

EXPLORING THE INTERRELATIONSHIP OF GINGIVAL RECESSION, DENTINE HYPERSENSITIVITY AND ORTHODONTIC TREATMENT IN YOUNG ADULTS: A RESEARCH STUDY

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ABSTRACT

Background: The objective of this research is to examine the connection between gingival recession, dentine hypersensitivity and conducted orthodontic therapy in young adults.

Materials and methods: The research is conducted on 50 healthy, young subjects. The subjects received consent forms for participation in the research. In their anamnesis, the subjects provided information about their general health, oral hygiene habits, completed orthodontic therapy and gingival recessions on the buccal side of all teeth were documented by the clinical gingival examination. In the case of the presence of dental plaque, initial periodontal therapy was conducted. After documenting gingival recession on each tooth with a recession on the vestibular side, an examination of dentine hypersensitivity was conducted using an air blast from a distance of around 2 cm. All obtained data were documented in the work chart especially designed for this research. Results: Of 1400 examined teeth, 946 teeth were with no gingival recessions present, and 454 teeth were with gingival recessions present. Out of that number, 186 (41%) were with dentine hypersensitivity, whereas in the group with no gingival recessions present, dentine hypersensitivity was recorded only in 12 teeth (1.3%). In patients that were orthodontic patients out of the total number of teeth (644), a gingival recession was noticed in only 209 teeth.

Conclusion: The occurrence of gingival recessions is connected to the occurrence of dentine hypersensitivity. Orthodontic therapy is listed as a factor in the occurrence of gingival recessions, but many other factors should be taken into consideration. Still, there is not enough evidence that would suggest that one method of brushing teeth or a type of toothbrush is more effective than the other in the prevention of the occurrence of gingival recessions. Excessive diversity of samples and methodology design in certain studies make it difficult to detect ideal techniques.

Keywords: recession, dentine hypersensitivity, orthodontic therapy

Introduction

A gingival recession occurs when the marginal gingiva moves from the cemento-enamel junction toward the tooth's root. It can be localized or generalized and affect one or more tooth surfaces. This condition often leads to esthetic problems for patients and the fear of losing a tooth. Additionally, gingival recession can cause dentine hypersensitivity and root caries, which are common reasons for visiting dental practices [1,2,3]. There are two main types of recession: one is related to periodontal disease, and the other to mechanical factors such as using a toothbrush. However, there may be other causes that contribute to this condition.

Current studies indicate that gingival recession has multiple causes [4, 5, 6].

Various factors can contribute to dental problems, but dental plaque is a primary cause [1,7]. Other factors to be considered include using hard toothbrushes, incorrect brushing techniques, high frenulum insertion, teeth position in the dental arch, movement of teeth due to orthodontic forces, traumatic occlusion, subgingival restorations [1], periodontitis, erosion (chemical or electro-chemical degradation of dental tissue), friction, tooth wear (endogenous mechanical wear), and abrasion (exogenous mechanical wear) [4,6,8].

There is a growing demand for orthodontic therapy among patients wishing to improve the appearance and function of their teeth [9]. However, like any other medical therapy, orthodontic therapy can have unwanted side effects. One of the most common complications of periodontium in patients undergoing orthodontic therapy is the development of gingival hyperplasia and gingival recession [9,10]. Studies have shown that up to 12% of orthodontic patients may develop gingival recession [10]. Orthodontic tooth movement outside of the alveolus and a decrease in the height of the keratinized gingiva can result in changes leading to gingival recession [9].

However, different lesion morphologies connected with the prevalence of specific etiological factors in the cervical area [4,8,11] often result in the occurrence of wedge-shaped or concave lesions [4,12]. Taking into consideration the combined

effects of all or certain etiological factors, the occurrence of gingival recessions can contribute to exposure to dentine and the occurrence of dentine hypersensitivity [4].

Dentine hypersensitivity is a common clinical problem with an increasing rate of prevalence. For patients, it represents a long-term painful discomfort, and for dentists, it represents a diagnostic and therapeutic challenge [13,14,15].

It is defined as a short and painful ache that occurs in exposed dentine as a response to thermal, chemical, tactile or osmotic stimuli which cannot be attributed to any other defect or tooth pathology [15,16].

The frequency of the occurrence of dentine hypersensitivity ranges from 3 – 57%, and it is more common in patients suffering from periodontal disease, 72 – 98% [13,17].

Nevertheless, epidemiological studies linking gingival recession and dentine hypersensitivity are not common, due to the difficulties in attaining and comparing data from different populations [1]. Even within the same population the differences in clinical characteristics and risk factors that these conditions include must be further researched.

The objective of this research is to examine the connection between gingival recession, dentine hypersensitivity and conducted orthodontic therapy in young adults.

Materials and methods

The research was done in the form of a clinical prospective study and was conducted on 50 healthy young adults coming for a regular dental examination.

All of the subjects were examined at the Department of Oral Medicine and Periodontology at the Faculty of Dentistry in Sarajevo. The subjects were given a consent form for participation in the research to sign before the anamnestic-diagnostic procedure.

After conducting anamnesis in which the subjects provided data about their general health, oral hygiene habits and completed orthodontic therapy, a

clinical examination including examination of the gingiva and gingival recession on the buccal side of all teeth was performed. Initial periodontal therapy was conducted in the case of plaque presence.

After documenting gingival recessions in every tooth with a recession on the vestibular side, an examination of dentine hypersensitivity was conducted using an air blast from a distance of around 2 cm.

All obtained data were documented in the work chart especially designed for this research.

Results

The results were processed by standard statistical methods, using the SPSS computer program for statistical analyses (SPSS – Statistical Package for Social Sciences), version 21.0. The results were shown as absolute numbers N and percentage values %. The Chi-square test was used in the analysis of the dependence between the category variables. The value $p < 0.05$ was taken as statistically significant.

Table 1 shows the baseline characteristics of the subjects.

The total number of subjects was 50, and the total number of examined teeth was 1400. 19 of them (38%) were male subjects, whereas the remaining 31 (62,0%) were female. When it comes to brushing use, 1 of them (2,0%) uses an electric brush, 41 (82,0%) use a soft brush, 7 (14,0%) use a medium hard brush, whereas 1 (2,0%) use a hard brush. Out of additional products, 32 subjects (64,0%) use dental floss, 15 (30,0%) use an oral rinse, whereas 1 subject (2,0%) uses a water-pic oral shower. The scrub brush method was used by 10 subjects (20,0%), whereas the remaining 40 (80,0%) used the modified Stillman brushing technique. Completed orthodontic therapy (wore a fixed dental appliance) was ascertained in 14 subjects (28,0%), in 6 (12,0%) there was completed orthodontic therapy – mobile dental appliance, in 2 (4,0%) there was no completed orthodontic therapy – mobile dental appliance, whereas 28 subjects (56,0%) were not orthodontic patients.

Total number of patients

50

Total number of examined teeth

1400

Sex

Male – 19 (38,0%)

Female – 31 (62,0%)

Type of brush

Electric – 1 (2,0%)

Soft – 41 (82,0%)

Medium hard – 7 (14,0%)

Hard - 1 (2,0%)

Additional products

Dental floss – 32 (64,0%)

Oral rinse – 15 (30,0%)

Water-pic oral shower – 1 (2,0%)

Brushing techniques

Scrub brush method – 10 (20,0%)

Modified Stillman brushing technique
– 40 (80,0%)

Orthodontic therapy

Completed orthodontic therapy
(wore fixed dental appliance) – 14 (28,0%)

Completed orthodontic therapy
– mobile dental appliance – 6 (12,0%)

Not completed orthodontic therapy
- fixed dental appliance – 2 (4,0%)

Not completed orthodontic therapy
– mobile dental appliance – 0 (0,0%)

Was not an orthodontic patient – 28 (56,0%)

*Results are shown as absolute numbers (N)
and percentage values (%)*

Table 1
Baseline characteristics of the subjects

Additionally, about the total number of examined teeth, there was no significant dependence ascertained between the occurrence of recession and orthodontic therapy ($p=0,944$) (table 2).

There was no significant dependence ascertained between the occurrence of recession and the need for periodontal treatment ($p=0,944$) (table 2).

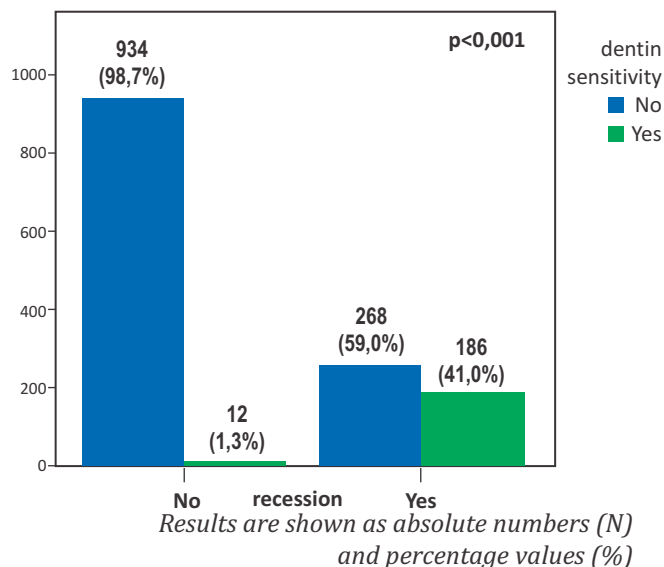
	Recession		p
	No	Yes	
The need for periodontal treatment			
NO	325 (68,7%)	148 (31,3%)	0,516
YES	621 (67,0%)	306 (33,0%)	
Orthodontic therapy			
completed orthodontic therapy (wore fixed dental appliance)	265 (67,6%)	127 (32,4%)	0,944
completed orthodontic therapy – mobile dental appliance	131 (66,5%)	66 (33,5%)	
not completed orthodontic therapy – fixed dental appliance	39 (70,9%)	16 (29,1%)	
not completed orthodontic therapy	511 (67,6%)	245 (32,4%)	

Results are shown as absolute numbers (N) and percentage values (%)

Table 2

Dependence between the occurrence of recession, the need for periodontal treatment, and orthodontic therapy

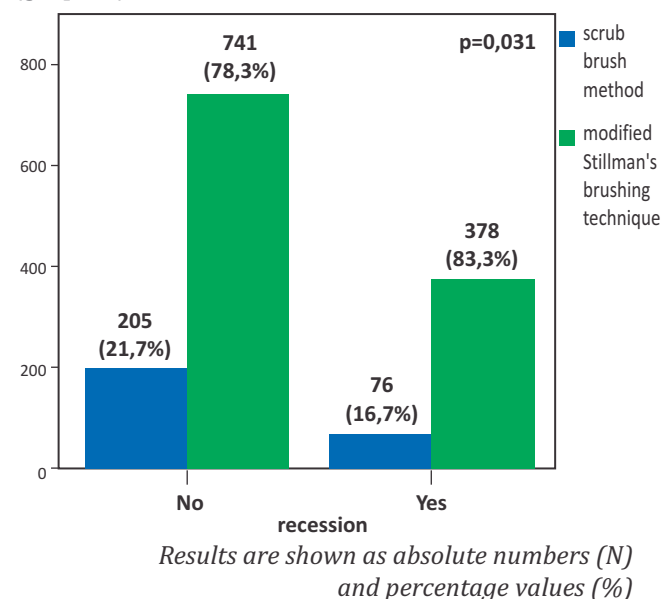
The ascertained difference in the frequency of occurrence of dentine sensitivity concerning the presence of recession was statistically significant ($p<0,001$) (graph 1).



Graph 1.

Dependence between the occurrence of recession and dentine sensitivity

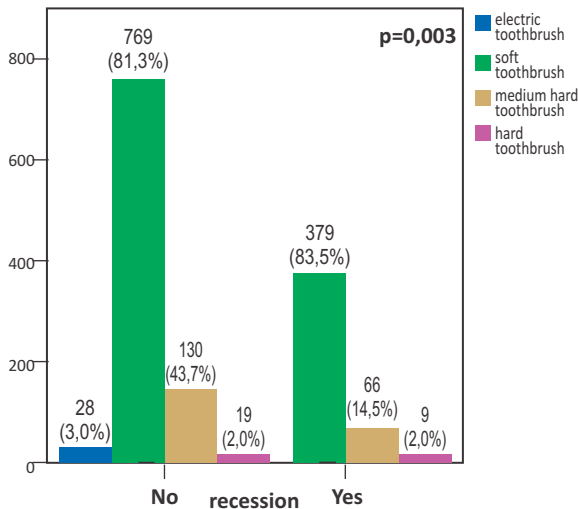
The ascertained difference in the frequency of brushing techniques concerning the presence of recession was statistically significant ($p=0,031$) (graph 2).



Graph 2

Dependence between the occurrence of recession and brushing technique

The ascertained difference in the frequency of use of different types of toothbrushes concerning the presence of recession was statistically significant ($p=0,003$) (graph 3).



Results are shown as absolute numbers (N) and percentage values (%)

Graph 3

Dependence between the occurrence of recession and the type of toothbrush is used

Discussion

The research was conducted on 50 young adults who responded to the Department of Oral Medicine and Periodontology. The total number of examined teeth in subjects was 1400 (table 1).

In our research, of the total number of examined teeth, 454 of them had gingival recessions present, or 32,4%, whereas 946 or 67,6% of teeth were with no gingival recessions present. The role of dental plaque and gingivitis in the etiology of gingival recessions was examined in numerous earlier epidemiological studies, where the inflammation of the gingiva was listed as one of the important favoring factors in the occurrence of gingival recessions [18,19]. In the results of our research out of the total of 1400 examined teeth, 927 teeth required treatment, and 453 teeth were without the need for periodontal treatment. Of the teeth requiring periodontal treatment 621 (67,0%) were teeth with no gingival recessions present, and 306 (33,0%) were with gingival recessions present, so no significant

dependence was ascertained between the occurrence of recession and the need for periodontal treatment ($p=0,516$) (table 2). These results also correspond to the results of other authors [1,20].

The occurrence of gingival recessions after orthodontic therapy is considered to be one of the frequent occurrences (21). In our research, of the total 1400 examined teeth, 644 teeth were included in orthodontic therapy, out of that number 435 teeth were without recessions, and in 209 teeth gingival recessions were recognized. Of this number, 127 wore a fixed orthodontic appliance. Therefore, no significant dependence was determined between the occurrence of recession and orthodontic therapy ($p=0,944$) (table 2). These results do not correspond with the results of other authors who linked the occurrence of gingival recessions to orthodontic therapy [1,21,22,23,27], but they do correspond with the results of authors [9,24].

The results of our research show that out of the total of 946 teeth with no recession present, 934 of them (98,7%) did not have dentine hypersensitivity, whereas the remaining 12 (1,3%) did. Of the total of 454 teeth with recession present, 268 of them (59,0%) did not have dentine hypersensitivity, whereas the remaining 186 (41,0%) did. The ascertained difference in the frequency of occurrence of dentine sensitivity concerning the presence of recession was statistically significant ($p<0,001$) (graph 1). These results correspond with the results of other authors [4,25,26,28] who have proven in the results of their researches that dentine hypersensitivity is connected to the occurrence of gingival recessions.

Out of the total of 946 teeth with no recession present, 205 of them (21,7%) applied the scrub brush method, whereas the remaining 741 (78,3%) used the modified Stillman brushing technique. Of the total of 454 teeth with recession present, 76 of them (16,7%) applied the scrub brush method, whereas the remaining 378 (88,3%) used the modified Stillman brushing technique. The ascertained difference in the frequency of brushing techniques concerning the presence of recession was statistically significant ($p=0,031$) (graph 2).

Here it is important to emphasize that most of the subjects in both groups, with recession and without a recession, used the Stillman brushing technique, which can be understood that it cannot be said that

one technique is more effective than the other in the etiology of gingival recessions. The same results were obtained by other authors as well [29]. However, they do not correspond with the results of other authors [1,4,28].

Also, in the results of our research, when it comes to the connection between gingival recessions and the type of toothbrush, we found that out of the total of 946 teeth with no recession present, 28 of them (3,0%) used the electrical brush, 769 (81,3%) used a soft brush, 130 (13,7%) used a medium hard brush, while the remaining 19 (2,0%) used a hard brush. Out of the total of 454 teeth with recession present, 379 of them (83,5%) used a soft brush, 66 (14,5%) used a medium hard brush, while the remaining 9 (2,0%) used a hard brush (graph 3). The results do not correspond to the results of other authors [30] who concluded in their researches that the use of ultra-soft brushes significantly contributed to the prevention of the progression of gingival recessions, as well as the fact that the maximum effect of oral hygiene maintenance was achieved with the use of these brushes in class 1 recessions, as well as other authors [1,4,7]. But they do correspond with the results of authors [11,29] who also note in their researches that the types of brushes cannot be taken with certainty as an etiological factor in the occurrence of gingival recessions.

Conclusion

The occurrence of gingival recessions is connected to the occurrence of dentine hypersensitivity. Orthodontic therapy is listed as a factor in the occurrence of gingival recessions, but orthodontic irregularities should be taken into consideration here, including conditions before therapy, cooperation between the orthodontist and periodontologist, as well as certain groups of teeth. Still, there is not enough evidence suggesting that one method of brushing teeth or a type of toothbrush is more effective than the other in the prevention of the occurrence of gingival recessions. The excessive diversity of samples and methodology design in certain studies make it difficult to define ideal techniques.

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