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Dentistry

ANALYSIS OF DENTAL EROSION IN LOCAL SCHOOL CHILDREN

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ABSTRACT **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. 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 local school going children. **Methods:** The present Cross Sectional analytical study is carried out on 100 subjects. A descriptive cross-sectional survey was designed to estimate the prevalence and severity of dental erosion in one year duration in 10-12-year old local school children of the city. The schoolchildren were clinically examined as per the American Dental Association Type 3 criteria using mouth mirrors while seated on the chair under natural light. The four upper incisors were examined **Results:** A total of 32 children had dental erosion. A significant association was recorded between the intake of fruit juice & Consumption of Carbonated Drinks ($P < 0.05$*) and occurrence of dental erosion. The frequency of erosion (35.5%) observed in maxillary central incisors was high when compared to maxillary lateral incisors (7%). The predominance of erosion sites on the labial surfaces was noted for both the maxillary central and lateral incisors.Matt appearance of the enamel was the most prevalent type of dental erosion (23.4% for central incisors and 7.9% for lateral incisors) The surface area affected by erosion was 26.25% for central incisors and 4.83% for lateral incisors. **Conclusions :** Dental erosion among 10-12-year old children was found to be 32%. It provides evidence that dental erosion is becoming a significant problem in schoolchildren. In this study, labial surfaces were the most affected and matt appearance of the enamel was the most prevalent type of dental erosion. In most of the involved cases, more than half of their surfaces were diagnosed as affected by erosion, which is frequently associated with the increased consumption of fruit juices and carbonated beverages.

KEYWORDS : Tooth Erosion , Labial Surface , Loss of enamel , School Children

INTRODUCTION

Erosion has been identified as an important cause of the loss of tooth tissues for adults, children, and adolescents. 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.

Tooth erosion has been defined as the physical result of a localized, chronic, pathologic, and irreversible loss of dental hard tissue caused by acids or chelates without bacterial involvement.[1] The etiology of tooth erosion is multifactorial and could be due to intrinsic factors (vomiting or regurgitation, such as gastro-esophageal reflux, anorexia and bulimia nervosa, or illnesses that cause reduction in salivary flow) and extrinsic factors (dietary habits such as acidic drinks to influence the erosive process, making it difficult to identify the risk factors, and if it is not controlled and stabilized, patient may suffer from severe tooth loss, tooth sensitivity, overclosure, poor esthetics, or even dental abscesses in the affected teeth. 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 is necessary to identify this pathological process as early as possible to prevent further progression. Clinical features of erosion include shallow, broad, smooth, glazed wedge-shaped depression within the enamel surface adjacent to cemento enamel junction, cupping of cusp tips and grooving of incisal edges, wear on non-occlusal surface, non-tarnished and raised amalgam surface.[1-2] 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 local school going children.[3]

METHODOLOGY

The present Cross Sectional analytical study is carried out on 100 subjects. A descriptive cross-sectional survey was designed to estimate the prevalence and severity of dental erosion in one year duration in 10-12-year old local school children of the city. Approval was obtained from the principals of the concerning schools. A written consent was obtained from the parents of the participating school childrens.

A pilot study was conducted first to assess the feasibility of the study and to assess the validity and accuracy of the predesigned pro forma. The questionnaire items were analyzed for difficulty in understanding, interpreting, and answering correctly. Cronbach's alpha was applied for measuring the intraexaminer reliability.

Sample size was 100 for the ease of the study. The estimated sample was selected by multistage cluster random sampling method from the schools. All the schoolchildren who were present on the day of examination and whose parents gave consent were included in the study. Children with orthodontic appliances, extensive restorations, and enamel defect accompanied by a loss of tooth substance, and fractured or missing incisors were excluded from the study.

A pretested study pro forma was used to record the information about the participants. The first part of the pro forma consisted of structured questionnaires, including demographic details, general medical history with reference to medications and chronic disorders, drink and food items which have erosive potential, and the consumption of intake, which was classified as once, twice, and thrice per week. The second part of the pro forma consisted of assessment of dental erosion using O'Sullivan index (2000),[4] which was recorded by a single trained and calibrated investigator. The arrangement of different levels of erosion was used in the calibration exercise, which was based on the diagnosis of photographic images. Intra examiner reliability was assessed through the kappa statistics.

The schoolchildren were clinically examined as per the American Dental Association Type 3 criteria using mouth mirrors while seated on the chair under natural light. The four upper incisors were examined. Each examination lasted for approx. 40 s.

Statistical Analysis

The data obtained were analyzed in detail using the statistical software SPSS 21 for Windows. Data are reported as mean ± SD or proportions and 95% confidence intervals. Statistical analysis was performed by tests of significance.

The difference was considered as statistically significant for a p- value of less than 0.05.

RESULT

A total of 100 schoolchildren were examined. Among the 100 schoolchildren enrolled in the study, 52% were males and 48% were females. A total of 32 children had dental erosion giving an overall prevalence of 32% . There was no significant difference in the prevalence of dental erosion between males and females.

From a total of 41 children who consumed fruit juice, it was observed that 27 (65.85%) had dental erosion. A significant association was recorded between the intake of fruit juice (P < 0.05*) and occurrence of dental erosion (Table 1). From a total of 37 children who consumed carbonated drinks, it was observed that 23 (62.16%) had dental erosion. The frequency of consumption of carbonated drinks was significantly related (P < 0.05*) to dental erosion in the present study (Table 1). Mild association was reported between the prevalence of dental erosion and gastric disorder . No association was found between dental erosion and individual's medical history.

Table 1 – Magnitude of erosions among students related to food habits.

Students (both Males & Females)	Erosion -Present	No Erosion	P Value
Consuming Fruit juice (n=41)	27 (65.85%)	14 (34.15%)	P < 0.05
Consuming Carbonated Drinks (n=37)	23(62.16%)	14 (37.84%)	P < 0.05

The frequency of erosion (35.5%) observed in maxillary central incisors was high when compared to maxillary lateral incisors (7%). The predominance of erosion sites on the labial surfaces was noted for both the maxillary central and lateral incisors [Table 2].

Matt appearance of the enamel was the most prevalent type of dental erosion (23.4% for central incisors and 7.9% for lateral incisors) [Table 2]. The surface area affected by erosion was 26.25% for central incisors and 4.83% for lateral incisors.

Table 2: Distribution of erosion site on maxillary permanent incisors among study children

Tooth frequency (affected tooth surface)	Central incisor, n (%)	Lateral incisor, n (%)
Labial or buccal only	36 (18.0)	5 (2.5)
Lingual or palatal only	11 (05.5)	4 (2.0)
Occlusal or incisal only	22 (11.0)	3 (1.5)
Labial and incisal/occlusal	1 (0.5)	2 (1.0)
Multi surface	0.0	0
Total	70 (35.0)	14 (7.0)

Table 3: Distribution of the grade of erosion severity on maxillary permanent incisors among study children

Tooth frequency (grade of severity)	Central incisor, n (%)	Lateral incisor , n (%)
Normal Enamel	112 (56%)	168 (84%)
Matt Appearance of the enamel surface with no loss of Contour	53 (26.5%)	17 (8.5%)
Loss of enamel only	20 (10%)	15 (7.5%)
Loss of enamel with with exposure of dentine	11 (5.5%)	00
Loss of enamel and dentine beyond dentinoenamel junction	04 (2%)	00
Loss of enamel and dentine with exposure of the pulp	00	00
Total	200 (100%)	200 (100%)

DISCUSSION

Over recent decades, dental erosion has become a significant factor when the long-term health of the dentition is taken into account.[5] The use of maxillary incisors in evaluating dental erosion in 10-12-year-old children is considered appropriate since by this age these teeth have been exposed in the oral environment for a considerable period of time when compared to other teeth present at the age,[6] and also the examination of incisors is easier. In the recent decades, due to modern lifestyle, there has been change in the quality of dietary habits resulting in an increase in the consumption of acidic beverages. The frequent consumption of carbonated drinks and fruit juices was shown to be strongly associated with dental erosion. The prevalence of dental erosion of 32% in the current study was similar to the results of Chrysanthakopoulos (33.8%).[2] A slightly lower prevalence (28%) of dental erosion was observed in the study by Caglar et al.[7] Variation in the prevalence of dental erosion among the studies might be due to the differences in the diagnostic criteria and indices used to measure the same. Furthermore, other factors such as geographic, socioeconomic, and cultural could have also influence the outcome of prevalence data. In the present study, there were no differences in the prevalence of dental erosion between males and females . which is in agreement with a study carried out by Yaseen et al.[5] It might be attributed to the fact that both boys and girls are exposed to similar risk factors in this population.

The frequency of consumption of fruit juices was significantly related to dental erosion in the present study, similar findings were observed in a study conducted by Al-Malik et al.[8] The main component of citrus fruits is citric acid, and fruit juices have higher potential to cause dental erosion than other types of acids, possibly because its chelating action on calcium enamel continues with the increase in pH. Dental erosion was significantly related to the frequency of consumption of carbonated drinks in the present study. Similar findings were observed in the study conducted by Al-Malik et al.[8] This might be attributed to the fact that these carbonated drinks have a high buffering capacity, which has a strong erosive potential on teeth.

Matt appearance of the enamel was the most prevalent type of dental erosion , which is in agreement with the study by Talebi et al.[9]

The predominance of erosion on the labial surface seen in this study is in agreement with a previous study by Yaseen et al.[5] The surface area affected by erosion in the present study was in agreement with the study conducted by Talebi et al.[9] It could be due to the fact that children are exposed to more risk factors for a longer duration.

The cross-sectional design of the study can be considered as an important limitation. Hence, further longitudinal studies are needed to better understand and interpret dental erosion among children and identification of etiological factors associated with it for the establishment of adequate preventive measures. Dental erosion should receive more attention that promotes awareness among dentists to make an early diagnosis. A strategy of offering preventive care, including more campaigns promoting a healthier lifestyle for those at a risk of dental erosion and a regular dental follow-up, should be conducted for schoolchildren.

CONCLUSION

Dental erosion among 10-12-year old children was found to be 34.12. It provides evidence that dental erosion is becoming a significant problem in schoolchildren. In this study, labial surfaces were the most affected and matt appearance of the enamel was the most prevalent type of dental erosion. In most of the involved cases, more than half of their surfaces were diagnosed as affected by erosion, which is frequently associated with the increased consumption of fruit juices and carbonated beverages.

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