Original Article

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Prevalence of Dental Erosion in School going Children of South Bangalore: A Cross-Sectional Study

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Abstract

Introduction: Dental erosion is recognized as a major problem in both children and adults. There is a progressive, irreversible loss of dental hard tissues by a chemical process without the bacterial involvement and causes tooth structure loss which results in tooth sensitivity, poor esthetics, and in severe cases may cause pulp exposure and abscess. There is a limited literature with regard to the prevalence of dental erosion in school going children. Hence, this study was undertaken to assess the prevalence and severity of dental erosion in school going children of South Bengaluru.

Materials and Methods: The present study was done among randomly selected 500 school children of South Bengaluru aged between 4 and 15 years. Each child's teeth were examined using mouth mirror and probe. A single investigator did all the examination. The examination was done in a systematic approach, and the degree of tooth wear and scoring were recorded according to modified Smith and Knight Index.

Results: Of 500 children examined, dental erosion was seen in 73 (25.17%) boys and 55 (24.09%) girls. 5-year-old children showed 42.10% of dental erosion. 23.93% of primary teeth and 8.55% of permanent teeth had dental erosion. Of the surfaces examined the labial surface of deciduous maxillary central and lateral incisor (32.81% and 28.39%, respectively) and the occlusal surface of mandibular first deciduous molar (26.92%) were affected predominantly. 82 children (64.06%) had low dental erosion, 26 children (20.31%) had moderate erosion, and 20 children (15.62%) showed severe erosion.

Conclusion: The findings of the present study give an inference that there is a need for enhancing awareness about dental erosion among the school children, their parents and should be recognized and treated early.

Key words: Children, Dental erosion, Primary teeth

INTRODUCTION

Tooth wear has recognized a major problem in both children and adults for many years, which includes the triad of erosion, attrition, and abrasion, but the contribution of erosion to tooth wear is increasing. Dental erosion is defined as the progressive, irreversible loss of dental hard tissues by a chemical process without bacterial involvement and not directly associated with mechanical or traumatic factors, or with dental caries.[1]

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Dental erosion is increasingly recognized as a cause of tooth structure loss, not only in adults, but also in children and adolescents which results in tooth sensitivity, eating difficulties, poor esthetics, altered occlusion and in severe cases may cause pulp exposure and abscesses.[2] It has a multifactorial etiology which may be intrinsic or extrinsic acid sources. Intrinsic is when gastric acid enters the mouth secondary to gastro-esophageal reflux, eating disorders, chronic vomiting, persistent regurgitation, or rumination. Extrinsic acid sources include acidic beverages and foods, medications, battery and fertilizer factory workers, professional wine tasters, laboratory technicians, environmental acids, and in competitive swimmers. In addition, many modifying factors affecting the host and parafunctional habits significantly increases tooth susceptibility to dental erosion.[3] Clinical features of erosion include shallow, broad, smooth, glazed wedge-shaped depression within the enamel surface adjacent to cemento

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enamel junction, cupping of cusp tips and grooving of incisal edges, wear on non-occlusal surface, non-tarnished and raised amalgam surface.[1] Symmetrical erosive dentine exposures on the cuspal inclines of the molar teeth are described as a cup or bowl-shaped lesions. The erosive potential of acid may be decreased by educating the child and parent, appropriate oral hygiene practices, dietary alterations, fluoride supplementation, restorative care.[2]

There is a limited literature with regard to the prevalence of dental erosion in school going children. Hence, this study was undertaken to assess the prevalence and severity of erosive tooth wear in school going children of South Bengaluru.

MATERIALS AND METHODS

The present study was done among randomly selected 500 school children of south Bangalore with 280 boys and 220 girls aged between 4 and 15 years. Institutional ethical clearance was obtained before conducting the study. Prior informed consent was taken from the parents and the school authorities for participation in the study. Each child's teeth were dried thoroughly, and examination was performed in their respective classrooms under natural daylight using mouth mirror and probe. The single investigator did all the examination.

The examination was done in a systematic approach starting from upper first quadrant followed by second, third, and fourth quadrant. Examination of the surface of teeth was proceeded in an orderly manner starting from occlusal/incisal, buccal, palatal/lingual surfaces. The degree of tooth wear and scoring were recorded according to modified Smith and Knight Index.[1]

Modified Smith and Knight index (2003)

Code	Tooth structure involved
0	Normal
1	Enamel only
2	Enamel and dentine
3	Enamel, dentine, and pulp
9	Assessment cannot be made

Code	Criteria
0-1	Low erosion
2	Moderate erosion
3-9	Severe erosion

RESULTS

A total of 500 children were examined with 280 boys and 220 girls. The highest number of participants was among 6-year-old children with 37 boys and 35 girls (Table 1 and Figure 1). Dental erosion was seen in 73 (25.17%) boys and 55 (24.09%) girls (Table 2 and Figure 2). 5-year-old children showed dental erosion with 42.10% (Table 3 and Figure 3). Among 128 children, 23.93% of primary teeth and 8.55% of permanent teeth had dental erosion (Table 4 and Figure 4). Of the surfaces examined the distribution of dental erosion was more predominant on the labial surface of deciduous maxillary central and lateral incisor with 32.81% and 28.39%, respectively (Table 5 and Figure 5), and on the occlusal surface of a mandibular first deciduous molar with 26.92% (Table 6 and Figure 6). Among 128 children, it was observed that 82 children (64.06%) had low dental erosion, 26 children (20.31%) had moderate erosion, and 20 children (15.62%) showed severe erosion (Table 7 and Figure 7).

Table 1: Age and sex distribution of children

Age in years	Males	Females	Total number of children examined
4	30	21	51
5	25	13	38
6	37	35	72
7	36	25	61
8	37	19	56
9	30	17	47
10	15	16	31
11	17	21	38
12	10	13	23
13	15	9	24
14	14	19	33
15	14	12	26

Table 2: Sex distribution of children with dental erosion

Sex	Number of the children examined	Children with dental erosion	% affected
Male	280	73	25.17
Female	220	55	24.09
Total	500	128	

Table 3: Prevalence of dental erosion (both sexes)

Age in years	Number of children examined	Number of children with dental erosion	Percentage of children with dental erosion
4	51	8	15.68
5	38	16	42.10
6	72	26	36.11
7	61	13	21.31
8	56	12	21.42
9	47	13	27.65
10	31	13	41.93
11	38	10	26.31
12	23	5	21.73
13	24	4	16.66
14	33	3	9.09
15	26	5	19.23

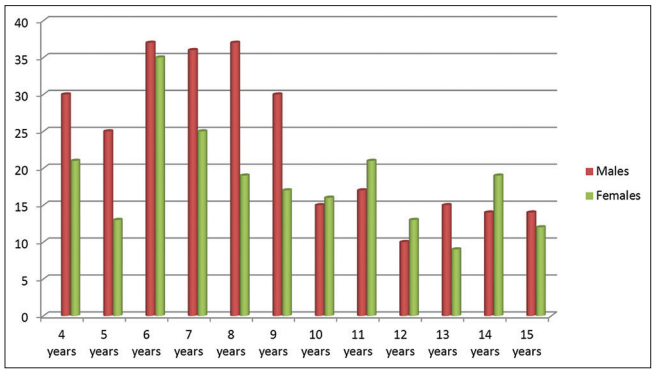

Figure 1: Age and sex distribution of children

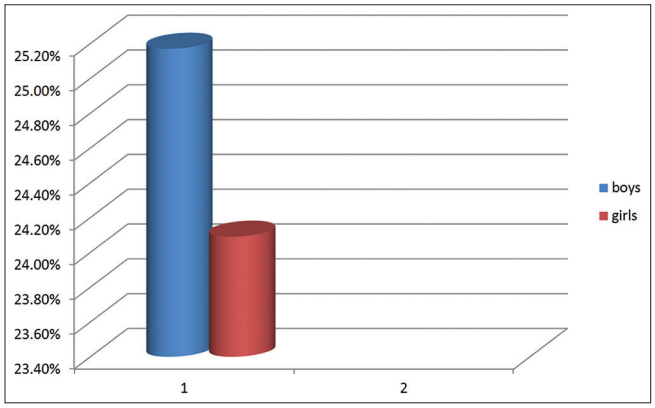

Figure 2: Sex distribution of children with dental erosion

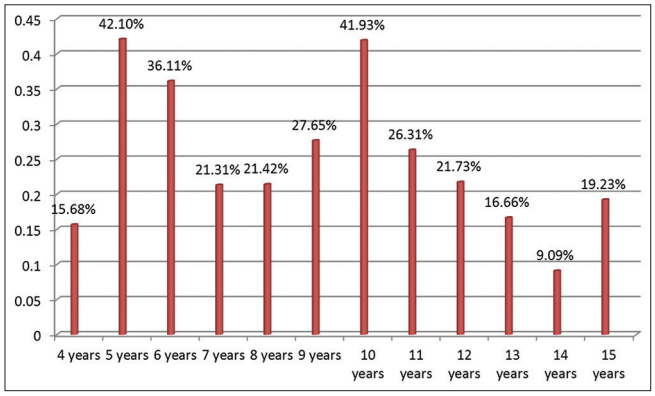

Figure 3: Prevalence of dental erosion (both sexes)

Table 4: Teeth with dental erosion

Dentition	Total number of teeth examined	Teeth with dental erosion	% affected
Primary teeth	940	255	23.93
Permanent teeth	1180	101	8.55

DISCUSSION

The present cross-sectional study was done among 500 school going children of South Bengaluru, between the age group of 4 and 15 years.

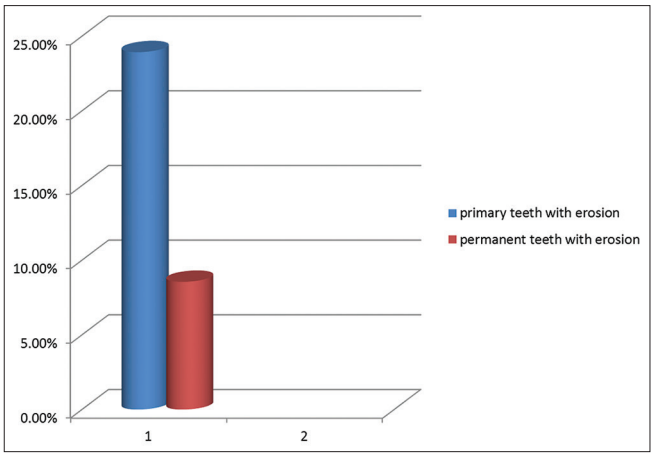

Figure 4: Teeth with dental erosion

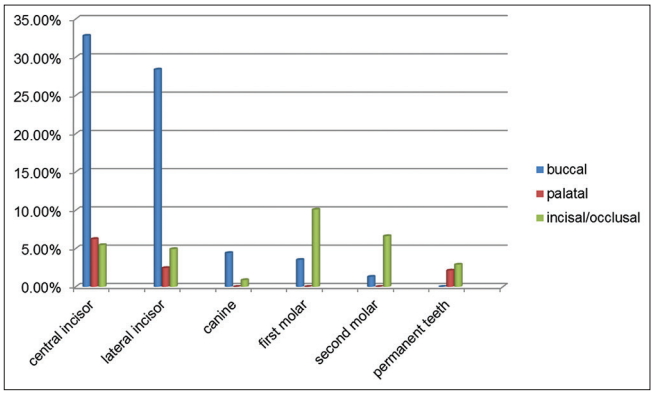

Figure 5: Number of surfaces of maxillary teeth involved with dental erosion

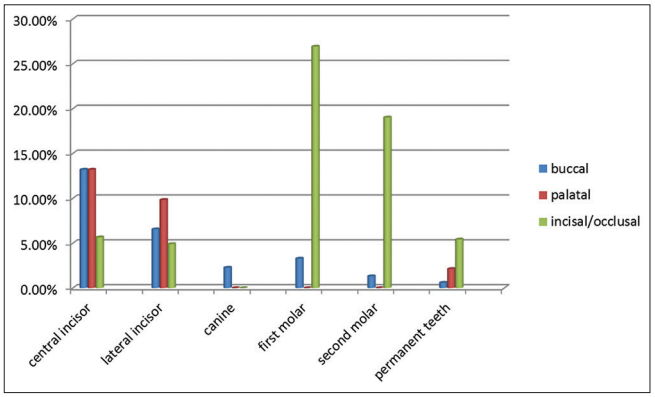

Figure 6: Number of surfaces of mandibular teeth involved with dental erosion

Table 5: Number of surfaces of maxillary teeth involved with dental erosion

Maxillary	Buccal (%)	Palatal (%)	Incisal/occlusal (%)
Central incisor	42 (32.81)	8 (6.25)	7 (5.46)
Lateral incisor	46 (28.39)	4 (2.46)	8 (4.93)
Canine	10 (4.42)	0	2 (0.88)
First molar	7 (3.53)	0	20 (10.10)
Second molar	3 (1.32)	0	15 (6.63)
Permanent teeth	0	11 (2.13)	15 (2.90)

Table 6: Number of surfaces of mandibular teeth involved with dental erosion

Mandibular	Buccal (%)	Lingual (%)	Incisal/occlusal (%)
Central incisor	14 (13.20)	14 (13.20)	6 (5.66)
Lateral incisor	8 (6.55)	12 (9.83)	6 (4.91)
Canine	4 (2.27)	0	0
First molar	6 (3.29)	0	49 (26.92)
Second molar	3 (1.32)	0	43 (19.02)
Permanent teeth	4 (0.60)	11 (2.13)	36 (5.42)

Table 7: Severity of dental erosion

Severity	Number of children with dental erosion	% affected
Low	82	64.06
Moderate	26	20.31
Severe	20	15.62

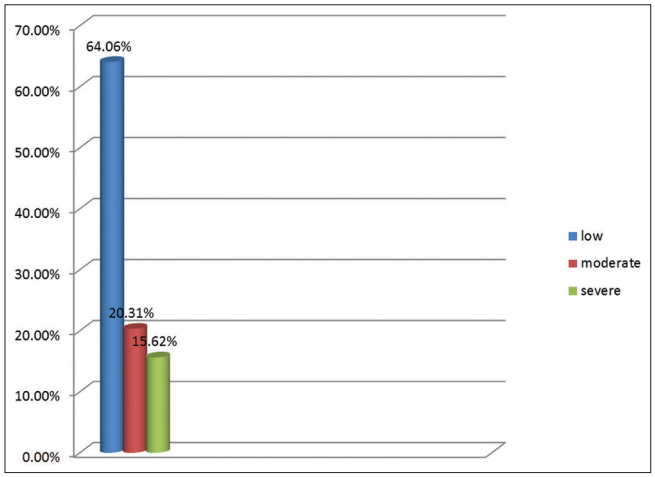

Figure 7: Severity of dental erosion

In the last 20 years, studies have been published showing that prevalence of erosive tooth wear was increasing especially in the children and adolescence. This is due to change in their dietary habits and lifestyle. There is a limited literature with regard to the prevalence of dental erosion in school going children. Hence, this study was undertaken to assess the prevalence and severity of erosive tooth wear in school going children of South Bengaluru.

The prevalence of dental erosion in the present study was found to be 25.6%. Similarly Wiegand *et al.* showed a prevalence of 32% in 2-7 years old children.[4] However, in contrast to this, Ayers *et al.* reported 82% prevalence in 5-8 years old children.[5] There were wide ranges in results due to differences in the populations studied, age, sample size, length of time the teeth were exposed to acid. Furthermore, there was a difficulty in comparing prevalence studies due to differences in diagnostic criteria, indices, different teeth assessed, socioeconomic conditions, and cultural factors.

Dental erosion in boys was found to be 25.17% which was more than in girls with 24.09%. This was in accordance with the studies conducted by Dugmore and Rock, Milosevic *et al.*, and Al-Dlaigan *et al.* who reported more erosion in boys than in girls.[6-8] This might be due to consumption of soft drinks was more among boys than in girls.

The percentage of dental erosion among 5-year-old children was 42.10%. Millward *et al.* reported 38% at 4-5 years age.[9] Similarly, Al-Majed *et al.* showed 82% in 5-6 years old children.[10] Harding *et al.* reported 47% in 5-year-old.[11] Furthermore, Luo *et al.* showed a prevalence of 57% in 3-5 years.[12] This might be due to the exposure of carbonated drinks, medications more at a younger age. However, in contrast to this study, increased percentage of erosion at 6 years age group with 30.70% and at 5 years of age with 28.57% was reported by Deshpande and Hugar.[1]

Among 128 children with dental erosion, the primary teeth were affected more commonly with 23.93%, while the permanent teeth showed 8.55%. Similarly, Ganss *et al.* reported increased the percentage of dental erosion in primary teeth with 70.6% than in permanent teeth with 11.6%.[13] Kazoullis *et al.* also showed the percentage of dental erosion in primary teeth with 78% and in permanent teeth with 25%.[14] This is due to the thinner enamel layer and morphological differences in the primary teeth. Johansson *et al.* reported microhardness of enamel in primary teeth was less compared to permanent teeth.[15] Furthermore, primary enamel contains more water and has increased permeability compared to permanent enamel.

When the teeth with erosion were considered, the primary maxillary central incisors (32.81%) and primary mandibular first molar (26.92%) were affected predominantly. Similarly, Wiegand *et al.* reported that the most affected teeth were primary maxillary incisors (15.5-25%) and primary mandibular first molar (3.5-5%).[4] The upper incisors are located in the front of the oral cavity which are exposed more to extrinsic acids, such as acidic beverages predisposing to the dental erosion. The lower first molars present in the oral cavity for a longer period and are exposed to erosive challenges for a longer period of time.

Among the surfaces examined, distribution of erosion was seen more predominantly on the labial surface of deciduous maxillary central and lateral incisor with 32.81% and 28.39%. Deshpande and Hugar reported that the buccal and palatal surfaces of central incisor showed maximum erosion with 35% and 21.6%, respectively.[1] This is due to the labial surface of upper incisors are in direct contact with dietary intake of acidic beverages, foods, and medication. Furthermore, tooth brushing performed after consumption of acidic drinks or an erosive episode such as vomiting.

The study showed a predominant distribution of erosion on the occlusal surface of a mandibular first deciduous molar with 26.92%. Similarly Deshpande and Hugar showed maximum erosion of 13.3% on occlusal surface of first deciduous molar in the mandibular arch.[1] Furthermore, Wiegand *et al.* reported erosions were mostly seen on the occlusal surfaces of the primary first and second molars (75.9%).[4] Chewable Vitamin C preparation or acidic foods left in direct contact with tooth, increases risk for dental erosion on the occlusal surface.

According to the severity of dental erosion, 82 children (64.06%) had low dental erosion, 26 children (20.31%) had moderate erosion, and 20 children (15.62%) showed severe erosion. This was comparable with the study by Deshpande and Hugar, who reported 20 cases (66.6%) had low severity and 9 cases (30%) had moderate severity.[1] Furthermore, Al-Dlaigan *et al.* reported 48% mild erosion, 51% moderate erosion, and 1% severe erosion.[8] Similarly, Ganss *et al.* also reported 70.6% had low erosion and 26.4% had moderate erosion.[9] The severity of dental erosion is increasing in children, and may cause severe loss of dental hard tissues that adversely affects esthetics and function of the mouth, hence should be recognized and treated early.[16]

Further survey to be carried with a detailed questionnaire proforma and dietary chart which shall investigate the intrinsic and extrinsic causes of dental erosion in children.

CONCLUSION

- Dental erosion showed a high prevalence in 5-year-old children. Erosion was seen more in boys than girls and primary teeth affected more commonly
- Distribution of erosion was seen more predominantly on labial surface of deciduous maxillary central and lateral incisor and on the occlusal surface of mandibular first deciduous molar
- The findings of the present study give an inference that there is a need for enhancing awareness about dental erosion among the school children, their parents and should be recognized and treated early.

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