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ABSTRACT

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INDEX ASSESSMENT OF THE CONDITION OF PERIODONTAL TISSUES IN PATIENTS WITH GASTROESOPHAGEAL REFLUX DISEASE

Introduction. Significant prevalence of periodontal diseases, tendency to progress with the subsequent loss of teeth, onset at a young age, decrease in the quality of life of patients and significant financial costs determine the relevance of this medical and social problem. The problem of gastroesophageal reflux disease (GERD) is being increasingly paid attention by researchers and doctors due to the high prevalence and variety of its clinical manifestations. One of the atypical (extraordinary) syndromes of gastroesophageal reflux disease is dental. The purpose of the research was to assess the condition of periodontal tissues in patients with gastroesophageal reflux disease.

Materials and methods. For the study, 65 patients with GERD were selected who had been hospitalized to the gastroenterology department of Ternopil City Hospital No. 2. In total, the sample included 34 (52.31 %) men and 31 (47.69 %) women. To identify inflammatory changes in the gum mucosa, the papillary-marginal-alveolar index (PMA) and the complex periodontal index (CPI) according to P.O. Leus (1989) were used. Statistical processing of the data obtained during the study was carried out using the licensed Microsoft Excel 2016 and Statsoft Statistica 12 statistical analysis packages.

Results. As a result of our study, we found that only 18.5 % of patients suffering from GERD had clinically healthy gums. 9.2 % of patients showed signs of mild gingivitis (PMA index values were within 20 %). According to the RMA index, 33.8 % of patients in the main group were diagnosed with moderate gingivitis (values ranged from 25–50 %). In 38.5 %, manifestations of severe gingivitis were visualized (the PMA index value was more than 51 %). We have found that in patients with GERD, the manifestations of inflammatory phenomena in periodontal tissues increase with age and their severity increases. According to the data obtained when determining the CPI index, 11.2 % of patients with

erosive lesions of the esophagus were diagnosed with moderate periodontal tissue damage (CPI value was (2.9 ± 0.1)). In 44.4 % of patients with the erosive form of GERD, mild periodontal tissue damage was visualized (CPI = (1.6 ± 0.1)). All patients with periodontitis secondary to erosive GERD were elderly (45–59 years, according to WHO). Only 44.4 % of patients with the erosive form of GERD and 100.0 % of patients with non-erosive GERD had no inflammation of periodontal tissue (the average CPI value did not exceed 1.0).

Conclusions. Based on the studies described above, we can come to the conclusion that inflammatory processes in the tissues of the periodontal complex and oral mucosa in patients suffering from gastroesophageal reflux disease are interconnected processes that aggravate each other.

Keywords: gastroesophageal reflux disease, periodontitis, gingivitis, combined pathology, inflammatory processes.

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ІНДЕКСНА ОЦІНКА СТАНУ ТКАНИН ПАРОДОНТА У ПАЦІЄНТІВ ІЗ ГАСТРОЕЗОФАГЕАЛЬНОЮ РЕФЛЮКСНОЮ ХВОРОБОЮ

Значна поширеність захворювань пародонта, схильність їх до прогресування з подальшою втратою зубів, поява у молодому віці, зниження якості життя пацієнтів і значні фінансові затрати обумовлює актуальність даної медичної і соціальної проблеми. Усе більше уваги дослідників і лікарів привертає проблема гастроєзофагеальної рефлюксної хвороби (ГЕРХ) у зв'язку з високою поширеністю та різноманіттям її клінічних проявів. Одним з атипичних (позастравохідних) синдромів гастроєзофагеальної рефлюксної хвороби є стоматологічний.

Тому **метою роботи** стала оцінка стану тканин пародонту у пацієнтів із гастроєзофагеальною рефлюксною хворобою.

Матеріали та методи. Для проведення дослідження відібрано 65 хворих на ГЕРХ, які знаходились на стаціонарному лікуванні в гастроентерологічному відділенні Тернопільської міської лікарні № 2. Загалом вибірка включала 34 (52,31 %) чоловіків й 31 (47,69 %) жінку. Для виявлення запальних змін у слизовій оболонці використали папілярно-маргінально-альвеолярний індекс (РМА) та комплексний пародонтальний індекс (КПІ) за П.О. Леусом (1989). Статистичну обробку отриманих при дослідженні даних виконували із використанням ліцензованих пакетів статистичного аналізу Microsoft Excel 2016 та «Statsoft Statistica 12».

Результати. В результаті проведеного нами дослідження встановлено, що лише у 18,5 % пацієнтів, які хворіють на ГЕРХ, підтверджено клінічно здоровий стан ясен. У 9,2 % пацієнтів виявлено ознаки легкого ступеня гінгівіту (показники індексу РМА знаходились в межах 20 %). У 33,8 % пацієнтів основної групи згідно індексу РМА діагностовано гінгівіт середнього ступеня тяжкості (значення варіювали в межах 25–50 %). У 38,5 % осіб візуалізовано прояви тяжкого ступеня гінгівіту (значення індексу РМА становили понад 51 %). Нами встановлено, що у хворих на ГЕРХ із віком зростають прояви запальних

явищ у тканинах пародонта і підвищується ступінь їх тяжкості. Прояви гінгівіту середнього ступеня тяжкості переважали у осіб зрілого віку, тоді як гінгівіту тяжкого ступеня у старечій групі. Згідно даних, отриманих при визначенні індексу КПП, у 11,2 % хворих з ерозивним ураженням стравоходу діагностовано ураження тканин пародонта середнього ступеня тяжкості (значення КПП становило $(2,9 \pm 0,1)$). У 44,4 % пацієнтів з ерозивною формою ГЕРХ візуалізовано ураження тканин пародонта легкого ступеня тяжкості (КПП = $(1,6 \pm 0,1)$). Усі пацієнти з пародонтитом на фоні ерозивного ГЕРХ були зрілого віку (45–59 рр., згідно ВООЗ). Лише у 44,4 % пацієнтів із ерозивною формою ГЕРХ та у 100,0 % пацієнтів з неерозивною ГЕРХ запалення тканин пародонту були відсутніми (середнє значення КПП не перевищувало позначку 1,0).

Висновки. На основі вищеописаних досліджень, можна дійти висновку, що запальні процеси у тканинах пародонтального комплексу та слизової оболонки порожнини рота у пацієнтів, які хворіють на гастроєзофагеальну рефлюксну хворобу, являються взаємопов'язаними процесами, які обтяжують перебіг один одного.

Ключові слова: гастроєзофагеальна рефлюксна хвороба, пародонтит, гінгівіт, поєднана патологія, запальні процеси.

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INTRODUCTION / ВСТУП

Inflammatory periodontal diseases currently occupy a leading place in the structure of dental diseases. Generalized data from independent WHO experts, based on the results of recent epidemiological studies, demonstrate the detection of intact periodontal disease in only 2–10 % of individuals versus 90–95 % of the adult population with diagnosed periodontal diseases. In Ukraine, damage to periodontal tissues is diagnosed with different frequencies: before the age of 35–40 years, symptoms of the disease appear in 50–80 %, while after 40 years – in 99.3 %, which generally reflects the global trend in the development of pathology [1, 2, 3].

The significant prevalence of periodontal diseases, the tendency to progress with the subsequent loss of teeth, the appearance at a young age, the decrease in the quality of life of patients and significant financial costs determine the relevance of this medical and social problem.

The problem of gastroesophageal reflux disease (GERD) is attracting increasing attention from researchers and doctors due to the high prevalence and variety of its clinical manifestations. Thus, symptoms of GERD are diagnosed in 20–40 % of the adult population aged 25 to 50 years with the same frequency in men and women [4, 5].

The epidemiological aspects of GERD as a “disease

of the third millennium” are currently being actively studied, but the actual prevalence of the disease has not been sufficiently studied, which is associated with significant variability in manifestations – from episodic heartburn to symptoms of complicated esophagitis. The disease manifests itself in almost 40 % of the adult population of different ages over the past decades. According to the results of epidemiological studies, the prevalence of GERD in Ukraine among the working population averages 30 % (25 % in men and 39 % in women). The peak incidence of GERD in women occurs at the age of 17–29 years, and in men – at 20–59 years. However, the actual incidence rate is much higher, given that a significant proportion of patients are treated for a long time by other specialists for extraesophageal manifestations of GERD [6, 7, 8].

The increased interest in GERD is due not only to the peculiarities of the course of the disease, diagnostic measures, and a decrease in the quality of life of patients, but also to extraesophageal «masks» [9].

One of the atypical (extraordinary) syndromes of gastroesophageal reflux disease is dental. According to various authors, dental syndrome with GERD, which occurs as a result of inflammatory changes in the oral mucosa under the influence of refluxate, is characterized by the appearance of erosions of tooth enamel, inflammation of periodontal tissue, and changes in the mushroom-shaped papillae of the tongue. But the

prevalence, nature and severity of lesions of organs and tissues of the oral cavity have not been sufficiently studied. The mechanisms of their development also remain completely unclear [10, 11].

Therefore, **the aim of the work** was to assess the condition of periodontal tissues in patients with gastroesophageal reflux disease.

Materials and methods

The study was carried out in compliance with the main provisions of the Declaration of Helsinki of 1975, revised in 2000, the Council of Europe Convention on Human Rights and Biomedicine (2007) and the recommendations of the Bioethics Committee of the Presidium of the National Academy of Medical Sciences of Ukraine (2002). The manipulations were approved by the bioethics commission of the I. Horbachevsky Ternopil National Medical University. The clinical dental examination took place after the patients signed the appropriate informed consent for dental procedures.

For the study, 65 patients with GERD were selected who were hospitalized in the gastroenterology department of Ternopil City Hospital No. 2. In total, the sample included 34 (52.31 %) men and 31 (47.69 %) women.

The comparison group consisted of 15 volunteers who did not have metal fillings, orthopedic or orthodontic structures, or periodontal pathology. The average age of the subjects was (47.0 ± 2.0) years, among men – (42.0 ± 2.0) years, and among women – (51.5 ± 2.0) years. The average duration of the disease was (6.0 ± 1.0) years (in the examined men – (5.0 ± 1.5) years, in women – (8.0 ± 2.0) years).

It should be noted that according to the WHO classification of age groups, the majority of men (42.0 ± 2.0 years) and women (51.5 ± 2.0 years) were of working age. The number of patients of working age (25–60 years) was 49.0 (75.4 %), that is, the sample reflected the most socially active part of the people. No less important is diagnosis in 3.0 (4.6 %) patients with GERD at a young age (18–29 years). 47.0 (72.3 %) specialized patients were diagnosed with a non-erosive form of GERD, and 18.0 (27.69 %) patients were diagnosed with an erosive form of GERD. Concomitant pathology was diagnosed in 65.0 (100.0 %) patients. However, the patients were selected in the stage of remission or stabilization of the concomitant disease, which did not significantly affect the clinical picture of the underlying disease and did not require treatment adjustments that would affect the results.

To identify inflammatory changes in the mucosa, the papillary-marginal-alveolar index (PMA) and the complex periodontal index (CPI) according to P.O. Leus (1989) were used.

Statistical processing of the data obtained during the study was carried out using licensed statistical analysis packages Microsoft Excel 2016 and Statsoft Statistica 12, where materials were grouped by study population (calculation of relative and average values, their errors, t-test). The critical level of significance when testing statistical hypotheses in this study was taken equal to 0.05.

Results

When determining the dental status of patients with GERD, complaints were received of itching in the gum area in 56.0 (86.2 %) patients, periodic bleeding when brushing teeth in 63.0 (96.9 %) patients, unpleasant odor from the mouth in 65.0 (100.0 %) people. Congestive-hyperemic gums with a cyanotic tint were noted, which covered the dentition in a roller-like manner. Inflammatory-dystrophic changes were not limited to the area of the interdental papillae and the marginal edge of the gums, but also extended to the alveolar part of the gums. Moderate swelling of the gum papillae and gingival margin was diagnosed in 19.0 (29.2 %) people, and of the alveolar part of the gums – in 25.0 (38.5 %) patients. Objectively, 44.0 (67.7 %) patients were diagnosed with flabby chronic catarrhal gingivitis of varying degrees of severity.

Periodontal pockets with a depth of 3 mm were identified in 8.0 (12.3 %) patients, while 4.5 mm were identified in 2.0 (3.1 %) people. Pathological mobility of teeth in the vestibulo-oral direction by 1–2 mm was diagnosed in 2.0 (3.1 %) patients. The identified pathological changes in 9.0 (13.8 %) specialized patients are characteristic of chronic generalized periodontitis of mild to moderate severity. In 12.0 (18.5 %) patients with GERD, no pathological changes were objectively detected in the mucous membranes and periodontal tissues.

In accordance with the results of identifying inflammatory changes in the mucosa according to the papillary-marginal-alveolar index (PMA), the following indicators were established. Among the majority of patients in the main group – 21.0 (32.3 %) – moderate gingivitis was confirmed, which corresponded to an index value of 25–50 %. In 24.0 (36.9 %) people, the PMA value was more than 51 %, which indicated manifestations of severe gingivitis. In 6.0 (9.2 %) patients, the PMA index was within 20 %, which is typical for mild gingivitis. While in 12.0 (18.5 %) patients the clinically healthy state of the gums was confirmed (Table 1).

It should be noted that in patients with GERD there is an inflammatory process in the mucous membranes, which is confirmed by a significant increase of 1.7 times ($p < 0.05$) in the PMA index relative to the control group. Thus, the average value of PMA in patients with

GERD reached (34.4 ± 1.6) % compared to (19.6 ± 2.5) % against the control group ($p < 0.05$). According to the results of the PMA index, with age, the prevalence of inflammatory phenomena and an increase in their severity in patients with GERD gradually

increases. Thus, manifestations of moderate gingivitis prevailed in elderly people – 8.0 (12.3 %) patients, while severe gingivitis in 10.0 (15.4 %) people – in the senile group (Table 1).

Table 1 – Characteristics of PMA index values in patients with GERD according to age groups, n (%)

Age group, years:	Clinically healthy gums	Mild gingivitis	Moderate gingivitis	Severe gingivitis
18–29	1,0 (1,5 %)	–	5,0 (7,7 %)	2,0 (3,1 %)
30–44	2,0 (3,1 %)	2,0 (3,1 %)	5,0 (7,7 %)	5,0 (7,7 %)
45–59	6,0 (9,2 %)	1,0 (1,5 %)	8,0 (12,3 %)	6,0 (9,2 %)
60–74	3,0 (4,6 %)	3,0 (4,6 %)	3,0 (4,6 %)	10,0 (15,4 %)
75–89	–	–	–	1,0 (1,5 %)
Total	12,0 (18,5 %)	6,0 (9,2 %)	21,0 (32,3 %)	24,0 (36,9 %)

The obtained results of the average PMA value in different age groups turned out to be important. In turn, the average value of PMA in mature patients with moderate gingivitis is 1.2 times higher ($p < 0.05$) compared to that in the middle age group, while in old

age it is 1.4 times higher than in middle-aged people. ($p < 0.05$). Also, among patients with severe gingivitis, the average value of the PMA index in the elderly group was significantly higher by 1.6 times ($p < 0.05$) than the same indicator in the middle age group (Fig. 1).

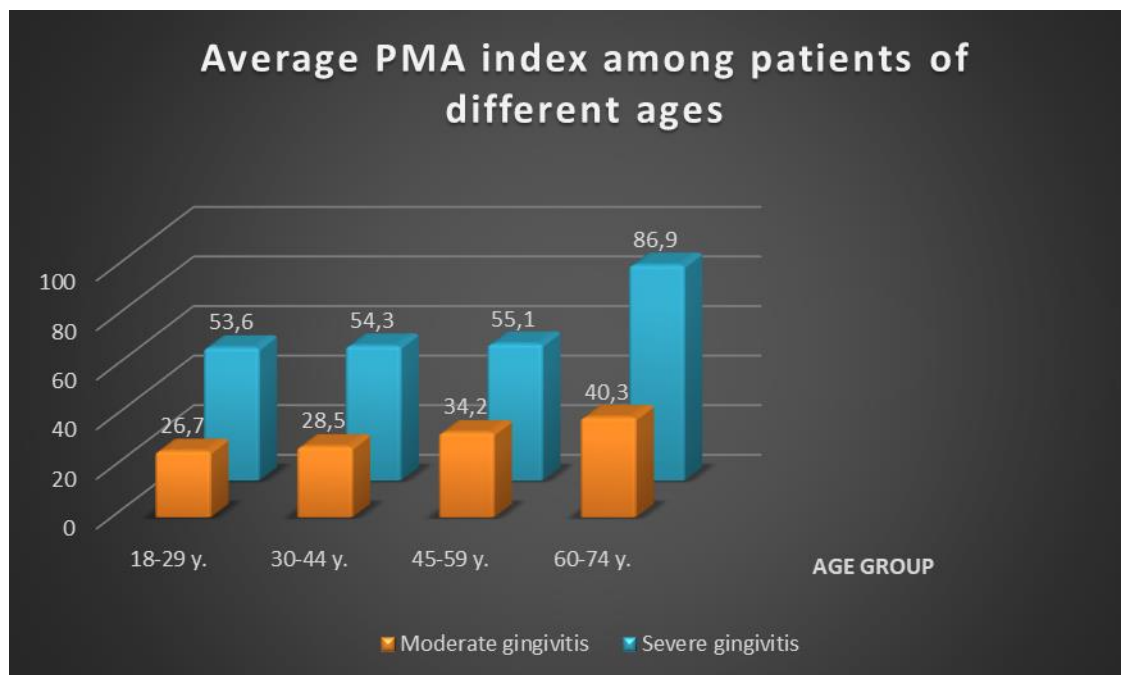


Figure 1 – Average value of the PMA index among patients of different ages

According to the results obtained when determining the CPI index according to P.A. Leus (1989) found that in patients with GERD the CPI value significantly exceeded the corresponding index result of the control group ($p < 0.05$), which indicates the presence of periodontal diseases in patients with gastrointestinal pathology.

Taking into account the presence of soft or hard

dental deposits, bleeding gums, periodontal pockets, and varying degrees of tooth mobility in 10.0 (55.6 %) patients with erosive GERD, the average CPI value was (2.3 ± 0.1), which is 3.3 times ($p < 0.05$) higher than the value of the control group (0.7 ± 0.2). Thus, in 2.0 (11.2 %) patients with erosive lesions of the esophagus, the average value of the CPI reached (2.9 ± 0.1), which

corresponds to moderate periodontal damage. While in 8.0 (44.4 %) patients with the erosive form of GERD this figure is (1.6 ± 0.1) and is determined by pathological changes in the periodontal tissues of mild severity. All 10.0 (55.6 %) patients with periodontitis secondary to erosive GERD were of mature age (45–59 years, according to WHO). Among the remaining 8.0 (44.4 %) patients in this group and 47.0 (100.0 %) patients with non-erosive GERD, the average CPI value did not exceed 1.0, which did not differ from the control group ($p > 0,05$).

Discussion

A number of researchers express the opinion that chronic generalized periodontitis, despite the fairly monomorphic clinical manifestations, is an etiologically and pathogenetically heterogeneous disease [12, 13, 14].

Motor-tonic disorders of the esophagus against the background of dysfunction of the lower sphincter lead to disruption of the mineral composition and viscosity of saliva with the development of acidification ($\text{pH} < 5.0$) and, according to many scientists, trigger a cascade of dental damage in GERD [15, 16, 17].

It has been scientifically proven that repeated exposure to refluxate in GERD leads to catarrhal inflammation. The latter determines the development of hydropic dystrophy in the epithelium of the marginal zone and mucoid-fibrinoid swelling with vasculitis in the connective tissue of the gums [18, 19, 20].

Borysenko A. and co-authors (2021) in their works provides data on the presence of changes in periodontal tissues in patients with various pathologies of the gastrointestinal tract in 76–91 % of cases [21].

Epidemiological studies conducted by a number of scientists have established that dental manifestations of GERD are present in more than 87 % of examined patients, regardless of gender and form of GERD. At the same time, the fact that 83 % of patients with existing

signs of gingivitis during pH-metry was diagnosed with GERD deserves special attention [22, 23, 24, 25].

A number of scientists have proven the presence of damage to the hard tissues of teeth in the form of hyperesthesia in patients with GERD [26, 27, 28]. A strong correlation has also been established between the degree of reflux esophagitis and the intensity of swelling of the mucous membrane, dry lips and plaque on the tongue [29, 30].

As a result of our study, we found that only 18.5 % of patients suffering from GERD had clinically healthy gums. 9.2 % of patients showed signs of mild gingivitis (PMA index values were within 20 %). According to the RMA index, 33.8 % of patients in the main group were diagnosed with moderate gingivitis (values ranged from 25–50 %). In 38.5 %, manifestations of severe gingivitis were visualized (the PMA index value was more than 51 %).

We have found that in patients with GERD, the manifestations of inflammatory phenomena in periodontal tissues increase with age and their severity increases. Manifestations of moderate gingivitis predominated in people of mature age, while severe gingivitis in the senile group.

According to the data obtained when determining the CPI index, 3.1 % of patients with erosive lesions of the esophagus were diagnosed with moderate periodontal tissue damage (CPI value was (2.9 ± 0.1)).

In 44.4 % of patients with the erosive form of GERD, mild periodontal tissue damage was visualized (CPI = (1.6 ± 0.1)). All patients with periodontitis secondary to erosive GERD were elderly (45–59 years, according to WHO).

Only 44.4 % of patients with the erosive form of GERD and 100.0 % of patients with non-erosive GERD had no inflammation of periodontal tissue (the average CPI value did not exceed 1.0).

repeated exposure to gastric refluxate contributes to the occurrence of inflammatory diseases of periodontal tissue against the background of gastroesophageal reflux disease, which is manifested by the development of gingivitis and generalized periodontitis of varying degrees of severity.

CONCLUSIONS / ВИСНОВКИ

Based on the studies described above, we can come to the conclusion that inflammatory processes in the tissues of the periodontal complex in patients suffering from gastroesophageal reflux disease are interconnected processes that aggravate each other.

The inflammatory process that occurs as a result of

PROSPECTS FOR FUTURE RESEARCH / ПЕРСПЕКТИВИ ПОДАЛЬШИХ ДОСЛІДЖЕНЬ

Based on the diagnosed changes in periodontal tissues, we consider it advisable to include a mandatory dental examination of the above-mentioned patients in the diagnostic treatment complex.

CONFLICT OF INTEREST / КОНФЛІКТ ІНТЕРЕСІВ

The authors declare no conflict of interest.

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None.

AUTHOR CONTRIBUTIONS / ВКЛАД АВТОРІВ

Petro Hasiuk – Work concept and design, final approval of the article;
 Alina Bezushko – Data collection and analysis, writing the article;
 Anna Vorobets – Responsibility for statistical analysis, writing the article
 Tetiana Dzetsiukh – Critical review, final approval of the article.
 Authors take full responsibility for the integrity of all aspects of the work.

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