

NON-CARIOUS CERVICAL LESIONS: RISK FACTORS AND TREATMENT OPTIONS

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Abstract

Anyone with a natural tooth can develop a non-carious lesion, but many patients are unaware of its consequences until it reaches an advanced stage. The prevalence of non-carious lesions increases with aging and mostly affects the male population. It is a physiological process that occurs during aging, although it can be considered pathological when the level of its destruction creates functional problems, aesthetics, or dental sensitivity. This research investigates the etiology, prevalence, and progression of non-carious dental lesions in different populations.

The research was conducted in two dental practices in the cities of Shtip and Radovich. Fifteen men and fifteen women aged 25 to 60 were included in this study. For this research, we conducted an anonymous survey questionnaire. The questionnaire consisted of questions about the type of brush the patients use and the method of brushing, then about the food and the type of drinks they consume, which are a source of acids, and whether they have bruxism and acid reflux. Patients were also asked if their profession was associated as a risk factor with those changes. The gained data were processed by Statistica 7.1 for Windows and SPSS 23.

According to the data obtained from our patients, it can be seen that the main reason for the appearance of non-carious lesions among the subjects was the consumption of food and drinks that are a source of acids. Aggressive brushing is an improper technique, and together with an improper diet, builds a basic etiological factor and makes a hole that leads to the appearance and progression of these lesions. While caries remains the most prevalent dental disease, non-carious lesions contribute to a significant proportion of dental health problems, affecting both the appearance and functionality of teeth. Therefore, a comprehensive assessment of risk factors and lifestyle oral health

behaviours is crucial for implementing tailored preventive strategies.

Lifestyle, work choices, oral hygiene practices, and systemic conditions influence the management and progression of these lesions. By solving these goals, the research seeks to improve the prevention of non-carious dental lesions, improve clinical outcomes for affected individuals, and launch an initiative to promote better oral health.

Key words: *Functional anomalies, Non-carious lesions, Consumption of dental substance.*

1. Introduction

In medical diagnostics and pathology, research of non-carious lesions extends far beyond those of immediate concern or urgency. Amidst the myriad abnormalities that could manifest in the human body, these lesions emerge as a distinct category that deserves attention. Although lacking immediate alarming features or obvious pathological significance, these lesions are important in medical evaluation and patient care. Defined by their benign nature or minimal clinical impact, non-carious lesions represent a spectrum of tissue abnormalities that could be found in random findings [5]. This introduction lays the groundwork for searching through the nuances of non-carious lesions, shining a light on their significance in the broader landscape of medical practice and highlighting their implications for patient management and healthcare delivery.

As a result of one or more causes, tooth wear could be very significant. The group of non-carious lesions includes:

- Erosion (loss of tooth substance as a result of a chemical process).

- Attrition (occurs due to the mutual friction of the antagonists, spontaneously or during mastication).
- Abrasion (loss of tooth substance due to mechanical forces).
- Abfraction (loss of a cervical part of the crown due to occlusal pressure) [1].

Abrasion means the loss of the hard tooth substance due to external mechanical forces. Examples of such forces could be objects used in the occupation, such as nails, pins, as well as holding a pipe, and too aggressive teeth brushing. It is important to describe that these lesions occur as a result of already softened tooth substance due to acids, which sometimes leads to a dilemma, whether it is abrasion or erosion [8]. If the examination is performed on dry and clean teeth, then it is very easy to diagnose the lost parts of the tooth structures. It is more difficult to determine whether it is pathological or physiological tooth wear [12]. When assessing the condition, it is necessary to perform a clinical and radiological examination, where insight can be gained into the amount of reparative dentin and the proximity of the pulp in teeth that have suffered loss. The dental abrasion has the potential to be asymptomatic, which is why the patients are not aware of its presence, and it could be identified incidentally during a dental examination [9].

Erosion is described as the irreversible loss of dental hard tissue resulting from exposure to non-bacterial agents or chelating agents. It could be caused by exogenous or endogenous factors. In the former case, food, drink, and the environment could be sources of acids; in the latter, the acids that flow into the oral cavity from the stomach and duodenum. The reduced salivary secretion that occurs in many diseases also affects dental erosion, while the factors that cause erosion and aggressive teeth brushing immediately after consuming acidic foods increase the extent and depth of the erosive cavities. The consequence of dental erosion is tooth hypersensitivity, which is a result of exposure of the dentinal tubules and the pulp, leading to loss of tooth vitality and a decrease in the occlusal height. The treatment of exogenous dental erosion consists of changing the nutritional and hygiene habits. However, in the case of endogenous erosion, the therapy should mainly address the underlying disease. The worn tooth surfaces should be restored by conservative and/or prosthetic methods. In the context of an increasing prevalence of dental erosion in the population, it is necessary to develop and implement prophylactic measures, including widely understood health education about the risk factors, preventive activities, and possibilities for diagnosis and therapy. According to Ren [12], acidic beverages, soft beverages, carbonated beverages, fruit juices, and sports beverages are almost exclusively

acidic ($\text{pH} < 4$) by nature, to maintain a fresh and fizzy mouth odor (carbonated beverages), and to prevent the rapid growth of bacteria. These beverages, when in contact with the tooth, will reduce the tooth surface pH value to a level below the critical value of 5.5, which will cause the enamel demineralization. The erosion begins with the softening of the enamel surface in the early stage, and the loss of the enamel tissue progressively develops with the continuous intake of foods and beverages that cause it (Figure 1).

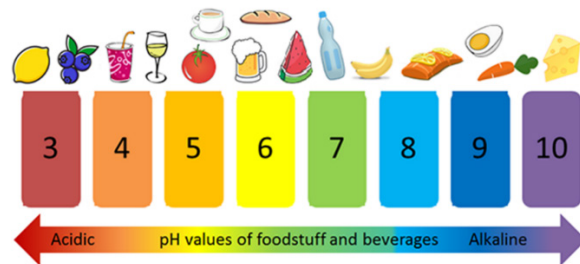


Figure 1. pH value of foods that (do not) cause dental erosion

The source of endogenous acids in the oral cavity is predominantly the gastric contents refluxing through the esophageal tract. The gastric juice consists mainly of hydrochloric acid, produced by the parietal cells of the stomach. The presence of highly acidic gastric juice ($\text{pH} = 1 - 3$) in the oral cavity could lead to dental erosion. Gastroesophageal reflux disease (GERD) and bulimia are the main diseases associated with gastric juice reflux into the mouth. Although rare, this should be considered as one of the potential etiological factors in patients with unknown causes of erosive tooth wear [10].

Accurate diagnosis of erosion and erosive tooth wear begins with a thorough assessment of the risk factors for erosion and medical and dental history. It is imperative to recognize risk factors early, preferably before any sign of erosive tooth wear is present, to ease early intervention. According to Kuchta *et al.*, [6], the localization of the erosive cavities depends on the source of acids (endo- and exogenous acids), the cavity depth, as well as the dynamics of the erosive changes, the presence of risk factors, and the frequency of the exposure.

Among the exogenous causes of dental erosion, diet is the most important. The consumption of products with a low pH (lower than 5.5) dissolves the enamel hydroxyapatites, whose clinical pH is 5.5, while products with a pH lower than 4.5 contribute to the dissolution of fluorapatites. Fruit juices, sweet carbonated and non-carbonated drinks, wine, acidic fruits (among others, apples, grapes, citrus fruits, and plums), and fruit teas could be very erosive. Phosphoric

acid is the most commonly ingested acid, present in foods, especially fresh fruit. Ascorbic acid (vitamin C) is also commonly consumed as an ingredient in drinks, candies, and medicines that dissolve in the oral cavity. These acids cause enamel erosion. Adding phosphates and calcium compounds to beverages reduces the development of erosive changes to some extent and favors remineralization of tooth surfaces. In recent years, an increasing number of people have led an active and healthy lifestyle, which is associated with drinking isotonic beverages and a greater intake of vegetables and fruits.

Attrition occurs as a consequence of the mutual tooth friction of one jaw with the antagonist's teeth. The loss of tooth substance on the occlusal surfaces of the teeth is a normal process throughout life; it is a physiological teeth wear that occurs as part of the aging process, but the problem will occur when there is an accelerated rate of loss of tooth substance for various reasons, such as bruxism, grinding and clenching of the teeth, as well as certain other bad habits [7]. The wear could also be intensified by abrasive components of the food. In the advanced stage, there may be a decrease in the height of the bite and severe morphological and functional changes in the stomatognathic system. Teeth in this condition have exposed dentin with smoothed occlusal surfaces, which results in an increased risk of dental caries and dentin hypersensitivity. Some of the signs that there is attrition could be problems with the temporomandibular joint and tingling of the masticatory muscles upon waking [13]. The most common localization of these conditions is the occlusal and incisal surfaces of the teeth, but sometimes there is a change in the approximal surfaces due to the movement of the teeth in the alveolus. It has also been proven that the influence of food on the degree of severity of friction is of great importance. Foods that damage the dentin are more abrasive and not necessarily more consistent. The presence of saliva mitigates the tooth wear, due to the potential lubricating effect that occurs on the surfaces. Therefore, patients with less or almost no saliva show a higher level of dental attrition [4].

The therapy depends on the degree of substance loss, and according to this, there are two criteria: the aesthetic appearance of the patient and the need for bite elevation.

Therefore, according to this classification, we have three categories of patients:

- Category 1 - Minor loss of tooth tissue, teeth have a satisfactory appearance.
- Category 2 - Satisfactory appearance of the teeth; no need for overbite correction yet.
- Category 3 - The appearance of the teeth is not

satisfactory, and we need an overbite lift. There are two subgroups:

- a. When there is enough space available.
- b. When there is not enough space available.

In category 3 patients, the treatment could be very complex. In some cases, it is initially necessary to achieve an increase in the vertical dimension of the occlusion to make room for the intended restorations. Generally, when it comes to an increase in the vertical dimension that is not greater than 2 mm, the patients easily get used to it, but if this increase needs to be greater than 2 mm, a diagnostic or bite splint should be made to ensure that the patient could accept such a change in the height. The height of such splints should be gradually increased at regular intervals until the patient accepts the required height. After this adjustment, the fabrication of a definitive prosthetic restoration can begin [2, 3].

Another way for this kind of gradual habituation is to apply composite material over the occlusal surfaces of the posterior teeth to provide temporary elevation of the teeth, then gradually add material until the patient becomes accustomed to the new height.

Patients can be treated in a manner known as the Dahl concept, which includes patients who need restorations placed on only a small number of front teeth but do not have enough space due to compensatory mechanisms.

The purpose of this research was to investigate the etiology, the prevalence, and the progression of non-carious dental lesions in different populations. To assess the effectiveness of different dental materials, restorative techniques, and patient education programs aimed at mitigating the impact of these lesions [11].

2. Materials and Methods

To realize the set goal, research was conducted in two dental offices in the cities of Shtip and Radovish. This study included 15 men and 15 women aged 25 to 60 years. To carry out this research, we conducted an anonymous survey questionnaire. The questionnaire consisted of questions related to the type of brush used by the patients, as well as the method of brushing, the food, and the type of drinks they consume, which are sources of acids, whether they have bruxism, and whether they have acid erosion. Patients were also asked whether their occupation is associated as a risk factor with these changes.

The data analysis was performed on a statistical program, Statistica 7.1 for Windows and SPSS 23, and

the arithmetic mean of the responses was calculated. The data and the results are presented in graphs.

3. Results and Discussion

Only 20% of the respondents use the rotational brushing technique, while 40% use the horizontal and 40% the vertical brushing technique (Figure 2).

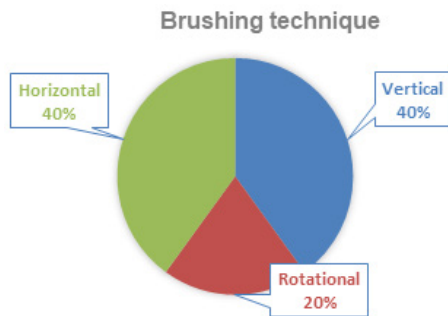


Figure 2. Graphical representation of tooth brushing techniques

According to the type of brush used by our respondents, 70% use a brush with medium-hard bristles (medium), 20% use a soft bristle toothbrush (soft), 10% use a hard bristle toothbrush (hard) and 0% of respondents use an ultra-soft bristle toothbrush (ultra soft) (Figure 3).

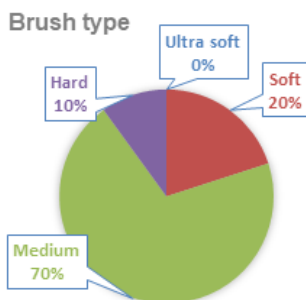


Figure 3. Graphical representation of brush type

A large portion of the respondents, 70%, use aggressive tooth brushing (Figure 4), and when asked whether they consume foods and beverages that are a source of acids, the majority, i.e., 90% of the respondents, answered that they do (Figure 5).

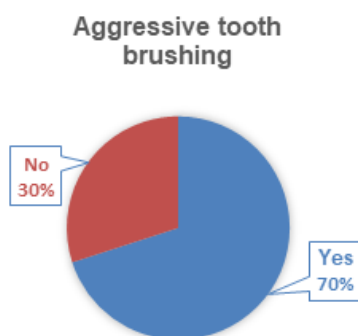


Figure 4. The way of brushing teeth

Consuming food and beverages that are a source of acids

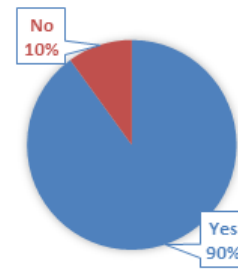


Figure 5. Consumption of foods and beverages that are sources of acids

In this research, none of the respondents had teeth grinding, i.e., bruxism (Figure 6), and reflux of stomach acid into the oral cavity was present in 10% of the respondents (Figure 7), and in these cases, the cause was pregnancy (Figure 8). In none of the respondents, the occupation is not the cause of these lesions (Figure 9).

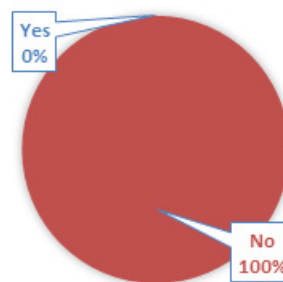


Figure 6. Presence of bruxism

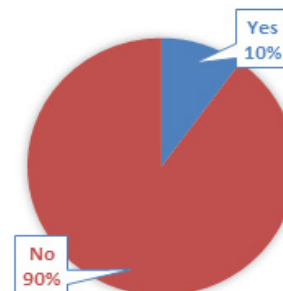


Figure 7. Existence of gastric acid reflux

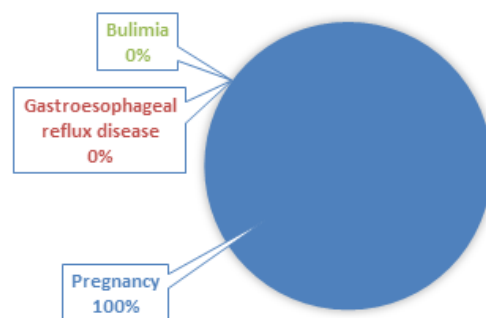


Figure 8. Causes of gastric acid reflux

In this research, the purpose was to investigate the etiology, prevalence, and progression of non-carious dental lesions in different populations. According to the data obtained from the conducted survey questionnaire, it can be concluded that the main reason, i.e., the underlying cause of the occurrence of non-carious lesions in the respondents, was the consumption of foods and beverages that are a source of acids.

The aggressive brushing and the use of incorrect techniques, along with improper diet, build a basic etiological factor and make a hole that leads to the occurrence and progression of these lesions. The youngest patient among our respondents who had non-carious lesions was 26 years old, while the oldest was 60 years old. As the main factors, the answer also provides the following question related to nutrition, which indicates that almost all respondents (90%) eat improperly and consume foods that are a source of acids that are unsuitable for tooth enamel.

4. Conclusions

- Lifestyle habits, dietary choices, oral hygiene practices, and systemic conditions play roles in the development and progression of these lesions.
- While caries remains the most prevalent dental disease, non-carious lesions contribute to a significant proportion of dental health problems, affecting both the appearance and the function of the teeth. Therefore, a comprehensive assessment of risk factors and oral health behaviors of the patients is crucial for implementing tailored preventive strategies.
- By addressing these goals, this research seeks to improve the prevention of non-carious dental lesions, improve the clinical outcomes for affected individuals, and initiate initiatives to promote better oral health.

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