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FREQUENCY AND DEVELOPMENT CAUSES OF GINGIVAL RECESSION IN DIFFERENT AGE GROUPS ON THE EXAMPLE OF YUNUSABAD DISTRICT, TASHKENT

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ABSTRACT

Research objective: to study the frequency and causes of the development of gingival recession in different age groups on the example of Yunusabad district in Tashkent city.

Material and methods. The research covered a clinical examination of 645 patients with gingival recession who underwent treatment in the 2nd Pediatric Dental Clinic and in 7th City Hospital located in the Yunusabad district in the period from 2015 to 2019. Patients composed 4 age groups according to WHO recommendations: 15-25 years old, 26-40 years old, 40-64 years old, and over 64 years.

Results and conclusion. Prevalence of gingival recession increased at age 15 from 11.8 % to 100% at the age of 64 and over. Morris Stahl's index varied from 6.7% to 73.8%, the recession intensity made from 1.09 mm to 3.38 mm, the recession index (IR) - from 0.59 to 3.95 points. The most effective methods in diagnostics of gingival recession during dental investigation were Morris Stahl's index (with the proposed interpretation) and the recession index developed by us.

Those allowed to evaluate rapidly both incidence of pathology and its severity, without using special training or special devices. It was established, that at the young age, the incidence of gingival recession is mainly affected by long-term injury in the presence of predisposing physiological characteristics, in older age groups, gingival recession is the result of pathological changes in periodontal tissues and its aging.

Keywords: gingival recession, Morris Stahl's index, recession index.

INTRODUCTION

One of the most urgent problems in dentistry to date is gingival recession, which has high prevalence rates in all age groups. [1, 2].

Quite often patients complain of increased dental sensitivity, one of the reasons for which may be a gingival recession, which in turn can affect the smile aesthetics. The prevalence of this pathology in the age group of 30-40 years is 38%, in the age group of 80-90 years reaches 90%.

According to researches of Leus P.A. and Kazeko L.A., prevalence rates range from 9.8% in 15-year-olds to 99.7% in adults. During studies, it was found out that the older was the patient's age, the greater was the percentage of gingival recession development [4].

The analysis of the literature data made it possible to establish several main causes leading to the development of gingival recession [10]. According to Starikov E.G, one of the causes of gingival recession is a traumatic gingival injury. This type of gingival pathology is caused due to the use of a hard toothbrush, and improper movements when cleaning teeth, especially horizontal ones. It is noted that in left-handed people, gingival recession develops more often on the right side and vice versa. It is explained by the fact that the left-handed person makes more pressure on the toothbrush when cleaning teeth with left hand. Besides, it is worth noting a single injury of various etiologies, which can also be a trigger in the occurrence of gingival recession, such as protruding edges of fillings, or bad habits (using toothpicks, "chewing" or "biting off" a pencil, etc.) [6].

Kernohan D.C. identified the following cause of gingival recession: a trauma of a chronic nature in breastfeeding children. During sucking, the child is traumatized by the gums and mucous membrane of the lower lip due to the movement of the dummy ring during meals. This ring makes rubbing movements that cause trauma and gingival recession [8]. Injury to the gingival tissue is possible in children with mental disorders. This is a rather rare cause, difficult to diagnose, but requiring close attention of dentists and pediatricians. This problem requires a consultation with a psychiatrist and psychotherapist to find out the cause and further treatment [4].

According to A.S. Grigoryan, “lesion of tissue elements is an essential component of all known pathological processes and, upon closer examination, represent their foundation.” Lesion is the starting point in the occurrence of gingival inflammation [5]. Toker H. identified the following cause of gingival recession: mucogingival abnormalities and deformities. This group of reasons for the development of gingival recession include a small vestibule of the oral cavity, low attachment of the frenulum of the lips, strands of the mucous membrane.

Insufficient attachment of the gingiva with a small vestibule of the oral cavity leads to permanent injury to the food lump, resulting in impaired blood circulation and atrophic processes that contribute to the onset of recession [7].

Other researcher Gorbatova E.A. proved in her works that the ratio of the values of the attached and marginal gingiva plays a large role in the development of gingival recession. The average ratio is 5: 1. At the same time, 5 mm is the minimum size. With a ratio of 1: 1, the percentage of patients with periodontal tissue pathology increases (90.5%), with a ratio of 8: 1, the percentage decreases to 27.6% [15].

High rates of gingival recession causes are occupied by mucous-alveolar cords, short and long frenum of the lips, and their incorrect attachment. A causal factor such as interweaving of connective tissue fibers in the interdental papilla, which leads to local disturbance of microcirculation and the appearance of focal gingival recessions, should be emphasized [3, 8].

Congenital absence of one or several teeth, the presence of supernumerary teeth, or malocclusion cause a violation of the chewing act, dysfunctions in the periodontal tissues, which contributes to gingival recession. The insufficiently expressed tooth equator contributes to the forcing of the food lump to the gingiva during chewing and causes additional periodontal injury [9].

Jdanov E.V. argued that as a result of poor oral hygiene, an abundant process of dental deposits occurs, where there is an active reproduction of pathogenic microorganisms. Poor oral hygiene results in inflammatory changes in the periodontal tissues, and in the future, gingival recession can be one of the symptoms [12].

Dependence of gingival recession on oral hygiene is established based on the data of the epidemiological examination. In the group of 15 years with satisfactory hygiene according to the Green-Vermillion index (OHI-S), the gingival recession index corresponds to Stahl, Morris - 3.8, the recession intensity - 1.05 mm, IR - 0.26, then with poor hygiene, i.e. Green Vermillion index > 2.6 indicators: gingival recession index grew to 6.75, recession intensity 1.22 mm, IR - 0.63.

Thus, indicators in other age groups change, indicating the dependence of gingival recession on oral hygiene, i.e. the worse oral hygiene, the more pronounced gingival recession is [9].

The alveolar process on the upper jaw has its own structural features. The canine teeth of the upper jaw have a thin cortical plate in the frontal part, the blood supply to this zone is due to the vessels of the periosteum, and their lesion leads to a dysfunction of blood supply and loss of the cortical plate. Due to this, digiscences and fenestrations are formed. Gingiva with these defects is very sensitive to mechanical injury, subsequently leading to its recession [6].

The movement of teeth in various directions with the help of orthodontic bracket leads to thinning of the alveolar bone and gingiva. Because of this, gingiva becomes vulnerable to the microbial factor (as wire structures make it difficult to conduct thorough oral hygiene). The accumulation of microbial plaque near the isthmus leads to gingival inflammation, while the gingiva is subjected to

mechanical stress due to the tensile force of the orthodontic bracket, which together leads to a progressive loss of gingival tissue. [10].

According to the research outcomes conducted by Kazeko L.A., in the group of 15-year-old adolescents with gingival recession, crowding of teeth was established in 15.2% of cases, teeth protruding vestibularly from the dental arch - in 26% of cases, often a combination of gingival recession with malocclusion. These factors can be attributed to the risk group for the development of gingival recession [9].

RESEARCH OBJECT

The object is to study and analyze the frequency and causes for the development of gingival recession in different age groups on the example of the Yunusabad district, Tashkent city.

MATERIAL AND METHODS

The research covered analysis of clinical examination of 645 patients with gingival recession who underwent treatment in the 2nd Children's Dental Clinic and in the 7th City Hospital (Dental Department) located in the Yunusabad district in the period from 2015 to 2019. All patients age was from 15 years and older, composing 4 age groups according to WHO recommendations: 15-25 years, 26 -40 years old, 40-64 years old, and over 64 years old.

In addition to a clinical examination of patients, they also were interviewed on issues related to the teeth cleaning. In each age group, the prevalence of gingival recession was studied, as well as its intensity (magnitude of gingival recession) on the lower and upper jaws, on the right and left. For individual groups this factor was determined on the surfaces of the teeth.

In all age groups, the index score for gingival recession was compared with the index score for periodontal tissues. The following indexes were established: OHI-S, simplified oral hygiene index (Green-Vermillion), PMA index (Parma), periodontal index PJ (Russel), periodontal disease index PDI (Ramfjord), complex

periodontal index (Leus P.A.). The results of the examination were recorded in a specially designed card, periodontal status.

As clinical methods for diagnosing gingival recession, we used gingival recession index (Stahl, Morris), which allowed to determine the prevalence of pathology in the patient.

Based on our epidemiological survey of residents of the Yunusabad district (Tashkent city) and analysis of the results obtained in different age groups, we recommend to evaluate the severity of gingival recession by Morris Stahl's index as follows:

Severity index value	Mild degree	Median degree	Severe degree
Percentage ratio	Up to 25%	26-50%	51-100%

The gingival recession was determined as the distance from the enamel-cement border to the level of the gingival margin. Measurements were taken on all teeth surfaces.

To determine the magnitude of the recession, we used a graduated periodontal probe, a specially adapted compass and caliper.

We proposed a new gingival recession index, which allows both quantitative and qualitative evaluation of gingival recession (prevalence and intensity) to be determined simultaneously. It is less laborious, does not require examination of all surfaces of all teeth and special training personnel.

Depending on the age of the patient, different teeth were studied according to the following scheme: 13, 23, 33, 31, 41, 43 - for young adults (15-25 years old); 16, 26, 33, 31, 41, 43 - for persons of older age groups (26-64). The following criteria are used to assess gingival recession in points:

- 1- no gingival recession;
- 2- gingival recession from 1 to 2 mm at one tooth surface;
- 3- gingival recession from 1 to 2 mm in two or more tooth surfaces;
- 4 - gingival recession from 3 to 5 mm at one tooth surface;
- 5 - gingival recession from 3 to 5 mm in two or more tooth surfaces;

6 - gingival recession of more than 5 mm at one or more tooth surfaces.

The individual recession index is calculated using the formula:

$$\text{IR} = \frac{\sum \text{codes}}{n \text{ teeth (usually 6)}}$$

The average recession index of the surveyed population group is calculated by finding the average number of individual index values:

$$\text{Average IR} = \frac{\sum \text{IR individual}}{n \text{ examined patients}}$$

The following interpretation of the recession index is proposed, regardless of the age of the patient:

The value of the recession index; The severity of the recession

0,1 - 2,0 mild

2,1 - 3,5 median

3,5 - 5,0 severe

To evaluate the efficacy of the proposed treatment and preventive measures carried out in 345 people aged 15 to 35 years with various clinical forms of gingival recession, we applied all the above mentioned clinical methods. Some features had the determination of the magnitude of the gingival recession.

According to our proposed method, we determined the distance from the middle of the cutting edge of the tooth crown to the level of the apically-displaced gingiva, from the middle of the cutting edge to the enamel-cement border, the difference between which was the distance from the enamel-cement border to the gingival level, i.e. recession. These measurements were carried out using a modified indicator micrometer, compass and caliper (measurement accuracy up to hundredths of mm), to obtain more accurate data in order to assess gingival recession before and after treatment. All measurements were recorded on a specially designed card.

For various forms of gingival recession in adults, we have proposed and introduced therapeutic measures, with the exception of surgical treatment methods.

When developing therapeutic and preventive measures, we focused on their availability and the possibility of widespread use at a practical reception.

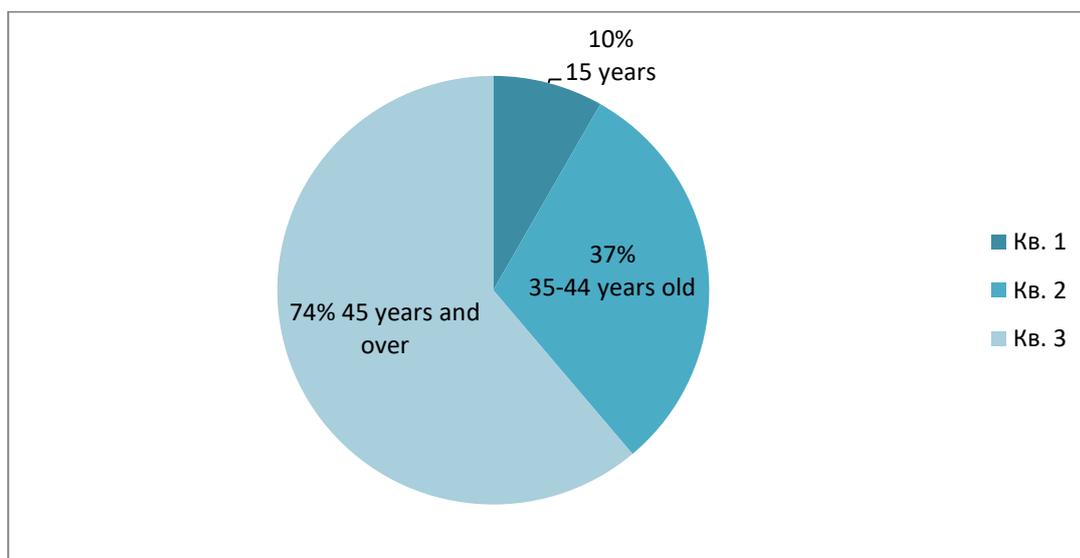
Treatment and preventive measures were carried out in 345 patients aged 15 to 35 years. Under observation there were 39 patients with localized injury gingival recession, 30 patients with generalized injury, 41 with symptomatic localization, 51 - with symptomatic generalized.

The control group consisted of 139 patients of the same age with similar periodontal status. Of these, 32 patients with localized injury gingival recession, 28 people with generalized injury, 35 with symptomatic localized and 44 people with symptomatic generalized cases.

The processing of clinical data was carried out by a variational-statistical method using Student's criterion (Gubler E.E.).

RESULTS AND DISCUSSION

Gingival recession was diagnosed in all age groups of residents of the Yunusabad district (Tashkent). The prevalence of gingival recession increased from $10.9 \pm 0.05\%$ in 15-year-olds to 100% in people over 64 years of age. The gingival recession indicators (indexes) varied in different age groups. In the group of 15 years old, the index according to Stahl, Morris was $5.5 \pm 0.5\%$, in the group of 35-44 years, recession was observed in $37.7 \pm 1.5\%$ of the teeth, in old people (64 years and over), the index value reached $74.6 \pm 1.8\%$. The intensity of the gingival recession increased from 1.04 ± 0.06 mm at the age of 15 to 2.4 ± 0.03 mm in the group of 35-44 years and 3.5 ± 0.1 mm at the age of over 64.



The index of gingival recession (IR) that we have proposed increased in proportion to age, as indicated by its values, which in the group of 15 years old made 0.6 ± 0.2 , in the group of 35-44 years - 2.2 ± 0.05 , and in the group of 64 years - 3.95 ± 0.1 points.

All clinical indicators of gingival recession tend to increase with age, which, in our opinion, can serve as evidence of both an increase in the intensity of lesion to periodontal tissues and the process of its physiological aging. It was found that gingival recession in the teeth of the lower jaw was more common than in similar teeth of the upper jaw (the difference is statistically significant in all age groups, $p < 0.001$). Gingival recession was observed almost equally often on the right side of each jaw, i.e., it can be said symmetrically, at the same time, there was a tendency for the gingival recession to prevail on the left, which, in our opinion, can be associated with the influence of the right manual brushing. Despite the unreliability of the differences in the prevalence of gingival recession along the sides of the jaw ($p > 0.05$ in all age groups), when evaluating the gingival recession in certain groups of teeth, it turned out that the main difference exists between right and left clicks and premolars. We presumably explain this with the physiological features of the location of the teeth in the jaw and the influence of tooth brushing. Gingival recession was most often observed in the region of the lower anterior teeth (incisors) and in the region of the upper first molars, i.e. in places of primary formation of tartar, which suggested that poor oral hygiene was the risk factor for the studied pathology.

However, it should be noted that in the age groups of 15 years, and 20-24 years, gingival recession was more common in lower anterior teeth and upper canines. This is evidenced by the fact that in the age group of 15 years, gingival recession in the upper canines was determined in 0.39 ± 0.06 teeth, in upper molars in 0.07 ± 0.01 teeth; in 20-24 years, those indicators were 0.73 ± 0.1 and 0.14 ± 0.01 , respectively. The presented data indicate that differences in the prevalence of gingival recession in certain groups of teeth in different age groups indicate the influence of certain physiological characteristics on the development of gingival

recession at a young age, as well as such a factor as brushing teeth. In older age groups, gingival recession should be considered as a result of the cumulative effect of all etiological factors that increase in direct proportion to age.

The analysis of the prevalence of gingival recession on individual tooth surfaces indicated that the gingival recession begins with the vestibular surface (at 15 years of age, the number of vestibular surfaces with gingival recession is 1.7 ± 0.1 , oral - 0.2 ± 0.02). In older age groups, gingival recession on the oral surface prevailed (in the age group 35-44 years, the number of vestibular and oral surfaces was almost the same and made 6.3 ± 0.3 and 6.2 ± 0.2 , respectively, in people of 64 years old and over, the number of vestibular surfaces was 7.2 ± 0.1 , oral - 8.6 ± 0.1). Gingival recession on proximal surfaces was established mainly in the age group of 30 years. The maximum quantitative and qualitative indicators of gingival recession in older age groups are inherent in the oral surface, and the minimum are approximate. It is also characteristic that if at the age of 15 there are no surfaces with a recession of more than 3 mm, then in all other age groups there is a clear increase in the number of surfaces with both a recession of less than 3 mm and a gingival recession of more than 3 mm. Risk factors in the occurrence of gingival recession include poor oral hygiene, gingivitis, dentoalveolar anomalies (deep and distal occlusion), genetically determined predisposition (protruding teeth, crowding of teeth, small vestibule of the oral cavity), and traumatic tooth brushing. All gingival recession rates increase with age.

The dependence of gingival recession on oral hygiene is established based on the data of an epidemiological examination. In 15 years, they led to satisfactory hygiene according to the Green-Vermillion index, the recession index corresponds to Stahl, Morris $3.8 \pm 0.1\%$, the recession intensity - 1.05 ± 0.2 mm; IR - 0.26 ± 0.01 , then with poor hygiene, i.e. OHI-S > 2.6 gingival recession rates rise to $6.75 \pm 0.5\%$, 1.22 ± 0.1 mm and 0.63 ± 0.07 , respectively. In the same way, indicators in other age groups change, indicating the dependence of gingival recession on oral hygiene: the worse oral hygiene, the more pronounced gingival recession is.

Poor oral hygiene leads to inflammatory changes in the periodontal tissues and in the future gingival recession can act as one of the symptoms. So, in individuals of 15 years old with mild inflammation ($GI=0.1-1.0$), the recession Index no Stahl, Morris was $6.12 \pm 0.46\%$, the recession rate was 1.05 ± 0.05 mm, IR $0,45 \pm 0.02$ points; for moderate inflammation ($GI=1.1-2.0$), Morris Stahl's index is 7.80 ± 0.6 , the recession rate is 1.32 ± 0.13 , and IR is 0.70 ± 0.08 .

With an increase in inflammatory changes, gingival recession indicators increase. With a severe degree of inflammation in the 35-44 group, Morris Stahl's recession index was $52.66 \pm 4.4\%$, the recession intensity was 2.42 ± 0.06 mm and the IR was 2.59 ± 0.05 points, which significantly exceeds indicators of recession in patients of the same age with a mild degree of inflammation: Stahl, Morris index $34.36 \pm 1.19\%$, recession intensity 2.21 ± 0.06 mm, IR - 2.09 ± 0.05 points. The same regularity was revealed by the analysis of the results when comparing the recession indices with the PMA index: the heavier the degree of inflammation, the more pronounced gingival recession.

We determined the dependence of clinical indicators of gingival recession on the degree of lesion to periodontal tissues. In the group of 35-44 years, the value of the index according to Stahl, Morris increases from $30.09 \pm 1\%$ to $42.7 \pm 2.3\%$, the intensity of the recession from 1.85 ± 0.14 mm to 2.45 ± 0.09 mm, IR from 1.9 ± 0.1 to 2.4 ± 0.14 during the transition of KPI from mild ($1.1-2.0$) to severe ($2.6-5.0$). Over the age of 64 years, the median degree of KPI corresponds to Morris Stahl's index of $62.3 \pm 2.8\%$, intensity - 2.92 ± 0.2 , IR - 3.4 ± 0.04 , with a severe degree, these values are $74.2 \pm 1.9\%$; 3.4 ± 0.2 mm and 3.98 ± 0.13 , respectively. These data indicate an increase in gingival recession with an increase in pathological changes in periodontal tissues. A similar picture is observed when comparing gingival recession indicators with the dynamics of other periodontal indices PI, PDI. Gingival recession is often found in individuals with various orthodontic abnormalities. According to our data, in the group of 15-year-old adolescents with gingival recession, crowding of teeth was noted in 15.2% of cases, teeth protruding vestibular from the dental arch in 26% of cases, often a

combination of gingival recession with malocclusion. From our point of view, these factors can be attributed to the risk group for the development of gingival recession.

When interviewing the population of different age groups on issues related to brushing (multiplicity and brushing method, brush stiffness), it was found that traumatic (incorrect, excessive) brushing contributes to the development of gingival recession in young people.

The studies clinically confirm that gingival recession occurs only on the vestibular surface, most often on canines and premolars, with good oral hygiene and the absence of any inflammatory processes, and mainly on the left (for most people, cleaning with the right hand). With age, the presence of risk factors increases the incidence of gingival recession. Analysis of the results revealed the dependence of the prevalence of a particular clinical form on the age factor. Therefore, at a young age, the traumatic form of recession prevails over the symptomatic: at 15 years of age, traumatic recession occurs in 62.1%. With increasing age, incidence decreases significantly (at 25-29 years - 15.5%, at 30-34 years - 9.8%, at 35-44 years - 2.5%); at the same time, the incidence of the symptomatic form is growing from 37.6% at 15 years old to 97.3% at the age of over 64 years, 2.6% of the population at this age gingival recession is a sign of periodontal aging.

The presented data confirm our earlier assumptions that, at the young age, the incidence of gingival recession is mainly affected by long-term injury in the presence of predisposing physiological characteristics, in older age groups, gingival recession is the result of pathological changes in periodontal tissues and its aging.

CONCLUSIONS

1. Gingival recession was determined in all age groups of the adult population. It has been established that the incidence of gingival recession increases from 11.8% at age 15 to 100% at the age 64 and over. Morris Stahl's

index varies from 6.7% to 73.8%, the recession intensity is from 1.09 mm to 3.38 mm, the recession index (IR) we proposed is from 0.59 to 3.95 points.

2. Risk factors in the development of gingival recession are poor oral hygiene, gingivitis, dental alveolar anomalies, as well as genetically determined predisposition (convex contour of the alveolar arch, teeth protruding vestibularly from the dentition, crowding of the teeth, etc.), traumatic brushing.

3. Gingival recession in the teeth of the lower jaw occurs significantly more often than in similar teeth of the upper jaw ($p < 0.01$). Gingival recession occurs almost equally often on the right and left side of the jaw, that is, symmetrically, but there is a tendency for gingival recession to prevail on the left. At the young age (up to 25 years), gingival recession is more common in the area of the lower front teeth and upper canines. In older age groups - in the lower frontal teeth and upper molars.

4. The most effective methods for diagnostics of gingival recession during a dental examination are Morris Stahl's index (with the proposed interpretation) and the recession index that we developed, which allow us to quickly assess both the prevalence of the pathology in the subject and its severity, not requiring special training or other special equipment.

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