ABSTRACT:
Background: Dental erosion is defined as irreversible loss of hard dental tissues as a result of the action of endogenous and exogenous acids of non-bacterial origin. Its severity and extent depends on different behavioral factors.
Aim: This study examined the relationship between oral hygiene habits and the presence of dental erosion in children aged 3 to 5 and 11 to 12 years of age.
Material and methods: The study included 429 children aged 3 to 5 years and 487 children aged 11 to 12 years. The presence of erosive changes was detected by an intraoral examination and oral hygiene habits were investigated by a direct individual questionnaire. The influence of oral hygiene habits on the presence of dental erosion was tested using the chi-square test. The level of significance was set at 5%.
Results: Frequency of oral hygiene procedures and tooth brushing immediately after consumption of erosive foods or beverages were considered as significant risk factors for erosion occurrence in primary teeth. Tooth brushing more than twice a day had a significant impact on the presence of dental erosion in permanent teeth as well.
Conclusion: Oral hygiene habits are related to the development of erosive changes and the frequency and timing recommendations must be tailored to the risk assessment for erosive lesions.
Key words: dental erosion, oral hygiene habits, childhood

INTRODUCTION
Dental erosion is a chronic loss of hard dental tissue as a result of the action of acids of non-bacterial origin. Some behavioural factors like the oral hygiene practices can modify the extent of erosive tooth wear [1]. The erosion process can be aggravated and accelerated by the abrasive effect of brushing the teeth. Though the toothbrushing is accepted to be a prerequisite for maintaining good oral health, it is well known that it also has the potential to influence the tooth wear, especially regarding tooth erosion. Experimental studies show that tooth abrasion can be caused by a number of factors, including not only the physical properties of the toothpaste and toothbrush, but also factors like brushing frequency and force of brushing that are patient-related factors. While abrasion resulting from routine oral hygiene can be considered as physiological wear over time, intensive brushing can further damage eroded surfaces by removing the demineralised enamel surface layer. It is approved that force and frequency of tooth brushing as well as toothbrush hardness act as etiological co-factors in regard with cervical non-caries lesions. The benefits of the normal oral hygiene procedure far outweigh the possible side effects, but excessive tooth brushing - especially of eroded teeth - can cause some harmful effects. [2].

The purpose of this study is to investigate the relationship between the oral hygiene habits and the presence of dental erosion in children from two age groups - preschool and school age.

MATERIALS AND METHODS
The study included 429 children aged 3 to 5 years and 487 children aged 11 to 12 years randomly selected. The children attended educational institutions – kindergartens and schools in the city of Plovdiv. The choice of age groups was based on the need to investigate specific primary or permanent teeth with such a period of functioning in the mouth which provides sufficient time for the effects of erosive factors to occur. The participation of the children in the study was with a prior written parents’ inform consent. The presence of dental erosion was established by an intraoral examination using the index developed for the Children’s Dental Health Survey of 1993 and modified by Dugmore and Rock [3] to assess erosive loss. All the children were examined clinically at their schools under standard illumination from a portable light source using individual mouth mirrors for single use. The vestibular and palatal surfaces of the upper incisors and the occlusal surfaces of the first molars of the respective dentition were ex-
amined for dental erosion. The children’s oral hygiene habits were assessed by a questionnaire. It was filled in by the preschool children parents at home and by the school children themselves in a classroom before the clinical examination was undertaken. The frequency of oral hygiene procedures and their conduct immediately after erosive foods or beverages ingestion was studied. All data were analyzed using SPSS with Chi-squared test. Significance was accepted at the P<0.05 level. Odds ratios with 95% confidence intervals were used to assess the univariate relationships between the variables.

RESULTS

The study of the relationship between dental erosion and oral hygiene habits of the younger age group showed that with the increasing frequency of the oral hygiene procedures the relative share of the children affected by erosion also increased and this trend was statistically significant (P < 0.05; $\chi^2 = 9.29$). The likelihood of erosive lesions occurrence by more than two oral hygiene procedures per day was more than three times higher (OR = 3.14; 95% CI 1.42 - 6.91) than by two or less procedures daily (Diagram 1).

Diagram 1. Distribution of children with dental erosion in primary teeth according to the frequency of tooth brushing

There was an over 7 times (OR = 7.19; 95% CI 2.94 - 17.58) increased risk of erosion of the primary teeth of children whose parents have indicated that they wash the teeth after each erosive food and drink consumption. Nearly two-thirds of these children had symptoms of erosive loss of hard dental tissues compared to a quarter of children who didn’t brush their teeth immediately after taking fruits, juices and carbonated beverages (Diagram 2).

Diagram 2. Distribution of children with dental erosion in primary teeth depending on the conduct of oral hygiene procedure immediately after ingestion of erosive food / beverages
The results for oral hygiene habits in the older age group were similar. Oral hygiene procedures more than twice a day were statistically significant in relation to the presence of erosion of the permanent teeth of the examined school children ($c^2 = 11.78; P < 0.01$) (Diagram 3).

**Diagram 3.** Distribution of children with erosion of permanent teeth depending on the frequency of tooth brushing

![Diagram showing the distribution of children with erosion of permanent teeth depending on the frequency of tooth brushing.](https://www.journal-imab-bg.org)

There was also a twice higher risk of erosive lesions (OR = 2.10; 1.37 – 3.24). A similar relation, but not statistically significant, was established with regard to the brushing of teeth immediately after consumption of erosive foods or beverages ($c^2 = 3.01, P> 0.05$) (Diagram 4).

**Diagram 4.** Distribution of children with erosion on permanent teeth depending on tooth brushing immediately after consumption of erosive foods or beverages

![Diagram showing the distribution of children with erosion on permanent teeth depending on tooth brushing immediately after consumption of erosive foods or beverages.](https://www.journal-imab-bg.org)

**DISCUSSION**

While good oral hygiene has a proven preventive role in periodontal disease and dental caries, frequent tooth-brushing with abrasive oral hygiene agents can aggravate dental erosion, especially in combining brushing with recent intake of acidic beverages or food [1]. It was found that the quantity of biofilm is smaller in children with mean dental erosion, as compared to those with no dental erosion [4].

Although not all epidemiological studies authors have found a relationship between oral hygiene habits and the presence of erosive lesions [5, 6], a number of experimental studies have shown that the loss of hard dental tissue was greater in the combination of erosive impacts and brushing of the teeth, rather than only by erosive action [7, 8]. While active ingredients like fluorides or agents with special anti-erosive properties were shown to offer some degree of protection against erosion and combined erosion/abrasion, the abrasive effects of dentifrices may increase the surface loss of eroded teeth [9]. The reason is the removal of the salivary pellicle layer during brushing, which leads to a direct exposure of the tooth surface to erosive impacts. The co-destructive effect of the processes of abrasion, attrition and erosion was experimentally proven [10, 11, 12].

Al-Dlaigan et al. [13] found a significant correlation between tooth erosion and some oral hygiene habits such as tooth brushing before bedtime, after meals, brushing technique, brush type and brushing frequency. Nayak et al. [14] found that brushing frequency was a significant prognostic risk factor for dental erosion in primary teeth. A recent study of erosive tooth wear among 12-year-old schoolchil-
children has established that the extent of severe dental erosion depends on brushing frequency [15]. The results of these studies are consistent with the findings of the present study and demonstrate the association between the oral hygiene practices and the presence of erosive lesions in children.

CONCLUSION
The recommendations for the frequency and timing of the oral hygiene procedures in children should be consistent with the risk assessment of dental erosion.

REFERENCES:

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