Original Article

Assessment of Oral Health Status in Children Suffering from Nephrotic Syndrome

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Abstract

Introduction: Nephrotic Syndrome is one of the chronic illnesses in the paediatric age group. Advances in paediatric nephrology in recent years have resulted in a marked increase in the number of children surviving with chronic renal failure. The aim of this study is to assess the oral hygiene status of children suffering from Nephrotic syndrome.

Materials and Methods: 100 children within the age group of 4 years to 17 years, suffering from Nephrotic Syndrome were examined and the oral health status of each patient was evaluated based on a questionnaire, DMFT index, dmft index, gingival index and oral hygiene index.

Results: 68% male predominance was seen; 11% children in the age range of 12-17 years and 17% children in the age range of 4-11 years had dental caries. 66% children had mild inflammation of the gingiva; 58% children had poor oral hygiene index; 26% children had mucosal lesions (Aphthous ulcers).

Conclusion: Higher plaque accumulation and gingival inflammation was observed in these children along with reduced caries prevalence, and mucosal lesions (Aphthous ulcers). The findings of the present study indicate that there is a need for dental health education for children with Nephrotic Syndrome. Dental and medical care should be closely integrated to avoid conditions such as gingival problems, inspite of low caries incidence in children with Nephrotic Syndrome.

Keywords: Oral health, Nephrotic syndrome

INTRODUCTION

For more than two centuries Chronic renal disease and renal failure have been recognised as significant medical problems and were considered to be one of the most fatal diseases.[1] Various factors can result in renal failure and Nephrotic syndrome is just one of them.

Nephrotic syndrome (NS) is a serious medical condition which is characterized by swelling, large amounts of protein in the urine (usually no less than 3.5 g/dl), hyperlipidaemia, hypoproteinaemia, decreased protein in the blood and high cholesterol levels. It indicates the glomerulus is damaged and filtration function is impaired seriously.

Glomerular Filtration Rate (GFR) is the common medical index used to reflect kidney function and the normal range of it is 100 to 130. For people with kidney problem, the higher the GFR, the better the kidney function. Glomerular filtration function decides patient's Glomerular Filtration Rate (GFR) directly, so for patients with Nephrotic Syndrome, the severity of their symptoms usually reflects their GFR.

Nephrotic Syndrome may have different causes depending on the child's age and with varying outcomes and symptoms at all ages. When the proteinuria exceeds 1000 mg/m^2 per day or spot (random) urinary protein-to creatinine ratio exceeds 2 mg/mg it is known as Nephrotic range proteinuria. The proteinuria in childhood nephrotic syndrome constitutes primarily albumin and is relatively selective.[2] In recent years advances in pediatric nephrology have resulted in a marked increase in the number of children surviving with chronic renal failure (CRF).

Various studies have reported enamel hypoplasia, enamel opacities, uremic stomatitis, oral bleeding, decreased periodontal disease, reduced salivary flow, xerostomia,

an increased tendency for calculus deposition reduced prevalence of caries, bad metallic taste, ammonia odour, as the oral changes seen in patients with chronic renal failure (CRF) and End stage renal disease (ESRD).[3,4]

While diagnosis of mucosal lesions, dental caries and the status of the periodontal condition in the oral cavity is an essential part of dental practice, there are relatively few systematic studies of oral health status in children with Nephrotic Syndrome.

So taking the above aspects into consideration along with the available scattered reports and the scarcity of available data in the Karnataka region, the present study is undertaken to assess the prevalence of mucosal lesions, dental caries and gingival status in children suffering from Nephrotic syndrome and to plan a better dental care for these children.

MATERIALS & METHODS

The study to assess the oral health status in children with Nephrotic Syndrome was conducted at Indira Gandhi Institute of Child Health, Bangalore, Karnataka, India. The study was reviewed and ethical clearance was obtained from the institutional ethical committee. Signed written informed consent was obtained from the parents/guardians of the children participating in the study.

The study consisted of 100 diagnosed cases of Nephrotic syndrome in the age group of 4 to 17 years. Children with other systemic disorders and who had received dental treatment earlier were excluded from the study.

In each child, a detailed case history was taken which included age of onset, frequency of hospitalization, dialysis, history of blood transfusion, hepatitis and treatment advised followed by assessing the extra oral and intraoral findings.

The patients were on a low protein, sodium, phosphorus, potassium and high carbohydrate diet.

RESULTS

The present clinical study was conducted to assess the oral health status of 100 children suffering from Nephrotic Syndrome, within the age group of 4-17 years. The data obtained from the questionnaire and the observations were compiled and results were statistically analysed.

The mean age was 10.5 years and the maximum number of patients i.e. 35 (35%) were in the age group of 4-7 years comprising of 68 (68%) males and 32 (32%) females.

83 (83%) children in the study had a history of breast feeding and 25 (25%) children were sleeping at night using the bottle as a pacifier.

The parents of the children were asked regarding the amount of sugar consumption in the diet (6-8 spoons of sugar/day) and it was found that 26 (26%) children were exposed to sugar more than thrice daily and 15 (15%) children had sugar exposure thrice daily.

With regard to oral hygiene habits it was seen that 18 (18%) children did not brush their teeth daily as they were bed ridden and also used their finger to brush whenever possible. Only 26% children brushed twice or more in a day while only 5 (6%) children performed tooth brushing under parental supervision.

Decayed-Missing-Filled Index (DMF) was introduced by Klein, Palmer and Knutson (1938), modified by WHO in 1986 was used to assess the dental caries status. DMFT and dmft indices were used for the permanent and primary dentition respectively.

In the permanent dentition (DMFT), 21 (75%) children in the present study were found to have sound teeth (score 0) whereas 3 (11%) children had decayed teeth (score 1) and 4 (14%) children had missing teeth (score 4) due to caries (Table 1).

In the primary dentition (dmft), 36 (49%) children had sound teeth (score A) while 17 (23%) children had decayed teeth (score B) and 19 (26%) children had teeth missing (score E) due to caries. (Table 2).

The Modified Gingival Index (MGI), devised by Lobene et al. in 1986, a non-invasive (no probing) method

Table 1: DMFT index

DMFT index	n	%
Score 0	21	75%
Score 1	3	11%
Score 2	0	0%
Score 3	0	0%
Score 4	4	14%
Total	28	100%

Table 2: dmft index

dmft index	n	%
Score A	36	49%
Score B	17	23%
Score C	0	0%
Score D	0	0%
Score E	19	26%
Total	72	100%

to rate mild and moderate inflammation was used to assess the gingival status. 66 (66%) children showed mild inflammation (score 2) of the entire gingiva and 25 (25%) children showed very mild inflammation (score 1) of the gingiva with slight color change and 9 (9%) children showed moderate inflammation (score 3) of the gingiva (Table 3).

Simplified Oral Hygiene Index given by John. C. Greene and Jack. R. Vermillion in 1964 was used to assess the oral hygiene status which is an indication of oral cleanliness.

58 (58%) children had poor oral hygiene and 37 (37%) children had fair oral hygiene while only 5 (5%) children had good oral hygiene (Figures 1 and 2), (Table 4).

26 (26%) children had mucosal lesions (Aphthous ulcers) whereas 74 (74%) children did not have mucosal lesions (Figure 3), (Table 5).

DISCUSSION

Nephrotic Syndrome is one of the chronic illnesses in the pediatric age group. Dental management of children with Nephrotic syndrome begins with prevention of dental disease and thus maintenance of a caries-free dentition.

Many studies related to oral health status of those with chronic renal disease have been reported but as per the available data, there are no studies conducted regarding the oral health status of the children suffering from Nephrotic syndrome.

Table 3: Gingival index

Gingival index	n	%
Score 0	0	0%
Score 1	25	25%
Score 2	66	66%
Score 3	9	9%
Score 4	0	0%
Total	100	100%

Table 4: Oral hygiene index-simplified

OHI-S	n	%
Score 0 (good)	5	5%
Score 1 (fair)	37	37%
Score 2 (poor)	58	58%
Total	100	100%

Table 5: Mucosal lesions

Mucosal lesions	n	%
Absent	74	74%
Present	26	26%
Total	100	100%

In more than 90% of renal patients oral symptoms are observed as the disease itself and its treatment have systemic and oro-dental manifestations. Various studies have investigated elements of caries, higher prevalence of dental calculus, periodontal health, enamel defects, delayed eruption, bone lesions and oral-health-related quality of life and have stated disturbed calcium and phosphate metabolism to be the reason for such changes in patients with Chronic renal failure.[4,5]

In the present study, 100 children were in the age range of 4-17 years with a mean age of 10.5 years. This is comparable to 10.86 years as reported by Fahinur Ertugrul, Cigdem Elbek- Cubukcu,[3] 10.50 years as reported by L. Pertea, Mihaela Munteanu. Nephrotic syndrome has the same symptoms at all ages, yet depending on the child's age it may have different causes with varying outcomes.

This study comprised of 68% males and 32% females Thus, a higher incidence of Nephrotic Syndrome was observed in males. Similar male predominance was reported by Khadija Herwis and Kumar Raghav.[1]

Dental caries was the most common outcome investigated in studies related to oral health of individuals with chronic renal failure in the literature review.

The severity of caries is represented by the mean number of decayed, missing or filled teeth. In the present study, 11% children in the permanent dentition (DMFT) and 17% children in the primary dentition (dmft) had dental caries.

Similar outcome of reduced caries prevalence was also reported by Fahinur Ertugrul, R. Proctor and various authors.[1,3,4,6-9]

Reduced caries prevalence in children with Nephrotic syndrome maybe attributed to the factor that the pH of the saliva is elevated by the urea present in it, possibly minimising the effect of any acid formation by the cariogenic bacteria resulting from sugar intake. This mechanism also decreases caries because of its antibacterial properties and its inhibitory effect on plaque formation. Also, the high salivary phosphate concentrations found in patients with uremia facilitate remineralization of incipient carious lesions.[6]

Children with Nephrotic syndrome are at high risk of developing poor gingival health which is a consequence

of neglected or insufficient tooth brushing. Although the evidence is sparse, it appears that there has been a low frequency of periodontal or gingival disease reported in children with CRF. There are several possible reasons for this, including confounding factors, such as lifestyle differences, oral hygiene practices, biological determinants like difference in underlying susceptibility.

Periodontal conditions of patients with chronic renal failure were investigated by Khadija Herwis, Kumar Raghav and various authors.[1,3,4,6,7,9] However, majority of these studies including the present study have used a visual index of inflammation with no probing depth or loss of attachment measurements being carried out.

Immunosuppression and uremia associated with CRF and hemodialysis may alter the inflammatory response of gingival tissue to the bacterial plaque. Also the inflammatory signs of gingiva may mask the pallor caused by anaemia [common systemic manifestation of reduced renal function].[4]

In this study, 66% children showed mild inflammation of the entire gingiva. Similar findings were also reported by B. Seraj, R. Ahmadi and other authors.[3-5] Their findings concluded that the lack of inflammatory response could be due to the suppression of the inflammatory markers or due to decreased level of haemoglobin that leads to paleness of the gingivae despite the presence of marked inflammation. These findings were mostly seen in patients with low socioeconomic status and a low level of education which indicate that there is a need for dental health education for all children and their families.

Several authors like N. Kumar and A. Stein have evaluated calculus levels to determine the oral hygiene status in patients with Chronic renal failure.[4,6,8] Martins reported that calculus formation was prevalant in 86.6% of CRF children and in healthy controls 46.6%.[10]

In this study 58 (58%) children had poor oral hygiene and only 5% had good oral hygiene.

Abundant calculus formation is rarely seen in healthy children; however, children with chronic renal failure demonstrate an elevated level of calculus. Alterations in salivary Ca, P, Mg, oxalate (Ox), urea and pH levels is seen in patients suffering from chronic kidney disease. Ca-P and Ca-Ox precipitation and dental calculus formation is seen mainly due to elevated salivary pH, in addition to decreased salivary Mg and a higher concentration of salivary urea and phosphorus. Lingual surface of lower incisors are the most prevalent site for calculus formation, due to their proximity to the submandibular glands orifices, which act as a reservoir of Ca and P ions. However, abundant calculus formation may also be observed in other parts of the oral cavity.[5] It is imperative that parents are advised of the importance of oral care at the outset, and that preventive care is delivered as early as possible and is reinforced at every dental visit, so that the need for active treatment is minimal. In this way, groundwork in the young patients will set standards which, if maintained through adult life, will prevent dental and medical complications throughout life.

Figure 1: Abundant calculus formation seen on the lingual surface of mandibular teeth

Figure 2: Accumulation of calculus seen in the labial surface of mandibular teeth

Figure 3: Mucosal lesion - Apthous ulcer

26% children in this study had mucosal lesions (Aphthous ulcers) whereas 74% children did not have mucosal lesions. A high prevalence of uremic factor, xerostomia, saburral tongue have been cited as the reasons for mucosa lesions in such patients.[3,4]

A questionnaire was distributed to all the parents of the children which included details regarding the oral habits and dietary habits of children, and oral hygiene habits.

Ertugrul, Cigdem Elbek-Cubukcu,[3] Yahya B, Bayramy Ali[4]; Khadija Herwis and Kumar Raghav[1] in their studies asked participants about oral hygiene practices and found oral hygiene to be an extremely neglected issue among these children who belonged to a low socioeconomic background mainly due to their strict treatment routine.

In the present study, out of 100 children, 83% children had history of breast feeding, 25% children used to sleep in the night using the bottle as a pacifier, 18% did not brush their teeth as they were bed ridden and only 26% of children brushed their teeth twice or more times a day.

CONCLUSION

The present study was undertaken to assess the oral health status in children with Nephrotic syndrome and an attempt to understand the possible complications and predict prognosis.

However, the findings of this study regarding the global trends in clinical manifestation, severity, patients care, parent's attitude about the disease did not show any greater variations as compared to other studies reported based on similar criteria.

Reduced caries prevalence, poor oral hygiene and mucosal lesions (Aphthous ulcers) were found in this study. Children undergoing strict treatment routines have got less time for preventive or treatment procedures regarding their oral ailments; therefore, the incorporation of dental service into their medical program and oral hygiene care may be crucial.

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