

Prevalence of dental erosion in 12 years old children and adolescents. Investigation of etiological factors related to dental erosion

PhD thesis

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1. Introduction

Tooth wear (TW), or “non-carious loss of dental hard tissue,” is a regressive lesion of a tooth, the chronic and irreversible loss of tooth hard tissue by physical and/or chemical action. Based on the root causes, we separate two groups of TW: the physical and the chemical type. The first group includes three forms: attrition, abrasion and abfraction. The only member of the latter group is dental erosion (DE). DE is the loss of the dental hard tissues due to acid action, rarely chelation, where the acid is not of bacterial origin. Extrinsic and intrinsic ED are distinguished based on the origin of the acid.

Epidemiological data of scientific value have been available worldwide for roughly 50 years. It can be clearly stated that, since then, the incidence of tooth wear has continuously increased in all age groups. The drastic increase in the occurrence frequency of ED is primarily responsible for the rise, which is why we focused on this type of tooth wear.

Clinical indices are used to examine DE. Over the decades, many index systems have been developed. The

Basic Erosive Wear Examination (BEWE) Index was created in 2008 and has since become the most widely used test method. The advantage of the index is that it can be recorded in a simple, user-friendly way, and based on the results, it also provides therapeutic recommendations for the examined person.

2. Objectives

The null hypothesis of our research was that the erosion prevalence data in Hungary is similar to the increasing frequency seen worldwide. In addition, we examined dietary, lifestyle, and socio-economic factors that may be associated with ED. Detailed epidemiological data on the prevalence of tooth wear and ED are unavailable from Hungary, and the public and incomplete data are 30-40 years old. Therefore, we strove for representative sampling from the entire country during our work. We were able to do this entirely in one age group. Due to the appearance of DE at an earlier and earlier age, we chose the 12-year-old age group. During the data evaluation, some of the previously identified ED risk factors could

be used for risk estimation. The risk assessment was developed in cooperation with an international research group.

3. Material and Methods

We conducted our epidemiological investigation in Hungary between February 2014 and June 2015. The sampling locations and the number of persons examined were based on the procedure recommended by the WHO. Based on this, an investigation was conducted at seven urban and seven rural locations across the country, using the BEWE Index. In addition to the clinical examination, all participants anonymously filled out a self-declared questionnaire about their dietary habits and the family's socioeconomic factors. The mean, SD and prevalence values of the loss of dental hard tissue were calculated during the statistical analysis. The 2-sided Fisher's Exact Test and Pearson's Chi-Square test were used to calculating the differences. The probability level for significance was set at $p < 0.05$. All statistical

calculations were performed using IBM SPSS Statistics for Windows (Version 24.0. USA, Armonk, NY).

4. Results

In the "Dental erosion and its relation to potential influencing factors among the 12-year-old Hungarian schoolchildren" (DE12HU) study, based on the examination of 609 children, of which 579 (287 boys, 292 girls) had evaluable results, DE prevalence was 21.2%. The mean BEWE value was 0.39 ± 0.83 (mean \pm SD), which showed a significant difference between urban and rural locations (0.48 ± 0.92 vs. 0.29 ± 0.72 (mean \pm SD) respectively, $p = 0.0058$). Examining the oral distribution of DE, there was no difference in prevalence. Still, the cumulative BEWE value in the mandible was 0.25 ± 0.64 (mean \pm SD), while in the maxilla, it was 0.14 ± 0.45 (mean \pm SD), which was statistically highly significant ($p < 0.001$).

Based on the questionnaire results, a significant correlation was confirmed between the daily consumption of carbonated soft drinks and the

cumulative BEWE score of three or above ($p=0.034$). Also, the cumulative BEWE score was statistically significantly more often three or more among those whose mother's educational level was at most secondary compared to mothers with higher education ($p=0.000$). The cumulative BEWE score did not show a statistically significant correlation with the following factors: daily frequency of tooth brushing, consumption of fresh fruits, consumption of non-carbonated fruit juice, sweets and candies.

Results of the “Multicenter study to develop and validate a risk assessment tool as part of composite scoring system for erosive tooth wear” (MuSRA) study. DE was present in 58.5% of the examined persons. In the case of 24.5%, the cumulative BEWE was ≥ 3 , which necessitates further patient preventive care. Among the potential risk factors, the following showed a statistically significant relationship with DE: "energy drink consumption ($V = 0.317$, $p < 0.0001$), low secretion of stimulated saliva ($V = 0.298$, $p < 0.0001$), juices consumption ($V = 0.278$, $p < 0.0001$), erosive drink consumption for quenching thirst

between meals ($V = 0.168$, $p < 0.053$), and erosive drink kept in the mouth ($V = 0.157$, $p < 0.024$)”.

5. Conclusions

- Based on the results of the DE12HU study, it can be stated that the primary hypothesis has not been confirmed. The prevalence of ED in Hungary at 12 does not reach the European average but remains below it (21.2%).
- In the MuSRA study, the prevalence of ED in the 15-21 age group was much higher at 58.5%.
- Within the limitation of these studies, it can be assumed that the following factors showed a statistically significant association with the prevalence and/or severity of ED:
 - energy drinks consumed on a daily basis
 - rehydrating sports drinks
 - carbonated soft drinks

- soft drinks with a high fruit content
- the mother's secondary or lower education level
- living in an urban environment
- Neither DE12HU nor MuSRA showed an association with ED prevalence and the following factors:
 - consumption of fresh fruit
 - daily frequency of toothbrushing and the hardness of the toothbrush

6. Bibliography of the candidate's publications

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