

ORIGINAL ARTICLE

Prevalence and Severity of Dental Erosion among Preschool Children in Peshawar

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ABSTRACT

Objective: To analyze the impact of dental erosion among preschool children in Peshawar.

Place and Duration of Study: Study was conducted in Peshawar, KPK Pakistan over a period of 8 months from 1st December 2019 – 3rd July 2020.

Study Design: This was a descriptive cross-sectional study.

Materials and Methods: This study was conducted among preschool children in private schools of Hayatabad Peshawar on 1021 children with age range of 3-5 years. Parents of the invited children were asked to complete a questionnaire and consent form at home, distributed beforehand. Examination was done according to Basic Erosive Wear Examination (BEWE) criteria. Clinical examination of the children was performed in their classrooms using disposable dental mirror and a ball-ended WHO CPITIN probe on all the surfaces of the deciduous teeth. Status of the dental erosion of the entire sextant was represented by the tooth surface with the highest noted BEWE score in that sextant. The association of erosive tooth wear with children's socioeconomic status, dental and oral hygiene habits was calculated using multiple logistic regression.

Results: Total of 1021 preschool children assessed in this study revealed prevalence of dental erosion (BEWE Score > 0) to be 12.2%. Among these 92 (9.01%) children had initial tooth wear, 27 (2.6%) had distinct tooth loss, and 6 (0.58%) showed severe tooth loss. Prevalence of erosive tooth wear was recorded to be 1.9%, 4.8% and 27.1% among 3, 4 and 5-year-old children respectively.

Conclusion: Prevalence of dental erosion among preschool children in Peshawar is low. However, increasing age, parental education as well as poor dietary and oral hygiene habits were the factors deemed to contribute towards increasing prevalence.

Key Words: Erosive Tooth Wear, Oral Hygiene, Preschool Children, Parental Education.

Introduction

Dental erosion and the subsequent tooth wear are the irreversible loss of tooth enamel by acids from a non-bacterial source and are not directly related to mechanical or traumatic factors or dental caries. They are both documented as a major progressive problem in preschool children.¹

On the basis of literature review, acidic beverages and food increase the potential for dental erosion,² which can lead to consequences like hypersensitivity, bad aesthetics, pulp exposure and malocclusion.³

The enamel of deciduous teeth is thinner when compared to permanent tooth surface and morphological difference between the two dentitions exists.⁴ This clarifies the fast and rapidly progressing erosive process in primary teeth. Even short-term exposure to acids may lead to advanced lesion extending to dentine in deciduous teeth. Tooth wear may entail tooth sensitivity, compromised esthetics, altered occlusion and even pulpal exposure in severe cases.⁴ Moreover, child may face a compromise in the entire dentition for his lifetime due to early damage to the teeth from dental erosion.⁵ Tooth wear in deciduous dentition is considered as the prognosticator of the augmented risk of the tooth wear in permanent dentition.^{6,7}

Early diagnosis of tooth wear and prevention is the need of time as treatment in such cases might be complex, expensive and challenging⁸. The evidence available on the prevalence of dental erosive wear in preschool children in Peshawar is not sufficient. Therefore, the study aims to concentrate on the prevalence of dental erosion among preschool

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children in Hayatabad Peshawar, Pakistan.

Materials and Methods

This was a descriptive cross-sectional study and included 1021 kindergartens. Children from private schools of Hayatabad, Peshawar were included in the study using stratified random sampling technique over an interval of 8 months (December 2019 – July 2020). Sample size was calculated using G-Power with effect size 0.42, α -error 0.05 and power of 0.95. Consent was obtained from the Ethical Review Board of Rehman College of Dentistry (EC Ref. No. RCD-20-03-009). The dental examination was performed according to Basic Erosive Wear Examination (BEWE) criteria. Out of 121 children, 534 were girls and 487 were boys. Age range was 3 to 5 years. According to BEWE criteria tooth erosion is divided into 4 levels. Score 0 = No tooth surface loss, score 1 = Initial enamel loss, score 2 = Distinct defect spanning less than 50% of the tooth and score 3 = Hard tissue loss of more than 50%.⁹

Healthy kindergarten 3 to 5 years old children in the selected schools were included in the study population upon their parental consent. Children having special needs and those suffering from severe chronic diseases were excluded from the study.

A questionnaire and consent form were distributed to parents of the invited children beforehand, prior to conducting the survey and were asked to complete it at home within a week. The questionnaire contained two fragments including demographic characteristics (sex, age parental education, place of birth and family income) and oral hygiene behaviors (Tooth brushing and snacking frequency and history of previous dental visit). A research subordinate requested the parents to complete the questionnaire in case of missing data in the returned questionnaires via a phone call.

All three dentists were trained in BEWE assessment. Instrument used in classroom were disposable dental mirror, Head lamp (illumination in 100 mm Working Distance: = 40000 lux, Adjustable Rang Fluctuation Distance: 12.5 mm, Direction of illumination: Vertical 45 degree adjustable) for vision, cotton to dry the tooth surface, face mask, gloves and WHO CPITN ball end probe. After examining all the surfaces of the primary teeth, status of dental erosion of the entire sextant was represented by the tooth surface with the highest

noted BEWE score in that sextant. In addition, following the diagnostic criteria of the WHO, the decayed, missing and filled tooth index (dmft) was adopted.^{10,11} Caries experience was measured to be “yes” if dmft score was greater than 0, and “no” if dmft score was =0.

Statistical analysis was performed using SPSS version 20. Significance level was set at $P \leq 0.005$. Descriptive statistics were used to calculate counts, means and standard deviations. Fisher Exact test was used to calculate significance among both genders, Chi square test was performed to test relationship between categorical variables while significance level of dental erosion in various age groups was calculated using independent t test.

Results

Among 1021 children examined, 6(0.58%) were scored 3, 27(2.6) were scored 2, 92(9.01%) were scored 1 and 896(87.7%) were scored 0 according to BEWE criteria. Out of 487 male children 0.41% and out of 534 females 0.74% had severe erosive loss as shown in Table I.

In sextant assessment, upper anterior teeth were the most damaged teeth and, lower right and left posterior teeth were least damaged teeth. Children of age 5 years were mostly prone to dental erosion according to our study.

The prevalence and severity of dental erosion are labelled in Table I in the context of gender and age, showing erosive tooth wear increased with increasing age among the study population. Male children were more effected with dental erosive wear (Fisher's Exact Test $P=0.028$).

Values for birthplace according to chi square= 1.146 and $P=0.766$ were not significant, which showed that birthplace had no effect to cause or increase dental erosive wear (Table III).

Table II presents the severity and prevalence of dental erosion in all the sextants. The anterior maxillary primary teeth were ranked as teeth showing highest prevalence and more severe dental erosion as compared to other sextants, whereas the lower mandibular molars as the lowest in terms of prevalence of tooth erosive wear.

Sociodemographic characteristics linked to erosive tooth wear are described in Table III. Child's age, parental education level and frequency of daily snacking were the factors that showed associated

Table I: Prevalence and Severity of Erosive Tooth wear Among 3-5 years old Children in Peshawar

	N	BEWE SCORE				Total BEWE Score Mean (SD)	Prevalence BEWE>0
		0	1	2	3		
Gender							
Male	487	414(85%)	53(11%)	18(3.7%)	2(0.41%)	0.20(0.51)	73(14.9%)
Female	534	482(90.3%)	39(7.3%)	9((1.7%)	4(0.74%)	0.13(0.44)	52(9.7%)
Age							
3 years	151	148(98.01%)	3(1.9%)	0(0%)	0(0%)	0.029(0.14)	3(1.9%)
4 years	397	378(95.2%)	19(4.9%)	0(0%)	0(0%)	0.05(0.21)	19(4.8%)
5 years	473	370(78.2%)	70(14.8%)	27(5.7%)	6(1.3%)	0.30(0.63)	103(21.7%)
Total	1021	896(87.7%)	92(9.01%)	27(2.6%)	6(0.58%)	0.16(0.47)	125(12.2%)

Table II: Distribution of Severity of BEWE Scores in each Sextant

Sextant	BEWE Scores			
	0 (No erosion)	1 (Initial Loss)	2 (Hard tissue Loss <50%)	3 (Hard tissue loss > 50%)
Upper Anterior Teeth	937(92%)	70(6.8%)	11(1.07%)	3(0.29%)
Upper Right Posterior	1007(98.6%)	6(0.58%)	6(0.58%)	2(0.19%)
Upper left Posterior	1013(99.2%)	5(0.48%)	2(0.19%)	1(0.09%)
Lower Anterior Teeth	1007(98.6%)	10(0.97%)	4(0.39%)	0(0%)
Lower Right Posterior	1019(99.8%)	2(0.19%)	0(0%)	0(0%)
Lower left Posterior	1020(100%)	1(0.09%)	0(0%)	0(0%)

Table III: Sociodemographic Characteristics Linked to Tooth Erosive Wear

Variables	N	BEWE Score >0(%)	Comparison and Statistics
Children Examined	1021	125(12.2%)	
Gender			Fisher's Exact Test P=0.028
Male	487	73(14.9%)	
Female	534	52(9.7%)	
Age			Independent t test P=0.000 95% CI= -0.632 to 0.329
3 years	151	3(1.9%)	
4 years	397	19(4.8%)	
5 years	473	103(21.7%)	
Birthplace			Chi square= 1.146 P value= 0.766
KPK	707	87(12.3%)	
Others	314	38(12.1%)	
Fathers Education			Chi square= 726.523 P value= 0.000
Primary	48	0(0%)	
Secondary	127	117(92.1%)	
Tertiary or above	826	8(0.96%)	
Mothers Education			Chi square= 220.697 P value= 0.000
Primary	130	2(1.53%)	
Secondary	364	119(32.6%)	
Tertiary or above	527	4(0.75%)	
Family Income			Chi square= 1.324 P value= 0.724
Low	0	0(0%)	
Middle	482	63(13.07%)	
High	539	62(11.5%)	

Snacking Frequency Two times or fewer	838	10(1.2%)	Chi square= 532.985
More than two times	183	115(63%)	P value= 0.000
Tooth Brushing Frequency Once a day or less	640	79(12.3%)	Chi square= 1.517
Twice or more	381	46(12.07%)	P value= 0.678
Dental Caries Experience Yes	621	50(8.05%)	Chi square= 30.513
No	400	75(18.75%)	P value= 0.000

with the prevalence of dental erosion statistically (BEWE>0) (P<0.05). Male children who had BEWE score >0% were 14.9% and female children who had BEWE score >0% were 9.7%. This displayed that male children are more prone to dental erosive wear as compared to girls. BEWE Score >0% in 3, 4 and 5-year-old children were recorded as 1.9%, 4.8% 21.7% respectively indicating increase in erosive tooth wear with increase in age (shown in Figure-1). Parental education levels (primary, secondary and tertiary), snacking frequency, tooth brushing

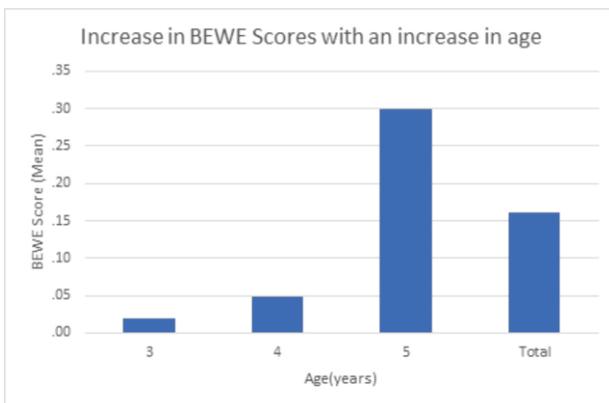


Fig. 1: Showing Association of Age with BEWE Scores

frequency, dental caries experience, place of birth and income, were some of the predominant features affecting the rate of dental erosive wear in children.

Discussion

Dental erosion is multifactorial. Our results illustrate that many factors are involved in tooth erosion like acidic food, acidic drinks, parental education, family income, gender, tooth brushing frequency and

snacking frequency. Carbonated drinks and fruit juices have acidic PH. Therefore, been implicated in the growing incidence of erosion. Dental wear is a general term used to describe a non-carious surface loss of the dental hard tissues that can be caused by abrasion, de-mastication, attrition, abfraction, resorption and erosion or a combination of any of these.¹² There is currently a growing interest among dentists and researchers about dental erosion although the reports have appeared frequently in literature. Reformed lifestyle and eating patterns, with bigger consumption of acidic foods and beverages are considered probable risk factors for dental erosion.¹³

Moss SJ et al reported¹⁴ that erosive loss of tooth enamel occurs only in susceptible individuals irrespective of patterns of food and beverage consumption, concluding the fact that consumption of an acidic drink or food alone is highly questionable to cause erosion.

The ability of a drink to resist buffering by saliva may play an important part in the process of erosion.¹⁵ Cough syrups are also associated with a significant decline in PH of the saliva with an increased risk of development of caries in children.⁷

One of the studies among preschool children in Hong Kong¹⁶ states that there is a decline in dental erosion with increasing parental education. In contrast to this, our study revealed that children of those parents who had a higher education status suffered from erosive tooth wear more easily. One possible reason to explain this could be the fact that parents with higher education have high socioeconomical status due to which their children can easily afford acidic(carbonated) drinks and food as compared to poor families.¹⁶

Dental erosive wear increases with increasing age.¹⁷ As age increases exposure for dental erosion wear also increase.¹⁸ This is in accordance with our results where children with age 5 years old have more dental erosive wear as compared to 3- and 4-years old children.

Upper Anterior teeth are more damaged sextant as compared to other due to dental erosive wear.¹⁹ In our study 3% of upper anterior teeth had BEWE score=3, which demonstrates that upper anterior teeth are more prone to dental erosive wear and lower posterior teeth are least prone to the dental

erosion wear.

Various factors strengthening our results were a high sample size, a good inter examiner reliability (κ value=0.76), and stratified random sampling technique for study population. However, certain limitations of this study must be investigated as the basic potential risk factors for erosive tooth wear including the types of acidic foods consumed and gastroesophageal reflux were not taken in account which might possibly lead to a bias during multivariate analysis. This demands for further research projects focusing on depth over the interplay between the medical conditions and the nutritional factors.

Nevertheless, the useful evidence provided by this study regarding the burden of erosive dental wear as well as its correlation with sociodemographic factors can provide a baseline data to serve as a convenient tool for designing community-based preventive programs.

Conclusion

There is a low prevalence of dental erosion among preschool children in Peshawar. However, increasing age, parental education as well as poor dietary and oral hygiene habits were the factors deemed to contribute towards increasing prevalence.

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CONFLICT OF INTEREST

Authors declared no conflicts of Interest.

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DATA SHARING STATEMENT

The data that support the findings of this study are available from the corresponding author upon request.

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