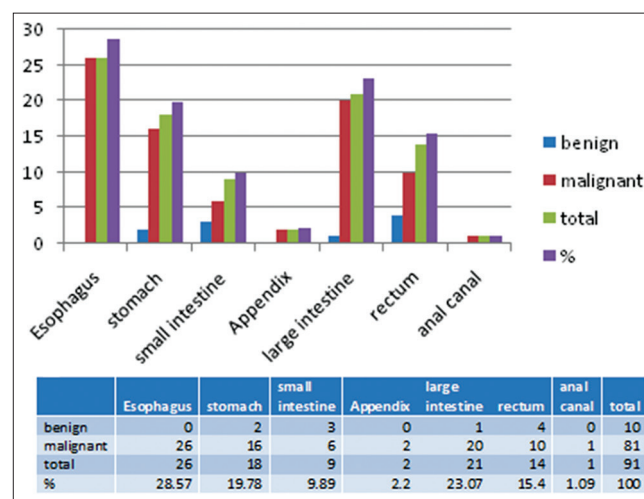


Figure 1: Anatomical distribution of gastrointestinal tumors

Table 1: Age and sex wise distribution of GI tumors

Age in years	Number of cases male (%)	Number of cases female (%)
0–10	3 (3.3)	0 (0)
11–20	1 (1.1)	1 (1.1)
21–30	4 (4.4)	3 (3.3)
31–40	8 (8.8)	2 (2.2)
41–50	11 (12.08)	5 (5.49)
51–60	22 (24.17)	14 (15.38)
61–70	11 (12.08)	3 (3.3)
71–80	1 (1.1)	2 (2.2)
Total	61 (67.03)	30 (32.97)

GI: Gastrointestinal

Table 2: Distribution of malignant GI tumors

S. no	Malignant tumors	Location	Histological			Subtype		Number of cases (%)	Total cases (%)
			Signet ring (%)	Mucinous (%)	Well differentiated (%)	Moderately differentiated (%)	Poorly differentiated (%)		
1	Adenocarcinoma	Stomach	6 (13.3)		0	3 (6.7)	6 (13.3)	15 (33.3)	45 (55.6)
		Small intestine			1 (2.2)			1 (2.2)	
		Large intestine	1 (2.2)	2 (4.4)	-	15 (33.3)	1 (2.2)	19 (42.2)	
		Rectum				10 (22.2)		10 (22.2)	
2	Squamous cell carcinoma	Esophagus				21 (80.77)	5 (19.23)	26 (100)	26 (32.09)
3	GIST	Small intestine						3 (100)	3 (3.7)
4	Non-Hodgkin's lymphoma	Stomach						1 (33.3)	3 (3.7)
		Small intestine						1 (33.3)	
		Large intestine						1 (33.3)	
5	Carcinoid tumor	Appendix						2 (66.7)	3 (3.7)
		Small intestine						1 (33.3)	
6	Basaloid carcinoma	Anal canal						1 (100)	1 (1.21)
Total								81	100

GI: Gastrointestinal

who noted 87.14% and 85.7% colorectal adenocarcinomas, respectively. Mucinous (2/29; 6.8%) and signet-ring (1/29; 3.4%) carcinoma in colorectal region comprised <10% in different studies,^[8,10] including ours. Since only one case of basaloid carcinoma of anal canal was reported in our study, comparison with other studies was insignificant.

CONCLUSION

GI tumors were more common in the 6th decade and showed male preponderance. Predominantly affected site was the colorectal region. Overall, adenocarcinoma was the predominant type. However, in esophagus, predominant type was the squamous cell carcinoma. In the small intestine, GISTs were more common than adenocarcinomas. Of 81 malignant cases, 19 cases (23.45%) presented with lymph node metastasis. Tumors of the GI tract show a wide variation in the histological type, making the histopathological examination crucial in the diagnosis of these tumors. Early diagnosis and treatment is beneficial for better management and is imperative in providing better quality of life to the patient.

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Differential Diagnosis of Intestinal Tuberculosis from Crohn's Disease: A Diagnostic Dilemma

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Abstract

Background: In geographical regions where both intestinal tuberculosis (ITb) and Crohn's disease (CD) coexist, the differential diagnosis of these two conditions poses a challenge to clinicians, because of similar clinical, radiological, and endoscopic findings, and hence, there are high rates of misdiagnosis in both conditions.

Methods: A total of 345 cases of gastrointestinal (GI) endoscopic biopsies and resected specimens were received during the period January 2009–June 2011. Of the cases, 40 were clinically suspected to be suffering from Tb. These cases were analyzed with clinical, endoscopic, radiological, and pathological findings used acid-fast bacilli stain and culture along with newer ancillary techniques such as polymerase chain reaction (PCR) for *Mycobacterium tuberculosis* DNA and anti-Saccharomyces cerevisiae antibody (ASCA): ASCA - IgG and IgA for CD.

Results: Of 40 clinically suspected patients, 20 (50%) were suffering from Tb, 4 (10%) from CD, 8 (20%) from ischemic enteritis, 6 (15%) from chronic non-specific enteritis, 1 (2%) from adenocarcinoma cecum, and 1 (2%) from inflammatory fibroid polyp.

Conclusions: ASCA test was not found useful in differentiating CD from GITb. Tissue PCR was most reliable technique to confirm GITb. Serological assay is used to some extent, and it is sensitive when IgG and IgA are combined. The best way to diagnose CD, is by exclusion of GITb and to correlate histology with clinical finding.

Key words: Anti-Saccharomyces cerevisiae antibody, Crohn's disease, Intestinal tuberculosis, Polymerase chain reaction

INTRODUCTION

Tuberculosis (Tb) can involve any part of gastrointestinal (GI) tract and is the sixth most frequent site of extrapulmonary involvement. *Mycobacterium tuberculosis* (M. tb) reaches the GI tract through hematogenous spread, ingestion of infected sputum, or direct spread from infected contiguous lymph nodes and fallopian tubes.^[1] The incidence of abdominal Tb is increasing globally with the spread of AIDS.^[2] Crohn's disease (CD) is found to show cumulative increase from fewer than 5000 in 1987 to 21061 in 2001.^[3] Unfortunately, traditional methods (acid-fast bacilli [AFB] stain and culture) for confirming Tb suffer its own limitations: (a) Finding AFB in only,

one-third of patients. (b) AFB can be recovered, in culture of the involved tissues (in only 50% and it takes about 6–8 weeks).

The ultimate course of these two disorders is different. ITb is curable; in contrast, CD is a progressive-relapsing illness. For this reason, newer ancillary techniques have been attempted to distinguish these two conditions.

METHODS

A total of 345 cases of GI endoscopic biopsies and resected specimens were received, during the period January 2009–June 2011. Of the cases, 40 were clinically suspected to be suffering from Tb. A complete clinical, endoscopic, and radiological finding was obtained for these cases, and specimens were also collected.

Macroscopic examination of GI surgical specimens was done after 24 h of fixation. Representative bits were taken from ulcerated lesion and stricture site, and mesenteric

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lymph nodes were also taken. Histological sections were studied with hematoxylin and eosin wherever needed. Ziehl-Neelsen (ZN) method of staining and culture for the presence of AFB, tissue polymerase chain reaction (PCR) for Tb, and serological assay anti-Saccharomyces cerevisiae antibody (ASCA) - IgG and IgA for CD was performed.

RESULTS

Table 1 shows morphological findings of CD and ITb. In the rest 10 of GITb showed serosal tubercles in 8 cases and caseating mesenteric nodes in 2 cases. Table 2 shows histopathological findings of CD and ITb.

- Mycobacterial culture was found to be positive in 10 cases, AFB stain positive in 5 cases, and PCR positive for M. tb DNA in 3 cases.
- Serological assay: ASCA - IgG and IgA positive in one case.

Of 40 cases, 20 cases was diagnosed to be Tb, 17 cases showed caseating granuloma and 3 non-caseating granulomas in which PCR for M. tb DNA were positive for 3 cases. AFB identified in 5 cases by ZN method, and culture was positive in 10 cases of 20 cases.

In suspected CD cases, 4 were diagnosed as CD as 2 cases presented with non-caseating granuloma, 1 case was positive for ASCA - IgG and IgA. Morphological features of CD were deep fissures and skip lesion, and enterocutaneous fistula was seen in 4 cases. PCR for M. tb was negative in all 4 cases.

Table 1: Morphological findings of CD and intestinal Tb

Colonoscopy	CD (4)	GITb (20)
Ulceration	3 (75)	6 (30)
Skip lesions	3 (75)	0 (0)
Pseudopolyps	1 (25)	0 (0)
Strictures	3 (75)	4 (20)

CD: Crohn's disease, ITb: Intestinal tuberculosis, GITb: Gastrointestinal tuberculosis

Table 2: Histopathological findings of CD and ITb

Histological features	CD	GITb
Granuloma	2 (50%)	19 (95%)
*Caseating	0	17
*Non-caseating	2	2
*Confluent	0	6
*Discrete	2	13
Ulceration	3 (75%)	5 (25%)
Lymphoid aggregates or follicles	3 (75%)	15 (75%)

CD: Crohn's disease, ITb: Intestinal tuberculosis, GITb: Gastrointestinal tuberculosis

DISCUSSION

There is a close resemblance in clinical, radiological, surgical, and histological features of CD and GITb, thus differential diagnosis is a major challenge. In India because of diagnostic similarity, definite diagnosis of CD is must to avoid unnecessary antitubercular therapy (ATT). Most of the CD cases respond to mesalamine preparations, immunotherapy or steroid treatment. Only a small proportion will respond to ATT, and in such cases, problem is more confusing.

For definite diagnosis of CD, there are certain criteria,^[4] which are based on morphological and pathological criteria; (a) morphological criteria are discontinuous/segmental and asymmetrical mucosal involvement, deep mucosal or longitudinal fissures, rigid and stricture intestinal wall, and presence of enterocutaneous or enteroenteric fistula or chronic perianal disease. (b) Pathological criteria: Normal mucus content in the goblet cells of the inflamed region, lymphocyte aggregation in the mucosa or submucosa, non-caseating granuloma, longitudinal ulcers/fissures, and transmural inflammation or inflammation beyond mucosa. For definite diagnosis of CD, presence of at least 3 different criteria or presence of non-caseating granuloma on histology with at least one test to exclude Tb (by histological, microbiological, and PCR studies) is required.

For this reason, many investigators have attempted to find specific differential diagnostic methods to distinguish these conditions. A variety of clinical, endoscopic, and radiological criteria has been recommended for the differentiation^[5-9] but does not give good result. However, histology can give clue such as ITb showing well-defined large, confluent granuloma often with caseation and with more than four sites of granulomatous inflammation per site, presence of epithelioid cells. The granulomas in CD are fewer, smaller, and never confluent.

Tissue culture takes a long time and its sensitivity is low. As per studies on tissue culture, in case series, the sensitivity of tissue culture in the diagnosis of ITb is between 21% and 54.5% and the specificity is 100%.^[10-14] In another case series, comparing 26 patients with CD and 26 patients with ITb were found to be 40%, 86%, and 41%, respectively. In another case series, comparing 26 patients with CD and 26 patients with ITb, the tissue culture sensitivity was between 25% and 35% and the specificity was 100%.^[13]

On colonoscopy, colonic Tb may present as an inflammatory stricture, hypertrophic lesions resembling polyps or tumors, and segmental ulcers. In one study, endoscopically the distribution of macroscopic lesions was similar in the two conditions, with 60–70% of the patients showing ileocecal

involvement and about 50% showing involvement of the transverse or distal colon. Involvement of the ileocecal valve, deformity of the cecum, and stricture/stenosis were, however, more common in the Tb patients, while fistulae were more in patients with CD. Recently, ASCA and tissue PCR for *M. tb* were employed for the diagnosis. TB PCR was found highly specific for the diagnosis of GITb but lacked sensitivity, the analysis of result can be done quickly and result can be obtained in 48 h. This test is very specific for Tb but occasionally may be positive in patient with CD. Several studies suggest a role for PCR for mycobacterial DNA in the differential diagnosis of ITb. Sensitivity of positive ASCA for the diagnosis of CD reaches up to 76% and 98% in various trials.^[15] IgA ASCA and IgG ASCA are considered to be 95% specific for the diagnosis of CD when individually tested but 100% when tested in combination.^[15,16]

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Citrobacter Emerging as a Common Uropathogen in Pediatric Population

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Abstract

Introduction: There is a changing scenario of the epidemiology of uropathogen in the hospital setup. *Citrobacter* species being the inhabitants of intestinal tract is emerging as one of the leading uropathogens in pediatric age group.

Purpose: The study was undertaken to look for the prevalence of *Citrobacter* species responsible for uropathogen with its antibiogram, in pediatric age group.

Materials and Methods: A cross-sectional study was carried out over a period of 1½ year. A total of 1890 clean-catch midstream urine samples were processed in clinical microbiology laboratory during the study period. Isolates were identified using standard isolation methods, and antibiogram was done using Kirby–Bauer diffusion method as per the Clinical and Laboratory Standards Institute guidelines. Extended-spectrum beta-lactamase (ESBL), metallo-beta-lactamase, and AmpC were tested for the multidrug-resistant (MDR) isolates.

Results: 90% belonged to Gram-negative pathogens, among which highest growth isolated was *Escherichia coli* 289 (41%) followed by *Citrobacter* spp. 122 (17.3%) and *Pseudomonas* spp. 105 (15%). Antibiograms of *Citrobacter* spp. isolates revealed that effective agent against *Citrobacter* spp. isolates was imipenem (89.7% sensitive), followed by amikacin (85.4%), gentamicin (72%), and piperacillin/tazobactam (68.4%). Among oral drugs, most sensitive is levofloxacin (52%) and nitrofurantoin (51.2%). Of the 122 strains in pediatric population, 74 (61%) were found to be MDR of which 62 (51%) were ESBL producers and 81 (66.4%) were AmpC producers.

Conclusion: Our study showed that the prevalence of *Citrobacter* as a uropathogen in pediatric population has increased becoming the 2nd most common uropathogen (17.3%). The *Citrobacter* isolates resistant to multiple antimicrobial agents have emerged, making it an emerging nosocomial pathogen. In pediatric age group, urinary tract infection soon progresses to urosepsis and renal damage, so search for this pathogen as well as its antibiogram is essential. Adoption of hospital infection control practices and a good antibiotic policy may prevent their spread.

Key words: Antibiotic sensitivity, *Citrobacter* species, Multidrug resistance, Pediatrics, Urinary tract infection

INTRODUCTION

Urinary tract infections (UTIs) in children are usually associated with high morbidity and long-term complications if they are not treated in the beginning. The incidence varies

according to age, races, and sex of children.^[1,2] UTI is one of the most common infections of childhood. It distresses the child, concerns the parents, and may cause permanent kidney damage.^[3]

The genus *Citrobacter* is a distinct group of facultative anaerobic Gram-negative bacilli from the *Enterobacteriaceae* family.^[4] The genus *Citrobacter* comprises 11 different species. Among these, *Citrobacter koseri* (previously known as *Citrobacter diversus*) and *Citrobacter freundii* are the most common species implicated in infections. *Citrobacter* species can cause variety of infections such as respiratory tract infections, UTI, bloodstream infections, wound and burns infections,

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meningitis, endocarditis, and peritonitis.^[5] We report here the emergence of *Citrobacter* as an increasingly common urinary pathogen in pediatrics patients attending this medical college.

As a pathogen of UTI, most common etiologic pathogens are *Escherichia coli* (93.3%) followed by *Proteus* spp., *Klebsiella* spp., *Citrobacter* spp., *Staphylococcus aureus*, and others.^[6]

An association with virulence markers such as the serum resistance, the cell surface hydrophobicity, and the killing in the polymorphonuclear leukocytes, which had been studied in *E. coli*, was found to exist in *Citrobacter* spp., leading to its pathogenicity.^[7]

Recently, the isolation of this pathogen in hospital settings across the globe is increasing, and multidrug-resistant (MDR) strains are emerging. These strains present a challenge for clinicians and clinical microbiologists alike because of their increased propensity to cause not only nosocomial infections but also community-acquired infection also. The aim of this study was to assess the prevalence and antibiotic sensitivity pattern of *Citrobacter* spp. in pediatric population with UTIs in a tertiary care hospital.

MATERIALS AND METHODS

This is a cross-sectional study conducted over a period of 1 year and 6 months (June 2016–January 2017) in the Department of Microbiology, Bankura Sammilani Medical College and Hospital, Bankura, West Bengal.

Inclusion Criteria

A total of 1890 freshly voided midstream specimens of urine under the 12 years were submitted to the clinical microbiology laboratory for processing.

Exclusion Criteria

Inadequate urine samples, urine bag collected samples, specimens collected more than 2 h before submission, specimens submitted in leaking or unsterile containers, and specimens revealing the growth of more than two types of bacteria on culture were excluded from the study.

Semiquantitative urine culture using a calibrated loop was used to inoculate Blood agar and MacConkey Plates (HiMedia Laboratories Pvt., Ltd., Mumbai).^[8]

After aerobic incubation at 37°C for 24 h, the petri plates were inspected for growth of bacteria in the form of colonies. Those, which showed no colony, were noted down as no growth. The media, which showed the appearance of colonies, was processed following the standard bacteriological procedures. Colony characteristics of each type were recorded. Gram-

staining was done from the colonies, and based on the findings of that, identification of bacterial isolates was done by conventional biochemical tests for identification. The significant pathogens were identified by standard biochemical procedures.^[9]

Inoculum for each isolate was prepared by direct colony suspension in nutrient broth, and the turbidity of the broth was adjusted to a 0.5 McFarland standard suspension, which contains approximately $1-4 \times 10^8$ colony-forming units/ml. The Mueller-Hinton agar (MHA) plates were inoculated and then incubated at 37°C for overnight. On the next day, MHA plates were examined, the zone of inhibition was noted by measuring with a ruler held against the back of petri plate, and the sensitivity pattern of the bacterial isolates to various antibiotics was noted. Antimicrobial susceptibility testing was done for all the isolates using Kirby–Bauer disc diffusion method on MHA (HiMedia Laboratories Pvt., Ltd., Mumbai) recommended by Clinical and Laboratory Standards Institute (CLSI) M2-A9.^[10]

The antimicrobials tested for the Gram-negative bacteria were amikacin (30 µg), gentamicin (10 µg), ofloxacin (5 µg), levofloxacin (5 µg), ceftriaxone (30 µg), cefoperazone (CP) (75 µg), CP-sulbactam (CPS) (75 µg, 1:1), cefotaxime (30 µg), ceftazidime (30 µg), nitrofurantoin (300 µg), amoxicillin-clavulanate (30 µg), piperacillin-tazobactam (100:10 µg), and imipenem (10 µg) which were obtained from HiMedia, India. MDR was defined as resistance to more than two groups of drugs.

Detection of Extended-Spectrum and AmpC Beta-Lactamase

The isolates which were resistant or intermediately susceptible to any of the third-generation cephalosporins were further processed for extended-spectrum beta-lactamase (ESBL) detection by the double-disk potentiation method^[11] using a disc of cefotaxime (30 µg)/ceftazidime (30 µg, and combination discs of cefotaxime 30 µg and clavulanic acid 10 µg and of ceftazidime 30 µg plus clavulanic acid 10 µg. *Klebsiella pneumoniae* ATCC 700603 was used as the ESBL-positive control. ESBL production was inferred if the inhibition zone increased by 5 mm toward the cefotaxime plus clavulanic acid disc or toward the ceftazidime plus clavulanic acid disc in comparison to the third-generation cephalosporin disc alone.

Organism resistant to cefoxitin, CPS, and piperacillin-tazobactam combination in addition to other cephalosporins were considered to be AmpC producers (CLSI 2003).^[12]

Detection of Metallo-Beta-Lactamases (MBLs)

Imipenem-resistant isolates were tested for MBL production using modified Hodge test and double-disc synergy test using ethylenediaminetetraacetic acid.^[13]

The data were tabulated and statistical analyses of the data were done using SPSS Statistics 20.0, and qualitative and quantitative data were expressed as frequency and percentage. Association between two or more qualitative variables was analyzed using Chi-square test. A two-sided $P < 0.05$ was considered to be statistically significant.

RESULTS

Of the total 1890 pediatric samples, growth was seen in 705 samples. Among the positive urine cultures, 90% belonged to Gram-negative pathogens. Among which highest growth isolated was *E. coli* 289 (41%) followed by *Citrobacter* spp. 122 (17.3%) and *Pseudomonas* spp. 105 (15%) Shown in Table 1 [$\chi^2 = 95.34$, d.f = 5, $P = 0.000$].

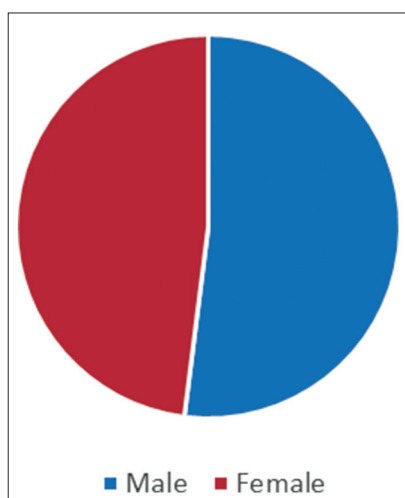


Figure 1: Gender distribution of *Citrobacter* species in children

In pediatric population, of the 620 Gram-negative isolates, 122 belonged to the *Citrobacter* species (*C. freundii* - 30 and *C. koseri* - 92). Among the 122 *Citrobacter* isolates, 96 (78.68%) were obtained from indoor samples, whereas 24 (19.6%) were obtained from outdoor specimens.

Among pediatric group, the *Citrobacter* spp. isolates showed slight male predominance (52%) [Figure 1]. Maximum number of cases was seen in the age group of 6–12 years of age, where males were 190 and females were 120 and majority of female culture positive cases were in age group of 2–5 years [Table 2].

Antibiograms of *Citrobacter* spp. isolates revealed that effective agent against *Citrobacter* spp. isolates was imipenem (89.7% sensitive), followed by amikacin (85.4%), gentamicin (72%), and piperacillin/tazobactam (68.4%). Among oral drugs, most sensitive is levofloxacin (52%) and nitrofurantoin (51.2%) [Figure 2].

Of the 122 *Citrobacter* strains in pediatric population, 74 (61%) were found to be MDR, of which 62 (51%) were ESBL producers and 81 (66.4%) were AmpC producers. Most of the ESBL producing strains were isolated from inpatients. No MBL was identified in this study.

DISCUSSIONS

The education and application of personal hygiene are important in that *Citrobacter* strains are excreted as fecal wastes. Infections occurring in hospitals are closely related to the fact that hospital staff carries the bacterium in

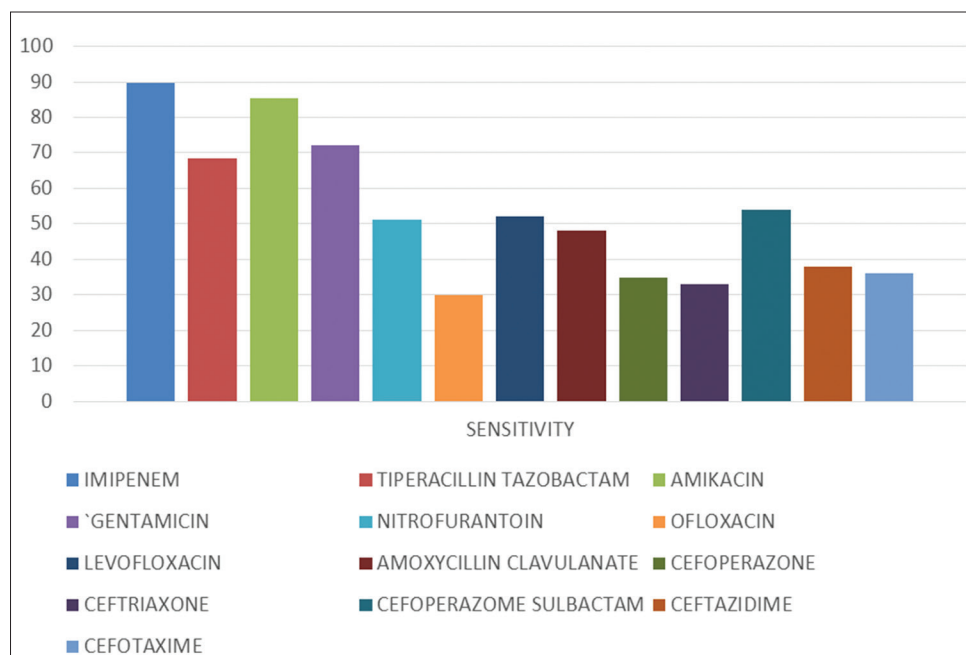


Figure 2: Antibiogram of *Citrobacter* species isolated from urine of children

Table 1: Distribution of pathogens

Bacteria	Total population (%)	Pediatrics (%)
<i>E. coli</i>	982 (48)	289 (41)
<i>Citrobacter</i> spp.	200 (9.7)	122 (17.3)
<i>Klebsiella</i> spp.	344 (16.7)	85 (12)
<i>Pseudomonas</i> spp.	280 (13.6)	105 (15)
Other GNB	42 (2)	19 (2.7)
GPC	207 (10)	85 (12)
Total	2056	705

E. coli: *Escherichia coli***Table 2: Age- and gender-wise distribution of children**

Age (years)	Sex		Total (%)
	Male (%)	Female (%)	
<2	12 (19)	11 (18.6)	23 (18.9)
2-5	18 (28.6)	27 (45.8)	45 (36.9)
6-12	33 (52.4)	21 (35.6)	54 (44.2)
Total	63	59	122

their hands and gastrointestinal systems. *Citrobacter* strains are mostly isolated from the infections of urinary and respiratory systems as pathogens.^[14] Invasive procedures such as catheterization help them to colonize urinary bladder, and during intensive chemotherapy, this bacterium disseminates to the bloodstream to cause severe bacteremia. The problem is further intensified by the emergence of MDR *Citrobacter* spp. resulting into treatment failure.^[15]

Citrobacter has emerged as the 2nd leading uropathogen in pediatric population in our study, with increasing trend of 17.3%, resistant to the commonly used antibiotics which are alarming. The prevalence of *Citrobacter* isolates in pediatric age group reported by Khatoon *et al.* reported as 9.5%, Gautam *et al.* as 12.1%, and Metri *et al.* as 9.4%. In our study, we found the prevalence to be 17.3% which is much more higher in contrary to other studies so far.^[15,16,17]

Citrobacter species isolated in our study are *C. koseri* and *C. freundii* with *C. koseri* being the predominant one. This study correlates well with the study of Hiba *et al.*^[18]

Antibiograms of *Citrobacter* spp. isolates revealed that effective agent against *Citrobacter* spp. isolates were imipenem (89.7% sensitive), followed by amikacin (85.4%), gentamicin (72%), and piperacillin/tazobactam (68.4%). Among oral drugs, most sensitive is levofloxacin (52%) and nitrofurantoin (51.2%).

Of the 122 strains in pediatrics, 74 (61%) were found to be MDR of which 62 (51%) were ESBL producers and 81 (66.4%) were AmpC producers. Most of the ESBL producing strains were isolated from inpatients. The rate of the ESBL production among the *Citrobacter* species in

our study was higher than that which was reported by other authors,^[19,20] which was 36.36% and 19.3%, respectively. However, it was comparable with the finding of Rizvi *et al.*^[21] (62%) and lower than that which was reported by Uma *et al.*^[22] who had reported it to be 86.50% among the hospital isolates. Excessive antibiotic exposure (especially the extended-spectrum cephalosporins), extended hospital stay, recent surgery, admission to the intensive care unit, and instrumentation have been identified as the risk factors for the selection of the ESBL-producing strains.

Sensitivity to imipenem showed in our study was 89.7% which in contrary to various studies which shows 100% sensitivity^[23] but corresponds well the study of Preethishree *et al.*^[24] Carbapenems are important antibiotics for the treatment of healthcare-associated infections and have a special role in treating infection with ESBL-producing organisms. The emergence and spread of resistance to carbapenems will end all the treatment options available for treating MDR pathogens.

The strength of this study was that it would be helpful for better patient care in pediatric population, precautionary actions to prevent the emergence and spread of resistant microorganisms can be undertaken. The limitation of the study was that it is phenotypic identification. It would have been better if molecular-based method was used for confirmation of identification, and bacterial resistance was identified on genetic level.

CONCLUSION

The magnitude of *Citrobacter* as a pathogen of urine in pediatric population has shown increase in our study, becoming the 2nd most common uropathogen. This pathogen once a commensal of gastrointestinal tract and environment cannot be considered a commensal anymore being 17.3% of the total uropathogen. The *Citrobacter* isolates resistant to multiple antimicrobial agents have emerged, making it an emerging nosocomial pathogen and it requires keen attention as it is not only resistant to the commonly used antibiotic but also MDR. It is alarming that 10.3% of *Citrobacter* is resistant to imipenem, suggesting carbapenemase production. As in pediatric population, UTI soon progresses to urosepsis and renal damage, so search for this pathogen as well as its antibiogram is essential as judicious use of empirical therapy will be dangerous. Adoption of hospital infection control practices and a good antibiotic policy may prevent their spread.

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Dyslipidemia in Women with Polycystic Ovary Syndrome: Comparison between Obese Cases and Obese Controls in a Government Hospital in West Bengal

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Abstract

Introduction: Polycystic ovarian syndrome (PCOS) causes dyslipidemia. The aim of this study was to compare plasma lipid profiles in women with obese PCOS with body mass index (BMI) matched women without PCOS inpatient in government hospital in West Bengal.

Purpose: A total of 75 obese PCOS cases and 75 BMI matched and obese controls were recruited in the study. Blood samples were taken during the 3rd day of the menstrual cycle. After 12 h of fasting cholesterol, triglycerides (TG), very-low-density lipoprotein-cholesterol (VLDL-C), LDL-C, and high-density lipoprotein-C (HDL-C) were measured. Statistical analysis was done by descriptive statistics in independent group *t*-test between two means of both cases and controls and $P < 0.05$ was considered as statistically significant.

Result: No difference was observed between groups in terms of total cholesterol levels ($P = 0.28$) or LDL-C ($P = 0.342$). In PCOS, HDL-C level is lower than controls ($P = 0.001$). No difference was observed between groups in terms TG level ($P = 0.33$) and VLDL-C ($P = 0.358$), respectively.

Conclusion: A more atherogenic lipid profile with low HDL-C was found in women with PCOS.

Key words: Polycystic ovarian syndrome, Dyslipidemia and obesity,

INTRODUCTION

Polycystic ovarian syndrome (PCOS) is one of the most frequently encountered endocrine disorder in women of the reproductive age.^[1] It has been suggested that this condition occurs in as many as 4%–10% of women of the reproductive age with onset manifesting as early as puberty.^[2,3] Because of diversity of clinical and metabolic

findings in PCOS, there has been a great debate as to whether it represents single disorder or multiple associated pathological disorder. PCOS is primarily characterized by hyperandrogenism, insulin resistance, and chronic anovulation.^[4] However, PCOS was not described until 1935 when Stein and Leventhal described the syndrome as having pathognomonic ovarian finding (multiple cysts) and clinical triad of hirsutism, amenorrhea, and obesity.^[5] The term PCOS came in use in 1960, when it was understood and clinical and histological diversity was typical of syndrome.^[6] In 1990, PCOS should be defined by National Institute of Health-National Institute of Child Health and Development. PCOS was defined as clinical and/or biochemical evidence of hyperandrogenism and anovulation and exclusion of some known disorder. This disorders are hyperprolactinemia, thyroid disorder, adrenal

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hyperplasia, androgen producing ovarian tumor chronic anovulation.

Hyperandrogenism is usually suggested by the presence of hirsutism (occurs in approximately 80% of PCOS women) and can be documented by measuring androgen levels in the blood. Free testosterone is the most frequently elevated steroid in the blood in PCOS. Circulating levels of total testosterone, androstenedione, and dehydroepiandrosterone are also elevated.^[7]

PCOS is associated dyslipidemia. Lipid abnormalities in PCOS include lower high-density lipoprotein (HDL) and HDL2-cholesterol (HDL2-C), higher total and low-density lipoprotein-cholesterol (LDL-C), and higher triglycerides (TG) and very-LDL-C (VLDL-C) levels (210,211).

Women with polycystic ovary syndrome (PCOS) are dyslipidemic with high total cholesterol, increased small dense LDL-C. High TG reduced HDL-C.^[8-10] Obesity is a common finding in women with PCOS. Many women with PCOS (between 38% and 88%) are overweight^[11,12] or obese. Adiposity plays a crucial role in PCOS and influences the clinical and endocrine features in many women with the condition.^[13] Obesity itself causes the metabolic syndrome, which includes insulin resistance, Type 2 diabetes mellitus, hypertension, non-alcoholic fatty liver disease, and dyslipidemia, all risk factors for cardiovascular disease (CVD).^[14,15] The typical dyslipidemia of obesity consists of increased TG, VLDL-C, and FFA, decreased HDL-C with HDL-C dysfunction and normal or slightly increased LDL-C with increased small dense LDL-C. The concentrations of plasma apolipoprotein (apo) B are also often increased, partly due to the hepatic overproduction of apo-B containing lipoproteins.^[16,17] Adipokines such as resistin and retinol-binding protein 4 decrease insulin sensitivity, in addition, cytokines such as tumor necrosis factor- α and interleukin-6, which originate from macrophages in adipose tissue.^[18] Obesity causes dyslipidemia irrespective of PCOS. Dyslipidemia is also due to its association with insulin resistance that frequently encountered in PCOS. Dyslipidemia also observed in lean PCOS.

Aims and Objectives

The aims of this study were planned to determine the lipid profile in obese women with PCOS to identify the cardiovascular risk early.

MATERIAL AND METHODS

Study Design

A community-based, cross-sectional study was carried out from 2007 to 2011 among women aged 20–35 years who were permanent residents of West Bengal. PCOS patients

with body mass index (BMI) (≥ 30 <35 kg/m²) were recruited from the outpatient department clinics of the Department of Gynecology in Institute of Postgraduate Medical Education and Research (IPGME&R), Kolkata. This clinical study was approved by the Institutional Ethics Committee, (IPGME&R) Kolkata. All of the participants signed informed consent to be included in the study.

Selection of Cases and Control from Sources

Operational definition

Amenorrhea

Amenorrhea was defined as the absence of periods for at least 3 of the previous cycle in patient who had been menstruating previously.

Oligomenorrhea

Oligomenorrhea was considered when length of menstrual cycle was greater than 35 days.

Obese

Obesity was considered when BMI was between 30-35 kg/m².

Clinical hyperandrogenism

Hyperandrogenism was defined as presence of hirsutism (modified Ferriman-Gallwey score > 5) and or severe acne.

Polycystic ovaries

Polycystic ovaries was defined having follicles 2–9mm in diameter and ≥ 12 in number or ovarian volume ≥ 10 cm³ in one or both ovaries on transabdominal pelvic ultrasonography (USG). There should be no dominant follicle with size greater than 10 mm in diameter.

Participants selected were undergone three stages of operation.

Stage I: Questionnaire

“Probable cases” and “probable controls” were identified during the cross-sectional survey after administration of the questionnaire. A “probable case:” A “probable case” was defined as a woman with symptoms suggestive of PCOS (i.e., oligo/amenorrhea according to menstrual cycle length and/or clinical features of hyperandrogenism) as defined above.

A probable control: A “probable control” was defined as a woman with regular menses and no clinical features of hyperandrogenism who was not a relative of a probable case. Probable controls were selected by drawing lots among eligible women from the same age and BMI.

The process was repeated until the desired number of controls was obtained at a 1:1 ratio.

All “probable cases” and randomly selected “probable

controls” were invited to undergo further evaluation (Stages 2 and 3).

Stage 2: Clinical examination and biochemical investigations

Selected women were examined for the presence of hirsutism, acne, or alopecia. Hirsutism was routinely graded by two physicians independently using the common modified Ferriman–Gallwey (FG) score. If the FG score differed by >2 , reevaluation by a third physician was done and median values were used. Nine areas were examined: Upper lip, chin, chest, upper abdomen, lower abdomen, upper back, lower back, thighs, and upper arms. Each area is scored 0–4, resulting maximum score 36. Hirsutism was diagnosed when a score above 5 was evaluated.

Biochemical Investigations

Venous blood (5 ml) was drawn from both probable cases and probable controls. Blood samples were taken during the 3rd day of the menstrual cycle. Hemolyzed sera were discarded. Serum total testosterone was measured to diagnose biochemical evidence of androgen excess or hyperandrogenemia. Hyperandrogenemia was diagnosed when serum total testosterone level was greater than 55ng/dl. Upper normal level of serum total testosterone level was 55ng/dl mentioned by kit supplier. Kit was supplied by Radio-pharmaceutical and isotope technology, BARC, Mumbai.

Stage 3: Ultrasound scanning

Women identified as probable cases and probable controls were invited to undergo pelvic ultrasound scanning within the first 5 days of commencement of their next menstrual period.

Polycystic ovaries on ultrasound sonography (USG) - multiple small follicles (> 10 – 12) and (2 – 9 mm in diameter) tightly spaced along the periphery of the ovary. Ovaries which contained cysts >10 mm in diameter were excluded from then calculations as per diagnostic recommendation, since they do not represent immature follicles of PCOS.

Inclusion Criteria of Cases

The diagnostic criteria for PCOS were based on the unified standards formulated by the Rotterdam International Conference in 2003. Patients with any two of the following three conditions were diagnosed with PCOS: (1) Infrequent ovulation or anovulation; (2) hyperandrogenism or clinical manifestations of high blood androgen; and (3) polycystic ovaries on USG - multiple small follicles (>10 – 12) and (2 – 9 mm in diameter) tightly spaced along the periphery of the ovary. Exclusion criteria included congenital adrenal hyperplasia, androgen-secreting tumors, Cushing

syndrome, thyroid dysfunction, hyperprolactinemia, and other diseases.^[12]

Inclusion Criteria of Controls

Patients in the control groups exhibited normal menstruation, no clinical or biochemical signs of hyperandrogenism, normal ovaries as defined by B-mode ultrasonic examination, no family history of endocrine and metabolic diseases, and no family history of PCOS including age and BMI matched with cases.

Participants on OCP or conceived were excluded from the study.

A total of 75 obese PCOS patients between age group between 20 and 35 years were recruited. Healthy age and BMI matched ($n = 75$) women without PCOS enrolled as controls.

Other Biochemical Parameters

Blood samples were taken during the 3rd day of the menstrual cycle after 12 h of fasting. Hemolyzed sera were discarded. Serum HDL-C, LDLC, VLDL-C, and total cholesterol TG were measured.

Statistical Analysis

Statistical analysis was done by descriptive statistics in statistical analysis was carried out using Microsoft Excel sheet 2003. Descriptive statistics are presented as mean \pm standard deviation for normally-distributed variables. Student *t*-test was used to compare variables with normal distribution and $P < 0.05$ was considered as statistically significant.

RESULTS

Baseline Characteristic

The present analysis evaluates 75 women with PCOS (PCOS group) and 75 healthy controls matched for age and BMI. [Table 1] There was no age difference between groups ($P = 0.86$) and no difference in term of BMI ($P = 0.27$).

Table 1: Age and BMI of the study population

Age/BMI	Obese PCOS <i>n</i> =75	Obese controls <i>n</i> =75
Age in years $P=0.86$		
Range	20–35	20–35
Mean \pm SD	27.8 \pm 3.4	28.65 \pm 2.7
BMI kg/m ² $P=0.27$		
Range	30–35	30–35
Mean \pm SD	31.08 \pm 1.76	30.98 \pm 1.32

BMI: Body mass index, SD: Standard deviation, PCOS: Polycystic ovarian syndrome

Table 2: Lipid profiles of women with obese PCOS and control

Lipid mg/dl	Obese PCOS, n=75 Mean±SD	Obese Controls, n=75 Mean±SD	P value P<0.05 Significant	Significant or not
Total cholesterol	197.55±11.2	189.25±24.7	P=0.28	Not significant
VLDL	35.5±9.98	37.5±4.09	P=0.358	Not significant
LDL	116.2±12.32	109±16.24	P=0.342	Not significant
HDL	42.05±3.34	47.75±3.32	P=0.001	Significant
TG	130±22.7	137±32.3	P=0.35	Not significant

PCOS: Polycystic Ovarian Syndrome, VLDL: Very-low-density lipoprotein-cholesterol, LDL: Low-density lipoprotein, HDL: High-density lipoprotein, TG: Triglycerides

Lipid Parameters [Table 2]

No difference was observed between groups in terms of total cholesterol levels ($P = 0.28$) or LDL-C ($P = 0.342$). In PCOS, HDL-C level is lower than controls ($P = 0.001$). No difference was observed between groups in terms TG level ($P = 0.33$) and VLDL-C ($P = 0.358$).

DISCUSSION

Decrease in HDL-C and increase in TG levels are well-known lipid profile characteristics in women with PCOS.^[19-21] Decrease in HDL-C is only lipid abnormalities in our finding. Many studies have reported that LDL-C is increased in women with PCOS, which is usually not noted in insulin-resistant states. The reason why LDL-C is also increased in women with PCOS is not clear yet, but increased LDL-C levels in women with PCOS may be related to hyperandrogenism or genetic factor.^[22] Another study shows that no differences were observed in the incidence of high total cholesterol, HDL cholesterol level, LDL-C level; TG, and homocysteine levels did not differ between PCOS and control groups.^[23] Further study is needed why HDL is decreased in our study. Insulin resistance is cause of dyslipidemia in PCOS. Obesity is important cause of dyslipidemia. Obesity is associated with dyslipidemia and it plays a major role in the development of atherosclerosis and CVD. Obesity causes higher TG, decreased HDL-C levels, and increased small, and dense LDL particles and these have been shown to be atherogenic.^[24,25] Several recent studies have suggested that insulin resistance causes dyslipidemia and insulin resistance is associated with hypertriglyceridemia and high levels of VLDL-C and low levels of HDL-C cholesterol and apo A-I).^[26,27] Dyslipidemia is associated with insulin resistance in women with PCOS. The mechanisms by which PCOS exerts an effect on lipoprotein metabolism independent of insulin resistance are not known, but hyperandrogenemia may cause dyslipidemia. However, plasma androgen levels do not always correlate closely with clinical hyperandrogenemia, and it is thought that other factors such as tissue sensitivity to androgens are involved. Hyperandrogenemia is a risk factor for dyslipidemia, which was altered only in the phenotypes with elevated androgen levels.^[28] The mechanism by which hyperandrogenism

may contribute to the development of lipid abnormalities in PCOS is not clear. Hyperandrogenism may lead to the abnormalities in lipoprotein profile by working directly at the liver by acting on hepatic lipase by mediating central obesity.^[29-33] A higher prevalence of dyslipidemia in women and men with androgenic alopecia has been found.^[34] Hence, we can conclude that androgen itself causes dyslipidemia. We did not measured central obesity in both cases and controls. Hence, further study is needed. In my study, HDL-C level correlates with androgen not with insulin resistance. It cannot be explained. It may be due to clearance of HDL-C by hepatic lipase that is up regulated by androgen.

CONCLUSIONS

A more atherogenic lipid profile, in particular related to low HDL-C, was found in women with PCOS. The results of this study may indicate increased risk for CVD in obese women with PCOS than BMI matched obese women without PCOS.

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Patient's Profile of Foreign Body in the Esophagus

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Abstract

Introduction: Foreign body in the esophagus is one of the most common cases found by ENT experts.

Purpose: The purpose of the research is to obtain patient's profile of foreign body in the esophagus in the Department of Otorhinolaryngology - Head and Neck Surgery of Adam Malik General Hospital from the period of 2012 to 2016.

Materials and Methods: This is a descriptive research using medical data at Adam Malik General Hospital.

Results: There are 112 cases of foreign body in esophagus with 62 men and 50 women. Their ages ranges from 8 months to 74 years with a mean of 17.9 years. The most common type of foreign body is inorganic 83%. The location of most foreign body is in the upper-third of 91.1%. The time interval starts from swallowed until reached the nearest hospital is 6–24 h at 63.4%. The most common length of time since diagnosis is established until performing surgery is >24 h by 85.7%. There were 6,2% patients developed complications. There were significant correlations between type and location foreign body with age ($P < 0.005$).

Conclusion: This research was found profile of foreign body in the esophagus and the significant relations between type and location of foreign body with age.

Key words: Esophagoscopy, Esophagus, Foreign body, Profile

INTRODUCTION

Foreign body in the esophagus is one of the most common and emergency cases in the part of esophageal bronchus which is commonly happened.^[1,2] The location of stucked foreign body depends on the size and shape of the foreign body. Small foreign bodies can go through larynx to trachea or bronchus.^[3] Chest X-ray examination is the first step in investigating suspected cases of foreign bodies lodged in the esophagus.^[4] Flexible endoscopy is necessary in making a diagnosis and also as a treatment when breathing disturbance occurs.^[5]

MATERIALS AND METHODS

This is a descriptive research in Adam Malik General Hospital. The population is all patients of foreign body in the esophagus

gained from medical record data of Adam Malik General Hospital from the period of January 1, 2012, to December 31, 2016. Sample is taken using total sampling method.

RESULTS

There are 112 cases of foreign body in the esophagus (62 men and 52 women) aged 8 months to 74 years, with a mean of 17.9 years.

Dysphagia is the most common clinical symptom experienced by 67 patients while the most rare is no symptoms of 3 patients.

Children are the most common group in the case of inorganic foreign body that is equal to 71 people (76.3%), while adults are mostly found in case of organic foreign body 12 people (63.2%). There was a significant correlation between age group and foreign body type ($P = 0.002$).

The upper-third of the esophagus is the most common site in children of 75 (96.2%), while the middle-third is common in adults of 7 (20.6%). There was a significant relation between the location of upper-third esophagus and the occurrence of foreign bodies in children ($P = 0.008$). There was also

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Table 1: Frequency distribution cases of participants based on clinical symptoms

Clinical symptoms	Year, n (%)					Total, n (%)
	2012	2013	2014	2015	2016	
Odynophagia	6 (13.3)	9 (20.0)	15 (33.3)	4 (8.9)	11 (24.4)	45 (100.0)
Dysphagia	9 (13.4)	15 (22.4)	24 (35.8)	11 (16.4)	8 (11.9)	67 (100.0)
Drooling	3 (27.3)	2 (18.2)	1 (9.1)	2 (18.2)	3 (27.3)	11 (100.0)
Choking	0 (0.0)	3 (50.0)	0 (0.0)	1 (16.7)	3 (33.3)	6 (100.0)
Vomiting	4 (14.8)	9 (33.3)	8 (29.6)	2 (7.4)	4 (14.8)	27 (100.0)
Chest pain	1 (12.5)	1 (12.5)	4 (50.0)	1 (12.5)	1 (12.5)	8 (100.0)
Cough	1 (11.1)	4 (44.4)	1 (11.1)	1 (11.1)	2 (22.2)	9 (100.0)
No symptom	0 (0.0)	0 (0.0)	1 (33.3)	1 (33.3)	1 (33.3)	3 (100.0)

Table 2: Distribution of the proportion of age to the location of foreign bodies of age groups

Age groups	Groups of foreign body, n (%)		Total, n (%)
	Organic	Inorganic	
Children	7 (36.8)	71 (76.3)	78 (69.6)
Adults	12 (63.2)	22 (23.7)	34 (30.4)
Total	19 (100.0)	93 (100.0)	112 (100.0)

Table 3: Distribution of the proportion of age to the location of foreign body

Location	Age groups, n (%)		Total, n (%)	P
	Children	Adult		
Upper-third	75 (96.2)	27 (79.4)	102 (91.1)	0.008
Middle-third	3 (3.8)	7 (20.6)	10 (8.9)	0.008
Lower-third	0 (0.0)	0 (0.0)	0 (0.0)	-

a significant relation between the middle-third esophagus and the occurrence of foreign bodies in adults ($P = 0.008$).

DISCUSSION

In Table 1, the most common clinical symptoms are dysphagia (67 patients). This is similar to Anita's research (2013), and dysphagia is the most common symptom (66 patients).^[1] While the research of Sumertini and Sucipta (2017), the most clinical symptom is odynophagia (47.62%).^[5] Zuleika and Ghanie (2016) found that most clinical symptoms were wedge (86.04%).^[6] From Table 2, there was a significant relationship between foreign body type and age group ($P = 0.002$). Of 93 cases of inorganic foreign objects, 71 cases (76.3%) occurred in children. Unlike the case with the case of organic foreign body which in children, there are as many as 7 cases (36.8%). This is similar to Anita's (2013) study of 70 cases (67.3%) were children <15-year-old with inorganic foreign objects and 8 cases (88.9%) in adult

with organic foreign bodies. According to Table 3, 75 cases (73.5%) of foreign bodies in the upper-third are grouped, and in the middle of the esophageal area, there are 7 cases (70%) in the adult group. Statistically, there was a significant association ($P = 0.008$) between the upper-third with the children group and the middle-third with adult. Similarly, in the study of Koirala *et al* (2012), in children, 92.8% of foreign body cases were located in the upper-third of the esophagus, and in adult, there were 66.7% of foreign body cases in the middle-third and were statistically significant ($P < 0.001$).^[7]

CONCLUSION

This research found that dysphagia is the most common clinical symptom, and there was a significant relationship between type and location of foreign body with age.

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Study of Family Planning among Antenatal Patients Attending a Tertiary Care Hospital in Goa

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Abstract

Introduction: Family planning allows women to attain their desired number of children and spacing of births, thereby limiting family size. Promotion of family planning – ensuring access to preferred contraceptive methods for women and couples is essential in securing maternal and infant health, as well as autonomy of women and limits population size.

Aim: The aim of the study to assess the level of awareness of family planning methods among antenatal patients attending antenatal clinic and reported use of family planning methods before pregnancy.

Subjects and Methods: The study was conducted between February and March 2018. Ethical clearance was obtained from Ethical Review Committee of Hospital before the commencement of the study. 196 antenatal patients seeking antenatal care at the Outpatient Department of Obstetrics and Gynecology in Goa Medical College were selected through systematic random sampling. A descriptive cross-sectional study using predesigned semi-structured questionnaire to assess the awareness and reported use of family planning methods before pregnancy was carried out.

Results: All 196 respondents in the study were aware of family planning (100%), among which the best known was female sterilization. It was observed that 48 respondents (24.4%) reported using family planning method to space births or to prevent pregnancy, with 44% of them using oral contraceptive pills, and 29% using condoms, and 27% using intrauterine device. Among the respondents who did not report use of contraception before pregnancy, the most common reason reported was desire to have child (41%). Majority of the respondents got information about family planning from health-care staff (39%).

Conclusion: Despite high awareness of family planning methods among the respondents surveyed, utilization of family planning method was poor. Primary health-care staff and mass media would need to play a major role in improving women's knowledge of family planning. Family planning needs to be emphasized in antenatal clinics. Continued research into newer methods of contraception and its importance in improving quality of life is required.

Key words: Antenatal, Family planning, Hospital

INTRODUCTION

Family planning allows women to attain their desired number of children and spacing of births, thereby limiting family size. Promotion of family planning – ensuring access to preferred contraceptive methods for women and couples is essential in securing maternal and

infant health, as well as autonomy of women and limits population size.

It is well established that countries with high contraceptive prevalence rate have lower maternal and infant mortalities.^[1] Globally, 600,000 women die annually due to pregnancy-related causes, and 75,000 die as a result of unsafe abortions with 99% of these deaths occurring in developing countries.^[2-4] In India, about 8% of maternal deaths are attributed to unsafe abortion. A significant proportion of unwanted pregnancies are aborted more than half under unsafe condition in India.^[5]

India 53.5% of married women make use of family planning methods (National Family Health Survey-4),^[6]

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while in Goa, 26.3% use family planning which is much lower than that in India.^[7] The concept of unmet need points to the gap between women's reproductive intentions and their contraceptive behavior. The indicator is useful for tracking progress toward the target of achieving universal access to reproductive health. In Goa, the total unmet need for family planning is only 17.5% whereas unmet need for spacing is only 8.3% in Goa.^[7]

Uncontrolled fertility, which would contribute to increase in population growth, is a worldwide problem. India has a growth rate of 16 million per year, which ranks second after China.^[8] Lower family planning usage can lead to unwanted pregnancies or close spacing which can pose a threat to maternal health and increase abortion rates. Hence, the present study was undertaken to assess the awareness and practice of family planning methods before pregnancy in antenatal patients seeking antenatal care at tertiary care hospital.

AIMS AND OBJECTIVES

- To assess the level of awareness of family planning.
- To assess reported use of family planning before current pregnancy.
- To elicit reasons for not using family planning methods.

SUBJECTS AND METHODS

The study was conducted between February and March 2018. A descriptive cross-sectional study was carried out at the Outpatient Department (OPD) of Obstetrics and Gynecology of Goa Medical College. The respondents consisted of 196 antenatal patients who attended antenatal OPD irrespective of their gestational age. The women were interviewed with the help of pre-designed semi-structured questionnaire adapted to assess the awareness toward family planning while attending antenatal clinic. Information was obtained on variables, such as awareness and knowledge of family planning, age, religion, marital status, place of residence, educational level, occupation, and parity, sources of information of family planning use of family planning methods were assessed by asking the respondents whether before the current pregnancy, they had used family planning methods to space births or to prevent pregnancy. The respondents who did not use family planning methods were asked reasons for their refusal.

Inclusion Criteria

All pregnant women between 15 and 49 years receiving antenatal care in the hospital and willing to participate were included in the study.

Exclusion Criteria

Women did not consent for the above study.

Sampling Technique

The sample size was calculated from the expression of $n = Z^2pq/d^2$, where z is the normal standard deviation set at 1.96, confidence level set at 95%, the tolerable error margin at 7%, and taking prevalence at 50%, and sample size of 196 was obtained. A systematic random sampling technique was used to select women who consented to participate in the study and were not ill.

Using average weekly attendance as 600 at the clinic as the sampling frame, sampling interval of 3 was obtained. Subsequently, an eligible pregnant woman that registered with the department was recruited by adding sampling interval to preceding pregnant women's number. This was continued until the sample size was achieved.

Ethical Consideration

The study proposal was approved by the Institute of Ethics and Research Committee of Goa Medical College and informed consent was obtained from the participants. The participants were assured of confidentiality and that non-participation in the study would not in any way affect the care they would receive.

Data Analysis

The data obtained from the questionnaire were entered and analyzed using statistical package for the social sciences version 22.0 and categorical variables were summarized using frequencies and percentages. The chi-square test was used for evaluating the association between categorical variables.

RESULTS

A total of 196 pregnant women were enrolled in the study. Of 196 respondents, only 48 respondents (24.4%) reported that before present pregnancy, they were using family planning methods to space births or to prevent pregnancy, with 44% of them using oral contraceptive pills, and 29% using condoms, and 27% using intrauterine device. Respondents did not report use of any other method of family planning.

It can be observed from Table 1, most of the respondents in this study belonged to age group of 20–24 years were married, lived in rural areas, Hindu by religion, and received secondary education and were unemployed. It was also observed that respondents using family planning methods were less in number as compared to respondents

Table 1: Distribution of pregnant women according to sociodemographic profile

Variable	Use of family planning		Total n (%)
	No (%)	Yes (%)	
Age			
20–24	53 (72.6)	20 (27.4)	73 (100)
25–29	55 (79.7)	14 (20.3)	69 (100)
30–34	30 (76.9)	09 (23.1)	39 (100)
35–39	08 (61.5)	05 (38.5)	13 (100)
≥40	02	0	02 (100)
Marital status			
Married	146 (75.3)	48 (24.7)	194 (100)
Unmarried	02 (100)	0	02 (100)
Place			
Rural	96 (75.6)	31 (24.4)	127 (100)
Urban	52 (75.4)	17 (24.6)	69 (100)
Religion			
Hindu	99 (72.8)	37	136 (100)
Muslim	31 (79.5)	08	39 (100)
Christian	18 (85.7)	03	21 (100)
Education			
Illiterate	21 (80.5)	05 (19.2)	26 (100)
Primary	20 (95.2)	01 (4.8)	21 (100)
Secondary	70 (72.9)	26 (27.1)	96 (100)
Higher secondary	21 (70)	09 (30)	30 (100)
Graduation and above	16 (69.6)	07 (30.4)	23 (100)
Employment			
Unemployed	101 (82.8)	21 (17.2)	122 (100)
Employed	47 (63.5)	27 (36.5)	74 (100)
Parity			
Primigravida	74 (77.1)	22 (22.9)	96 (100)
1–2	63 (71.6)	25 (28.4)	88 (100)
≥3	11 (91.7)	01 (8.3)	12 (100)

who did not use any method of family planning before pregnancy in all age groups, and almost in all the variables included in the study. Respondents reported low use of family planning method before current pregnancy irrespective of parity.

All the respondents in the study were aware of at least one method of family planning method and the best-known method of contraception was female sterilization (93%), followed by oral contraceptive pills (86%), condoms (83%), intrauterine device (78%), injections (26%), and implants (9%). More than half of the respondents were aware of benefits of family planning.

The most common source of information about family planning was from health-care staff while the least common source was from family and friends as highlighted in Table 2.

As highlighted in Table 3, the remaining 148 respondents who did not use any method of contraception before pregnancy and were asked reasons for not using them. The most common reason given by respondents for not using family planning methods was the desire for a child (41%), and the least common reason was religious beliefs such as breaking away from religion (3%).

DISCUSSION

In the present study, 48 respondents (24.4%) reported that before the current pregnancy, they were using family planning methods to space births or to prevent pregnancy, with 44% of them using oral contraceptive pills, and 29% using condoms, and 27% using intrauterine device. Similar findings have been reported in a study done in Nigeria,^[9] wherein only 29% had used family planning methods, and types varied from injectables to female condoms with injectables being the most commonly used method (29%). In another study done in Indonesia,^[10] 36.03% had used family planning method, from which injection was most frequently used (53.27%) method of family planning.

In the present study, 100% respondents reported knowledge of at least one method of family planning with best-known method of family planning being female sterilization. Although the use of modern temporary method has increased recently, the present finding highlights that there is a constant cultural diffusion of sterilization knowledge and practice in Indian families across generations.^[11] Family planning services offered through public sector primarily focus on promoting permanent methods of family planning.^[12] This suggests that family planning services promoted through mass media could be strengthened in communities to inform women and couples of the effectiveness of short-term reversible methods and its advantages in terms of spacing between births and associated protective effects for maternal and child health survival.

Most of the respondents obtained information about contraception from health professionals, the findings in the current study were similar to a study conducted by Nansseu *et al.*^[13] in which primary health-care physicians were cited as main source of information, contrarily school and friends/relative,^[14] or media^[15] were the main sources of information cited as source of information in other studies.

The most common reason for not using contraception in the present study was the desire for more children (30.6%), which is similar to study done in Indonesia.^[10] Other reasons of refusal being lack of information (15.3%), fear of side effects (4.08%), opposition by family and husband (6.12%), and using natural methods of contraception (9.18%). In a study done by Ghike *et al.*,^[16] it was observed that the main reason for non-use of contraception was because of the disapproval from family (59%). In the present study, husbands and family disapproval was also reported as a reason (6.12%) for not using contraception. Thus, probably when women are educated and motivated to use contraception the man's negative attitude will always

Table 2: Distribution of sources of information on family planning

Sources of information*	n (%)
Tv source	73 (37)
Newspaper and magazine	45 (23)
Health-care staff	77 (39)
Family and friends	29 (15)

*Multiple responses allowed

Table 3: Reasons for not using family planning methods before pregnancy

Reasons	n=148(%)
Desire for child	60 (41)
Lack of information	30 (20)
Fear of side effects	08 (5)
Breaking religion/belief	04 (3)
Husband out of town	16 (11)
Already using natural method	18 (12)
Prohibited by husband and family	12 (8%)

influence the use of contraception. Lack of attention to the role of men in fertility decisions has been found to be shortcoming of family planning programs. A big contributor to the low use of family planning methods has been a lack of knowledge about various available options, combined with misconceptions about the use of contraceptives.

CONCLUSION

The level of awareness of family planning methods was high among the respondents surveyed, but utilization was poor. Primary health-care providers and mass media would need to play a major role in improving women's knowledge of family planning. Family planning needs to be emphasized in antenatal clinics. Continued research into newer methods of contraception and its importance in improving the quality of life is required.

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A Rural Center Study of Sigmoid Volvulus

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Abstract

Background: Sigmoid volvulus is a condition in which the sigmoid colon wraps around itself and its own mesentery, causing a closed-loop obstruction. It is the second common cause of intestinal obstruction and surgical emergency in elderly and its mortality remains significant in patients with late diagnosis. Usually, they present with sudden pain abdomen, distention, constipation, and not passing flatus. Delay in diagnosing and intervention leads to serious complications such as intestinal obstruction, bowel gangrene, perforation, peritonitis, and sepsis and may be fatal.

Materials and Methods: Between May 2015 and May 2018, 20 patients of sigmoid volvulus, who reported to the Department of General Surgery, Rajah Muthiah Medical College and Hospital, were included in the study. The aim of this work is to assess the etiological factors which predispose to the sigmoid volvulus, the clinical presentations, modes of remedy, treatment outcomes, and complications in our rural population.

Results: Majority of the sigmoid volvulus occurred in the age group of above 50 years with male predominance. Almost all sufferers had mixed diet more of non-vegetarian food. Most of them belonged to poor socioeconomic group. The overall mortality was 35% in this series.

Conclusion: Sigmoid volvulus is the second common cause of intestinal obstruction in elderly males in this region accounting for 40% of large bowel obstruction cases. The mortality of patients affected by sigmoid volvulus is related to the disease stage, prompt surgical timing, functional status of the patient, and his collaboration with the clinicians in the pre-operative decision-making process. Mortality is higher in both obstructed patients with generalized peritonitis and patients affected by subocclusion with late diagnosis and surgical treatment; in both scenarios, a Hartmann's procedure is the proper operation to be considered.

Key words: Distension, Intestinal obstruction, Sigmoid volvulus

INTRODUCTION

Sigmoid volvulus first described by Von Rokitansky in 1836, is a condition in which the sigmoid colon wraps around itself and its own mesentery, causing a closed-loop obstruction.^[1] Overall 2%–3% of all intestinal obstructions are due to sigmoid volvulus. It is the second most common cause of strangulating obstruction of the colon, next to carcinoma.^[2] The mean age group is 50–60 years (19–75 years). Typically, the clinical presentation is an elderly person with constipation, stomach pain, and abdominal distention. This classical

clinical presentation and X-ray abdomen are normally sufficient for diagnosis. Diagnostic difficulties, however, are not uncommon.^[4] Both sexes are affected, with adult males predominance. Wider pelvis in females believed to provide space of spontaneous untwisting.^[5]

The etiology of sigmoid volvulus is: A. Congenital: Idiopathic, narrow attachment of the sigmoid mesentery, lengthy mobile loop of the sigmoid colon, Hirschsprung disease, pseudo megacolon and congenital bands. B. Acquired and predisposing factors: Post-operative adhesions, chronic constipation, dietary-low fiber diet, old age and medications like anti-cholinergics, ganglion blockers anti-parkinsonian drugs and tranquilizers also cause megacolon or megacolon syndrome.^[6] The predisposing factors for the sigmoid volvulus are indeed the length of the sigmoid colon and the colon distension due to chronic constipation. The trigger factor causing the twisting of the sigmoid colon, maximally distended

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by the fecal impaction in constipated patients, is a quick emptying of the terminal fecal column portion in the sigma-rectum. In many instances, X-ray abdomen gives idea about the etiology and level of obstruction. When a dilated loop of bowel is seen, clinicians need to identify the level of obstruction, the loop of dilated bowel proximal to it, in addition to the undilated bowel distal to it. X-ray abdomen is normally sufficient for identifying the level of obstruction. However, surgical exploration itself is the best way; correct pre-operative analysis will reduce the morbidity and mortality.

Delay in analysis and intervention may cause sigmoid ischemia, infarction, peritonitis, and septicemia, ensuing in mortality of as much as 60%.^[7] In most instances, decompression may be accomplished with insertion of a rectal tube or by flexible sigmoidoscopy.^[8] However, sigmoidoscopy is contraindicated in patients who have developed bowel gangrene (consisting of those with sepsis, fever, or peritonitis).^[9]

Emergency laparotomy and resection with or without primary anastomosis is indicated when non-operative techniques fail, or if strangulation, infarction, or perforation is suspected.^[10] Post-operative mortality ranges from 6% to 60%. Factors related to poor prognosis encompass advanced age, delayed diagnosis, intestinal infarction, peritonitis, and shock at presentation.

MATERIALS AND METHODS

A total of 20 patients of sigmoid volvulus, admitted in all surgical units of Rajah Muthiah Medical College and Hospital, Annamalaiagar, Chidambaram, from May 2015 to May 2018 were studied. The study also includes the etiological factors which predispose to the sigmoid volvulus, the clinical presentations, modes of remedy, the treatment outcomes, and its complications.

RESULTS

The total number of patients treated during the study period at the General Surgery Department was 20.

Age-wise distribution of sigmoid volvulus is shown in Table 1.

Majority of the sigmoid volvulus occurred in the age group of above 50 years, 12 out of 20 forming 60%. Sigmoid volvulus is seen with same frequency among the age groups 21–30 years, 31–40 years, and 41–50 years and these accounted for remaining 40% of patients. In this study, the youngest patient was 28-year-old female and the oldest patient was 69-year-old male. It is very uncommon beneath the age of 20 years and above 70 years.

Sex-wise distribution of sigmoid volvulus is shown in Figure 1. Males and females were affected in 17 and 03 cases, respectively. We found the majority of sigmoid volvulus occurring in elderly male population. The ratio of male and female is 4:1.

Most of them belonged to poor socioeconomic group. The dietetic habit also plays a major role 90% of our sufferers is mainly non-vegetarians remaining had mixed diet [Table 2].

In the existing observe, distention of the stomach (100%) is the most common symptom accompanied by way of constipation (90%) and abdomen pain (60%) [Table 3].

When the bowel was viable, 65% of the patients survived irrespective of the surgical operation performed. One affected person (35%) died in the hospital [Table 4].

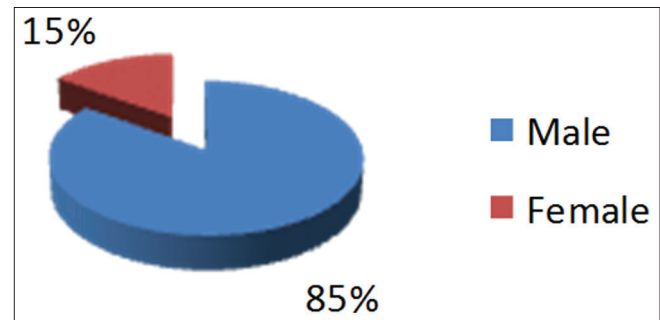


Figure 1: Sex-wise distribution of sigmoid volvulus

Table 1: Age-wise distribution of sigmoid volvulus

Age group	Number of patients
11–20	0
21–30	1
31–40	3
41–50	4
51–60	6
61–70	6
Total	20

Table 2: Occupation of the patients

Occupation	Number of patients (%)
Cooli	13 (65)
Housewife	3 (15)
Agriculture	4 (20)

Table 3: Mode of presentation

Symptoms	Number of patients (%)
Pain in abdomen	12 (60)
Distension of abdomen	20 (100)
Constipation	18 (90)
Vomiting	11 (55)
Retention of urine	1 (5)
Fever	1 (5)

DISCUSSION

Clinical Features

In this study, the most common age group affected is 51–70 years (60%) and the mean age is 55.5 years [Table 5].

We found the majority of sigmoid volvulus occur in elderly males and are less common in females as they have wider pelvis. Many literature shows male preponderance [Table 6].

Treatment

The fact that many operative approaches had been described but no single operation is suitable for all patients. The primary problem is a high prevalence of recurrence after the commonly performed procedures such as rectal tube deflation, laparotomy and simple derotation, and operative derotation, and fixation of the “omega loop” to the lateral or anterior abdominal wall.

Díaz-Plasencia *et al.* subjected 15.4% of the patient for this treatment and found 100% cure rate. In our present study, 10% patients underwent derotation and fixation to abdominal wall procedure with 100% cure rate [Table 7]. High incidence of post-operative recurrence has been noted by Shepherd^[17] and Anderson and Lee^[8]. Resection of the sigmoid colon nearly prevents recurrence as stated using Hines *et al.*,^[18] Chakrabarty *et al.*,^[3] Anderson and Lee,^[8] and Khanna *et al.*^[19,20]

Resection and end-to-end anastomosis as an emergency procedure have its own morbidity and mortality.

Table 4: Various types of surgery performed and outcome of the procedure

Procedure	Number of Cured Expired patients		
Primary sigmoid resection and end-to-end anastomosis	8	4	4
Primary sigmoid resection and end-to-end anastomosis with diversion colostomy	4	4	-
Hartmann's procedures	6	3	3
Derotation and fixation to abdominal wall	2	2	-

Table 5: Age incidence by various authors

Study group	Mean age (years)
De ^[13]	45.06
Ballantyne <i>et al.</i> ^[11]	68.5
Connolley <i>et al.</i> ^[14]	78
Atamanalp ^[15]	58.6
Present study	55.5

Díaz-Plasencia *et al.*^[8] subjected 56.9% of sufferers for primary resection and end-to-end anastomosis and observed 87% cured and 13% mortality. Peoples *et al.*^[10] study 47.6% of patients were subjected to primary resection and end-to-end anastomosis, but 73.7% of patients were cured and 26.3% mortality. In our present examine, 60% of sufferers underwent primary resection and end-to-end anastomosis with cure rate 66.7% and mortality 33.3% [Table 8].

In this study, 30% of patients underwent Hartmann's procedure with 50% cured and mortality 50% [Table 9]. De *et al.*^[13] performed surgical treatment on 196 cases of sigmoid volvulus. Derotation and fixation to abdominal wall for 1 case, primary sigmoid resection and end to end anastomosis in gangrenous bowel of 195 cases, and mortality was 1.01%.

In the prevailing observe, 20 cases of sigmoid volvulus diverse kinds of surgical procedures performed, in instances of derotation and fixation to the abdominal wall, there is no mortality. However, in the case of Hartmann's technique, the mortality rate is excessive, that is, 50%. Hence, the overall mortality is much less in viable bowel in comparison to the gangrenous bowel.

Table 6: Sex incidence by various authors

Study group	M: F ratio
Atamanalp ^[15]	4.7:1
Sankaran ^[16]	5:1
De ^[13]	2.07:1
Ballantyne <i>et al.</i> ^[11]	1.4:1
Connolley <i>et al.</i> ^[14]	5:3
Khanna <i>et al.</i> ^[19]	2.5:1
Present study	4:1

Table 7: Derotation and fixation to the abdominal wall

Study group	Number of patients	Cured (%)	Expired (%)
Díaz-Plasencia <i>et al.</i> ^[17]	19	19 (100)	0
Present study	2	2 (100)	0

Table 8: Primary sigmoid resection and end-to-end anastomosis/with diversion colostomy

Study group	Number of patients	Cured (%)	Expired (%)
Díaz-Plasencia <i>et al.</i> ^[17]	69	60 (87)	9 (13)
Peoples <i>et al.</i> ^[10]	19	14 (73.7)	5 (26.3)
Present study	12	8 (66.64)	4 (33.36)

Table 9: Hartmann's procedures

Study group	Number of patients	Cured (%)	Expired (%)
Díaz-Plasencia <i>et al.</i> ^[17]	35	24 (68.6)	11 (37.4)
Peoples <i>et al.</i> ^[10]	15	13 (87)	2 (13)
Present study	6	3 (50)	3 (50)

A study of 20 cases who presented with sigmoid volvulus was conducted at Rajah Muthiah Medical College and Hospital, during the period of May 2015–May 2018.

Sigmoid volvulus was found more common in males than females, and the highest incidence is seen in patients above 50 years of age of life. Sigmoid volvulus constituted 50% of the total large bowel obstructions second common cause next to carcinoma of colon in elderly males. Emergency laparotomy was carried out in all patients. The surgeries such as derotation and fixation to abdominal wall had good outcome. It had been executed in viable bowel. Mortality is seen higher with procedures such as resection and anastomosis and Hartmann's methods which were carried out in gangrenous bowel.

The presence of shock, bowel gangrene, colonic perforation, major comorbidity, advanced age, and emergency surgery increases the mortality rate. The overall morbidity is 6%–24%, and wound infection, incisional hernia, wound dehiscence, intra-abdominal abscess, anastomotic leakage, and stomal complications are the main problems.

Nevertheless, emergency surgery is required for patients in whom peritonitis, bowel gangrene, or perforation and intestinal obstruction is present or in those for whom non-operative treatment is unsuccessful.

Although emergency surgery includes various non-definitive or definitive procedures such as derotation, sigmoidopexy, or sigmoid resection with primary anastomosis or stoma. Resection with primary anastomosis, which has an 8%–33% mortality rate, is the most commonly recommended procedure because of the high recurrence rate of non-definitive procedures. After the resection of gangrenous segment, Hartmann's or Mikulicz procedures may be lifesaving, particularly to unstable patients, and the mortality rate of the stoma procedures has been reported to be 25%–67%. Although laparoscopic techniques of sigmoid resection, sigmoidopexy, and extraperitonealization have been described, their role is generally limited to elective surgery.

Although there has been considerable controversy about the ideal definitive procedure, elective sigmoid resection and anastomosis are generally recommended for good-risk

patients after a successful nonoperative derotation. These procedures also have a low mortality rate of 0% to 15%. The mortality of patients with sigmoid volvulus treated surgically is closely related to the disease stage, a prompt surgical timing, and the patient functional status. Mortality is higher in both obstructed patients with generalized peritonitis and patients with late diagnosis and delayed surgery in advanced stages.

In this subset of patients, the achievement of an early diagnosis through CT scan performance is strictly advised.

CONCLUSION

- Sigmoid volvulus is more common in this region accounting for 50% of large bowel obstruction.
- Majority of the patients are elderly above the age of 50 years.
- The male: female ratio is 4:1.
- Almost all sufferers had mixed diet. Most of them belonged to poor socioeconomic group.
- Delay in seeking medical aid ended in gangrene.
- The mortality is more in patients with gangrene than without gangrene.
- No single established etiological factor noted, and eventually, there is no single operative procedure beneficial in all sufferers.
- The average mortality was 35%.

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Characteristics of Patients Undergoing Tracheostomy

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ABSTRACT

Introduction: Tracheostomy is a technique used to treat patients with inadequate ventilation and upper airway obstruction.

Purpose: The purpose of the research is to obtain the tracheostomy action in Adam Malik General Hospital from January 2012 to December 2017.

Materials and Methods: This was a cross-sectional study of tracheostomy patients in Adam Malik General Hospital.

Results: : There were 159 patients underwent tracheostomy in the Department of Otorhinolaryngology-Head and Neck Surgery of Adam Malik General Hospital ranged 1 year to 85 years and male-to-female ratio was 4.9:1. The largest indication of tracheostomy actions was upper airway obstruction of 129 cases (81.1%). Elective tracheostomy is more common than emergency with 53.5% and 46.5% in sequence. The most common type of incision is horizontal incision with 97 cases (61%). Low location stoma was more frequent which was 95 cases (59.7%) than those at high (40.3%). From this research, 71 cases (46.7%) were found to be complicated, and 14 cases (8.8%) were performed by decannulation.

Conclusion: This research found out the illustration of tracheostomy in the Department of Otorhinolaryngology-Head and Neck Surgery of Adam Malik General Hospital from January 2012 to December 2017.

Key words: Characteristics, Otorhinolaryngology-head and neck surgery, Tracheostomy

INTRODUCTION

Tracheostomy is a technique used to treat patients with inadequate ventilation and upper airway obstruction.^[1] Respiratory failure is the most common cause of tracheostomy, and other things that may be indications such as loss of consciousness, poor airway defense reflexes, and drastic physiological changes associated with trauma and medical illness are also indications of tracheostomy actions.^[2]

MATERIALS AND METHODS

This is a cross-sectional study of patients undergoing tracheostomy in Adam Malik General Hospital. The

population is all patients who performed tracheostomy in the Department of Otorhinolaryngology-Head and Neck Surgery of Adam Malik General Hospital from January 2012 to December 2017. Samples were all patients who had a tracheostomy in Adam Malik General Hospital from the period of January 2012 to December 2017.

RESULTS

There were 159 patients who performed tracheostomy (132 men and 27 women) with the youngest age of 1 year and the oldest 85 years with mean of 54.5 years [Table 1].

Airway obstruction is the most indication of tracheostomy with 129 patients (81.1%).

Elective tracheostomy is more prevalent compared with emergency tracheostomy as many as 85 patients (53.5%) and 74 patients (46.5%), respectively.

There were 71 cases (46.7%) found complication.

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Table 1: Distribution of patients undergoing tracheostomy based on indications of tracheostomy

Indications of tracheostomy	Years n (%)						Total
	2012	2013	2014	2015	2016	2017	
Upper airway obstruction	9 (69.2)	23 (82.1)	27 (90)	26 (78.8)	24 (82.8)	20 (76.9)	129 (81.1)
Bronchial toilet	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Prolonged intubation	3 (23.1)	2 (7.1)	0 (0)	2 (6.1)	1 (3.4)	0 (0)	8 (5)
Failed intubation	1 (7.7)	1 (3.6)	2 (6.7)	4 (12.1)	1 (3.4)	4 (15.4)	13 (8.2)
Respiratory installation	0 (0)	0 (0)	1 (3.3)	0 (0)	1 (3.4)	0 (0)	2 (1.3)
Mixed indication	0 (0)	2 (7.1)	0 (0)	1 (3)	2 (6.9)	2 (7.7)	7 (4.4)
Total	13 (100)	28 (100)	30 (100)	33 (100)	29 (100)	26 (100)	159 (100)

Table 2: Distribution of patients undergoing tracheostomy based on execution time

Execution time	Years n (%)						Total
	2012	2013	2014	2015	2016	2017	
Elective	7 (53.8)	15 (53.6)	18 (60)	18 (54.5)	14 (48.3)	13 (50)	85 (53.5)
Emergency	6 (46.2)	13 (46.4)	12 (40)	15 (45.5)	15 (51.7)	13 (50)	74 (46.5)
Total	13 (100)	28 (100)	30 (100)	33 (100)	29 (100)	26 (100)	159 (100)

Table 3: Distribution of patients undergoing tracheostomy based on complication

Tahun Complication	n (%)						Total
	2012	2013	2014	2015	2016	2017	
No complication	9 (69.2)	15 (53.6)	20 (66.7)	15 (45.5)	13 (44.8)	16 (61.5)	88 (53.3)
Intraoperative complication	0 (0)	2 (7.1)	0 (0)	2 (6.1)	1 (3.4)	1 (3.8)	6 (3.8)
Intermediate complication	1 (7.7)	3 (10.7)	3 (10)	5 (15.2)	2 (6.9)	3 (11.5)	17 (10.7)
Late complication	3 (23.1)	8 (28.6)	7 (23.3)	11 (33.3)	13 (44.8)	6 (23.1)	48 (30.2)
Total	13 (100)	28 (100)	30 (100)	33 (100)	29 (100)	26 (100)	159 (100)

DISCUSSION

Based on Table 1, it was found that the most tracheostomy indication was upper airway obstruction of 129 patients (81.1%). This is in accordance with research conducted by Sigdel *et al.* and Onakoya *et al.* where upper airway obstruction is the greatest indication of 34.3% and 61.45%, respectively.^[3,4] This is different from the research of Fansula *et al.* where the installation of respiratory or bronchial toilet is the biggest indication that is as many as 141 patients (55.08%).^[5] Meanwhile, according to Archarya *et al.*'s study, old intubation is the largest indication of as many as 12 patients (40%).^[6] Based on Table 2, it can be seen that the tracheostomy performed by elective as a whole is more than the emergency tracheostomy performed by 85 patients (53.5%) and 74 patients (46.5%), respectively. This is in accordance with the research of Simbolon, the incidence of elective tracheostomy was more prevalent than the emergency tracheostomy with 52 cases (62.7%) and 31 cases (37.3%), respectively.^[7] From Table 3, it was found that as many as 71 cases (46.7%) were found to have complications and 88 cases (53.3%) did not find any complications. This is similar to Onakoya *et al.*'s study where the percentage of tracheostomy patients with complications was 69 patients

(38.55%).^[4] From this study, also known that age ≥ 41 years is the most common age group experienced complications (37%). Itamoto *et al.*'s study found that complications for tracheostomy were 11 (18.97%).^[8]

CONCLUSION

This research found out the illustration of tracheostomy in the Department of Otorhinolaryngology-Head and Neck Surgery of Adam Malik General Hospital from January 2012 to December 2017. The most tracheostomy indication was upper airway obstruction. The elective tracheostomy was more than the emergency. About 46.7% of patients got complications after tracheostomy actions.

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Management of Term Singleton Transverse Lie: A Prospective Study

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Abstract

Introduction: Transverse lie of the fetus is a position when the long axis of fetus is approximately perpendicular to the long axis of mother. Spontaneous delivery of a term fetus is impossible with a persistent transverse lie and, in general, the onset of labor is an indication for the lower segment cesarean section (LSCS).

Materials and Methods: Authors studied the management of term singleton transverse lie. This was a prospective observational study of 100 consecutive patients with term singleton transverse lie presentation who underwent LSCS during the study period of 7 months from November 2014 to May 2015. The age of the patients ranged from 20- to 43-year-old and 28 patients were primigravidas and 32 had previous first LSCS.

Results: Of the 100 patients, low transverse incision was employed in 91, high transverse incision in 8, and classical incision in 1 patient. Extension in the form of J or T was required in seven patients. Lateral inadvertent tears were seen in 11 women who underwent LSCS.

Conclusion: Early diagnosis during the antenatal period and elective cesarean section should be the goals of proper management in a transverse lie presentation.

Key words: Cesarean section, Transverse lie, Singleton

INTRODUCTION

The transverse lie of the fetus is a position when the long axis of fetus is approximately perpendicular to the long axis of mother.^[1] The back may be directed anterior, posterior, superior, or inferior and it is customary to distinguish varieties as dorsoanterior, dorsoposterior, dorsoinferior, and dorsosuperior. The incidence of transverse lie is around 1:335 fetuses.^[1] Spontaneous delivery of a term fetus is impossible with a persistent transverse lie and, in general, the onset of labor is an indication for the lower segment cesarean section (LSCS) in a case of transverse lie.^[2] During cesarean section, there is always a danger of difficult fetal extraction with attendant fetal and maternal

consequences.^[3] Fetal mortality ranges from 0% to 10%.^[4] One of the major decisions facing the surgeon is the type of uterine incision to make during cesarean section.^[2]

Transverse lie of a large fetus especially if the membrane is ruptured and shoulder is impacted in the birth canal or a fetus presenting back down is particularly difficult to deliver. While a transverse incision in the lower uterine segment is popular due to its safety, low vertical incision is advocated by some though not favored as it can easily extend to the upper segment.^[5]

The aim of this study was to assess the management of a term singleton transverse lie.

MATERIALS AND METHODS

A prospective observational study of 100 consecutive cases of singleton term transverse lie women recorded over a period of 7 months from November 2014 to May 2015 was done. During this period, a total of 7926 cesarean sections were performed, out of which 100 were done for term

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transverse singleton pregnancies. The term was defined as more than 37 completed weeks of gestation. Complete history and physical examinations were performed including maternal age, parity, last menstrual period, and gestational age. Details of the operation including type of incision made in uterus and maneuver employed to deliver the fetus if required were noted. Maternal complications including deliberate or inadvertent extension of the uterine incision, postpartum hemorrhage, and need for blood transfusion were noted.

Infant information was noted from the pediatric notes such as APGAR score at 5 min, birth-related trauma, stillbirth, and cause of death.

Statistical package for the social sciences (SPSS version 20) was used to obtain the statistical analysis of the data, and $P < 0.05$ was considered as statistically significant.

RESULTS

A total of 100 consecutive term singleton transverse lie pregnancies were studied during the study period of 7 months from November 2014 to May 2015. During this period, 14,311 deliveries took the place, of which 131 were transverse lie. Of these, 31 patients were excluded from the study in view of prematurity and multiple gestations. The total of 100 selected patients had a gestation age of 37–40 weeks with a mean gestation of 38.6 weeks. The fetal position was documented clinically in all women. External cephalic version (ECV) was not attempted in any patient as most of our cases had previous scarred uteri. Twenty-nine patients were in labor at the time of admission with 1 cord prolapse and 1 arm prolapse.

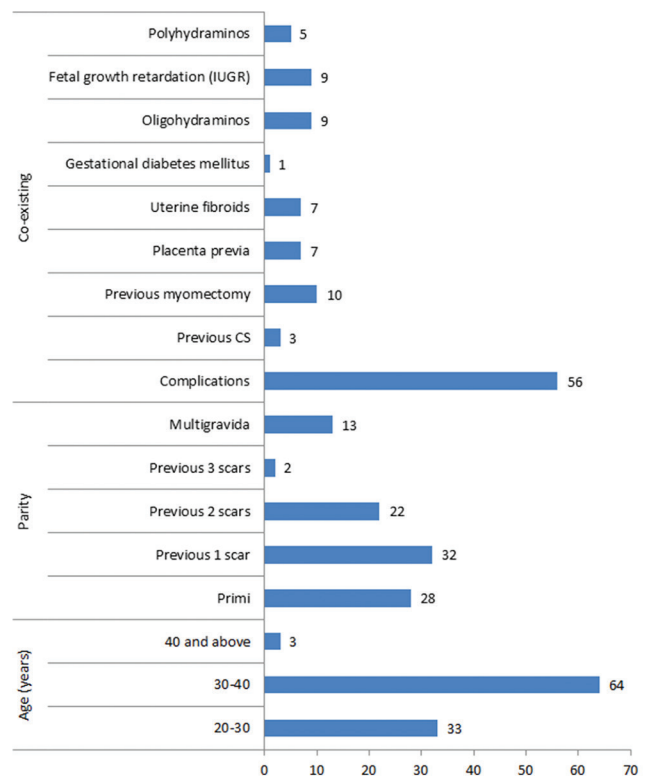
The age of the patients ranged from 20 to 43 years. Twenty-eight patients were primigravidas, 32 had previous 1 LSCS, 22 had previous 2 LSCS, and 2 patients had previous 3 LSCS. Three women had undergone previous myomectomy and seven had uterine fibroids. Nine women had oligohydramnios, nine intrauterine growth retardation (IUGR), and five had polyhydramnios.

The low transverse incision was employed in 91 women. The high transverse incision was given in eight patients with fibroid in lower uterine segment and three women of IUGR with poorly formed lower segment. Patients receiving high transverse incision were preferably ligated. one woman with ultrasound documented placenta accreta with adherent bladder underwent classical LSCS followed by subtotal hysterectomy. 88 women underwent emergency cesarean section and 12 elective LSCS. The low vertical incision was not attempted in any patient as majority of patients were

Table 1: Demographic data and coexisting disorders or complications before surgery in the 100 patients

Characteristics	No. of women
Age (years)	
20–30	33
30–40	64
40 and above	3
Parity	
Primi	28
Previous 1 scar	32
Previous 2 scars	22
Previous 3 scars	2
Multigravida	13
Coexisting	
Complications	56
Previous CS	3
Previous myomectomy	10
Placenta previa	7
Uterine fibroids	7
Gestational diabetes mellitus	1
Oligohydramnios	9
Fetal growth retardation (IUGR)	9
Polyhydramnios	5

CS: Cesarean section, IUGR: Intrauterine growth restriction

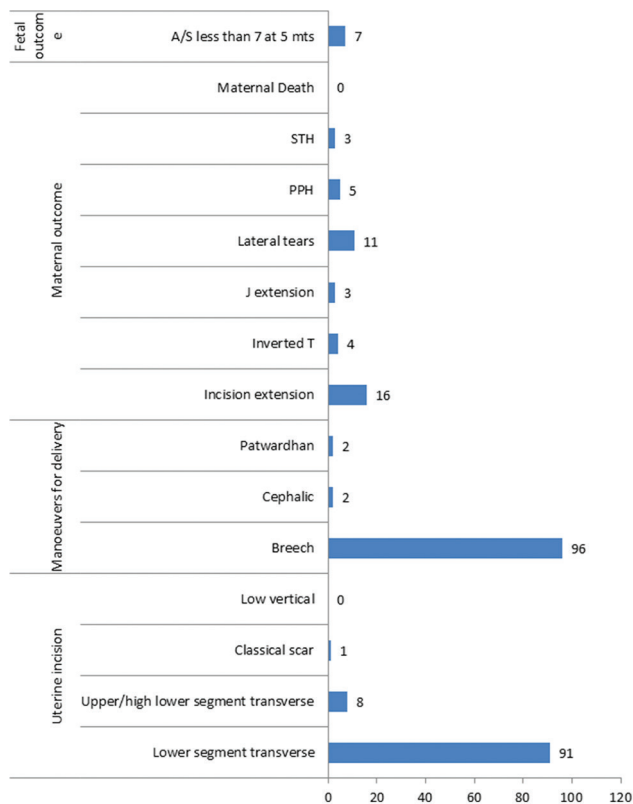


previous LSCS. Fetuses were extracted by grasping the feet and applying traction thereby delivering finally by breech. In two women fetus was delivered cephalic and in other two Patwardhan technique was employed to effect delivery. Uterine anomalies as septate, unicornuate, bicornuate, and

Table 2: Delivery technique and outcome

Variable	No. of women
Uterine incision	
Lower segment transverse	91
Upper/high lower segment transverse	8
Classical scar	1
Low vertical	0
Maneuvers for delivery	
Breech	96
Cephalic	2
Patwardhan	2
Maternal outcome	
Incision extension	16
Inverted T	4
J extension	3
Lateral tears	11
PPH	5
STH	3
Maternal death	0
Fetal outcome	
A/S<7 at 5 min	7

PPH: Postpartum hemorrhage, STH: Subtotal abdominal hysterectomy



arcuate malformations were noted in 16 women, of which six were primi and 10 previous scar. External cephalic version was not attempted in any patient. Low transverse incision was converted to inverted T incision in four women and deliberate J incision was given in three patients. 11 women had an inadvertent lateral extension (tear) of the scar. Of the extensions (deliberate or inadvertent), nine

were in dorsoinferior transverse positions. Postpartum hemorrhage was a complication encountered in five women, of which blood transfusion was required in four. Cesarean hysterectomy was required in three women of which one was previous three scars with placenta previa with accreta, other was previous myomectomy with PPH and the last one was a grand multi with congenitally malformed uterus with atonic PPH. Post-operative course was satisfactory in most operated women except 2 who had fever for 4 days. No maternal death was recorded in the study period.

Fetal outcome in the form of A/S <7 at 5 min was noted in 7 infants. Of these, one had congenital anomaly in the form of hydrocephalus. One had IUGR and the rest were infants born to women in prolonged labor with almost whole of the liquor drained. Delivery trauma in the form of fracture femur, dislocation hip, and abrasions was noted in three infants. Two infants had perinatal death [Tables 1 and 2].

DISCUSSION

Transverse lie is a common malpresentation. Patient if allowed to labor is at risk of cord prolapse, uterine rupture, and traumatic delivery. Good antenatal care, ECV, and elective cesarean section are the mainstay of management.

The low transverse isthmic incision was applied for 91 women in our study. The high transverse uterine incision was given in eight and classical cesarean section was done in one due to inaccessibility of lower segment or the lower uterine segment could not accommodate adequate length of incision transversely. The preference for low isthmic transverse uterine incision and nonuse of low vertical incision for the delivery of a transverse lying fetus as found in this study is in keeping with findings of other studies.^[2,6] A high transverse was also employed in few patients, especially where further fertility was not required. High transverse incision instead of a low vertical is preferred as repair is easy.^[7] In addition, we are more comfortable and well versed with a transverse incision than a vertical one. J and T extension incisions are difficult to repair and are associated with poor healing. Incision extension was noted in 16 women (inadvertent/deliberate) with conversion to T or J incision seen in 7. Better blood supply is usually associated with a transverse scar, but further studies are still required to determine scar integrity in high transverse incisions. Ninety-six women were delivered by breech, 2 by cephalic, and 2 by Patwardhan technique. Patwardhan is a technique of reversed fetal extraction in deeply impacted fetal head as seen in obstructed labor in which fetal arms are delivered first followed by breech and head in succession. It can also be used in deeply impacted transverse lie as well to affect delivery.

Low APGAR score was observed in 7 infants, out of which 1 died within 2 h because of associated congenital anomalies. Birth trauma was seen mostly in infants of oligohydramnios and dorsoinferior position.

NICU admission was required in 11 infants. PPH occurred in five women of whom patients two had placenta previa. Cesarean hysterectomy was performed in three cases.

There was no maternal mortality and infants' stillbirths were low compared to other studies.^[3,6]

CONCLUSION

All patients with transverse lie should preferably be diagnosed antenatally. Patients should not be allowed to labor due to high risk of cord prolapse, uterine rupture, traumatic delivery, and stillbirths. Although low transverse

incision is the preferred incision in most cases of poorly formed lower uterine segment, low vertical uterine incision should also be considered.

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Knowledge and Practices Regarding Rabies Prevention among Dog Owners in Sokoto, Nigeria

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Abstract

Introduction: Despite the fact that rabies elimination is feasible through vaccination of dogs and prevention of dog bites, it still causes tens of thousands of deaths every year, mainly in Asia and Africa. Rabies is endemic in Nigeria and is attributable to increasing human activities involving dogs, poor knowledge of the disease, and low level of vaccination of dogs.

Objectives: This study aimed to assess the knowledge and practices regarding rabies prevention among dog owners in Sokoto, Nigeria

Materials and Methods: A cross-sectional study was conducted among 190 dog owners selected by multistage sampling technique. Data were collected with a set of pretested interviewer-administered questionnaire; and analyzed using IBM SPSS version 20 software.

Results: The mean age of the respondents was 34.0 ± 9.9 years; majority of them were males (84.7%) and reside in urban areas (65.8%). Most of the respondents (86.8%) were aware of rabies with family/friend being the main source of information (82.4%). Less than half of respondents (43.7%) had good knowledge of cause and transmission of rabies, and only a few had good knowledge of its symptoms and signs (16.3%), and its prevention (21.1%). Majority of respondents (53.7%) allow their family members to play with dogs, <1/2 (48.4%) restrict dog movement, and only a few (16.3%) wear personal protective equipment while handling dogs. About a quarter of respondents (28.4%) had vaccinated their dogs in the past 12 months, and about a third (35.8%) reported rabid or suspect rabid dogs. Close to a quarter of respondents (23.7%) reported dog bites in their households, and most of the victims (77.1%) were bitten by their own dogs.

Conclusion: Government and other stakeholders should organize periodic awareness campaigns through the mass media to educate dog owners on rabies prevention, as well as annual free or subsidized mass dog vaccination campaigns.

Key words: Dog owners, Knowledge, Practices, Rabies prevention

INTRODUCTION

Despite the fact that rabies elimination is feasible through vaccination of dogs and prevention of dog bites, it remains widely distributed and constitutes a potential threat to about 3.3 billion people in more than 150 countries and territories.^[1] Although the mortality from rabies is grossly underreported,

it is believed to account for an estimated 55,000 deaths annually; and while the disease constitutes a huge economic burden estimated at USD 1 billion annually worldwide, the burden is disproportionately high in Africa and Asia, with an economic burden estimated at USD 583.5 million annually, and deaths due to human rabies in Africa and Asia amounting to 1.74 million disability-adjusted life years annually.^[1-3]

A distinct feature of the transmission of rabies is the fact that in up to 99% of human cases, the rabies virus is transmitted by domestic dogs.^[1] The virus is spread through infected saliva in bites, scratches and through licks from infected animals in open wounds or on mucosal membranes, or from infectious material such as brain tissue from a rabid animal.^[1,4-6] This explains why even though all

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age groups are susceptible to the disease, it is more common in children <15 years. The World Health Organization (WHO) estimates that up to 40% of people who are bitten by suspect rabid animals are children under-15 years of age, and an estimated 40% of post-exposure prophylaxis worldwide is given to children 5–14 years of age.^[1,7] Furthermore, at greater risk than the general population are certain occupational groups including veterinarians, dog handlers, hunters, field naturalists or journalists, and laboratory staffs working with rabies virus.^[7]

Rabies is endemic in Nigeria; studies conducted across the country reported the presence of rabies viral antigen in the brains of about a third of apparently healthy dogs.^[6,8,9] The high endemicity of rabies in Nigeria has been attributed to several factors including poor awareness of the disease, lack of knowledge and information about the disease, increasing human activities involving dogs (such as hunting and dog trading), increasing interactions between domestic and stray dogs, and low level (<50%) of anti-rabies vaccination coverage of dogs in the country.^[2,6,10,11]

Poor knowledge of rabies transmission, clinical features and prevention are considered to be a major obstacle to its prevention. It is important for members of the public to have information on the clinical signs of a suspect rabid dog, rabies fatality, what to do in the event of a suspected dog bite, and preventive measures such as seeking post-exposure prophylaxis when a bite occurs and bringing their dogs to rabies vaccination campaigns.^[5,12,13] Furthermore, in line with the health belief model which states that the perceived severity of a particular health problem influences adoption of health behaviors that prevent them from occurring or reduce their severity,^[14] individuals are, therefore, more likely to observe the rabies prevention practices if they are aware of its high fatality.

Studies conducted in Nigeria and other places reported wide variations in the knowledge of rabies, and it was found to be associated with sociodemographic factors. In a study conducted among dog meat processors and consumers in Zaria and Kafanchan, Nigeria, whereas 68.8% of respondents knew sudden aggression by a previously friendly dog as a sign of rabies, majority of respondents (71.2%) were unaware of the fatal nature of the disease. Furthermore, the proportion of respondents with good knowledge of rabies increased from 25% among those with no formal education to 59% among those with tertiary education.^[10] It is believed that educated persons have access to print and electronic media which give information on rabies and other diseases. Similarly, a study in Plateau State, Nigeria, reported that whereas majority of respondents knew the signs of rabies to include dog that bites without provocation (63%), friendly dog that suddenly

becomes aggressive (63%), only 34.8% were aware of the fatal nature of rabies in humans.^[15]

A study conducted among dog owners in Bahir Dar, Ethiopia, found that while majority of respondents had correct knowledge of the cause of rabies (60.1%), its clinical signs (76.8%), and the fatal nature of the disease (94.9%), and only very few (8%) had correct knowledge of its transmission.^[16] Contrary to the poor knowledge of rabies transmission in the Ethiopian study, a community based survey in Tanzania, by Sambo *et al.*^[13] reported that majority of respondents knew that rabies is transmitted through the bite of a rabid dog (81%) and that the disease is fatal (67%). Similarly, a study conducted in Namibia by Haimbodi *et al.*^[17] reported that 90.6% of respondents identified dog bite as a primary means of transmission, 38% recognized convulsions and hydrophobia as symptoms of rabies, and 84.5% knew that vaccines exist to prevent the disease.

It is believed that elimination of rabies is feasible through compliance with rabies prevention practices such as responsible ownership and vaccination of dogs; while mortality from the disease is preventable through appropriate care of wounds (including washing with soap and water), and post-exposure prophylaxis. It is commonly perceived that many African communities are characterized by low levels of responsible dog ownership.^[13] Responsible dog ownership is being promoted as the keystone of reducing the population of stray dogs and also of reducing the number of human cases of dog bites and transmission. Responsible dog ownership includes, for example, to take responsibility for the dog's welfare and health and to make sure it does not run around unsupervised and does not pose a risk to people.^[5] To have a large population of stray dogs in a community is considered to be a risk for a zoonotic disease such as rabies^[2,5] and likewise playing with strange/ownerless dogs.^[12]

Mass dog vaccination is the most effective measure to control rabies and prevent human deaths.^[13] The vast majority of human rabies deaths can be prevented through sustained dog vaccination programs. Annual anti-rabies vaccination and public enlightenment campaign aimed at achieving at least 70% vaccination coverage that is necessary for maintaining the required level of herd immunity in the vaccinated population irrespective of dog population turnover rates such as deaths, births, immigration, and emigration in the period between campaigns,^[6] are crucial to the control of rabies and to eventually eliminate the disease among the dog population. While several countries endemic to rabies do not succeed in getting optimal vaccination coverage,^[5] isolated studies conducted in Nigeria, including Zaria and Kafanchan,^[10] Plateau State,^[15] and Taraba

States,^[18] reported high dog vaccination coverage rates of 96.6%, 97.8%, and 86%, respectively. Despite the high population of farmers and other occupational groups with high risk of exposure to rabies infection in Sokoto, Nigeria, little is known about the knowledge and practices regarding rabies prevention among the groups at risk. This study was conducted to assess the knowledge and practices regarding rabies prevention among dog owners in Sokoto, Nigeria. The findings from the study would be useful to policymakers, human resource managers, and other stakeholders in designing appropriate strategies and interventions for the elimination of rabies in the study area.

MATERIALS AND METHODS

Study Design, Population, and Area

This was a cross-sectional study among dog owners with established households and with dogs of vaccination age (6 months) in Sokoto metropolis, Nigeria, in April and June 2017. Five of the 23 Local Government Areas (LGAs) in Sokoto State are in Sokoto metropolis, with an estimated population of 1,232,197 projected for 2017 based on the 2006 census.^[19]

Sample Size Estimation and Sampling Technique

The sample size was estimated at 199 using the statistical formula for calculating sample size for cross-sectional studies,^[20] a 13.5% prevalence of dog vaccination from a previous study,^[18] a precision level of 5% and an anticipated response rate of 90%.

The eligible participants were selected by a multistage sampling technique. At the first stage, two wards were selected in each of the 5 LGAs in Sokoto metropolis by simple random sampling using the ballot option. At the second stage, 10 areas/settlements were selected in each of the selected wards by simple random sampling using the ballot option. At the third stage, selection of participants was done in the selected areas/settlements by systematic sampling technique after doing a line listing of households that meet the inclusion criteria in the selected areas/settlements. Proportionate allocation of the study participants was done based on the projected population of the respective LGAs.

Data Collection and Analysis

A structured interviewer-administered questionnaire was used to obtain information on the study participants' sociodemographic profile, dog ownership and demography, knowledge of cause and transmission, symptoms and signs and prevention of rabies, as well as practices regarding rabies prevention. The questions were adapted from the questionnaires used in previous similar studies.^[10,21,22] The

questionnaire was pretested on 20 dog owners in Tambuwal LGA (situated outside Sokoto metropolis). The necessary modifications were made based on the observations made during the pretesting. Five Community Health Officers and Five Health Information Officers assisted in questionnaire administration after pre-training on conduct of survey research, the objectives of the study, selection of study participants and questionnaire administration.

Data were analyzed using IBM SPSS version 20 computer statistical software package. Respondents' knowledge of the cause and transmission of rabies was scored and graded on a 6-point scale. One point was awarded for a correct response, while a wrong response or I don't know response received no points. This gives a minimum score of "0" and a maximum score of "6" points. Those that scored ≥ 4 of 6 points were considered as having "good" knowledge, while those that scored < 4 of 6 points were graded as having "poor" knowledge. Respondents' knowledge of the symptoms and signs of rabies was scored and graded on a 10-point scale. One point was awarded for a correct response, while a wrong response or I don't know response received no points. This gives a minimum score of "0" and a maximum score of "10" points. Those that scored ≥ 6 of 10 points were considered as having "good" knowledge, while those that scored < 6 of 10 points were graded as having "poor" knowledge.

Respondents' knowledge of rabies prevention was scored and graded on a 12-point scale. One point was awarded for a correct response, while a wrong response or I don't know response received no points. This gives a minimum score of "0" and a maximum score of "12" points. Those that scored ≥ 8 of 12 points were considered as having "good" knowledge, while those that scored < 8 of 12 points were graded as having "poor" knowledge. Respondents' practices regarding rabies prevention were scored and graded on a 6-point scale. One point was awarded for a practice that reduces exposure to rabies infection, while a practice that increases exposure to rabies infection received no points. This gives a minimum score of "0" and a maximum score of "6" points. Those that scored ≥ 4 of 6 points were considered as having "good" rabies prevention practices, while those that scored < 4 of 6 points were graded as having "poor" rabies prevention practices. Frequency distribution tables were constructed; and cross-tabulations were done to examine the relationship between categorical variables. The Chi-square test was used for bivariate analysis involving categorical variables, while multivariate logistic regression analysis was used to determine the predictors of good practice of rabies prevention. All levels of significance were set at $P < 0.05$.

Ethical Consideration

Institutional Ethical Clearance was obtained from the Ethical Committee of Ministry of Health, Sokoto state, Nigeria. Permission to conduct the study was obtained from the administration of the respective LGAs and the traditional heads of the settlements where the study was conducted. Informed written consent was also obtained from the participants before data collection.

RESULTS

Sociodemographic Characteristics of Respondents

Of the 200 questionnaires administered, 190 were adequately completed and found suitable for analysis, giving a response rate of 95%. The mean age of the respondents was 34 ± 9.9 years, and most of them 146 (76.9%) were aged 20–39 years. Majority of respondents were males (84.7%), married (71.1%), Hausa/Fulani (74.7%), practiced Islam as religion (77.9%), and had at least secondary education (52.6%). A larger proportion of respondents (37.4%) were either into business or were artisans (37.4%), followed by farmers/hunters (33.2%); and majority of them (65.8%) reside in urban communities [Table 1].

Awareness of Rabies Among Respondents

Most, 165 (86.8%) of the 190 respondents had heard of rabies, and the most common sources of information were friends/neighbors (82.4%), and the mass media (13.3%). Only a few of them (6.8%) had attended any training on rabies [Table 2].

Respondents' Knowledge of Rabies

Less than half 83 (43.7%) of the 190 respondents had good knowledge of the cause and transmission of rabies. Only a few 20 (16.3%) had good knowledge of its symptoms and signs, and about a fifth 40 (21.1%) had good knowledge of its prevention [Figure 1].

Good knowledge of the cause and transmission of rabies was associated with the respondents' tribe, religion, and place of residence. The proportion of respondents with good knowledge of the cause and transmission of rabies was significantly ($P < 0.05$) higher among the other tribes (70.8%) as compared to Hausa/Fulani (34.5%), Christians (64.3%) as compared to Muslims (37.8%), and those who reside in urban communities (50.4%) as compared to those who reside in rural communities (30.8%) as shown in Table 3. Multivariate logistic regression analysis did not show any predictor of good knowledge of the cause and transmission of rabies.

Good knowledge of the symptoms and signs of rabies was associated with the respondents' tribe, occupation, and place of residence. The proportion of respondents with good knowledge of the symptoms and signs of rabies was

Table 1: Sociodemographic characteristics of respondents

Variables	Frequency n=190 (%)
Age group (years)	
<20	4 (2.1)
20–29	67 (35.3)
30–39	79 (41.6)
40–49	22 (11.6)
≥50	18 (9.5)
Sex	
Male	161 (84.7)
Female	29 (15.3)
Marital status	
Single	49 (25.8)
Married	135 (71.1)
Separated	2 (1.1)
Widowed	4 (2.1)
Tribe	
Hausa	109 (56.3)
Fulani	35 (18.4)
Yoruba	18 (9.5)
Igbo	20 (10.5)
Others	10 (5.3)
Religion	
Islam	148 (77.9)
Christianity	42 (22.1)
Education	
Primary and below	90 (47.4)
Secondary and tertiary	100 (52.6)
Occupation	
Unemployed/Housewife	21 (11.0)
Farmer/hunter	63 (33.2)
Business/artisan	71 (37.4)
Civil servant	35 (18.4)
Residence	
Urban	125 (65.8)
Rural	65 (34.2)

Table 2: Awareness of rabies among respondents

Variables	Frequency (%)
Ever heard of rabies(n=190)	
Yes	165 (86.8)
No	25 (13.2)
Source of information*(n=165)	
Friends and neighbors	136 (82.4)
Workplace	18 (10.9)
Mass media	22 (13.3)
Campaigns by NGOs	7 (4.2)
Previous training on rabies (n=190)	
Yes	13 (6.8)
No	177 (93.2)

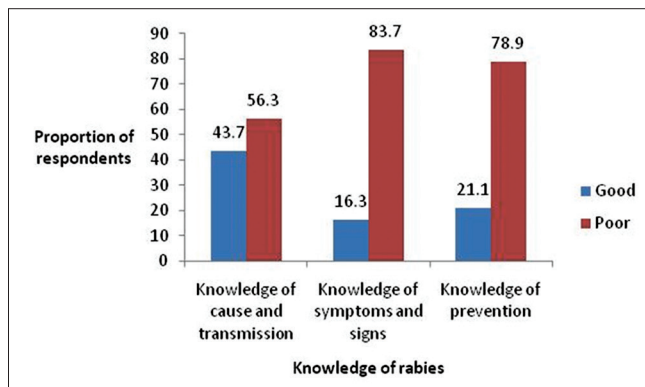
*Multiple responses allowed. NGO: Non-governmental organizations

significantly ($P < 0.05$) higher among the Hausa/Fulani (20.0%) as compared to the other tribes (3.6%), farmers/hunters (29.8%) as compared to those in other occupations (7.9%), and those who reside in rural communities (33.3%) as compared to those who reside in urban communities (2.9%) as shown in Table 3. Multivariate logistic regression analysis did not show any predictor of good knowledge of symptoms and signs of rabies.

Table 3: Distribution of respondents' knowledge of rabies by their sociodemographic characteristics

Sociodemographic variables	Knowledge of rabies					
	Knowledge of cause and transmission <i>n</i> =190		Knowledge of symptoms and signs <i>n</i> =190		Knowledge of prevention <i>n</i> =190	
	Good <i>n</i> (%)	Poor <i>n</i> (%)	Good <i>n</i> (%)	Poor <i>n</i> (%)	Good <i>n</i> (%)	Poor <i>n</i> (%)
Age (years)						
<40	62 (41.6)	87 (58.4)	16 (16.3)	82 (83.7)	27 (18.1)	122 (81.9)
40 and above	20 (50.0)	20 (50.0)	4 (16.7)	20 (83.3)	12 (30.0)	28 (70.0)
	$\chi^2=0.904$, $P=0.342$		$\chi^2=0.002$, $P=0.968$		$\chi^2=2.717$, $P=0.099$	
Sex						
Male	67 (41.6)	94 (58.4)	20 (17.9)	92 (82.9)	32 (19.9)	129 (80.1)
Female	16 (55.2)	13 (44.8)	0 (0)	11 (100)	8 (27.6)	21 (72.4)
	$\chi^2=1.836$, $P=0.175$		$\chi^2=2.346$, $P=0.126$		$\chi^2=0.879$, $P=0.348$	
Marital status						
Single, separated, widowed	24 (43.6)	31 (56.4)	2 (6.7)	28 (93.3)	11 (20.0)	44 (80.0)
Married	59 (43.7)	76 (56.3)	18 (19.4)	75 (80.6)	29 (21.5)	106 (78.5)
	$\chi^2=0.000$, $P=0.993$		$\chi^2=2.682$, $P=0.101$		$\chi^2=0.052$, $P=0.820$	
Tribe						
Hausa/Fulani	49 (34.5)	93 (65.5)	19 (20.0)*	76 (80.0)	22 (15.5)	120 (84.5)
Others	34 (70.8)*	14 (29.2)	1 (3.6)	27 (96.4)	18 (37.5)*	30 (62.5)
	$\chi^2=19.423$, $P<0.001$		$\chi^2=4.287$, $P=0.038$		$\chi^2=10.453$, $P=0.001$	
Religion						
Christianity	27 (64.3)*	15 (35.7)	1 (4.3)	22 (95.7)	18 (42.9)	24 (57.1)
Islam	56 (37.8)	92 (62.2)	19 (19.0)	81 (81.0)	22 (14.9)	126 (85.1)
	$\chi^2=9.302$, $P=0.002$		$\chi^2=2.948$, $P=0.086$		$\chi^2=15.424$, $P<0.001$	
Education						
Primary and below	17 (28.3)	43 (71.7)	11 (24.4)	34 (75.6)	1 (1.7)	59 (98.3)
Secondary and tertiary	31 (40.8)	45 (59.2)	7 (13.5)	48 (86.5)	12 (15.8)*	64 (84.2)
	$\chi^2=2.278$, $P=0.131$		$\chi^2=1.925$, $P=0.165$		$\chi^2=7.736$, $P=0.005$	
Occupation						
Farmer/hunter	23 (36.5)	40 (63.5)	14 (29.8)*	33 (70.2)	3 (4.8)	60 (95.2)
Others	60 (47.2)	67 (52.8)	6 (7.9)	70 (92.1)	37 (29.1)*	90 (70.9)
	$\chi^2=1.973$, $P=0.160$		$\chi^2=10.222$, $P=0.001$		$\chi^2=15.050$, $P<0.001$	
Residence						
Rural	20 (30.8)	45 (69.2)	18 (33.3)*	36 (66.7)	2 (3.1)	63 (96.9)
Urban	63 (50.4)*	62 (49.6)	2 (2.9)	67 (97.1)	38 (30.4)*	87 (69.6)
	$\chi^2=6.699$, $P=0.010$		$\chi^2=20.607$, $P<0.001$		$\chi^2=19.208$, $P<0.001$	

*Statistically significant

**Figure 1: Respondents' knowledge of rabies**

Good knowledge of rabies prevention was associated with the respondents' tribe, religion, education, occupation, and place of residence. The proportion of respondents with good knowledge of rabies prevention was significantly ($P < 0.05$) higher among the other tribes (37.5%) as

compared to Hausa/Fulani (15.5%), Christians (42.9%) as compared to Muslims (14.9%), those with secondary or tertiary education (15.8%) as compared to those with primary education and below (1.7%), those in other occupations (29.1%) as compared to farmers and hunters (4.8%), and those who reside in urban communities (30.4%) as compared to those who reside in rural communities (3.1%) as shown in Table 3. Multivariate logistic regression analysis did not show any predictor of good knowledge of rabies prevention.

Respondents' Practices Regarding Rabies Prevention

Only about a quarter 47 (24.7%) of the 190 respondents had good rabies prevention practices. About a half and less of respondents observed the practices that reduce exposure to rabies infection such as restricting dog movement (48.4%), wearing protective equipment while handling dogs (16.3%), having their dog vaccinated in the past 1 year (28.4%), and reporting rabid or suspected rabid

dogs (35.8%). Majority 102 (53.7%) of the 190 respondents allow their family members to play with their dogs, and a few of them (9.5%) also allow their family members to play with stray dogs [Table 4].

Good practice of rabies prevention was associated with respondents' religion, education level, occupation, and place of residence. It was also associated with good knowledge of cause and transmission of rabies, as well as with good knowledge of rabies prevention. The proportion of respondents with good practice of rabies prevention was significantly ($P < 0.05$) higher among Christians (40.5%) as compared to Muslims (20.3%), those with secondary and tertiary education (22.4%) as compared to those with primary education and below (1.7%), those in other occupations (33.9%) as compared to hunters and farmers (6.9%), and those who reside in urban communities (32.0%) as compared to those who reside in rural communities (10.8%). Furthermore, the proportion of respondents with good practice of rabies prevention was significantly ($P < 0.05$) higher among respondents with good knowledge of cause and transmission of rabies (37.3%) as compared to

those with poor knowledge (15.0%), and those with good knowledge of rabies prevention (67.5%) as compared to those with poor knowledge (13.3%) as shown in Table 5.

In multivariate logistic regression analysis, the predictors of good rabies prevention practices among the respondents were their level of education and their knowledge of rabies prevention. Higher educational background (secondary and tertiary) and good knowledge of rabies prevention were associated with a 21.084-fold (adjusted odds ratio [aOR]: 21.084, 95% confidence interval [CI]: 1.160–383.081, $P = 0.0039$) and 26.395-fold [aOR: 26.395, 95% CI: 1.055 – 660.269, $P = 0.046$] greater likelihood of good rabies prevention practices, respectively [Table 6].

Pattern of Dog Bites among Respondents

Forty-five (23.7%) of the 190 respondents reported that either themselves or a member of their family have ever experienced a dog bite, with the total number of dog bite victims being 61. Forty-seven (77.1%) of the 61 victims were by bitten by their own dogs, while 14 (22.9%) were bitten by stray dogs, and majority 38 (62.3%) of the dog bite victims were children (aged 12 years and below) as shown in Table 7.

Table 4: Respondents' practices regarding rabies prevention

Variables	Frequency (%) $n=190$
Allow family members to play with their dogs	
Yes	102 (53.7)
No	72 (37.9)
Cannot recall	16 (8.4)
Wear personal protective equipment while handling dogs	
Yes	31 (16.3)
No	149 (78.4)
Cannot recall	10 (5.3)
Restrict dog movement	
Yes	92 (48.4)
No	95 (50.0)
Cannot recall	3 (1.6)
Allow family members to play with stray dogs	
Yes	18 (9.5)
No	152 (80.0)
Cannot recall	20 (10.5)
Vaccinated their dog(s) in the past 12 months	
Yes	54 (28.4)
No	130 (68.4)
Cannot recall	6 (3.2)
Reported rabid or suspected rabid dogs	
Yes	68 (35.8)
No	27 (14.2)
Never had a rabid or suspected rabid dog	95 (50.0)
Practice grade	
Good	47 (24.7)
Poor	143 (75.3)

DISCUSSION

This study assessed the knowledge and practices regarding rabies prevention among dog owners in Sokoto Nigeria. The high level of awareness of rabies (86.6%) among the respondents in this study is not surprising considering the fact that the rabies virus is mostly transmitted by domestic dogs,^[1] the prevalent human activities involving dogs in Nigeria,^[10] and the severity of cases of the disease. This is supported by the finding of similarly high levels of awareness in studies conducted in other places where the disease is also endemic including Lagos Nigeria (88.6%),^[2] and Nairobi, Kenya (86%).^[23]

The finding of friends and neighbors being the main source of information on rabies among the respondents in this study (82.4%), as well as the abysmally low prevalence of previous training on rabies prevention among them (6.8%) is worrisome, in view of the high endemicity of the disease in studies conducted across Nigeria,^[8,9] as it suggests poor public health response to the disease in Nigeria, particularly periodic enlightenment campaigns on the mass media. It is, therefore, not surprising that less than half of the respondents in this study (43.7%) had good knowledge of the cause and transmission of rabies, only a few (16.3%) had good knowledge of its symptoms and signs, and about a fifth (21.1%) had good knowledge of its prevention; as the sources through which they could

Table 5: Factors associated with good rabies prevention practices among the respondents

Variables	Rabies prevention practices (n=190)		Test of significance
	Good Frequency (%)	Poor Frequency (%)	
Age (years)			
<40	33 (22.1)	116 (77.9)	$\chi^2=2.768$
40 and above	14 (35.0)	26 (65.0)	$P=0.095$
Sex			
Male	36 (22.4)	125 (77.6)	$\chi^2=3.200$
Female	11 (37.9)	18 (62.1)	$P=0.074$
Marital status			
Single, separated, and widowed	10 (18.2)	45 (81.8)	$\chi^2=1.787$
Married	37 (27.4)	98 (72.6)	$P=0.181$
Tribe			
Hausa/Fulani	31 (21.8)	111 (78.2)	$\chi^2=2.549$
Others	16 (33.3)	32 (67.7)	$P=0.110$
Religion			
Christianity	17 (40.5)*	25 (59.5)	$\chi^2=7.174$
Islam	30 (20.3)	118 (79.7)	$P=0.007$
Level of education			
Primary and below	1 (1.7)	59 (98.3)	$\chi^2=12.513$
Secondary and tertiary	17 (22.4)	59 (77.6)	$P<0.001$
Occupation			
Farmer/hunter	4 (6.3)	59 (93.7)	$\chi^2=17.117$
Others	43 (33.9)*	84 (66.1)	$P<0.001$
Residence			
Rural	7 (10.8)	58 (89.2)	$\chi^2=10.353$
Urban	40 (32.0)*	85 (68.0)	$P=0.001$
Knowledge of causes and transmission of rabies			
Good	31 (37.3)*	52 (62.7)	$\chi^2=12.593$
Poor	16 (15.0)	91 (85.0)	$P<0.001$
Knowledge of symptoms or signs of rabies			
Good	5 (25.0)	15 (75.0)	$\chi^2=0.041$
Poor	28 (27.2)	75 (72.8)	$P=0.840$
Knowledge of rabies prevention			
Good	27 (67.5)*	13 (32.5)	$\chi^2=49.766$
Poor	20 (13.3)	130 (86.7)	$P<0.001$

*Statistically significant

Table 6: Predictors of good rabies prevention practices among the respondents

Variables	aOR	95% CI		P value
		Lower	Upper	
Age (below 40 vs. 40 years and above)	3.649	0.321	41.467	0.297
Sex (Males vs. females)	2.812	0.171	46.282	0.469
Marital status (married vs. single, separated, and widowed)	1.132	0.140	9.147	0.908
Tribe (Hausa/Fulani vs. other tribes)	0.577	0.027	12.493	0.726
Religion (Christianity vs. Islam)	1.499	0.108	20.753	0.763
Education (secondary and tertiary vs. primary and below)	21.084*	1.160	383.081	0.039
Occupation (others vs. farmers and hunters)	2.797	0.309	25.309	0.360
Residence (urban vs. rural)	1.231	0.099	15.326	0.872
Knowledge of cause and transmission of rabies (good vs. poor)	3.406	0.592	19.600	0.170
Knowledge of symptoms or signs of rabies (good vs. poor)	4.171	0.316	55.194	0.278
Knowledge of rabies prevention (good vs. poor)	26.395*	1.055	660.269	0.046

*Statistically significant. CI: Confidence interval. aOR: Adjusted odds ratio

have obtained accurate information about the disease were apparently non-functional.

The association between good knowledge of the cause and transmission of rabies and the respondents' tribe and place of residence with a significantly higher proportion of those from other tribes and Christians having good knowledge as

compared to the Hausa/Fulani and Muslims could be due to the fact that they were mostly urban residents with better access to education as well as diverse sources of information about the disease. This is supported by the submissions of Odeh *et al.*,^[10] on educated people having better access to media and internet. Similar findings were also reported in studies conducted in other cities in Nigeria.^[12,18]

Table 7: Pattern of dog bites among respondents

Variables	Frequency (%)
Self or family members ever experienced a dog bite (<i>n</i> =190)	
Yes	45 (23.7)
No	145 (76.3)
(Total number of cases of dog bites=61)	
Type of dogs the responsible for the bites (<i>n</i> =61)	
Own dog	47 (77.1)
Stray dog	14 (22.9)
Age of dog bite victims (years) (<i>n</i> =61)	
1-5	11 (18.0)
6-12	27 (44.3)
13-17	14 (23.0)
18 and above	9 (14.8)

Whereas, the associations obtained in the distribution of respondents with good knowledge of rabies prevention in this study correlates perfectly with that of the distribution of their knowledge of the cause and transmission of the disease, with the proportion of those with good knowledge of both the symptoms and signs, and prevention of the disease, being significantly higher among the respondents from other tribes as compared to Hausa / Fulani, and among urban residents as compared to rural residents, the reverse is true of the associations obtained in the distribution of respondents with good knowledge of the symptoms and signs of the disease. A significantly higher proportion of Hausa / Fulani, farmers/hunters, and rural residents had good knowledge of the symptoms and signs of the disease as compared to those from other tribes, those in other occupations and urban residents.

The association between good knowledge of symptoms or signs of rabies and being Hausa/Fulani and rural residents among the respondents in this study could be a confounding effect of their occupation (farming/hunting) which exposes them to frequent contact with these animals with the resultant effect of development of familiarity with normal and abnormal behaviors and signs of illness in dogs. This finding is in agreement with the finding in a study conducted in Zaria and Kafanchan,^[10] that reported significantly higher knowledge of symptoms of rabies among rural as compared to urban residents, and occupation was also believed to be a confounding factor in that association, as the farmers/hunters were mostly resident in the rural areas.

Of serious concern is the low proportion of respondents with good practice of rabies prevention in this study (24.7%) and the high proportion of those that were engaged in practices that expose them and members of their households to rabies infection including allowing their family members to play with their dogs (53.7%), handling

dogs without wearing personal protective equipment (78.4%), not restricting dogs movement (50.0%), and the low vaccination coverage for their dogs (28.4%) in view of the substantial number of cases of dog bites among members of their households, and with majority of the victims (62.3%) being children aged 12 years and below. While the higher prevalence of dog bites among children in this study corroborates the WHO estimates of about 40% of people who are bitten by suspect rabid animals being children under 15 years of age,^[1] it also underlines the need for government and other stakeholders to step up education of the public, especially dog owners, on rabies prevention, by organizing periodic awareness campaigns through the mass media. In addition, government should organize annual free or subsidized mass dog vaccination campaigns, as it has been identified as the most effective measure to control rabies and prevent human deaths.^[13]

CONCLUSION

Although majority of the respondents in this study were aware of rabies, they had low knowledge of the cause and transmission, signs and symptoms, and prevention of the disease. Furthermore, the respondents' rabies prevention practices were poor, and dog bites were prevalent in their households, with majority of the victims being children. Government and other stakeholders should step up education of the public especially dog owners on rabies prevention, in addition to organizing annual free or subsidized mass dog vaccination campaigns.

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Serum Cystatin C and N-Acetyl-Beta-(D)-Glucosaminidase as Bio-markers in the Diagnosis of Acute Kidney Disease in Children

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Abstract

Background: Acute kidney injury (AKI) is one of the main public health issues all over the world. Its accurate prevalence in children and adolescents in India is unknown. The main cause of death in children with kidney failure is cardiovascular disease and infections. Unfortunately, AKI is asymptomatic, and their signs and symptoms become evident only when a great proportion of kidneys have lost their function. Hence, the early diagnosis and treatment of AKI in children are of paramount importance. Many physicians base their diagnosis is based on reduced urine output, and serum creatinine (Scr) levels apart from the clinical symptomatology. Measuring the serum level of certain biomarkers as a new method for early diagnosis of AKI, among which major attention has been drawn to Cystatin C and N-acetyl-beta-(D)-glucosaminidase (NAG).

Aim of the Study: The aim of the study was to evaluate the roles of Scr, Cystatin C, and NAG levels in the early diagnosis of AKI.

Materials and Methods: A total of 62 children with AKI and 50 healthy children as control group were included to study the importance of biomarkers in its diagnosis. In addition to, Scr used in the protocol for the diagnosis of AKI, Cystatin C and NAG estimations were done for all the children. The lab values were analyzed to find the specificity and sensitivity of the biomarkers in relation to Scr.

Observations and Results: Among the 112 children included in this study, Group A was 62 children with clinical features of AKI and 50 healthy children as control Group B. In Group A there were 38 (61.29%) male and 24 (38.70%) female children. The mean age was 08.65 ± 2.40 years in males and 08.03 ± 2.15 years in females. The mean body surface area was 0.59 ± 0.32 . The mean body mass index was 16.93 ± 1.85 . There was no statistical difference in the demographic features (P taken significant at <0.05). The most common clinical symptom was decreased urine output in 57/62 (91.93%), swelling legs, ankle, and feet in 48/62 (77.41%). The most common cause of AKI was post-renal 20/62 (32.25%), acute glomerulonephritis in 16/62 (25.80%), and nephrotoxic drugs in 13/62 (20.96%) children. The mean Scr was 03.23 ± 1.25 mg/dL in Group A and normal $0.6.10 \pm 0.15$ mg/dL in Group B children. The mean urine creatinine was 4.14 ± 1.50 g/L in Group A and 1.1 ± 0.65 g/L in Group B children. The mean Serum Cystatin C was 1.59 ± 0.64 mg/L in Group A and 0.63 ± 0.17 in Group B children. The mean values of NAG were 149.61 ± 22.84 in Group A and 19.0 ± 2.80 in Group B children. The U.NAG/U. creatinine ratio was 526.62 ± 78.49 in Group A and 53.12 ± 7.35 Group B children. The specificity of Scr was 78.94% and sensitivity was 86.36%. Cystatin C as a diagnostic marker was with a specificity of 60% and sensitivity of 96.49%. NAG as a diagnostic marker was with a specificity of 66.66% and sensitivity of 96.55%. U.NAG/U creatinine as a diagnostic marker was with a specificity of 71.42% and sensitivity of 94.54%.

Conclusions: Cystatin C and urinary NAG have an acceptable diagnostic value for early detection of AKI when compared to Scr in children. Since the serum level of Cystatin C and urinary NAG raises within the first 24 h of admission in patients with AKI, this biomarker can be a suitable alternative for traditional diagnostic measures.

Key words: Acute kidney disease, Cystatin C and N-acetyl- β -glucosaminidase, Glomerular, Nephrotoxic, Serum creatinine, Tubular

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INTRODUCTION

Acute kidney injury (AKI) is defined as an abrupt failure of kidney function with increased serum creatinine (Scr) levels with or without reduction in urine output. The damage may be mild to severe requiring renal replacement therapy.

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The causes may be pre-renal, intrinsic renal or post-renal. A thorough clinical history, recent usage of nephrotoxic medications and existing systemic illnesses would help in the diagnosis. Physical examination should include assessment of intravascular volume status, and skin rashes indicating systemic illnesses. Initially, measurement of Scr, complete blood count, urinalysis, and fractional excretion of sodium may be helpful. Ultrasound examination of kidneys should be done to know the status of kidneys and post-renal obstruction.^[1] Current diagnostic criteria include acute loss of renal function with an increase in Scr levels within 48 h after injury ≥ 0.3 mg/dl (≥ 26.5 μ mol/L)) or increase in Scr to ≥ 1.5 times baseline within the previous 7 days or urine output < 0.5 mL/kg/h for 6 h.^[2,3] The various complex causes of AKI include renal medullary ischemia caused by insufficient renal perfusion and renal vasoconstriction, decreased glomerular filtration rate (GFR), renal tubular obstruction, and remodeling, and metabolic changes of renal tubular epithelial cells. The kidney ischemia/reperfusion (I/R) is regarded as an important process in the causation of AKI today. The factors resulting in reduced I/R ratio are (1) vascular factors: Renal vasoconstriction; decreased renal blood flow; drop in glomerular blood pressure resulting in lateral medullary ischemia, leading to aggravation and activation of tubuloglomerular feedback; ischemic tissue damage; or cell necrosis. (2) Renal tubule factors: Including obstruction of renal tubules, reabsorption dysfunction, and renal interstitial inflammation.^[4] Similarly, oxidative stress response activated by inflammatory mediators produced from damaged epithelial cells and the release of various vasoconstrictor substances further aggravates the ischemic damage.^[4] Traditionally, Scr is used as a biochemical marker for the diagnosis of AKI, but Scr is not sensitive enough for early monitoring. Elevated Scr level is the consequence of loss of glomerular ultrafiltration capacity. As observed above several AKI cases occur due to acute renal tubular necrosis caused by ischemia or toxic substances, but they do not directly correlate with glomerular damage. On the other hand, the glomerulus has powerful compensatory capacity, and Scr usually begins to rise days or even weeks after AKI onset when GFR decreases by one-third to half, but not obvious in the diagnosis time window (48 h).^[5] In addition, Scr level can be influenced by several interference factors such as age, sex, race, pre-renal factors, muscle mass, metabolism, and nutrition status.^[6] N-acetyl- β -glucosaminidase (NAG) is a proximal tubule lysosomal enzyme and has been extensively studied and has proven to be a sensitive, persistent, and robust indicator of tubular injury. Increased NAG levels have been reported with nephrotoxicant exposure^[7] delayed renal allograft function, chronic glomerular disease, diabetic nephropathy,^[8] as well as following cardiopulmonary bypass procedures.^[9] Westhuyzen *et al.*^[10] reported that

urinary NAG levels (in addition to other tubular enzymes) were highly sensitive in detecting AKI in a population of critically ill adult patients, preceding increases in Scr by 12 h–4 days. The two advantages of using NAG are (a) sensitivity, subtle alterations in the epithelial cells in the brush border of the proximal tubules result in shedding of NAG into the urine, and the amount of shed enzyme can be directly correlated to tubular injury and (b) quantization, simple and reproducible enzymatic assays are well established to measure the analyze calorimetrically using a spectrophotometer.^[11] Cystatin C (CysC) belongs to the cysteine proteins inhibitors family with a 122-amino acid structure of low molecular weight (13 kDa). It is synthesized and released into plasma by all nucleated cells at a constant rate, can be freely filtered by the glomerulus due to its small size and positive charge, and is completely reabsorbed and degraded but not secreted by renal tubules. Hence, serum CysC is an early biomarker of AKI that can reflect the early changes in renal function and the decline of GFR. Initially, it was believed to be less influenced by factors such as weight, age, and gender. However, subsequent studies revealed that CysC concentration was higher in patients with greater height, body weight, age, and muscle content.^[12] The time period of CysC increase was slightly different due to the initial cause of AKI and patient's age. A prospective single-center study showed that compared with a non-AKI group, CysC levels in pediatric patients with AKI were significantly increased 2 h after cardiopulmonary bypass surgery, suggesting that it may be a good biological marker for early diagnosis of AKI.^[13] Similarly, Krawczeski *et al.*^[14] found that CysC is a sensitive and specific marker for children who developed AKI 12 h after cardiac surgery. Haase-Fielitz *et al.*^[15] found that blood CysC had 71% sensitivity and 53% specificity for diagnosing AKI in adults within 6 h after cardiac surgery. Recent studies showed that within 12 h after pediatric cardiopulmonary bypass surgery, serum CysC level was significantly elevated in patients who developed AKI.^[16] Using 99 mTc-DTPA clearances as an index of glomerular filtration function, Uzun *et al.*^[17] found that the sensitivity of CysC for diagnosing renal insufficiency was 82.8%, while that of Scr was only 68.2%; thus, CysC is easier to detect. Therefore, as a marker of kidney function, CysC is more ideal than Scr.^[18] Some factors including storage conditions, muscle mass, age, gender, diet, infections, inflammation, and tumor may not affect serum CysC levels, but CysC may be influenced by thyroid dysfunction, immunosuppressant use (e.g., Glucocorticoids), smoking, systemic inflammatory response, and elevated C-reactive protein.^[19] Its widespread application in clinical has been limited because of lack of a standardized test. In the present study, both NAG and CysC were used in pediatric age group patients with AKI to evaluate their role as diagnostic factors.

Type of the Study

This was a cross-sectional prospective and comparative study.

Institute of the study

The study was conducted at the Departments of Biochemistry and Pediatrics, Kannur Medical College, Anjarakandy, Kannur, Kerala.

Period of the study

The study duration was from July 2015 to June 2017 (2 years).

MATERIALS AND METHODS

A total of 62 children attending the department of pediatrics at a tertiary teaching hospital of Kerala with AKI were included in this study. A group of 50 healthy children attending the department of pediatrics for a regular health check-up were included as a control group. An institutional committee approval was obtained from the ethical committee before commencement to the study. An Ethical Committee approved consent form was used in this study.

Inclusion Criteria

1. Children aged between 3 and 13 years were included
2. Children satisfying “RIFLE criteria” to diagnose AKI as quoted in reference^[20] were included
3. Children with features of AKI occurring within 7 days were included.

Exclusion Criteria

1. Children below 3 and above 15 years were excluded
2. Children with acute systemic illnesses were excluded
3. Children with diabetes mellitus, cardiac diseases, and metabolic disorders were excluded
4. Children with Chronic Kidney diseases were excluded
5. Children earlier treated for AKI were excluded
6. Children with a treatment history of tuberculosis or fungal infections were excluded
7. Children with a history of acute abdominal emergencies were excluded.

Serum and urine samples of these children were analyzed for Scr, Cystatin C, and Urinary NAG levels. Clinical history taking to include demographic and biometric data was done. Clinical examination was done to identify the symptoms and signs of AKI. Ultrasound examination of the kidney was done in all the children. Serum Cystatin C was analyzed using turbidimetric immunoassay for the quantitative determination in human serum and is based on the principle of the agglutination reaction. The test specimen is mixed with Cystatin C latex reagent (R2) and activation buffer (R1) and allowed to react. Presence of

Cystatin C in the test specimen results in the formation of insoluble complex producing turbidity which is measured at a wavelength of 630 nm in semi-automated analyzer. The extent of turbidity corresponds to the concentration of Cystatin C in the specimen. The system was designed to detect Cystatin C concentration ranging from 0.5 to 8.0 mg/L. The lowest limit of detection was 0.33 mg/L; the lowest measurable Cystatin C concentration that can be distinguished from zero. The reference values for Cystatin C were determined to be 0.5 mg/L–1.05 mg/L. GFR was calculated using the following formula:

$$\text{GFR mL / min / 1.73 m}^2 = \frac{79.901}{\text{Cystatin C mg / L}}$$

No interface was observed with hemoglobin 8 Gms/L, bilirubin 420mg/L, and triglycerides 12.5 mmol/mL.

The urinary NAG levels were assessed by the colorimetric method by centrifuging the urine samples at 12,000 rpm for 10 min and storing the supernatants at -80°C . Urinary NAG (10 μL) was quantified by immunoblots with non-reducing 4%–20% gradient polyacrylamide gels (Bio-Rad Laboratories, Hercules, California) and monoclonal (1:1000; Antibody Shop, BioPorto Diagnostics, Gentofte, Denmark). The immunoblotting procedure (runtime, approximately 10 h) was used in this study. The urinary NAG values were expressed as the urinary NAG/creatinine ratio (U/L). Scr, the reference standard, was measured in the Columbia University Medical Center Core Laboratory using the Jaffe reaction. All the data were analyzed using standard statistical methods.

Statistical Analysis

All data analysis was done using Microsoft Excel and the Statistical Package for the Social Sciences (version 16.0) Windows software. Mean \pm standard deviation was calculated. Results were analyzed statistically for significance by independent *t*-test and Chi-square test. Moreover, Pearson correlation “*r*” test (correlation coefficient test) was done to assess the relation of biochemical laboratory investigations with demographic parameters. Student’s *t*-test used to calculate *P* values. At $P < 0.05$, results were considered significant.

Observations and Results

Overall, 112 children were included in this study. 62 children with clinical features of AKI were grouped as A and 50 healthy children as a control study grouped as B. There were 38 (61.29%) male and 24 (38.70%) female children. The children were aged between 3 and 15 years with a mean age of 08.65 ± 2.40 years in males and 08.03 ± 2.15 years in females. The demographic details are shown in Table 1. The body surface area of the children varied

Table 1: The demographic details of the study groups (A-62; B-50=n-112)

Observations	Group A - 62		Group B - 50		P value
	Male-38	Female - 24	Male - 27	Female - 23	
Age (years)					
3–6	6	5	5	4	0.073
7–10	19	9	8	9	
11–13	13	10	14	10	
Socioeconomic status					
Low	14	11	10	11	0.082
Middle	16	8	13	9	
High	8	5	4	3	
Weight category					
Under weight	12	9	9	8	0.076
Normal weight	15	8	7	9	
Over weight	11	7	11	6	
BMI (Kg.m ²), mean	17.30±1.17	16.85±1.38	16.98±2.20	16.60±2.65	0.068
Body surface area (M ²)	0.59±0.32	0.56±0.41	0.60±0.30	0.60±0.12	0.074

BMI: Body mass index

Table 2: The clinical presentation of the study groups n-112 (A-62; B-50)

Observations	Group A n=62 (%)
Symptoms	
Decreased urine output	57 (91.93)
Swelling legs, ankle, and feet	48 (77.41)
Breathlessness	46 (74.19)
Nausea	35 (56.45)
Fatigue	31 (50)
Palpitations	21 (33.87)
Seizures	13 (20.96)
Pain in the chest	11 (17.74)

Table 3: The causes of AKI in the study n-62 (Group A)

Causes of AKI	Male n=38 (%)	Female-24 n=24 (%)
Post-renal causes - 20	11 (28.94)	9 (37.50)
Acute glomerulonephritis - 16	9 (23.68)	7 (29.16)
Nephrotoxic drugs - 13	8 (21.05)	5 (20.83)
Blunt injury to abdomen - 9	6 (15.78)	3 (12.50)
Infections - 6	4 (10.52)	2 (8.33)

AKI: Acute kidney injury

from 0.41 ± 1.05 to 1.3 ± 1.75 with a mean of 0.59 ± 0.32 . The body mass index was varying from 24.65 ± 3.50 to 16.80 ± 4.80 with a mean value of 16.93 ± 1.85 . There was no statistical difference in the demographic features of both groups; the p values were more than 0.05 (p taken significant at <0.05), [Table 1].

The most common symptom observed in this study was decreased urine output in 57 (91.93%), swelling legs, ankle and feet in 48 (77.41%) children, breathlessness in 46 (74.19%), nausea in 35 (56.45%), and fatigue in 31 (50%) of the children. Other minor symptoms were palpitations in 21/62 (33.87%), seizures in 13/62 (20.96%), and pain

in the chest in 11/62 (17.74%). The clinical symptoms and signs in the study group children were tabulated in Table 2.

The various causes observed as the etiology of AKI in the study showed 20/62 (32.25%) children with post-renal causes, 16/62 (25.80%) children with acute glomerulonephritis, 13/62 children with use of nephrotoxic drugs (20.96%), 9 children with blunt injury to abdomen (14.51%), and 6 children (9.67%) with infections [Table 3].

Laboratory investigations undertaken in the study included were urine dipstick which was positive in 18/62 (29.03%) of Group A and negative in all of Group B children whereas in Group B 8/50 (16%) showed epithelial cells which were normal. Urine samples showed that red cell casts were observed in 15/62 (24.19%), dysmorphic red cells in 10/62 (16.12%), white cell casts in 5/62 (8.06%), leukocytes >3 cells/field in 7/62 (11.29%), granular casts in 14/62 (22.58%), and renal tubular cells in 11/62 (17.74%) children. Renal ultrasound examination showed positive renal vessel obstruction in 7/62 (11.29%) children and ascites, raised intra-abdominal pressure >20 mmHg in 4/62 (6.45%) children. There was raised white blood cells (WBC) count all the children of Group A with a mean value of $16.45 \times 10^3/\mu\text{L}$, whereas the WBC count was normal in the control group. The mean erythrocyte sedimentation rate was 28 in Group A and 14 in Group B children. The mean Scr was 0.323 ± 1.25 mg/dL in Group A and normal 0.610 ± 0.15 mg/dL in Group B children. The mean urine creatinine was 4.14 ± 1.50 g/L in Group A and 1.1 ± 0.65 g/L in Group B children. The mean blood urea was 45.79 ± 2.70 mg/L in Group A and 6.3 ± 0.96 mg/dL in Group B children. The mean serum Cystatin C was 1.59 ± 0.64 mg/L in Group A and 0.63 ± 0.17 in Group B children. The mean values of NAG were 149.61 ± 22.84 in Group A and 19.0 ± 2.80 in Group B children. The U.NAG/U. Creatinine ratio was $526.62 \pm$

78.49 in Group A and 53.12 ± 7.35 Group B children [Table 4].

The mean Scr, Cystatin C, and NAG values obtained from children with various causes resulting in AKI were tabulated in Table 5.

In this study, the specificity of Scr as a diagnostic marker was with a specificity of 78.94% and sensitivity was 86.36%. Cystatin C as a diagnostic marker was with a specificity of

60% and sensitivity was 96.49%. NAG 96 as a diagnostic marker was with a specificity of 66.66% and sensitivity was 96.55%. U.NAG/U creatinine as a diagnostic marker was with specificity of 71.42% and sensitivity was 94.54% [Table 6]. This confirms the finding that renal biomarkers such as serum Cystatin C, and NAG are elevated much before Scr levels start rising and do not suffer from the disadvantage of creatinine blind area. In this way, it helps in early detection of kidney injury.

DISCUSSION

In the present study, the roles of Scr, Cystatin C, and NAG levels in the early diagnosis of AKI were conducted. All over the world, Scr is used initially to predict, diagnose and treat AKI in both adults and children. Scr is actually used as a measure of GFR in clinical medicine. Unfortunately, Scr concentrations are not determined only by glomerular filtration.^[21] Scr levels are affected by renal handling, metabolism and methods used in its assessment.^[22] It is also affected by muscle mass, body weight, and size especially in growing children.^[23,24] Cystatin C, a non-glycosylated low molecular weight protein (M_r 13.359),^[25] is a proteinase inhibitor involved in the intracellular catabolism of proteins.^[26] Unlike creatinine, Cystatin C is produced in all nucleated cells at a constant rate, freely filtered in the renal glomeruli and almost completely reabsorbed and catabolized in the renal proximal tubular cells.^[26,27] Recent studies have shown that Cystatin C can be used as an endogenous marker of GFR and is a promising marker in children.^[28-30] In hemodialysis patients, GFR values calculated from serum Cys-C show less variability than those calculated from Scr.^[31] Cys-C is a good marker of GFR for an early identification of fetuses and children with urinary tract malformations.^[32,33] Bladder dysfunctions are frequently associated with occult spina bifida. In a prospective study, serum Cys-C and creatinine were used to estimate kidney function in subjects with nervous system malformation. In these children, the estimation of GFR from Cys-C was superior to that from creatinine.^[34] Compared with creatinine, Cystatin C facilitates the recognition of abnormal renal function in children as its reference range is constant beyond the 1st year of life. The higher levels of Cystatin C in the 1st year of life probably reflect the low GFR of neonates and infants.^[35] NAG is a hydrolytic enzyme with a molecular weight of 130,000–140,000 Daltons. It is normally not filtered at the glomerulus. NAG is a widely distributed lysosomal enzyme, located predominantly in the renal proximal tubules.^[36] NAG is a lysosomal hydrolysis product that plays an important role in the catabolism of both glycoprotein's and glycosaminoglycans.^[37-39] This mechanism is mainly occurred in the proximal tubules and

Table 4: Baseline laboratory and ultrasonography results of children in the study Groups (A-62; B-50=n-112)

Investigations - Mean values	Group A - 62	Group B - 50	P value
Urine dipstick positive	18	Negative	
Urine microscopy positive in children		Epithelial cells+in 08	
Red cell casts+	15	Negative	
Dysmorphic red cells+	10	Negative	
White cell casts+	5	Negative	
Leukocytes>3 cells/field±	7	Negative	
Granular casts+	14	Negative	
Renal tubular cells+	11	Negative	
Renal ultrasound			
Renal Doppler study	7		
Ascites, raised intra-abdominal pressure >20 mmHg	4	Normal	
WBC count - $10^3/\mu\text{mL}$, mean value	16.45 ± 3.10	6.20	0.075
ESR: mm/H, mean value	28	14	0.083
Scr: mg/dL, mean value	3.23 ± 1.25	0.61 ± 0.15	0.031
Urine creatinine: g/L, mean value	4.14 ± 1.50	1.1 ± 0.65	0.043
Blood Urea: mg/dL, mean value	45.79 ± 2.70	6.3 ± 0.96	0.039
Cystatin C: mg/L, mean value	1.59 ± 0.64	0.63 ± 0.17	0.044
Urinary NAG: U/L, mean value	149.61 ± 22.84	19.50 ± 2.80	0.027
U.NAG/U. creatinine ratio: U/g, Mean value	526.62 ± 78.49	53.12 ± 7.35	0.019

WBC: White blood cells, ESR: Erythrocyte sedimentation rate, Scr: Serum creatinine, NAG: N-acetyl-beta-(D)-glucosaminidase

Table 5: The serial Lab values of Scr (Cr), CYSC, and NAG in different causes of AKI in the study (n-62 Group A)

Causes of AKI	Mean values on admission		
	Scr	Cystatin C	NAG
Post-renal causes-20	3.18 ± 1.78	1.21 ± 0.11	148.37 ± 19.46
Acute glomerulonephritis - 16	4.10 ± 1.15	1.74 ± 0.41	153.90 ± 21.55
Nephrotoxic drugs - 13	2.87 ± 1.02	1.62 ± 0.12	167.80 ± 30.19
Blunt injury to abdomen - 9	2.90 ± 1.20	1.80 ± 0.7	137.65 ± 18.75
Infections - 6	3.10 ± 1.10	1.58 ± 1.90	140.36 ± 24.25

Scr: Serum creatinine, CYSC: Cystatin C, NAG: N-acetyl-beta-(D)-glucosaminidase, AKI: Acute kidney injury

Table 6: The specificity and sensitivity of tests of Scr, CYSC, Nag, and U.NAG/U. creatinine ratio in study group; n-62 Group A

AKI	True positive	False positive	True Negative	False negative	Specificity (%)	Sensitivity (%)
Scr	19	08	30	03	78.94	86.36
Serum cystatin C	55	02	03	02	60	96.49
NAG	56	01	02	02	66.66	96.55
U.NAG/U. creatinine ratio	52	02	5	03	71.42	94.54

Scr: Serum creatinine, CYSC: Cystatin C, NAG: N-acetyl-beta-(D)-glucosaminidase, AKI: Acute kidney injury

therefore can be interpreted as an indicator of functional disturbance of tubules.^[40] In addition to its use as a marker of AKI, it is mainly a bacteriostatic substance released from secondary granulocytes of neutrophils.^[41] Another study demonstrated an increase in urine and serum as a response to ischemia from renal tubular cells in the early period following ischemic damage, independent of the glomerular filtration; it was also shown to be a sensitive marker.^[42] In the present study, the mean Scr was $0.3.23 \pm 1.25$ mg/dL in Group A and normal $0.6.10 \pm 0.15$ mg/dL in Group B children. The mean urine creatinine was 4.14 ± 1.50 g/L in Group A and 1.1 ± 0.65 g/L in Group B children. The mean blood urea was 45.79 ± 2.70 mg/L in Group A and 6.3 ± 0.96 mg/dL in Group B children. The mean serum Cystatin C was 1.59 ± 0.64 mg/L in Group A and 0.63 ± 0.17 in Group B children. The mean values of NAG were 149.61 ± 22.84 in Group A and 19.0 ± 2.80 in Group B children. The U.NAG/U. creatinine ratio was 526.62 ± 78.49 in Group A and 53.12 ± 7.35 Group B children. The serum Cystatin C levels also predict the AKI 1–2 days before the Scr level^[43] and an increased urinary Cystatin C level has predicted the need for dialysis earlier than Scr.^[44] In a study by Hari *et al.* they observed that to compare performance of combined creatinine and Cystatin C based equation with equations based on either Cystatin C alone or creatinine alone found that Cystatin C based equation has a better performance in estimation GFR than creatinine-based equation in children with AKI.^[45] Serum Cystatin C showed a high correlation with measured GFR in young and older patients with CKD than creatinine. Thus, Cystatin C is a good alternative marker to creatinine in CKD patients.^[46] Serum Cystatin C may be influenced by factors other than renal function alone, including serum C-reactive protein,^[47] smoking^[48] the subjects with very low GFR,^[49] thyroid function,^[50,51] immunosuppressive therapy,^[52] and occupational exposure to toxic agents such as lead, cadmium, and arsenic^[52]. Thus, clinicians must be cautious when interpreting Cystatin C levels alone if the subjects encounter these factors. In this study, the specificity of Scr as a diagnostic marker was with specificity of 78.94% and sensitivity was 86.36%. Cystatin C as a diagnostic marker was with specificity of 60% and sensitivity was 96.49%. NAG 96 as a diagnostic marker was with specificity of 66.66% and sensitivity was

96.55%. U.NAG/U creatinine as a diagnostic marker was with specificity of 71.42% and sensitivity was 94.54% [Table 6]. This confirms the finding that renal biomarkers such as serum Cystatin C and NAG are elevated much before Scr levels start rising and do not suffer from the disadvantage of creatinine blind area. In this way, it helps in early detection of kidney injury.

CONCLUSIONS

Cystatin C and urinary NAG have an acceptable diagnostic value for early detection of AKI when compared to Scr in children. Since the serum level of Cystatin C and urinary NAG raises within the first 24 h of admission in patients with AKI, this biomarker can be a suitable alternative for traditional diagnostic measures.

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A Study on the Evaluation of Typhidot M (IgM Enzyme-linked Immunosorbent Assay) in the Early Diagnosis of Enteric Fever in Children

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Abstract

Introduction: Enteric fever, or typhoid, is a major public health problem in developing countries like India. The causative organisms, *Salmonella typhi* and *paratyphi*, are developing multidrug resistance due to indiscriminate use of antibiotics even in undeserving cases. Thus, enteric fever needs to be diagnosed early not only to reduce morbidity but also to combat antimicrobial resistance.

Aims and Objectives: This study aims to determine the utility of Typhidot M (IgM enzyme-linked immunosorbent assay [ELISA]) in the early diagnosis of enteric fever in children and to determine its sensitivity, specificity, and positive and negative predictive value in comparison with Widal, keeping blood culture as the gold standard.

Materials and Methods: Children from 1 to 12 years ($n = 90$) with clinical suspicion of enteric fever based on a set of criteria were enrolled in the study. Blood for blood culture, Typhidot M, and Widal were drawn, and the results analyzed.

Results: Among 90 children enrolled, 11 (12.22%) had positive cultures. 24 (26.67%) had positive Widal tests while 58 (64.44%) were positive for IgM antibodies by Typhidot M test. The sensitivity, specificity, and positive and negative predictive values of Typhidot M test were found to be 100%, 40.5%, 18.96%, and 100%, respectively, while that for Widal were 90.91%, 82.28%, 41.66%, and 98.45%, respectively.

Conclusion: Typhidot M (IgM ELISA) is a simple, sensitive, and reliable test for the early diagnosis of typhoid fever in children.

Key words: Antimicrobial resistance, Blood culture, Enteric fever, Typhidot M (IgM enzyme-linked immunosorbent assay), Widal test

INTRODUCTION

Enteric fever is a severe multisystemic infectious disease, caused by *Salmonella typhi*. It poses a significant public health threat in a number of developing nations, including India. Its presentation may be mild gastrointestinal symptoms or life-threatening complications such as intestinal perforation, delirium, meningitis, pneumonia,

or disseminated intravascular coagulation. Any delay in diagnosis and instituting timely and appropriate therapy can cause significant morbidity and mortality. Delayed diagnosis is of particular concern since the irrational use of empirical broad-spectrum antibiotics has resulted in the emergence of multidrug-resistant strains, leading to increase in adverse outcomes. Hence, there is an urgent need for a fast and reliable diagnostic test that can detect enteric fever early so that appropriate therapy can be instituted at the earliest.

Blood culture is the gold standard, for the confirmation of enteric fever. Although the test is highly specific, the sensitivity is very low, with the yield about 70–75% at best. Moreover, the results are obtained only after a minimum period of 3 days. The yield is also dramatically influenced by antibiotic usage. It is also dependent on the stage of

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the disease at which the blood is drawn, as the sensitivity falls drastically beyond the 1st week. The quantity of blood required for cultures is also more. It must also be drawn with strict aseptic precautions so as to avoid the growth of commensals. Hence, there is a need for another diagnostic modality that can circumvent the shortcomings of blood culture and at the same time be highly reliable with good sensitivity and specificity.

The Widal test has been in use for a long time. It is a serological test that is easy to perform and is readily available in most primary health facilities. It is also not too expensive nor does it require intense personal training. However, it is highly inaccurate with several cross-reactions occurring with other diseases such as TB, rickettsial infections, chronic hepatitis, dengue, and malaria. Thus, its very validity is now being questioned. In addition, the antibody titer rises significantly only in the 2nd week of illness which may be too late to prevent complications.

Typhidot M enzyme-linked immunosorbent assay (ELISA) is a dot ELISA kit used for the diagnosis of enteric fever. This test is similar to the ELISA kit used for the diagnosis of HIV infection and is based on the principle of antigen-antibody reaction. It detects the presence of IgM antibodies against a distinct protein, 50 kDa antigen on the outer membrane of *Salmonella typhi* in the patients' sera. The test becomes positive within 3–4 days of infection with *Salmonella typhi*. A positive IgM indicates an acute infection. This test has been shown to have high sensitivity and specificity in a number of studies conducted in different parts of India as well as elsewhere in the world. Thus, it not only detects the disease at an earlier stage but also gives reliable results that can be applied universally.

Aims and Objectives

The aims of this study were as follows:

1. To determine the utility of Typhidot M test in the diagnosis of clinically suspected enteric fever in children.
2. To compare the results of Typhidot M test with blood culture and Widal test and to correlate them clinically.
3. To determine the specificity, sensitivity, positive predictive value, and negative predictive value of Typhidot M test and Widal test keeping blood culture as the gold standard.

Study Design

This was a hospital-based prospective cohort study.

Period of Study

The study duration was 1 year.

Study Subject

Children who were admitted at a tertiary care institute with fever of 4 days or more, with clinical suspicion of enteric fever were enrolled.

Inclusion Criteria

All children 1–12 years of age with a history of fever of 4 days or more, with one or more of the following:

1. Headache.
2. Nausea or vomiting.
3. Constipation or diarrhea.
4. Abdominal pain.
5. Coated tongue.
6. Hepatomegaly.
7. Splenomegaly.
8. Signs of toxemia.
9. Leukopenia or leukocytosis.
10. Response to antibiotic therapy for the treatment of typhoid fever.

Exclusion Criteria

The following criteria are excluded from the study:

1. Children with documented typhoid fever within the past 8 weeks.
2. Those who were immunized against typhoid fever.
3. Those with definite focus of infection, other than enteric fever.

The study was approved by the institute ethical committee.

METHODOLOGY

Children aged 1 year up to 12 years admitted to the Tertiary Institute, who fulfilled the inclusion criteria, were included in the study. At admission, the procedure and test requirements were explained to the parents and written consent obtained. A complete and detailed history was elicited from the parent to fill the predesigned pro forma. A meticulous systemic examination was conducted. Baseline investigations taken at admission include hemoglobin, total and differential leukocyte count and platelet count, and blood (enteric) culture. 5 ml of blood for culture was drawn at admission before the first dose of any antibiotic was administered under strict aseptic precautions as to obtain the maximum yield possible. Blood was inoculated so as to attain blood: Broth ratio of 1:5–1:10. The culture media were checked for growth as well as other properties such as turbidity and gas formation at 24 h after inoculation and incubation. Antibiotic sensitivity was determined using the Kirby–Bauer disc diffusion method, and results were reported after a period of 72 h. The report stated the name of the enteric group of organisms grown and the sensitivity pattern.

1 ml of venous blood for IgM ELISA was taken at admission or the next day in plain screw-capped test tubes. Blood for Widal test was drawn depending on the duration of fever at the time of presentation. If a child presented with fever of 7 days or less, Widal test was deferred until the 8th day of illness.

Meanwhile, the treatment of all suspected cases was started in the form of supportive measures and antibiotics. All children were monitored closely for the development of any complications. Response to therapy was defined as the absence of fever, feeling of well-being or improvement in the general condition of the child, return of appetite, and feeding well. Children who remained afebrile for 3 consecutive days and had regained appetite were discharged. In children, in whom all three investigations for typhoid turned out to be negative, other fever investigations were sent depending on clues in history and clinical examination.

KIT for IG-MELISATM: "Typhiwell" a microwell IgMELISA kit manufactured by AB Diagnopath Manufacturing Private Limited, I-11, DSIDC Industrial Area, Udyog Nagar, New Delhi – 110041 was used for this study. It is an ELISA for the detection of IgM antibodies specific to *Salmonella typhi* in human serum/plasma.

Interpretation

Negative: 0–0.49; it indicates IgM antibody is not present in the sample.

Positive: Equal or more than 0.50; it indicates the presence of IgM antibody against *Salmonella typhi*

Statistical Analysis

Data analysis was done with the help of computer using the open source software R, using the statistical software SPSS 16.0. Using this software, sensitivity, specificity, positive predictive value, and negative predictive value were calculated. *P* value was calculated using Chi-square test. Concept of *P* value: *P* value: 0.00–0.01 ≥ highly significant, *P* value: 0.011–0.05 ≥ significant, and *P* value: 0.051–1.00 ≥ not significant.

RESULTS

Total number of cases enrolled based on clinical suspicion of enteric fever = 90

Number of cases with blood culture positive for *Salmonella typhi* = 11

Number of cases with positive Widal test = 24

Number of cases with positive Typhidot IgM ELISA = 58.

Case Characteristics

Age

Cases were divided on the basis of age group, with maximum cases between 3 and 6 years [Table 1].

Gender distribution of cases

In this study, nearly 59% of the cases were male while 41% were female [Figure 1].

Duration of illness

Nearly half the cases presented with fever of ≤7 days duration, while the remaining half presented with fever of more than 7 days [Figure 2].

Clinical presentation

The most common presentation among children enrolled in this study, apart from fever, was nausea/vomiting. This was followed by hepatomegaly, toxic look, and coated tongue. The least common presentation was diarrhea [Figure 3].

Antibiotic administration before admission

Almost four-fifths of the study subjects had exposure to antibiotics before admission in our hospital [Figure 4].

Laboratory diagnosis

Overall, the yield of blood culture was found to be very low (12.22%). It may be due to the rampant usage of empirical antibiotics taken before the confirmation of the diagnosis [Table 2].

Table 1: Age distribution of cases

Age (in years)	Number of cases (%)
≤3	23 (25.55)
3–6	28 (31.11)
6–9	24 (26.66)
>9	15 (16.66)
Total	90

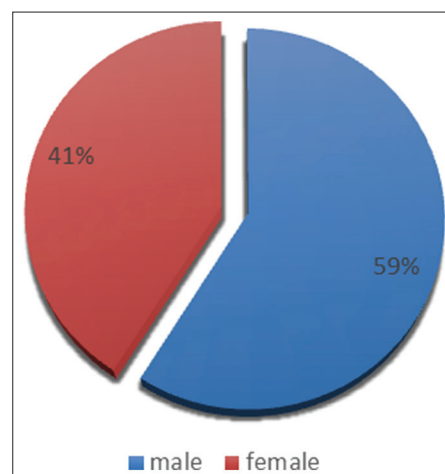


Figure 1: Gender distribution of cases

Comparison of Typhidot M - ELISA with the gold standard investigation - blood culture

Thus, Typhidot was found to have high sensitivity and negative predictive values. However, the specificity and positive predictive value were found to be below. This may be because of the low sensitivity of blood culture in this study [Tables 3a and b].

Comparison of Widal with the gold standard investigation - blood culture [Table 4a and b]

Relation between duration of fever and investigation

Among fevers of ≤ 7 days, Typhidot M detects the maximum number of cases. Typhidot M is able to detect 29 of 46 cases (63.04%) as compared to Widal which could detect only 7 of the 46 cases (15.21%), which was found to be statistically significant ($P = 0.03$), thus proving beneficial in the early diagnosis of typhoid fever. When compared to both blood culture and Widal, it is found

Table 2: Investigations for enteric fever

Investigations	Number of cases (%)
Enteric culture	11 (12.26)
Widal	24 (26.67)
Typhoid IgM ELISA	38 (64.44)

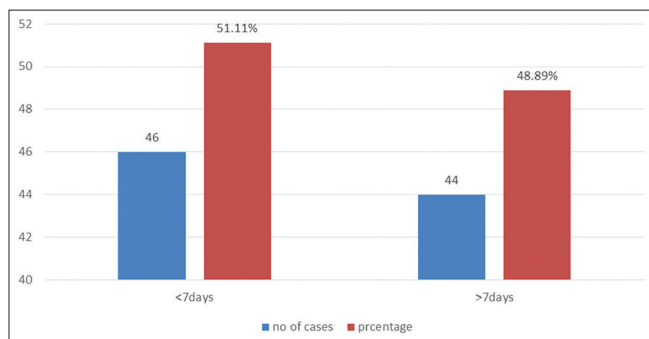


Figure 2: Duration of illness

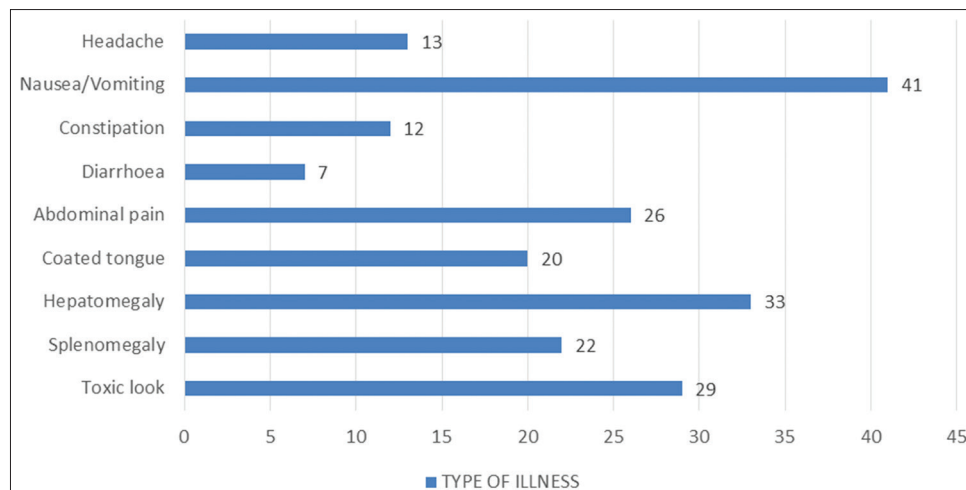


Figure 3: Clinical presentation

that Typhidot M detects more number of cases which is statistically significant ($P < 0.001$) [Table 5].

DISCUSSION

Typhoid is a major health problem in our country. There are various methods of diagnosis of enteric fever; however, the need for the hour is a quick and reliable test that can diagnose typhoid early so that appropriate antibiotic therapy can be instituted on time. This is necessary not only to prevent complications but also to prevent antibiotic resistance. The rampant misuse of empirical antibiotics has resulted in the rise of multidrug-resistant *Salmonella typhi* as well as nalidixic acid-resistant *Salmonella typhi*. Hence, early diagnosis is of immense importance.

This study was aimed at evaluating Typhidot M (IgM ELISA) as a possible candidate for the ideal diagnostic test for early diagnosis of typhoid fever. A total of 90 children were enrolled in this study based on clinical suspicion of enteric fever. Investigations used to confirm the diagnosis included blood (enteric) culture, Widal, and Typhidot M ELISA.

Age

In this study, the age distribution was found to be nearly uniform across all age groups.

Antibiotic Administration and Rampant Misuse

In our study, nearly 80% of the children had at least one dose of an antibiotic before presenting to our hospital. In most cases, the antibiotics were administered even before any investigations for the confirmation of the diagnosis could be sent. This adversely affected the outcomes of our study. More importantly, such blatant misuse of antibiotics is adding to the intimidating burden of antibiotic resistance in the country and the world.

Table 3a: Comparison of Typhidot M - (IgM ELISA) with the gold standard investigation - blood culture

Typhidot M (IgM ELISA)	Blood culture positive	Blood culture negative
Positive	11	47
Negative	0	32

Table 3b

Sensitivity	90.91%
Specificity	82.28%
Positive predictive value	41.66%
Negative predictive value	98.48%

Table 4a: Comparison of Widal with the gold standard investigation - blood culture

Widal test	Blood culture positive	Blood culture negative
Positive	10	47
Negative	1	65

Table 4b

Sensitivity	90.91%
Specificity	82.28%
Positive predictive value	41.66%
Negative predictive value	98.48%

Blood Culture Growth

In this study, it was found that the yield of blood culture was very low, probably due to the high percentage of test subjects who had been administered antibiotics before admission here. The yield was only 12.22% which was much lower than that observed in other similar studies. Narayanappa *et al.* obtained a blood culture yield of 39.05%, while the yield was up to 68% for Sherwal *et al.*

Blood Culture Positivity

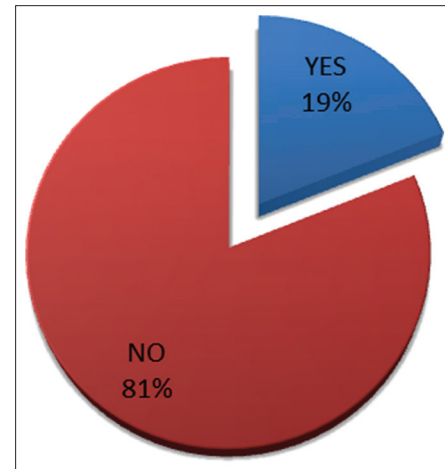
Comparison of the yield of previous studies with the present study

Study	Yield (%)
Narayanappa <i>et al.</i> ^[2]	39
Sherwal <i>et al.</i> ^[3]	68
Krishna <i>et al.</i> ^[4]	26.88
Khan <i>et al.</i> ^[5]	53.90
Begum <i>et al.</i> ^[6]	14
Anila <i>et al.</i> ^[7]	55.55
Present study	12.22

The low yield of blood cultures seen in almost all the studies reflects the poor sensitivity of this investigation. However, the test is highly specific and is believed to be the gold standard in diagnosis of typhoid. Lately, bone marrow cultures have replaced blood cultures as the gold

Table 5: Relation between duration of fever and investigation

Illness days of fever	Blood culture	Typhidot	Widal
≤7 days (46)	7	29	7
≥7 days (44)	4	29	17

**Figure 4: Antibiotic administration before admission**

standard investigation for enteric fever. Blood cultures are highly susceptible to prior use of antibiotics with the culture turning negative after even a single dose of antibiotics. In our present study, almost four-fifths of the study population had been exposed to prior antibiotics. This could be the cause behind the dismal yield of blood cultures.

Another factor in the yield of cultures is the time of presentation in relation to the clinical course of the disease, i.e. duration of fever at the time of presentation. Cultures give maximum results when taken before 7 days of fever. In our study, nearly half of the study population presented with more than 7 days of fever. This may also have contributed to the low yields.

The Utility of Typhidot M - ELISA in the Diagnosis of Typhoid Fever

In this study, as in all other studies, the percentage of total study subjects in whom enteric fever was detected through Typhidot M - ELISA^[8,9] was high. Among clinically suspected cases of enteric fever, Typhidot M ELISA picked up much more number of cases as compared to both Widal and blood culture.

Comparison of Typhidot M ELISA Positivity in this Study with Other Studies

Study	Typhidot M positivity (%)
Narayanappa <i>et al.</i>	74.3
Sherwal <i>et al.</i>	79.0
Khan <i>et al.</i>	71
Begum <i>et al.</i>	73
Present study	64.5

Typhidot M ELISA detects antibodies against the 50 kDa outer membrane protein of *Salmonella typhi*. These antibodies appear early in the course of the disease. Other antibodies, especially antibodies to the O and H antigens, do not appear till late in the course of the disease. Moreover, for meaningful interpretation of Widal, rising titers need to be demonstrated while it is not so in the case of Typhidot M ELISA. Thus, Typhidot M ELISA is a simple test that gives a high yield in the detection of enteric fever cases.

Widal Test and its Utility

In our study, Widal was positive in only 26.67% of cases. This is very low when compared to other studies. Narayanappa *et al.* obtained yield of 45.7% with Widal while Sherwal *et al.* demonstrated 57.0% positivity with Widal.

Comparison of Widal Positivity in Our Study with Other Studies

Study	Widal positivity (%)
Narayanappa <i>et al.</i>	45.7
Sherwal <i>et al.</i>	57
Present study	26.67

The causes for the poor results with Widal are uncertain. However, even in other studies,^[10] the yield is not high enough for its routine use as a screening or confirmatory diagnostic test.

Typhidot Versus Blood Culture

Keeping blood culture as the gold standard, the sensitivity, specificity, and positive and negative predictive values were calculated in several studies.^[11] Our study also revealed a very high sensitivity and negative predictive value for Typhidot M ELISA test. However, the specificity and positive predictive values were quite low when compared to other studies. This may be because of the low rate of culture positivity, against which the comparisons were made.

Comparison of the Sensitivity, Specificity, and Positive and Negative Predictive Values of Typhidot M ELISA in Different Studies

Study	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)
Narayanappa <i>et al.</i>	92.6	37.5	-	-
Sherwal <i>et al.</i>	92	87.5	-	-
Krishna <i>et al.</i>	100	95.5	89.2	100
Khan <i>et al.</i>	71	43	59.7	56.5
Begum <i>et al.</i>	92.85	90	76.47	97.29
Anila <i>et al.</i>	100	63	-	-
Present study	100	40.5	18.96	100

PPV: Positive predictive value, NPV: Negative predictive value

All these studies showed a high sensitivity of Typhidot test, thus justifying its routine use in clinical practice as a sensitive and rapid tool in the diagnosis of typhoid fever. The studies also showed that this test had a high negative predictive value, thus preventing overdiagnosis and

overenthusiastic treatment that contributes to the burden of antibiotic resistance.

Comparison of the Sensitivity and Specificity of Widal Test in Various Studies

Study	Sensitivity (%)	Specificity (%)
Narayanappa <i>et al.</i>	34.1	42.8
Sherwal <i>et al.</i>	74	83
Anila <i>et al.</i>	82	65
Present study	90.91	82.28

Early Diagnosis of Typhoid Fever

In our study, emphasis was given to the early detection of typhoid fever cases so as to

Study	Sensitivity (%)	Specificity (%)
Narayanappa <i>et al.</i>	34.1	42.8
Sherwal <i>et al.</i>	74	83
Anila <i>et al.</i>	82	65
Present study	90.91	82.28

prevent complications and decrease the morbidity and hospital stay. In this regard, the investigations were compared as to which test gives maximum yield in the initial period of the disease, i.e. within the first 7 days of fever onset. It was found that Typhidot M ELISA detects 63.04% of cases while Widal is able to detect typhoid in only 15.21% of early fevers. Narayanappa *et al.*, 20 obtained 97% positivity in the early cases of typhoid fever with Typhidot M ELISA as compared to only 24.2% with Widal.

The poor yield of Widal in the initial days of fever is expected because of low titers of O and H antibodies in the 1st week of illness. As the sensitivity of blood cultures is also low, Typhidot M is the only and the ideal test that can detect typhoid in the 1st week of illness itself.

CONCLUSION

1. Typhidot-M (IgM ELISA) has immense utility in the early diagnosis of typhoid fever in children.
2. When compared to blood culture and Widal, this test gives a high yield and is able to detect more number of cases early in the course of the disease.
3. It has high sensitivity and negative predictive value, keeping blood culture as the gold standard. However, the specificity and the positive predictive values are not very high.
4. Typhidot M (IgM ELISA) is a simple, sensitive, and reliable test for the early diagnosis of typhoid fever in children.

Limitations of the Study

1. The yield of blood culture was very low which resulted in the low specificity of the IgM ELISA test.

2. Paratyphoid infection cannot be detected by this kit.
3. Cold storage is required for the test agents.

Recommendations

Further studies with large number of children, including infants, need to be conducted to determine the utility of the test and to make it a routine in clinical practice so as to avoid the overdiagnosis of enteric fever and prevent antibiotic misuse.

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A Prospective Study of Bedside Index for Severity in Acute Pancreatitis Score in Acute Pancreatitis

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Abstract

Introduction: Acute pancreatitis (AP) is defined as an acute inflammatory process of the pancreas with possible peripancreatic effusion and tissue necrosis with or without multi-organ involvement inducing multiple organ dysfunction syndrome with an increased mortality rate.

Materials and Methods: It is a prospective observational study involving patients diagnosed to have AP at Mahatma Gandhi Memorial Hospital, Warangal, from January 2016 to July 2017.

Results: The present study is done for evaluation of the bedside index for severity in AP score in assessing mortality and intermediate markers of severity in AP.

Key words: Acute pancreatitis, Bedside index for severity in acute pancreatitis score, Organ failure

INTRODUCTION

Acute pancreatitis (AP) is defined as an acute inflammatory process of the pancreas with possible peripancreatic effusion and tissue necrosis with or without multi-organ involvement inducing multiple organ dysfunction syndrome (MODS) with an increased mortality rate.^[1] According to the revised Atlanta classification of AP, AP (regardless of presence or absence of chronic pancreatitis) is clinically defined by at least the first two of three features. Abdominal pain consistent with AP (acute onset of a persistent, severe, and epigastric pain often radiating to the back) and serum lipase activity (or amylase activity) at least 3 times greater than the upper limit of normal. Characteristic findings of AP on contrast-enhanced computed tomography (CT) and less commonly magnetic resonance imaging (MRI) or transabdominal ultrasonography (US).^[2] If AP is diagnosed on the basis of the first two criteria with no systemic sign of severe systemic inflammatory response syndrome (SIRS)

or persistent organ failure, contrast material-enhanced CT may not be necessary for determining patient care. The underlying mechanism of injury in pancreatitis is thought to be premature activation of pancreatic enzymes within the pancreas, leading to a process of autodigestion. Once the cellular injury has been initiated, the inflammatory process can lead to pancreatic edema, hemorrhage, and eventually necrosis. As inflammatory mediators are released into circulation, systemic complications can arise, such as hemodynamic instability, bacteremia (due to translocation of gut flora), acute respiratory distress syndrome (ARDS), and pleural effusions.^[5-8]

MATERIALS AND METHODS

All patients who present at MGMH diagnosed as AP AP defined in accordance with revised Atlanta classification as the presence of any two or three of the following:

- Abdominal pain suggestive of pancreatitis (epigastric pain often radiating to the back), with the start of such pain considered to be the onset of AP;
- Serum amylase and lipase levels 3 or more times normal (imaging is to be used if the elevated values are, 3 times normal); and
- Characteristic findings on CT, MRI, or transabdominal US studies.

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Bedside index for severity in AP (BISAP) score is calculated in all such patients based on data obtained within 24 h of hospitalization.

Individual Components of the BISAP Scoring System

Blood urea nitrogen > 25 mg/dl, impaired mental status (Glasgow coma scale score <15), SIRS is defined as two or more of the following:

- Temperature of <36 or > 38°C
- Respiratory rate >20 breaths/min or PaCO₂ <32 mmHg
- Pulse >90 beats/min
- White blood cell <4000 or >12,000 cells/mm³ or >10% immature bands.

Age >60 years, pleural effusion detected on imaging. A CT or MRI or USG of the abdomen, obtained at any time in the first 7 days of hospitalization, is required to differentiate necrotizing from interstitial pancreatitis organ failure is defined as a score of ≥2 in one or more of the three (respiratory, renal, and cardiovascular) out of the five organ systems initially described in the Marshall score 12.

Organ failure scores will be calculated for all patients during the first 72 hrs of hospitalization based on the most extreme laboratory value or clinical measurement during each 24 h period. Duration of organ failure will be defined as transient (≤48 h) or persistent (>48 h) from the time of presentation.

Discrimination of the BISAP score for predicting mortality will be evaluated in the prospective cohort, using the area under the receiver operating curve (AUC). The receiver operating curve will be examined for an optimal BISAP score for mortality prediction.

The ability of this cutoff value to predict the development and duration of organ failure as well as pancreatic necrosis will then be evaluated.

$P < 0.05$ was chosen to be significant for all tests given the multiple testing conducted among the study cohort.

Inclusion Criteria

All cases of AP present at MIMS from January 2016 to July 2017 were included in this study.

Exclusion Criteria

All cases of AP with organ failure at or within 24 h of presentation were excluded from the study. Patients with incomplete clinical data, those who were symptomatic for more than 72 h at admission, patients with chronic pancreatitis were excluded from the study.

RESULTS

Of 40 cases studied 32 were males and 8 were females, and the ratio of M:F = 4:1. Males were more commonly affected, i.e., 80% [Table 1].

Age group of patients ranges from 14 to 60 years, with peak incidence being in 4th decade, i.e., 32.5%. The mean age of presentation is 36.62 years [Table 2].

Etiology

The leading cause of AP is alcohol in 36 (90%) patients, gallstones in 4 (10%) patients [Table 3].

Of 40 patients, 37 (92.5%) patients had no organ failure. Remaining 3 (7.5%) developed organ failure. All those patients who developed organ failure had BISAP score 3. In organ failure, renal failure (RF) 2 (5%) is most common [Table 4].

Of 12 patients with BISAP score ≥3, 2 (16.6%) patients developed transient RF. None of them with BISAP score <3 developed transient organ failure [Table 5].

Out of 40 patients, 1 (2.5%) patient developed persistent organ failure [Table 6].

Of 12 patients with BISAP score ≥3, 1 (8.3%) patient developed persistent organ failure. None of them with BISAP score <3 developed persistent organ failure [Figure 7].

1 (2.5%) patient in this study died. His BISAP score was 4 and he had developed MODS [Table 8].

Of 40 patients, 12 (30%) had severe pancreatitis and 28 (70%) were classified as having mild pancreatitis [Table 9].

Of 40 patients, 3 (7.5%) patients had an ICU stay of >5 days. Mean ICU stay is 2–10 days [Table 10].

DISCUSSION

AP remains a serious disease. It is defined as an inflammatory process of the pancreas with possible peripancreatic tissue and multi-organ involvement inducing MODS with an increased mortality rate 1. The majority of patients present with mild disease, however, approximately 20% run a severe course and require appropriate management in an intensive care unit. According to RAC, AP has been defined as in, mild, moderate, and severe form.

Table 1: Distribution of sex in the study population

Sex	n (%)
Male	32 (80)
Female	8 (20)
Total	40 (100)

Table 2: Age distribution total number of cases – n=40

Age group (in years)	n (%)
11–20	3 (7.5)
21–30	10 (25)
31–40	13 (32.5)
41–50	10 (25)
51–60	4 (10)

Table 3: Distribution of etiological factors among study populations

Causal factor	Number of patients (%)
Alcoholic	36 (90)
Gallstones	4 (10)
Others	0 (0)

Table 4: Distribution of organ failure among the study population

Organ failure	BISAP ≥3	BISAP <3	Total (%)
Renal	2	0	2 (5)
Respiratory	0	0	0 (0)
Cardiac	0	0	0 (0)
MODS	1	0	1 (2.5)
None	9	28	37 (92.5)
Total	12	28	40 (100)

Table 5: Transient failure rates and its correlation with BISAP score

Transient organ failure	BISAP >3	BISAP <3
Yes	2	0
No	10	28
Total	12	28

BISAP: Bedside index for severity in acute pancreatitis

Definition of Severity of AP^[2-4]

Mild AP

Mild AP is characterized by the absence of organ failure and the absence of local or systemic complications.

Moderately severe AP

Moderately severe AP is characterized by the presence of transient organ failure or local or systemic complications in the absence of persistent organ failure.

Severe AP

Severe AP is characterized by persistent organ failure. MODS, the extent of pancreatic necrosis, infection, and

Table 6: Persistent organ failure in the study population

Persistent organ failure	Frequency (%)
Yes	1 (2.5)
No	39 (97.5)
Total	40 (100)

Table 7: Persistent organ failure and its correlation with BISAP score in the study population

Persistent organ failure	BISAP ≥3	BISAP <3
Yes	1	0
No	11	28
Total	12	28

BISAP: Bedside index for severity in acute pancreatitis

Table 8: Mortality rate in the study population

Mortality	Number of patients (%)
Yes	1 (2.5)
No	39 (97.5)
Total	40 (100)

Table 9: Distribution of severity in the study population

Severity	Number of patients (%)
Mild AP (score <3)	28 (70)
Severe AP (score ≥3)	12 (30)
Total	40 (100)

Table 10: Distribution of patients according to ICU stay

ICU stay	BISAP ≥3	BISAP <3	Total (%)
>5 days	3 (7.5%)	0	3 (7.5)
<5 days	9 (22.5%)	28 (70%)	37 (92.5)
Total	12 (30%)	28 (70%)	40 (100)

ICU: Intensive care unit, BISAP: Bedside index for severity in acute pancreatitis

sepsis is the major determinants of mortality in AP.^[9] Pancreatic necrosis is considered as a potential risk for infection, which represents the primary cause of late mortality. The occurrence of acute respiratory (ARDS), cardiovascular (cardiovascular disease), and RFs can predict the fatal outcome in SAP. A wide range of mortality (20–60%) has been reported in sap. Early diagnosis and prognostic evaluation are extremely important and may reduce the morbidity and mortality associated with sap. On account of differences in outcome between patients with the mild and severe disease, it is important to define that group of patients who will develop severe pancreatitis, predicting which still represents a challenge for the clinician.

Interestingly, when seeking medical attention (usually 12–24 h after the onset of pain), most patients do not exhibit

multiple organ dysfunctions, which is likely to emerge by the second or 3rd day. Identification of patients at risk for mortality early in the course of AP is an important step in improving outcome “write Wu *et al.*, from Brigham and women’s hospital and Harvard medical school in Boston, Massachusetts, and colleagues, “current methods of risk stratification in AP have important limitations.” Most patients with AP recover without complications; the overall mortality rate of this illness is between 2–5% and 6–7%. Multiple risk stratification tools for AP have been developed, but their clinical usefulness is limited. Older measures such as the Ranson’s criteria and modified Glasgow score use data that are not routinely collected at the time of hospitalization. In addition, both require 48 h, thereby missing potentially valuable early therapeutic window.

The APACHE II score is the most widely used prediction system currently, but it requires the collection of a large number of parameters. APACHE II was originally developed as an intensive care instrument and requires the collection of a large number of parameters, some of which may not be relevant to prognosis. For this purpose, a simple and accurate clinical scoring system that is BISAP scoring system was developed. This scoring system used for stratifying patients according to their risk of hospital mortality and is able to identify patients at increased risk of mortality before the onset of organ failure. Data for BISAP score collected within the first 24 h of hospitalization.

The ability to stratify patients early in their course is a major step to improving management strategies in AP. The severity of AP was defined on the basis of the BISAP score. The ability to risk stratify patients early in their disease course has several important implications. First, early identification of high-risk patients may alert doctors to institute aggressive resuscitation efforts and to consider specialty care referral. Second, it is a major step in improving future management strategies in AP.

In this study, of 40 patients, 12 (30%) had severe pancreatitis that is they had BISAP score more than or equal to 3 and 28 (70%) were classified as having mild pancreatitis having BISAP score of <3. The majority of patients, the disease was self-limiting. Among 40 patients in this study, 32(80%) were males and 8 (20%) were females. Male to female ratio was 4:1.

The mortality rate of this study was 2.5%, i.e., one patient had died from MODS with persistent organ failure with BISAP score of 4. In the present study, the majority of patients who had BISAP score, more than 3 was above 40 years of age. With respect to etiological factors of AP, we found alcohol being the most common cause of AP,

accounting for 90% of cases, gallstones being the second most common, accounting for 10% of cases.

The proportion of two main causes greatly depends on the geographical and cultural variations. Alcohol is the main cause in the United States of America and Finland, gallstones in southern Europe, whereas central and northern Europe sees a similar frequency of the two factors or a predominance of alcohol.

In this study, of 40 patients, 37 (92.5%) had no organ failure and 3 (7.5%) patients developed organ failure. Of 12 patients, 2 (16.6%) patients had transient organ failure and 1 (8.3%) had persistent organ failure. Intransient organ failure group, 2 patients had a transient RF. Of 40 patients in this study, none had developed pancreatic necrosis.

The mortality rates of patients with AP vary from 2 to 9% while in severe cases, it is estimated at 30%. According to a recent study, the mortality rates among severe AP patients have decreased from 50–58% in 1978–1982 to 12–18% in 1993–1997. Furthermore, the early deaths of patients with AP were rare: 9 of 10 deaths occurred later than 3 weeks after disease onset.

The overall mortality in this study was 2.5% which is similar comparable with other studies. Perez *et al.* reported an overall mortality rate of 14% among 99 patients with pancreatic necrosis but found that the concomitant presence of organ failure at admission or during hospitalization was associated with a nearly 50% mortality rate. Rau *et al.* noted a 19-fold increased the risk of mortality among 230 patients with sterile necrosis, treated either operatively or conservatively, with multisystem organ failure. Ransons score, which requires 11 signs for computation, recorded at admission and 48 h is primarily aimed to evaluate the function of early operative intervention inpatients of AP. It is cumbersome, and accurate Ranson’s score takes 48 h to complete, and not all laboratories measure all the parameters in routine blood tests (e.g., serum lactate dehydrogenase).

More recently, the APACHE II system, developed for general use in intensive care units, has supplanted Ranson score because it can be applied at any point in time, unlike Ranson score, which is calculated only 48 h after admission. Ranson criteria and the APACHE II system are very cumbersome to use, and both are limited by their complexity. BISAP is a newly developed prognostic scoring system. It also has the advantage of being applicable at any time during the course of AP, unlike Ranson score. In this regard, it is much like the APACHE II system but is much simpler to use. Therefore, it has been proposed

that the primary advantage of BISAP over the traditional scoring systems, such as Ranson score and APACHE II, is its simplicity.

CONCLUSION

The present study is done for evaluation of the BISAP score in assessing mortality and intermediate markers of severity in AP. The BISAP score was evaluated among 40 cases of AP admitted to our institution during the period of January 2016–July 2017. BISAP scores were calculated in all cases using data within 24 h of presentation. Based on the data and results obtained in the present study, the following conclusions can be drawn: AP is more commonly seen in males. Age group ranges from 14 to 60 years, with peak incidence seen in a 4th decade. The mean age of presentation is 36.62 years. The most common etiological factor is alcoholism followed by gallstones. 30% patients had BISAP score more than or equal to 3 and 70% had BISAP score <3. The severity of AP is graded as mild in 70% and severe AP in 30% of patients. Transient organ failure is seen in 16.6%, and persistent organ failure in 2.5% of patients with BISAP score ≥ 3 . Overall, in this study group, mortality was 2.5% and organ failure seen in 7.5% and pancreatic necrosis in 0% of patients. 1 (2.5%) patient died of MODS with BISAP score of 4. 7.5% of patients had an ICU stay of >5 days. Present study infers that BISAP scores of ≥ 3 represent a simple way to identify patients at risk of increased mortality and the development of intermediate markers of severity within 24 h of presentation. Although most patients with AP recover without complications, the overall mortality rate of this illness is between 2% and 5%. Multiple risk stratification tools for AP have been developed, but their

clinical usefulness is limited. Older measures, such as the Ranson and modified Glasgow score, use data that are not routinely collected at the time of hospitalization, and these tools cannot be completed until 48 h after admission. The APACHE II score is most widely used prediction system currently, but it requires the collection of a large number of parameters. Our study found that BISAP score represents a simple way to identify patients at risk of increased mortality and the development of intermediate markers of severity within 24 h of presentation.

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Clinical Study of Hydatid Disease

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Abstract

Introduction: Hydatid disease has been known from the time of Hippocrates who refers to the disease as “Liver full of water.” The most common form is *Echinococcus granulosus*, which gives rise to cysts. Hydatid disease is prevalent enough in India to be seen by most general surgeons during their careers. The aim of studying hydatid is that it is a common parasitic infestation of surgical interest in our area.

Materials and Methods: The present study “clinical study of hydatid disease” is done in the Department of General Surgery, Mahatma Gandhi Memorial Hospital (Kakatiya Medical College), Warangal, Telangana, from January 2015 to September 2016. Consisted of 30 subjects from all the subjects, written and informed consent was taken, thorough examination and investigations and appropriate management were done.

Results: In the present study of mean age was the range of 41–50 years. Both females and males had the same range. Overall, male and female ratio is 1:1.3. The most common symptom appears to be pain (66.66%), second most common symptom was mass abdomen (33.33%). Fever history was present in 26.6% of cases.

Conclusion: Hydatid disease is one of the commonly met with diseases in M.G.M. Hospital, Warangal. 30 cases were reported during the present study from January 2015 to September 2016.

Key words: *Echinococcus granulosus*, Hydatid cyst, Hydatid disease

INTRODUCTION

Hydatid disease has been known from the time of Hippocrates who refers to the disease as “Liver full of water.”^[1] The word echinococcosis Greek in origin and means Hedgehog berry.^[1] Hydatid disease is a parasitic infection caused by several species of the cestode *Echinococcus*. The most common form is *Echinococcus granulosus*, which gives rise to cysts, primarily in the liver and lungs. Much less common is *Echinococcus multilocularis*, which produces an invasive tumor-like replacement of liver tissue. Hydatid liver disease is prevalent enough in India to be seen by most general surgeons during their careers. In India, large series have been reported from Punjab, Andhra Pradesh, and Chennai. Hydatid disease is readily preventable disease, but the reality of situation man's

intimate contact with his environment would indicate that this condition which has been known since antiquity will remain a problem for the foreseeable future. It remains today a common surgical condition in many rural parts of the world, carrying significant mortality and morbidity. Although the disease entity hydatidosis has been known for many centuries, the nomenclature was verifying from time to time, i.e., “hydatid cyst or echinococcal cyst.” “Hydatidose,” “hydatidosis,” “Echinococcosis,”^[1] etc., at present, all the above confusion nomenclature was discarded, and hydatidosis is the terminology accepted in the international congress of parasitology. The aim of studying hydatid is that it is a common parasitic infestation of surgical interest in our area of Rayalaseema districts of Andhra Pradesh and plenty of cases of extrahepatic hydatid disease were reported. Surgery offers a complete cure, and the mortality which can be attributed to surgery is minimal. Hydatid anaphylaxis so much described is not difficult to treat, and in fact, it is rarely met with.

Ultrasonogram

It detects 98% of Hydatid cysts. It is cost effective in endemic areas can be used both pre-operatively and postoperatively. It confirms the cystic lesion, visualize the

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Figure 1:Ultrasound picture of hepatic hydatid cyst

daughter cysts, defines the anatomical extent of the cyst and its relationship with vascular structures.

The "cart wheel appearance"^[2] is characteristic of multivesicular cyst. Separation of the laminated membrane produces a "split wall appearance"^[2] and its complete collapse results in "water lily sign"^[3,4] presence of hydatid sand is pathognomic more detailed account of the ultrasound findings in hydatid disease is given by Gharbi *et al.*^[4,5]

Classification of ultrasound appearance in hydatid disease:^[4,6]

Type	Description
I	Pure fluid collection
II	fluid collection within split wall (water lily sign)
III	fluid collection with septa (honeycomb sign)
IV	Heterogeneous complex mass (dead parasite) calcified mass (egg shell)
V	Reflecting thick walls ^[5]

Ultra sonogram is less accurate than CT in localising and delineating the extent of the cyst.

MATERIALS AND METHODS

The present study "clinical study of hydatid disease" is done in the Department of General Surgery, Mahatma Gandhi Memorial Hospital (Kakatiya Medical College), Warangal, Telangana, from January 2015 to September 2016. Consisted of 30 subjects from all the subjects, written and informed consent was taken, thorough examination and investigations and appropriate management were done. Follow-up period was of 6 months. Results were analyzed.

Results and Observations

1. In the present study of mean age was the range of 41–50 years. Both females and males had the same range. Overall, male and female ratio is 1: 1.3 [Table 1].
2. The most common symptom appears to be pain (66.66%), second most common symptom was mass abdomen (33.33%). Fever history was present in 26.6% of cases
3. The most common finding was hepatomegaly
4. Duration of symptoms ranged from 3 days to 3 years. Hemoglobin%, chest X-ray and abdominal X-ray, and ultrasonography (USG) abdomen were done in all patients. Computed tomography (CT) and liver function test were done in only a few cases
5. Among the 29 patients who underwent surgery 27 had elective surgery, 2 cases an emergency laparotomy was done
6. Only laparotomy was done for all the cases. Only conservative resection or partial resection was performed in all the cases
7. Management of cavity was done either by packing it with omentum (or) a drain (32 Fr) was placed in the cavity
8. Postoperatively, there were no immediate complications. All the patients received antibiotics for the first two post-operative days and albendazole for 4 weeks before and 4 weeks after surgery. Drains were removed on average on the 4th post-operative day
9. Wound infection was noticed in three patients
10. Sutures were removed in an 8th post-operative day
11. Patients were discharged on the 9th post-operative day.

In the present study, 40% of subjects were in the age group of 41–50 years, 30% were in the age group of 31–40 years, 16% were in the age group of 51–60 years, and 13.33% were in the age group of 20–30 years.

In the present study, 56.66% are females and 43.33% are males [Table 2].

In the present study, 33.33% had a history of contact with the dogs [Table 3].

In the present study, 66.66% of subjects presented with abdominal pain, 83.33% of subjects presented with lump abdomen, 26.66% of subjects had fever, and 6.66% had acute abdomen like picture. Of the 66.66% of subjects with abdominal pain, 50% of subjects also had lump abdomen [Table 4].

In the present study, 60% of subjects had symptoms lasting for a duration of <1 month. 20% of subjects had symptoms lasting for a duration between 1 and 3 months. 13.33% of subjects had symptoms lasting for a duration

Table 1: Age distribution

Age group	n (%)
20–30	4 (13.33)
31–40	9 (30.00)
41–50	12 (40.00)
51–60	5 (16.66)
Total	30 (100)

Table 2: Sex distribution

Sex	n (%)
Male	13 (43.33)
Female	17 (56.66)
Total	30 (100.00)

Table 3: Contacts with dogs

Contacts with dogs	n (%)
Present	10 (33.33)
Absent	20 (66.66)
Total	30 (100)

Table 4: Symptomatology of abdominal hydatid disease

symptoms	n (%)
Abdominal pain	20 (66.66)
Abdominal mass	10 (33.33)
Fever	8 (26.66)
Acute abdomen like picture of some other causes (intestinal obstruction and Ac.Du)	2 (6.66)

of 4–6 months. 6.66% of subjects had symptoms lasting for >6 months [Table 5].

In the present study, 40% of subjects had increased bilirubin levels. In all 100% of subjects, USG and CT showed hydatid cysts [Table 6].

In the present study, 76.6% of subjects underwent cystectomy and external drainage, 13.33% of subjects underwent cystectomy with obliteration of cyst wall, and 6.66% of subjects had into removal. 3.33% of subjects were not willing for treatment [Table 7].

In the present study, 73.33% of subjects had no complications, 16.66% of subjects had bile leak, and 10% of subjects had an infection [Table 8].

DISCUSSION

Abdominal hydatid disease is a common surgical problem at Mahatma Gandhi Memorial Hospital, Warangal, as many as 29 of 30 patients underwent surgeries for hydatid

Table 5: Duration of symptoms

Duration (months)	n (%)
<1	18 (60)
1–3	6 (20)
4–6	4 (13.33)
>6	2 (6.66)

Table 6: Investigations

S.no	Investigations	n (%)
1	Increased bilirubin	12 (40)
2	USG and suggestive of hydatid cysts	30 (100)
3	CT-abdomen	30 (100)

CT: Computed tomography, USG: Ultrasonography

Table 7: Treatment modality

Surgical modality	n (%)
Cystectomy+external drainage	23 (76.6)
Cystectomy+obliteration of cyst wall	4 (13.3)
In toto removal	2 (6.66)
Not willing	1 (3.33)

Table 8: Complications

Complication	n (%)
Bile leak	5 (16.66)
Infection	3 (10)
Nil	22 (73.33)

disease in the study period of 2 years. 1 patient refused surgery.

Age

The dictum that hydatid disease is uncommon at extremes of age appears to hold good. The age ranged from 20 to 60 years. The mean age is 40 years. The majority of patients were in the range of 41–50 years. Both males and females had the same range. This is in agreement with the studies of Barros *et al.* who started the mean age of 40 years. Most of the studies give a similar age range.

Sex

Of a total number of 30 patients in this study, 17 were females and 13 males. The overall male to female ratio is 1: 1.30.

Sex	Barrett's		Trivedi and Nanavathy ⁽¹⁾		Sachdev and Talwar		Present series	
Male	40	56	5	79	5	50	13	43.33
Female	31	444	2	21	5	50	17	56.66

Symptomology

Hepatic hydatid cyst

In general, hydatid disease is regarded as an asymptomatic disease. The cyst appears to be asymptomatic over long

periods of time. The most common symptom appears to be a pain (66.66) the site of pain is the epigastric region in case of left lobe hydatid cyst and the right hypochondrium in case of right lobe involvement. The pain was of dragging sensation and patients had good relief with nonsteroidal anti-inflammatory drugs. The pain was the most common symptom in most of the studies.

Some patients had undergone an upper gastrointestinal endoscopy before the admission.

The second most common symptom was the mass abdomen which was the complaint in 33.33% of patients. Icterus was noted in one of the patients. History of fever was present in about 8 cases 26.6%. This fever was of intermittent in nature.

Operative Treatment

Among the 29 patients who underwent surgery 27 had elective surgery.

They were admitted for elective hepatic hydatid surgery and on the 4th admission day developed pain and diagnosed as ruptured hydatid cyst. An upper midline incision was taken. About 500 ml of bilious fluid was present in the peritoneal cavity which was suctioned. The cyst was evacuated of the contents. The layers of the wall of the cyst were removed. Cysto-biliary communication was noticed. Thorough peritoneal lavage was performed with betadine solution and later with normal saline one drain placed in the residual cavity, and another was placed in the pelvis. Abdomen was closed by mass closure technique. Post-operative period was uneventful except for wound infection. Drains were removed on the 4th post-operative day.

All the remaining cases were performed as elective surgeries.

Open Hepatic Hydatid Surgery

Indications

The most common procedure for hepatic hydatid disease is the open procedure. Small hydatid cyst situated deep in either of the lobes is not operated on unless the patient is symptomatic. This was decided preoperatively based on US findings. These symptomatic cysts could be due to dragging sensation of the hydatid cyst or biliary colic. Small asymptomatic cysts were not operated on. They were discharged and were advised albendazole 400 mg bd for 4 weeks. This is in line with the series of Pappadimitrou, Kune, and Barros. However, Shembart *et al.* operated on all hydatid cysts of the liver. There was a higher incidence of hemorrhage. Blood transfusion had to be given. In our institute, nearly all the hydatid cysts had reached large size (4–6 cm) and were quite close to

the surface. Hence, the presence of hydatid cysts was an indication for surgery.

Only laparotomy was performed for all the cases. This is in general line of thought not to contaminate two cavities at the same time. The type of incision was decided on the location of the cyst. Right lobe cysts were operated either by a midline incision or a right subcostal incision.

The left lobe cysts were operated on by a midline incision. Only one left lobe cyst was operated on by the right subcostal incision. Rooftop incision (Chevron) incision was not used for any case. There appears to be no advantage (Saidi *et al.*) as the adequate exposure was possible with either right subcostal or upper midline incision. The mobilization of liver done for cysts located on the superior surface.

Most of the maneuvers were performed for the right lobe hydatid cysts. None of the left lobe hydatid cysts required mobilization. The ligamentum teres was divided between ligatures, and the falciform ligament was divided all the way up to the dome of the diaphragm above the liver. Mobilization of the right lobe of the liver was commenced by the division of right coronary ligament. Once this has begun an assistant on the opposite side of the table lifts the liver upward and forward while strong retraction is applied to the right costal margin using retractor. Great care was taken at this point because small veins entering the vena cava may be torn if excess of traction is applied. After mobilization of the liver, superior surface hydatid cysts were tackled like cysts at other sites.

Management of Cyst

The management of the cyst was, in general, a uniform procedure first after opening the abdomen a thorough search was made for extrahepatic hydatid cysts in addition to the routine exploration.

Small bowels were packed away from the operative site. Cyst was isolated using mops all around. Only conservative resection or partial resection was performed in all the cases.

In this procedure after isolating the cyst, fluid was aspirated, and betadine solution was used for sterilization of the cyst. Betadine was half diluted on normal saline. No other scoliceidal agent was used. Any fluid leaking from the puncture site was aspirated by the suction, no special type of suction cone or suction curette was used. The presence of bile staining to the cyst fluid was taken as proof for the presence of cysto-biliary communication. Unroofing of the cyst wall was performed using cautery. The contents of the cavity were removed without spillage by suction. Unroofing

of the entire cyst was performed. Ectocyst was formally opened. Daughter cysts and laminations were removed. Germinal layer (endocyst) was removed in total. A part of pericyst was not removed. Then, the remaining cavity was explored for any biliary communication obvious biliary communication was sutured using 2–0 catgut. Hemostasis was attained by suturing and cautery.

Management of Cavity (Hepatic Hydatid Cyst)

The management of the cavity is also simple. No attempt is done to close it. Either omentum is packed into the cavity, or a drain (32 Fr) is placed in the cavity.

After placing the omentum in the cavity, few sutures were placed between the omentum and pericyst using 2–0 catgut. A thorough peritoneal lavage was performed using the profuse amount of Betadine solution. A large drain (32 fr) was placed in Morrison's pouch in all the cases.

Average duration of surgery was 1 h.

Average blood loss was 50–100 ml. No perioperative blood transfusion was given except in 1 case. The concept of omental pedicle craft was devised by Dawson *et al.* 1988 and popularized B. Papadimitriou.

CONCLUSIONS

1. Hydatid disease is one of the commonly met with diseases in M.G.M. Hospital, Warangal. 30 cases were reported during the present study from January 2015 to September 2016.
2. US is the gold standard of diagnosis at MG.M. Hospital, Warangal, due to its noninvasiveness, easy availability, and reproducibility.
3. Although US is widely available and non-invasive, it is operator dependent. Failure to identify multiple cysts in the liver and other organs are noted. Hence, CT scan should be used if available.
4. The incidence of hydatid disease is more in females than in males (1.33). The most common age range is 40–49 years.
5. The most common presentation is pain and mass per abdomen. The duration of pain being 2 years. The general condition was good in all the cases.
6. Liver is the most common organ involved (93.33%) lung cysts, peritoneal cysts, splenic, and retrovesical cysts are also reported.
7. The indications for surgery in a case of hepatic hydatid cysts are
 - Complicated (infected and biliary colic).
 - Symptomatic large (>4–6 cm) hydatid cysts.

8. The indication for surgery for extrahepatic cyst was pain.
9. Surgery for hydatid cyst in extremely safe no risk of anaphylaxis is noted.
10. Omentoplasty appears to decrease the drain fluid and the duration of the drain.
11. The only scolicalidal agent used is povidone-iodine (5%).
12. The most common procedure for hepatic hydatid cyst is deroofting the cyst wall, evacuation of cyst contents (laminated membrane and germinal layer). Pericyst is not disturbed. The resultant cavity is either packed with omentum omentoplasty or simply drained. A drain in Morrison's pouch is placed in all cases. Minimal blood loss occurs, and no perioperative blood transfusion is required.
13. In view of the excellent results of surgery for hydatid cyst, surgery is the best line of management of hydatid disease. Exclusive medical management is best used only for patients not fit for surgery.
14. No mortality and low morbidity (10%) were noted in the present study. The morbidity is only due to wound infection. The reasons for the excellent results in the Department of Surgery, MGM, for hydatid disease appear to be:

Proper Selection of Cases

Only large cysts close to the surface are chosen for surgery.

Use of Scolicalidal Agent

The only scolicalidal agent used is povidone-iodine, which is extremely safe.

Type of Surgery

Simple technique of surgery consisting of cystectomy is used.

Use of Drains

The peritoneal cavity is drained using an abdominal tube drain (32 Fr) in the Morrison's pouch.

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Tertiary Dentition: Full Mouth Rehabilitation using Implants and Fixed Prosthesis

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Abstract

Introduction: Several treatment options with implant have been described for rehabilitation of edentulous patient. For many years, osseointegrated implant-supported fixed bridges have been used in the rehabilitation of the edentulous jaws with excellent results. Intraosseous dental implants are reported to show high success rate.

Case Report: A 64-year-old male patient presented in our dental office for evaluation of periodontal condition. The patient did not have any medical conditions and was not taking any medications that were associated with a compromised healing response.

Materials Used: Osstem Implants, Ethicon sutures, Sinus lift CASKIT, Osteotome, etc

Conclusion: Implant placement in the posterior maxilla that are atrophied with less height in between the sinus floor and the alveolar ridge can be greatly extended by the indirect sinus lift procedure through the crestal osteotome approach as the procedure is very easy and invasive and the time consumption is less and the apical bone themselves acts as the bone graft and that tents the sinus lining and crestal sufficient primary stability for the implant placement with less post-operative complications.

Key words: Atrophic maxilla, Sinus floor, Crestal approach, Pneumatic sinus

INTRODUCTION

Several treatment options with implant have been described for rehabilitation of edentulous patient. For many years, osseointegrated implant-supported fixed bridges have been used in the rehabilitation of the edentulous jaws with excellent results. Intraosseous dental implants are reported to show high success rate.

The posterior maxilla is always considered as challenging site for the placement of implant due to presence of maxillary sinus in the chronic atrophic maxilla and further poses difficulty in osseointegration.

Hence various techniques like sinus elevation procedures, ridge splitting, guided bone regeneration, enables the additional anchorage and stability in implants placed

support in maxillary segments in with atrophic ridges and pneumatic sinuses.

Sinus lifting procedure helps to achieve the desired height and primary stability for the placement of root form implants the widely performed two techniques for sinus floor elevation are lateral window approaches.

The sinus lift procedures and bone augmentation procedure were performed and developed at the mid 1970's. Crestal approach was very widely performed rather than lateral window approach followed by osteotome for elevation of the membrane and fracture of the floor of the sinus and immediate placement of the implant at the same time graft may or may not be placed.

This procedure is less invasive compared to lateral window approach, less time consuming, minimal trauma to the underlying structures and post-operative prognosis of the treatment is similar to the usual conventional technique.

CASE REPORT

A 64-year-old male patient presented in our dental office for evaluation of periodontal condition. The patient did

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not have any medical conditions and was not taking any medications that were associated with a compromised healing response. Clinical and radiographic examination indicated generalized severe alveolar bone loss and apically involved teeth. The patient was further evaluated for fabrication of treatment plan which was extraction of compromised teeth followed by treatment with implant-supported fixed prosthesis. The patient was given a detailed explanation concerning the present state, procedures and alternative treatment plans and then informed consent was obtained from the patient [Figure 1a-c].

MATERIALS USED

All the mandibular teeth were removed and the extraction sockets were thoroughly debrided and degranulated to remove all tissue. Following 2 weeks of healing, computed tomographic examination was performed to assess the available bone length and width. Six implants (Osstem Seoul, Korea) were planned to be placed within the mandible.

Two implants (Osstem Seoul, Korea) were placed first in the lower canines and two (Osstem Seoul, Korea) in the first premolar region and two (Osstem Seoul, Korea) in the first molar region. The defected area next to the extraction area and the marginal voids between the implant surface and the buccal cortex in the canine area were grafted with deproteinized bovine bone (Bio-Oss, Geistlich Pharm AG, Wolhausen, Switzerland). A cellular dermal matrix graft processed out of the patient's blood centrifuged by The Choukroun technique was used to completely cover the defect and bone graft in a saddle-like manner and secured under the buccal and lingual flaps. The wound was closed by means of single sutures (Ethicon, Johnson and Johnson).

Sinus Lift Procedure for Upper Right Molar

A preoperative evaluation of bone height and bone width are measured clinically and with the help of intra oral radiograph using RVG/CBCT/OPG.

Antibiotic prophylaxis was initiated a day before the surgery 500mg amoxicillin B.I.D for 5days, paracetamol 650mg T.I.D for 5days

Under local anaesthesia, a cut was given in the upper molar region on both sides, flap was raised, surgical curettage was done.

Drill upto 1 mm away from the floor was continued followed by CASKIT drills at slow speed were used to fracture the floor and Schneiderian membrane was elevated with hydrolic lift(Normal Saline)

Implant of dimension (Osstem Seoul, Korea 4.0 x 10



Figure 1: (a) Clinical view at the initial visit, (b) The radiograph showed generalized alveolar bone loss and apically involved teeth, (c) Cross-sectional view of computed tomogram before extraction

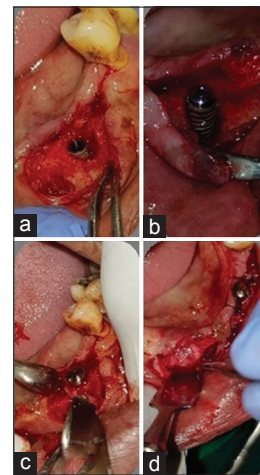


Figure 2: (a) Placement of bone graft (b) Placement of A-PRF (c) Placement of Cover Screw (d) Sutures in place

MM) was placed. Primary stability was assessed with finger pressure the implant showed primary stability

Temporization was accomplished by giving the patient a set of complete denture for 3 months.

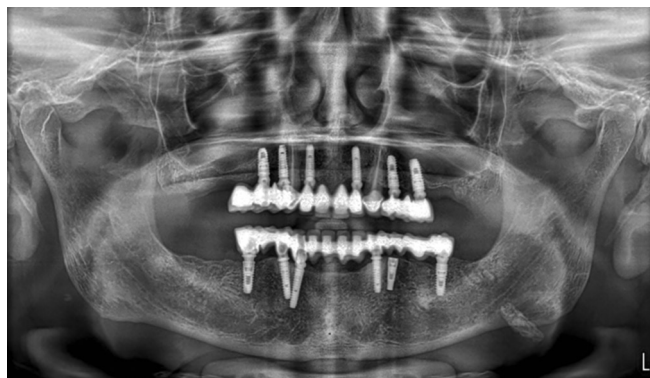
The second stage healing abutments (Osstem, Seoul, Korea) were placed and torque to 15 N cm in all implants and the healing abutment was placed 3 months after implant installation.

At 14 weeks impression for temporization were made and fabrication of Bis-GMA crowns was done. With these caps seated on the abutments and the temporary crowns were cemented in place using Impl Temp. The additional implant placed on the left mandibular premolar area was not engaged and kept preserved.

Postoperatively patient was advised to rinse the mouth twice with betakind mouthrinse for two weeks.

After a healing period of 4 months patient was recalled for second stage uncovering of the Implant and rehabilitated with fixed prosthesis [Figure 2a-d].

POST OPERATIVE OPG SHOWING FIXED PROSTHESIS



CONCLUSION

Implant placement in the posterior maxilla that are atrophied with less height in between the sinus floor and

the alveolar ridge can be greatly extended by the indirect sinus lift procedure through the crestal osteotome approach as the procedure is very easy and invasive and the time consumption is less and the apical bone themselves acts as the bone graft and that tents the sinus lining and crestal sufficient primary stability for the implant placement with less post-operative complications.

Use of A-PRF and sticky bone accelerated the healing process and avoided resorption of the graft aiding in strategic placement of implants in spite of bony defects thereby reducing the prosthetic load

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