ORIGINAL RESEARCH

Evaluation of Dental Caries Status and Level of Plaque Streptococcus Mutans of Haemophilic Children

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ABSTRACT

Introduction: Haemophilia is a group of inherited bleeding disorders characterized by a lifelong defect in the clotting mechanism. Oral health of these children has been neglected as more concern is towards the general health. **Aim:** To evaluate and compare the dental caries status and the level of plaque Streptococcus mutans of haemophilic children with that of healthy and normal children. **Materials and Methods:** Forty children aged 6-12 years formed the study group. Dental caries status was recorded using WHO criteria. Streptococcus mutans assessment was done by harvesting plaque from the non-carious buccal surface of permanent mandibular first molar and/or deciduous mandibular second molar. The number of colony forming units (CFU) of Streptococcus mutans was counted using digital colony counter. The data was statistically analyzed. **Results:** The mean DMFT level in the study and control group was 0.50±1.26 and 0.80±1.10 respectively. The mean deft in the study and control group was 1.50±2.20 and 1.9±1.6 respectively. The mean S.mutans count was $0.60\pm0.58X10^2$ CFU and 2.15 ± 1.37 $X10^2$ CFU in the in the study and control group respectively. **Conclusion:** The haemophilic children had lower dental caries prevalence with lower plaque Streptococcus mutans count.

KEYWORDS: Hemophilia, dental caries, S mutans

INTRODUCTION

Haemophilia is a group of inherited bleeding disorders characterized by a lifelong defect in the clotting mechanism. There are three forms of Haemophilia; Haemophilia A, B, and C. The disease is hereditary, the defect being carried by the X chromosome. Haemophilia A (Classical haemophilia) is the most common of these and accounts for about 80% of bleeding disorders.[1]

There is more concern towards the general health of the child as compared to oral health in these patients. Fear of bleeding during procedures, poor level of education and income, and difficulties in getting factor concentrates cause the negligence of dental care by the haemophiliacs. Despite of advances in treatment of bleeding disorders, not much importance is given to oral and dental health of haemophilic children. These children may be susceptible to dental caries and periodontal diseases more than ordinary people because of their reluctance to perform oral hygiene procedures. Some primary or secondary hemophilia-related factors, as viral infections and transfusion therapies, can interfere with the immune system.[2] The oral microflora of medically compromised individuals is altered predisposing them to oral infections like dental caries.

Existing research findings of the dental caries status of hemophilic children in different parts of the world were found to vary greatly. Very few studies[1] have assessed the dental caries status and level of Streptococcus mutans in the hemophilic children in India. Thus present study aimed to evaluate and compare the dental caries status and the level of plaque Streptococcus mutans of haemophilic children with that of healthy and normal children.

MATERIALS AND METHODS

The study was carried out at The Haemophilia society – Bangalore chapter located at Bhagwan Mahavir Jain Hospital, Bangalore and a public school in South Bangalore. Ethical clearance to conduct the study was obtained from the institutional review board of The Oxford Dental College and Hospital, Bangalore. Prior to the study, consent was obtained from the authorities of The Haemophilia Society and the public school.

The list of one hundred haemophilic children was obtained from the society, and the parents were contacted by telephone and requested to be a part of the study. The nature of the study was explained to parents who

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accepted to be a part of this research. The informed written consent was obtained from them. Children associated with any other medical conditions and those on regular long-term medication were not included. Children who were unable to cooperate sufficiently for the collection of plaque samples were excluded from the study. Thus forty children aged 6-12 years formed the study group. Forty healthy and normal children matched for age and gender were selected from the public school in Bangalore. These children formed the control group after obtaining prior consent from the school authorities and parents.

The oral examination was carried out by a single trained calibrated examiner under natural light with sterilized or disposable mouth mirror. Training and calibration for examination of dental caries were carried out in our department. Recoding of the dental caries was done by a dental surgeon. He was always sitting beside the examiner, so that the codes could be easily heard and entered correctly. To overcome the intra-examiner error, the children were examined twice. The kappa value of 0.88 was obtained for intra - examiner agreement of the tooth status.

Dental caries status was recorded using WHO criteria. The findings were based solely on clinical examination and the deft and DMFT indices were recorded.

Microbiological assessment: Streptococcus mutans assessment was done by harvesting plaque from the non-carious buccal surface of permanent mandibular first molar and/or deciduous mandibular second molar. The dental plaque was harvested atraumatically 1 hour after breakfast, using autoclaved wooden toothpicks.[3] The harvested plaque samples were transferred immediately to Eppendorf tube containing 1ml of saline. The samples were then carried to the laboratory within one hour, inoculated onto Mitis Salivarius agar and incubated at 37°C for 48 hours. The digital colony counter was used to count the number of colony forming units (CFU) of Streptococcus mutans. The colonies were identified as blue in colour about 1-2mm in diameter as spherical or ovoid shape with raised or convex surface.[3]

The obtained data was statistically analyzed using Mann-Whitney test and Spearman's Rank correlation.

RESULTS

The mean age of the children in the study was 9.10±2.25 years. In the study group, the mean deft and DMFT scores were 1.90±2.20 and 0.50±1.26, respectively. In the control group, the mean deft and DMFT scores were 1.50±1.66 and 0.28±0.60, respectively. (Table 1 and Table 2) Higher mean deft and DMFT scores were recorded in the study group compared to control group, but the difference between them was not statistically significant (P≥0.05). Higher mean S.mutans count was recorded in control group (3.66±2.67 $X10^2$ CFU) compared to study group (0.60±0.58$X10^2$ CFU) and the difference between them was found to be statistically significant (P≤0.001) (Table 3). The correlation between age and deft was found to be moderate and negative (ρ=-0.337) and was found to be statistically significant (P≤0.05). The correlation between age and DMFT was found to be moderate and positive (ρ=0.480) and was also found to be statistically significant (P≤0.01). The correlation between deft and S.Mutans was found to be moderate and positive (ρ=0.480) and was also found to be statistically significant (P≤0.01) (Table 4).

Group	n	Mean±SD	SE of Mean	Mean Difference	Z	P-Value
Control	40	1.50±1.66	0.26	0.400	-1.73	0.083
Study	40	1.90±2.20	0.35			

*significant P≥0.05

Table 1: Comparison of deft between the two groups

Group	n	Mean±SD	SE of Mean	Mean Difference	Z	P-Value
Control	40	0.28±0.60	0.09	-0.225	-0.17	0.863
Study	40	0.50±1.26	0.20			

*significant P≥0.05

Table 2: Comparison of DMFT between the two groups

Group	n	Mean±SD	SE of Mean	Mean Difference	t	P-Value
Control	40	3.66±2.67	0.42	3.058	7.074	<0.001*
Study	40	0.60±0.58	0.09			

*significant P≥0.01

Table 3: Comparison of mean S mutans count (x102) between the two groups

Correlations		Age	DMFT	deft	S.Mutans ($x10^2$)
Age	ρ	1.000	0.480	-0.337	-0.103
	P-Value	---	0.002**	0.034*	0.528
deft	ρ	-0.337	-0.184	1.000	0.480
	P-Value	0.034*	0.256	---	0.002*
DMFT	ρ	0.480	1.000	-0.184	0.138
	P-Value	0.002**	---	0.256	0.395
S.Mutans ($x10^2$)	ρ	-0.103	0.138	0.480	1.000
	P-Value	0.528	0.395	0.002**	---

*significant P≤0.05 ** significant P≤0.01

Table 4: Correlation between the different parameters in the study sample

DISCUSSION

Haemophilia is the most common inherited bleeding disorder characterized by a defect in clotting mechanism. It is classified as haemophilia A and B, based on the deficiency of factor VIII and IX respectively. It is also classified as mild (5–25%), moderate (1–5%) and severe (<1%) based on the concentration of the factor in the plasma.

Dental caries is the most common form of dental infection. Preventive dentistry is vital to the younger haemophiliac; older haemophiliacs may require extensive treatment to rehabilitate mouths that have been neglected for years.[1]

Access to professional oral and dental care may be difficult to haemophilic children. This may be due to disease specific risks or patient-related barriers. These factors may contribute to deteriorating oral health and consequently requiring invasive dental treatments.[4]

Primary oral health prevention is important in haemophilic children to maintain healthy teeth as well as for implementing timely secondary prevention if needed. Knowledge and understanding of oral health of haemophilic children is very essential to reduce the dental treatment needs of them.[5] Various studies have reported the surgical management of the disease rather than the evaluation of different aspects of oral health or disease in haemophilic patients. However, only a few studies in India have assessed the dental caries status in these children and have given varying results.[5,6] Thus the present study evaluated the dental caries status and Streptococcus mutans count in the dental plaque of haemophilic children.

In our study, the dental caries status and plaque Streptococcus mutans count was significantly lower for children with haemophilia compared with the matched controls. This may be due to a better awareness among the parents of these children due to the constant encouragement and promotion of oral health by the hospital authorities. It could also be attributed to the well designed and well executed programmes for promoting oral health in haemophilic children and the existence of comprehensive haemophilic centers which provide regular dental periodic checkups, following preventive dental practices and strict dietary and oral hygiene instructions from an early age. This thereby significantly reduces the need for invasive treatment and also promotes good oral hygiene

In agreement to our study, Boyd and Kinirons reported lower caries prevalence in 2-15 year old haemophilic children in both the primary and permanent dentitions.[7] Similarly, Sonbol et al found that a significantly greater proportion of children with severe haemophilia were caries-free compared with the control group. Both the DMFS and DMFT were significantly greater in the controls compared with the haemophilia group.[8] A study done in Poland demonstrated no significant difference in the caries prevalence of children with congenital bleeding diatheses, mainly haemophilia A and B and von Willebrand disease, compared with healthy children.[9] In Lithuania, healthier deciduous teeth were observed in children with haemophilia than in children without haemophilia, but other dental health or disease-related outcomes did not differ between cases and controls.[10]

Contradictory to the results of our study, Azhar et al reported higher dmft/DMFT in haemophilic patients in Pakistan compared to healthy control group. The oral health was compromised in severe haemophilic population with a high DMFT of 2.7. The possible explanation given is the lack of evidence-based hygiene practices and oral care, mainly due to lack of diagnostic facilities at health centres.[11]

Zwain et al in Iraq reported no significant difference between caries status in primary dentition of children with congenital coagulation disorders and healthy children but higher caries prevalence was seen in permanent dentition. The author attributed this difference to the fact that children with haemophilia in Iraq either refrain from the use of the tooth brush altogether or use it inefficiently to avoid gingival bleeding. It could also be due to the lack of motivation among these patients to exercise daily oral hygiene and difficulties in getting factor concentrate. All these factors can cause neglect of the oral health of these children, thus providing a suitable environment for the growth of bacteria leading to dental caries.[12] A higher gingival index and DMFT score has also been reported in 14-35 year old haemophilic patients in Turkey.[13]

Dental caries is a biofilm (plaque) induced disease and a number of endogenous oral microorganisms found in dental plaque are considered crucial to the initiation and progression of dental caries. The level of Streptococcus mutans in the plaque is directly associated with the occurrence of dental caries. Hence, the level of S.mutans in plaque was also evaluated and it was found that the levels are lower in the haemophilic patients as compared to the healthy controls. A significantly higher plaque and saliva S. mutans count was seen in the control group compared with the haemophilia group by Sonbol et al .[8] However, another study showed a higher viable count of Streptococcus mutans in the saliva of haemophilic patient group in comparison to the healthy subject group.[14] Similarly, Zwain et al reported that the mean values of colony forming units of Streptococcus mutans in congenital coagulation disorder children were higher than that of the healthy children.[12]

The lower dental caries experience and lower Streptococcus mutans count in the haemophilic children as found in our study shows that education, intervention and prevention can make positive changes in oral health of haemophiliacs. The children with haemophilia should be advised about the importance of oral care because oral health affects the people physically and psychologically. These patients should be recalled for regular dental visits and effective preventive measures should be planned for them. A team effort by parents/guardians, children, and dental professionals can aid in improving the oral health of those who may not have the necessary access to dental care. It is imperative that parents are advised about the importance of oral and preventive care that should be 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 into adult life, will reduce dental and medical complications throughout life.

CONCLUSION

The haemophilic children had lower dental caries prevalence with lower plaque Streptococcus mutans count.

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