

Determination of Prevalence of Dental Erosion in 12 - 14 Years School Children and Its Relationship with Dietary Habits

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ABSTRACT

Objective: To determine the frequency of dental erosion in 12-14 years school children and its association with dietary habits.

Study Design: Observational cross-sectional analytical study.

Place and Duration of Study: Fatima Jinnah Dental College, Karachi, from January to June 2010.

Methodology: School children aged between 12 - 14 years were included in this study. Dental erosion was detected by visual examination. A self-developed questionnaire was used to assess the dietary habits of children. Acidic diet was considered a diet that has an acidic pH. The amount of consumption of acidic drinks and food per week was categorized into low consumption (1 - 7 times / week) and medium consumption (8 - 21 times / week). Chi-square test was applied to see any statistical difference between diet and tooth erosion at 95% CI.

Results: The results showed a high frequency of (46%) dental erosion in children, which was significantly higher ($p < 0.001$) in children with more acidic diet.

Conclusion: This study highlights the impact of dietary habits on the prevalence of dental erosion in children. Acidic diets need to be controlled in frequency to prevent dental erosion.

Key Words: *Dental erosion. Dietary habits. Acidic diet. School children.*

INTRODUCTION

Tooth wear and tear is increasing both in adults (43%) as well as in children (80%),¹ and has been attributed to dental erosion as a major cause.² Dental erosion is defined as an irreversible loss of dental hard tissue by chemical process. Characteristics include concavities, cupping, grooving within enamel surface, and/or erosion on non-occluding teeth surfaces.³ Dental erosion is the most common chronic disease of children aged 5 - 17 years.⁴

Certain drinks, such as sport/energy drinks, 'healthy' drinks, and soda, are popular among children; but these are acidic and have fermentable sugars. Therefore, it is plausible that more children will be affected by dental erosion. In Iceland, 31% of 15-year-old teenagers had signs of erosion, and 5.5% of children had severe teeth erosion. Another study in Sweden found that 34% of 18 - 19 years old adults had at least one tooth with severe erosion extending to dentine.⁵

Erosive tooth surface loss may also occur due to some eating disorders such as anorexia or bulimia.⁶ Intake of

certain acidic medications like vitamin C tablets, and life-style factors like frequent swimming in chlorinated water have also been associated as co-factors.⁷ Most of the fruits and fruit juices, carbonated drinks and sports drinks have a low pH. This is important since children and adolescents are the primary consumers of these drinks, making themselves prone to erosion.⁸ Saliva has a protective role against dental erosion.⁹ Night-time exposure (e.g. baby bottle-feeding) to erosive agents may be particularly destructive because of the absence of salivary flow.¹⁰

In order to control dental loss due to erosive wear, it is crucial to take into account its multifactorial nature, which predisposes some individuals to this condition.¹¹ The acid contact is associated with a demineralization and softening of the tooth surface, leading to an increased susceptibility to mechanical abrasion such as tooth brushing.¹²

A cross-sectional study, conducted in school children in Brazil, revealed that the daily consumption of sugary drinks had a greater likelihood of causing erosion.¹³ Significantly more erosion occurred in boys than girls.¹⁴ High erosion was associated with a method of drinking, whereby the drink was kept in the mouth for a longer period.¹⁵

The purpose of this study was to establish an association between dietary habits and dental erosion.

METHODOLOGY

The data was collected from a private sector English-medium high school (representing high to medium class)

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and a public sector school (representing medium to low class), located in the same vicinity over the period of 6 months. The inclusion criteria were children aged 12 - 14 years of either gender. The exclusion criteria were handicapped (mental or physical) children, students/parents not willing to participate, and children with dental developmental disorders, e.g, amelogenesis, dentinogenesis or osteogenesis imperfecta.

Written consent was obtained from the schools and the parents of the children through the institution. Clinical examination was performed in the schools by all the three researchers using mouth mirrors, probes and a portable light source on all the teeth to see signs of dental erosion; and was labelled as present or absent. A pre-tested questionnaire was used to obtain relevant information regarding student's dietary habits.

Dietary habits were evaluated on the frequency of consumption of acidic foods (vinegar, pickles, citrus fruits like lemon and oranges) and acidic drinks (cola type drinks, fruit juices, sports drinks). The amount of consumption of drinks and foods per week was categorized into two groups of those with low consumption (1 - 7 times / week) and those with medium consumption (8 - 21 times / week).¹⁶ On clinical examination, any signs of tooth wear present was labelled as dental erosion such as loss of enamel surface characteristics by thinning, increased translucency of enamel and dentine, cupping or grooving of enamel surfaces on the teeth and exposure of pulp due to excessive wear.

The data was analyzed using a statistical computer program (SPSS 13). Frequencies and percentages were calculated for the categorical variables like gender, dental erosion, dietary habits, parent's occupation, education and income. Mean and standard deviation were calculated for the age of the patient. Chi-square test was used to analyze the relationship of dietary habits of the children with the prevalence of dental erosion. A p-value of ≤ 0.05 was taken as significant.

RESULTS

A total of 385 school children aged between 12 - 14 years from a private sector English-medium high school and a public sector high school, in Karachi, were included in this study. The average age of the children was 12.80 ± 0.80 years (95%, CI: 12.72 - 12.88). Out of 385 children, 159 (41%) were male and 226 (59%) female.

Regarding dietary habits of children, consumption of soft drink, juice, vinegar, pickles, and fruits are presented in Table I.

Prevalence of dental erosion in 12 - 14 years old school children was observed in 178 (46%) cases, out of which 100 (25.9%) were males and 78 (20.1%) females. Rate

Table I: Impact of dietary habits on the prevalence of dental erosion.

Dietary habits	N	Dental Erosion		p-values
		Yes	No	
How often do you take soft drinks?				
High consumption	128	78 (60.9%)	50 (39.1%)	<0.001
Low consumption	257	100 (38.9%)	157 (61.1%)	
How often do you take lemon or orange type juices?				
High consumption	121	91 (75.2%)	30 (24.8%)	<0.001
Low consumption	264	89 (33%)	177 (67%)	
Do you brush your teeth after you have a soft drink or juice?				
Yes	115	34 (29.6%)	81 (70.4%)	<0.001
No	270	144 (53.3%)	126 (46.7%)	
How often you take vinegar or pickles?				
High consumption	98	83 (84.7%)	15 (15.3%)	<0.001
Low consumption	287	95 (33.1%)	192 (66.9%)	
How often do you take fruits?				
High consumption	152	67 (44.1%)	85 (55.9%)	0.49
Low consumption	233	111 (47.6%)	122 (52.4%)	

of dental erosion was significantly higher in males than females ($p < 0.001$). Relationship between dietary habits of the children with the prevalence of dental erosion is also presented in Table I.

Dental erosion was significantly higher in those children whose consumption of soft drink (60.9%), lemon or orange type juice (75.2%) and vinegar or pickle (84.7%) was high, showing a strong association between dietary habits and dental erosion ($p < 0.001$), as presented in Table I. Fruit consumption did not show any significant relation with dental erosion, as presented in Table I. Regarding brushing habit after taking soft drink and juices, dental erosion was significantly higher even in those children who did not brush after soft drink and juice ($p < 0.001$) as shown in Table I. It was seen that despite not brushing teeth after consuming acidic drink, erosion was present.

DISCUSSION

Erosion is becoming an increasingly important factor when considering the long-term health of the dentition. It is a major health problem in most industrialized countries and it affects 80% of school-going children. The present study targets at children in two different schools in Karachi. This study was conducted to find out the association of dental erosion with dietary habits of school-going children.

This study was conducted on 12 - 14 years old children. The average age was 12 years. Karim and Sanhoury in Sudan,¹⁷ and Talebi *et al.* in Iran,¹⁸ also carried out similar cross-sectional studies on 12-year school children. Many studies, including the present, have focussed on 12 - 14 years children, because the

permanent incisors and first molars in the mouth at this age get exposed to potential etiologic factors like lifestyle and dietary habits for a considerably long duration of time.

In the present study, dental erosion was observed in 178 (46%) children in which 100 (25.9%) were males and 78 (20.1%) females. Rate of dental erosion was significantly higher in males than females ($p < 0.001$). In 2010, Halima *et al.* in a longitudinal study also found more erosion in boys than girls.¹⁹

Some studies conducted on 12 - 14 years children revealed much less prevalence, when compared with the present study, showing no difference between the two genders, i.e. males and females. In some other studies, females were more affected than the males. In 2010, Wang and Huan in China evaluated the prevalence of 25.5 - 29.0% in 12 - 13 years children,²⁰ with significantly higher erosion found in girls (29.9%) than in boys (25.7%). While Aguiar *et al.* found it be 21% with no significant differences between gender and age.²¹ The difference in the dental erosion being more in males than the females, may be due to boys being athletes and more into sports activities leading to high consumption of sports drink and carbonated cola type drinks as compared to girls.

Questionnaire was designed in order to assess the dietary habits of children and its relation to dental erosion. In this study, higher percentage of the children (60.9%) showed consumption of soft drinks and 75.2% showed consumption of acidic fruit juices, the signs of dental erosion also being prevalent in them. High consumption of acidic drinks and fruit juices leads to harmful effects on the teeth. The prevalence of dental erosion in this study was high as (46%), thus showing a strong relation between dental erosion and acidic drinks. The reason is the easy availability of soft drinks and fruit juices and lack of knowledge regarding the frequency of consumption of such drinks, causing harmful effect on their teeth.

Hamasha showed association of dental erosion with consumption of carbonated beverages, lemon, sour candies, and sports drinks, keeping soft drinks in the mouth for a longer time, brushing teeth following soft beverages or drinking lemon juice at bed time.²² Daily consumption of soft drinks were more likely to have at least one tooth with dental erosion.²³ The consumption of soft drinks and the daily consumption of lemon were significantly associated with the number of affected surfaces. Thus the frequency of intake and pattern of consumption of carbonated drinks and fruit juices was associated with the dental erosion. All these studies, including the present study, show that soft drinks and fruit juices are associated with dental erosion.

In this study as high as 84.7% children consumed vinegar and pickle and showed significant signs of

dental erosion (Table I). In 2008, Bassiouny *et al.* reported that vinegar is a highly erosive fluid when compared with soda, orange juice, and green tea. Vinegar was able to remove smear layer, open dentinal tubules, and increase dentin permeability in both studies, thus showing the highly erosive nature of vinegar.²⁴ The results of these studies are the same as compared to the present study that consumption of vinegar or vinegar in pickle can lead to dental erosion due to the erosive potential probability and the ability to remove the enamel and smear layer causing tooth surface loss.

In this study, fruit consumption of children was 55.9% and these children did not show significant signs of erosion. It is not just the total exposure to acidic substances that appears to have increased in recent years; there have also been changes in habits and general lifestyles. National campaigns for healthy eating have emphasized the importance of eating five pieces of fresh fruit or vegetables per day. These studies are not supporting the present study, which may be due to the frequency and method of consumption of fruits; it may also be due to the less emphasis on healthy diet in this part of the world.

In this study, the brushing habits after having soft drink was assessed. Dental erosion was significantly higher in those children who did not brush after consuming soft drink or juice. However, Chander *et al.* emphasized on the timing of tooth brushing after acid challenge, as consumption of acidic foods and drinks makes the teeth soft and hence become more susceptible to wear during brushing directly after having drinks and food which are acidic in nature.²⁵

Dental erosion is a major health problem affecting the children at different age groups. Thus its prevention requires combination of different techniques in order to decrease its prevalence. One way to contribute is by increasing the oral health awareness of children which would provide up-to-date oral health information as well as education and motivation of the parents. At the same time, the schools have great potential for children oral health habits formation as considerable time is spent in schools by the children. They should be guided regarding the dietary habits and lifestyles, i.e way of consumption of food. Parent's education and awareness regarding dietary habits and oral health knowledge are the key information in realization of children oral health status.

CONCLUSION

The results from this study shows that the dietary habits can lead to dental erosion. The frequency and pattern of consumption of acidic drinks are the major etiological factors in the occurrence and frequency of dental erosion.

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