



**UNIVERSITATEA DE MEDICINĂ ȘI FARMACIE
DIN CRAIOVA
ȘCOALA DOCTORALĂ**



**ASPECTS OF DENTAL WEAR IN
CHILDREN AND YOUNG
ADOLESCENTS**

PhD THESIS

SUMMARY

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TABLE OF CONTENTS

INTRODUCTION.....	3
CURRENT STATE OF KNOWLEDGE	
1. Dental wear.....	3
2. Dental erosion in children and young adolescents.....	3
PERSONAL CONTRIBUTION	
3. The working hypothesis and general objectives.....	3
4. Epidemiological study of dental wear in children between 6 and 11 years old from Dolj county, Romania.....	4
5. Study using the applications of factorial analysis in highlighting the risk factors of erosive dental wear.....	5
6. Study using the OCT analysis of primary teeth affected by dental wear.....	7
7. General discussions.....	8
8. General conclusions.....	9
REFERENCES.....	10

Key words: *dental wear, children, dental erosion, carbonated beverages, energy drinks, biocorrosion, friction, stress.*

INTRODUCTION

The incidence of dental wear has increased in the current population, and, in many clinical situations, the dentist can not identify its etiological factors due to the cumulative action of external, local and intrinsic factors. There is also insufficient information from dentists on these causes and on their mechanism of action on dental hard tissues.

CURRENT STATE OF KNOWLEDGE

The first section of the doctoral thesis is structured in two chapters and presents a synthesis on the aspects of dental wear in children and adolescents, starting from the information provided by representative national and international studies.

Chapter 1. Dental wear - is a dental lesion in which the loss of hard tissue occurs under the action of internal and external factors, excluding tooth decay and brutal trauma.

Chapter 2. Dental erosion in children and adolescents - The prevalence of dental wear varies greatly, with broad values reported due to inherently different study populations, methodologies and recording indexes used [1]. Erosive dental wear coexists with other types of wear, such as attrition and abrasion. In the early stages, chemical erosion could be the main type of dental wear.

PERSONAL CONTRIBUTION

The second part of the doctoral thesis includes three research directions.

Chapter 3. The working hypothesis and general objectives.

The working hypothesis for this research was based on the premise that early diagnosis of dental wear in children is very important, because the presence of dental wear lesions in the primary dentition presents a risk of later developing lesions in the permanent dentition [2].

The main objective of this research is to highlight the etiological factors of dental wear in children and the associations between them, as well as the mechanisms by which they act at the level of dental structures.

Chapter 4. Epidemiological study of dental wear in children between 6 and 11 years old from Dolj county, Romania.

The objective of this study was to establish the prevalence, severity of injuries and highlighting possible risk factors associated with dental wear in two groups of children from urban and rural areas in Dolj County, Romania aged between 6 and 11 years. It was a descriptive research.

Material and method. We performed the examination of 456 children in their classrooms, under natural light, by simply visual evaluation of the oral cavity. The evaluation of the children included the clinical examination followed by the filling-in an examination form where with the help of the BEWE score the damage to the dental structures was assessed. In addition, we asked the parents/tutors to complete a questionnaire which could help us later to identify the etiological and risk factors involved in dental wear in children.

Results and discussions. Out of the total of 456 children examined, 148 presented dental wear, representing **32.46%** (Figure 4.1.). This value is found approximately in other studies published in the literature [3, 4]. Regarding the age group, the most affected was the 7-year-old group (33.11%) with values quite close to those published in the literature [5]. Regarding the distribution by sex, the male sex was slightly more affected than the female sex (54.05%), an aspect also reported in other studies [6].

This study identified as common risk factors: ***consumption of sugary carbonated drinks and consumption of foods with acidic potential*** (pickles, plain yogurt, sour soups with cabbage juice or borscht). Consumption of sugary carbonated drinks was most commonly associated with dental wear, an aspect highlighted in the literature [3].

The frequency of brushing showed that 33.11% of those with dental wear performed a brushing twice a day, respectively 43.92% of them performed brushing their teeth once a day. The same aspect is presented in a recent study, where the prevalence of dental wear increased with the existence of poor oral hygiene [7]. A significant association between dental wear and brushing duration, brushing frequency and brushing method has been observed in other studies published in the literature [8, 9]. Regarding bruxism, in the present study, 18.92% of those with dental wear also describe the presence of bruxism episodes.

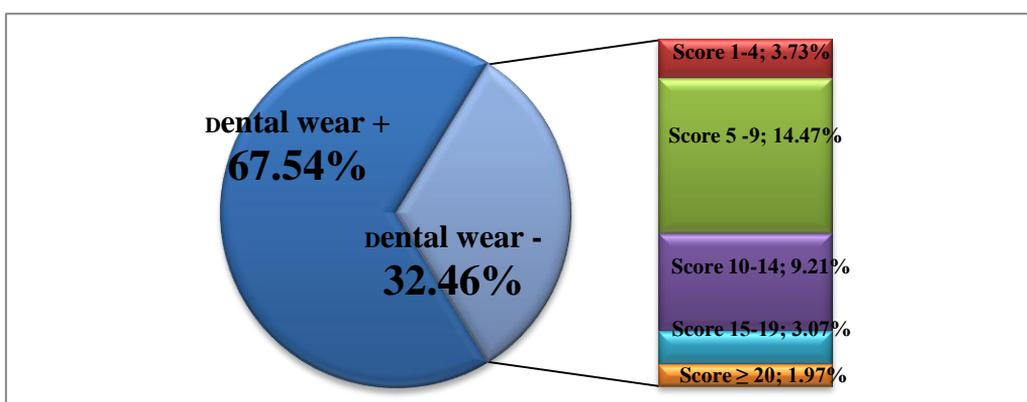


Figure 4.1. – Dental wear prevalence and distribution of BEWE score in the study group

Chapter 5. Study using the applications of factorial analysis in highlighting the risk factors of erosive dental wear.

In children and youngsters, the most common form of dental wear is dental erosion, especially in primary dentition [10]. Dental erosion begins with the enamel surfaces demineralization that progresses to extensive loss of hard dental tissues when the acidic contact continues [11].

The aim of the study was to determine the impact of individual or associated risk factors on the severity of dental erosion in children using factorial analysis, as well as the mechanisms by which they act in the production of dental wear.

Material and method. For this study we used the method of factorial analysis. We reanalyzed the statistical data and the database created in the Microsoft Excel program from the previous clinico-statistical study. Firstly, the registered variables were grouped, in order to observe if they are present at the same time, with similar intensity, thus constituting factors that act in the way of developing dental wear. Secondly, the impact of these categories of factors on dental wear was analyzed. To evaluate the relationship between the recorded variables and the wear score, we calculated the Pearson correlation coefficients. For our study, we highlighted the variables for which the p-value calculated for the Pearson correlation coefficient was below the threshold significance of 0.05.

Results and discussions. The risk factors evaluated as variables in this study (Figure 5.1.) act through three mechanisms of dental wear: *food, acidic beverages and the frequency of their consumption by biocorrosion; tooth brushing by friction and bruxism by stress* [12]. After identifying the associations between the risk factors involved in dental wear in the previous study, we could also highlight the mechanisms by which dental wear occurred in those patients.

Regarding *biocorrosion*, the study showed the highest erosive potential for energy drinks, yogurt and carbonated drinks. A number of other factors have been highlighted as having increased erosive potential: apples, pickles, commercial fruit juices by their frequency of consumption. Other studies have shown a positive association between diet and dental wear [13]. The role of *friction* in this study was represented by toothbrushing, relevant being the time of using the toothbrush, the frequency of brushing and the time when the toothbrushing was performed after consuming acidic foods. There is a lot of controversy in the literature about the role of tooth brushing in dental erosion [14]. *Stress* was represented in this study by bruxism. It should be noted that, according to the present study, the presence of dental wear as a pathognomonic symptom of bruxism in mixed dentition is not supported. Also, according to

another study, the occurrence of dental wear as a pathognomonic symptom of nocturnal bruxism in mixed dentition is not supported [15].

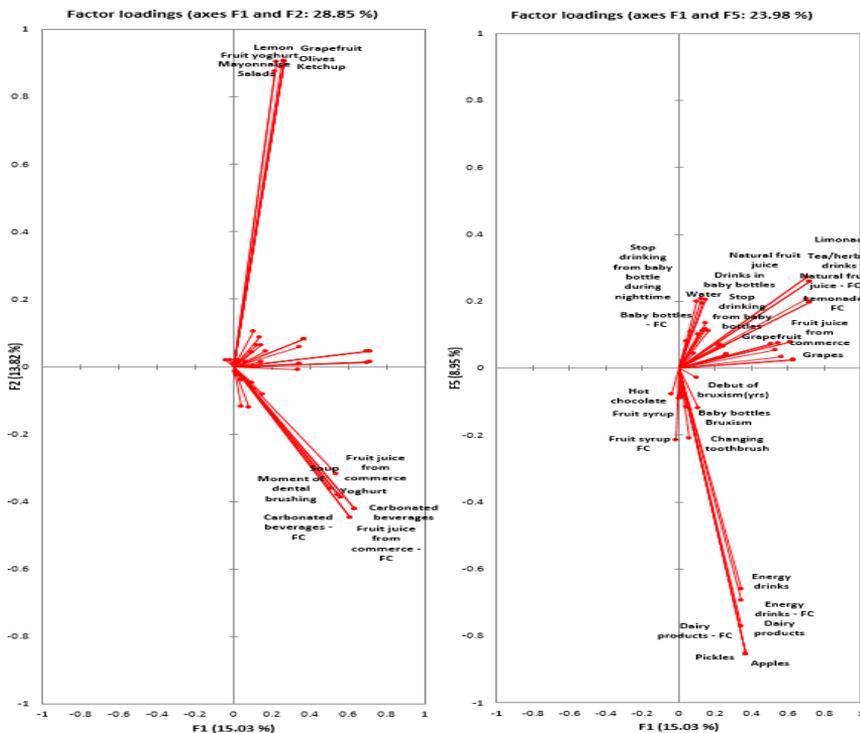


Figure 5.1. – Correlations between the representative factors resulted by factorial analysis

Chapter 6. Study using the OCT analysis of primary teeth affected by dental wear.

The aim of the study was to highlight the qualitative morphological changes of temporary teeth affected by dental wear using the OCT method, in order to establish the mechanisms by which dental wear occurred, the nature of etiological factors and the relevance of the OCT examination in diagnosing clinical forms of dental wear in children.

Material and method. The study was performed on a sample of 27 temporary teeth with dental wear.

Results and discussions. The OCT study showed aspects of demineralization of hard tissues specific to dental erosion and the presence of cracks specific to dental attrition (Figure 6.1.).

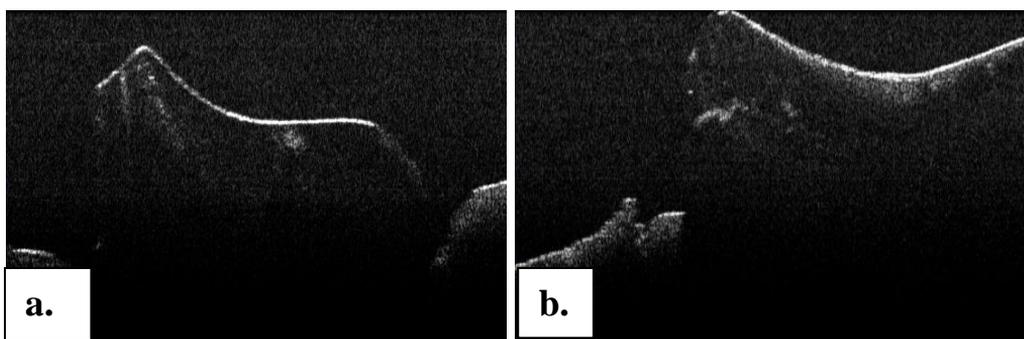


Figure 6.1. – OCT aspects of attrition (a) and erosion (b)

Regarding the etiopathogenetic mechanisms of dental erosion, the appearance of the dental erosion lesion is described by involving chemical demineralization (biocorrosion) with the contribution of physical factors through friction and stress. As for attrition lesions, according to the etiopathogenetic mechanisms described by Grippo, they are a form of dental wear caused by friction and cyclic stress, as in bruxism [16].

Chapter 7. General discussions.

Dental wear has been considered a growing oral health problem in children and adolescents, and erosion is often cited as the main cause of dental wear [17]. This study discussed the changes produced in the primary dentition by dental wear. In order to establish a proper diagnosis of the clinical form of dental wear, anesthetic data, macroscopic appearance based on photographic images and data obtained by OCT examination were taken into account.

Establishing an early diagnosis of dental wear in children is essential. Harding states that the presence of dental wear in the primary dentition, especially in complicated cases, presents an increased risk for the child to develop later wear lesions in permanent dentition [18].

Chapter 8. General conclusions.

1. The prevalence of dental wear in the region of Dolj County, Romania resulting from this research was **32.46%**.
2. The highest prevalence was in the 7-years-old age group (33.11%), in the urban environment, (84.46%) associated with the economic status and a series of drinks / foods to which the urban environment facilitates the access.
3. Of the three clinical forms of dental wear in children, the most common was **dental erosion**, with a significant percentage of 43.24%, followed by attrition with a percentage of 35.14%.
4. Through the associations resulting from the factorial analysis, there were highlighted the mechanisms involved in dental wear, firstly **biocorrosion**, followed by **friction** and **stress**.
5. Although 18.92% of those with dental wear also describe the presence of bruxism episodes, the presence of dental wear as a pathognomonic symptom of bruxism in mixed dentition is not supported.
6. The following were identified as common **risk factors**: consumption of carbonated and energy drinks and consumption of foods with acidic potential (pickles, plain yogurt, sour soups with cabbage juice or borscht).
7. Using factorial analysis, the greatest impact was determined by the associated consumption of energy drinks with apples, pickles and carbonated drinks.
8. According to the performed factorial analysis, the association between the consumption of acidic foods or drinks and the moment of brushing have a greater impact on dental erosion, but, analyzed separately, the consumption of acidic foods and beverages takes precedence.
9. The OCT aspects of the main forms of dental wear encountered in primary and mixed dentition (erosion and attrition) completed the clinical aspect of these lesions for a proper diagnosis.

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