

Kravchenko L. S., Bas N. O., Aksynorska O. I., Herasymova I. V., Rozumenko M. V., Rozumenko V. O. Dental status changes in patients with ischemic heart disease and the ways of its normalization. *Journal of Education, Health and Sport*. 2020;10(2):168-176. eISSN 2391-8306. DOI <http://dx.doi.org/10.12775/JEHS.2020.10.02.022>
<https://apcz.umk.pl/czasopisma/index.php/JEHS/article/view/JEHS.2020.10.02.022>
<https://zenodo.org/record/3694221>

The journal has had 5 points in Ministry of Science and Higher Education parametric evaluation. § 8. 2) and § 12. 1. 2) 22.02.2019.
© The Authors 2020;

This article is published with open access at Licensee Open Journal Systems of Nicolaus Copernicus University in Torun, Poland
Open Access. This article is distributed under the terms of the Creative Commons Attribution Noncommercial License which permits any noncommercial use, distribution, and reproduction in any medium, provided the original author(s) and source are credited. This is an open access article licensed under the terms of the Creative Commons Attribution Non commercial license Share alike. (<http://creativecommons.org/licenses/by-nc-sa/4.0/>) which permits unrestricted, non commercial use, distribution and reproduction in any medium, provided the work is properly cited.
The authors declare that there is no conflict of interests regarding the publication of this paper.

Received: 31.01.2020. Revised: 10.02.2020. Accepted: 28.02.2020.

DENTAL STATUS CHANGES IN PATIENTS WITH ISCHEMIC HEART DISEASE AND THE WAYS OF ITS NORMALIZATION

**L. S. Kravchenko, N. O. Bas, O. I. Aksynorska, I. V. Herasymova, M. V. Rozumenko,
V. O. Rozumenko**

The Odessa National Medical University, Odessa, Ukraine

Abstract

Aim: increasing the effectiveness of treatment of periodontal disease in patients with ischemic heart disease

Materials and methods. The oral cavity was examined and the clinical course features of chronic periodontitis were studied in patients with ischemic heart disease Determining dental, hygienic index and biochemical indices in oral liquid (elastase, MDA, urease, lysozyme, catalase). The “Apifil” and “Asepta” were used by oral rinsing.

Results. The patients with ischemic heart disease have a worse state of oral cavity, compared to those who do not suffer from ischemic heart disease. The determined periodontal indexes provided evidence of a significantly higher activity of the dystrophic and inflammatory changes of periodontal tissues in the patients with ischemic heart disease. The oral cavity liquid levels of elastase, urease were raised, but levels of catalase and lysozyme were reduced in patients with ischemic heart disease Oral rinsing of “Apifil” and “Asepta” were reduced the levels of elastase, urease and dental indices but were raised the levels of lysozyme and catalase.

Conclusions. The rinse “Apifil” render the stomatoprotective action on patients with ischemic heart disease.

Key words: inflammation; periodontitis; coronary heart disease; oral liquid.

Recent studies have identified the widespread prevalence of inflammatory diseases in the oral cavity in patients with coronary heart disease (CHD). At the same time the general pathogenetic mechanisms are highlighted - increase of lipid peroxidation, proteins, decrease of antioxidant protection, violation of immunological protection and imbalance of micro- and macroelements in the oral cavity [1, 2]. Common in the pathogenesis of somatic diseases and periodontitis are individual microorganisms, their endotoxins [3, 4]. The analysis of the accumulated observations proves that the development of the inflammatory process in the oral cavity occurs against the background of complex disorders of homeostatic balance in the body, while the relationship between the severity of the pathology of the oral tissues and the severity of coronary insufficiency has not been studied. The high prevalence of dental pathology and the lack of sound prevention and treatment approaches, taking into account pathogenetic mechanisms of development, determine the need for further study of the pathogenetic aspects of the effects of cardiovascular diseases on the development of dental complications. Therefore, studies aimed at studying the features of the dental status of patients with coronary heart disease, the search for new oral care products with evaluation of the effectiveness of the application of inflammatory processes in the tissues of the oral cavity, relevant, timely and promising for implementation in health care.

Aim: To increase the effectiveness of prevention and topical treatment of inflammatory diseases of the oral cavity in patients with coronary heart disease.

Materials and methods of research

In the course of the study, dental status was evaluated in 32 patients with coronary heart disease (angina pectoris, I and II functional classes of heart failure), aged 40-65 years, who were treated in a clinical hospital № 3 in Odessa. The primary diagnosis of coronary heart disease was made by doctors of the cardiology department according to the classification of the New York Association of Cardiologists (1964). The study excluded the main risk factors that affect the condition of organs and tissues of the oral cavity - age, sex, endocrine pathology, stress, smoking, which allowed to determine only factors that affect the emergence and course of dental diseases on the background of coronary heart disease. The condition of the hard tissues of the teeth, the condition of the periodontium, the mucous membrane of the mouth were investigated, the hygienic status, salivation, biochemical

composition of the oral fluid were evaluated. The condition of the oral cavity was determined by the indexes of hygienic and dental indices [5].

Patients with coronary heart disease formed a group of observations. The comparison group included patients (28 people) who had dental diseases (caries, periodontal disease, oral mucosa), but without CHD.

The control group was represented by a group of people (10 people) without somatic and dental diseases.

In addition to determining the relationship between oral diseases and coronary heart disease, the clinical course and treatment of dental diseases against coronary heart disease were studied. For this purpose, 13 patients with coronary artery disease with generalized periodontitis (GP) were selected, with an average age of 42.7 years, male, diagnosed with GP with initial severity (7 people), with I degree of severity (6 people). They formed the main group, in the complex treatment of which was applied topical therapy with the use of newly created oral care agent - rinse aid "Apifil" based on apiproducs and adaptogens of natural origin [6].

In the comparison group, which included 12 people with a similar diagnosis of GP with CHD, local therapy included the traditional use of Asepta rinse aid. Hygienic products were applied in the amount of 10 ml in the form of rinsing the oral cavity for 20s daily 2 times a day in the morning and evening after meals, a course of 7-9 days.

Green-Vermillion OHI-S oral hygiene index evaluated the amount of soft (plaque) and hard (tartar) dental deposits. The periodontal index of Russell (Ri) determined inflammatory changes of the periodontium, the presence of periodontal pockets. On the basis of the PMA index (papillary-marginal-alveolar), the degree of inflammation and the effectiveness of therapeutic agents were evaluated, the Schiller-Pisarev breakdown determined the intensity of gum inflammation.

Revealed bleeding gums when probing by the RBI index (Muhlemann-Gowell), which was important in the use of patients with coronary heart disease anticoagulants.

The condition of the mucous membrane of the oral cavity (SOPR) was noted by color features, signs of moisture or dryness, edema, the presence of elements of damage and injury. Attention was paid to detecting signs of xerostomia. The unstimulated oral fluid was collected on an empty stomach into graduated tubes. The rate of salivation was determined [7]. Protein content [8], malondialdehyde (MDA) [9], elastase activity [10], urease [11], catalase [12], lysozyme [13] were determined in the supernatant.

Statistical processing of the obtained results was carried out with the help of the statistical program Statistika-6.

Results of the study and their discussion

Dental examinations revealed periodontal disease in 84.3% (27 of 32) patients with coronary artery disease. In patients without coronary heart disease, this figure was 64.2% (18 of 28), ie 20.1% less. Statistical analysis of the CPU showed no difference, in the presence of CHD and its absence, which indicated a similar clinical characteristic of carious lesions.

The lesions of the oral mucosa were 43.7% (14 of 32) in coronary artery disease and 10.4% (3 of 28) in patients without coronary artery disease, ie 33.3% more.

The level of the Green-Vermillion hygiene index in patients with coronary heart disease was significantly higher compared to patients without coronary heart disease and was 3.75 ± 0.02 . The level of the Green-Vermillion hygiene index for patients in the comparison group averaged 3.18 ± 0.02 .

Patients with coronary heart disease had poorer results, both in dental plaque and tartar levels, compared with patients without coronary heart disease. The determination of the activity of the inflammatory process is clear using the PMA index showed that this index was higher in patients with GP on the background of coronary heart disease by 17.1% compared with patients without concomitant coronary heart disease. The results of determining the bleeding index of the gums showed that in patients with coronary artery disease the bleeding index was significantly higher compared to patients without coronary heart disease. The RI index also differed in coronary heart disease and its absence, which showed a 15.3% greater tendency to inflammatory periodontal lesions in patients with coronary heart disease.

The Schiller-Pisarev test confirmed the predisposition of coronary heart disease patients to pathological periodontal processes and showed a more inflammatory response in periodontal tissues than in patients without coronary heart disease.

Thus, in patients with coronary artery disease clinical manifestations of dental caries and diseases of SOPR do not show features in comparison with somatically healthy patients, and periodontal diseases are characterized by significant activity of the inflammatory process. In patients with more severe periodontitis in the period of exacerbation of interference with hygienic measures, due to pain, worsens the hygienic condition of the oral cavity. In addition, it is determined that patients with coronary heart disease who take anticoagulants suffer from increased bleeding gums.

Table 1

Indicators of hygienic and periodontal indices of oral cavity in patients with coronary heart disease

Indicators	Control group n=10	Observation group (with CHD) n = 32	Comparison group (without CHD) n = 28
Index ONI-S scores	1,83±0,10	3,75±0,02	3,18±0,02
index of plaque	1,18±0,10	2,23±0,02	2,00±0,02
-the index calculus	0,65±0,02	1,52±0,02	1,18±0,02
RMA %	25,4±1,2	51,60±2,30	42,80±2,08
The index of bleeding points	1,01±0,06	2,48±0,02	1,89±0,03
Periodontal index, scores	1,44±0,08	4,34±0,10	3,68±0,12
Schiller-Pisarev test	1,72±0,15	2,24±0,23	1,78±0,20
Salivation ml / min	0,50±0,18	0,38±0,14	0,54±0,20

The values of hygiene indices in the observation group are higher than in the comparison group, indicating that coronary heart disease contributes to the deterioration of oral hygiene. This negative impact is realized through a number of mechanisms. The first mechanism is tissue hypoxia and microcirculatory disorders described by many authors [2, 3, 4]. The second is the increase in bleeding of the gums, which leads to the refusal of teeth cleaning. The third is hypofunction of the salivary glands, which indirectly causes volume growth and maturation of the microbial biofilm of the oral cavity [1, 13].

In patients with coronary heart disease there is a 30% reduction in the rate of salivation compared with patients without coronary heart disease.

In patients with CP and coronary heart disease as a result of an objective examination of the oral cavity revealed that before treatment, the majority had papillary gingival hyperemia, and often with cyanotic tint, bleeding and painful sensations. A number of patients had a loose adherence of the ash margin to the neck of the teeth, indicating a clear inflammatory process in the gums, the presence of over- and subglacial dental deposits. In addition, three patients showed pathological periodontal pockets with serous purulent exudate.

The analysis of clinical observation showed that after the course of treatment of CP, in all patients with coronary artery disease tended to improve - decreased edema, bleeding, cyanotic gums, as well as pain, the depth of tooth-gum pockets decreased, the gum margin became more dense.

After the professional hygiene of the oral cavity there are no soft and hard dental deposits. According to the results of clinical observations, positive dynamics of periodontal

status were determined according to all indices after treatment (Table 2). However, in patients undergoing topical treatment with the newly developed Apifil rinse, the activity of inflammatory changes was significantly lower than in patients treated with Asepta rinse. Increased dental and hygiene indices in patients with GP and coronary heart disease with the use of "Apifila" in the treatment process decreased faster and more intensively. The most important effect of the application should be considered a decrease in the bleeding index of the gums by 1.8 times, as an indicator characterizing the degree of inflammatory changes of the periodontal and the state of its vessels, and the index of hygiene OH-S - 2.6 times, that is, improving the hygienic condition of the oral cavity. The use of the new rinse aid to increase salivation was charitable.

Table 2

Indicators of hygienic and periodontal indices of the oral cavity in patients with GP and coronary heart disease after treatment

Indicators	The main group is n = 13		Comparison group n = 12	
	before treatment	after treatment	before treatment	after treatment
Index ONI-S scores	3,46±0,12	1,30±0,14	3,44±0,20	1,62±0,16
P		<0,05		<0,05
RMA %	52,20±2,60	40,20±2,40	54,60±1,90	48,20±2,00
		<0,05		<0,05
The index of bleeding points	2,36±0,06	1,28±0,08	2,28±0,10	1,66±0,13
		<0,05		<0,05
Periodontal index, scores	4,62±0,10	2,58±0,07	4,74±0,12	3,12±0,06
		<0,05		<0,05
Salivation, ml / min	0,50±0,08	0,69±0,09	0,52±0,10	0,58±0,12
		>0,05		>0,05

Note. P₁ - compared to the indicator before treatment

Analysis of certain biochemical indicators of oral fluid, which are markers of inflammation (elastase, MDA), bacterial insemination (urease), antioxidant protection (catalase), nonspecific immunity (lysozyme), showed an increase in elastase activity by 2.3 times, 4 times activity, activity 4 times with a decrease in the level of protective systems of the antioxidant enzyme catalase 1.6 times and lysozyme 2.1 times in patients with GP and coronary heart disease. Topical application of conditioners reduces the activity of elastase by performing anti-inflammatory action, while increasing the activity of lysozyme and catalase. Therapy using the Apifil rinse aid proved to be more effective compared to the Asepta rinse, which is probably due to the action of the biologically active ingredients.

Table 3

Changes in biochemical parameters of oral fluid in patients with GP and coronary heart disease after treatment

Indicator	control	The main group is n = 13		Comparison group n = 12	
		before treatment	after treatment	before treatment	after treatment
Protein, g / l P	0,56±0,04	0,82±0,05	0,60±0,04 <0,05	0,78±0,05	0,66±0,06 <0,05
Activity elastases, µkat / l P	0,25±0,02	0,68±0,04	0,32±0,03 <0,05	0,70±0,05	0,36±0,05 <0,05
Activity ureases, µkat / l P	0,085±0,01	0,38±0,04	0,20±0,03 <0,05	0,40±0,03	0,28±0,03 >0,05
Activity catalysis, µkat / l P	0,26±0,02	0,16±0,02	0,34±0,03 <0,05	0,14±0,02	0,29±0,03 <0,05
MDA, mmol / l P	0,24±0,02	0,34±0,03	0,24±0,02 <0,05	0,35±0,02	0,28±0,02 <0,05
Activity lysozyme, units / l P	85,0±5,00	40,0±3,00	72,0±5,00 <0,05	43,0±4,00	68,0±6,0 <0,05

Note. P₁ – compared with the indicator before treatment

Thus, a wide range of BAS newly developed rinse provides its corresponding properties: regulation of metabolic processes, anti-inflammatory, bacteriostatic, antioxidant, anti-edema, capillary, analgesic, reparative, local immunomodulatory effect. It should be noted that the Apifil rinse was approved by the Ministry of Health of Ukraine [14] to use it as a prophylactic in medical dental institutions. Our research opens the prospects for the use of a newly developed agent for the prevention and treatment of inflammatory diseases of the oral cavity, which occur on the background of comorbid somatic diseases.

Conclusions

1. Conducted clinical and laboratory studies have identified a higher activity of the inflammatory process in the tissues of the oral cavity in patients with coronary heart disease compared with patients without this pathology in the absence of a difference in clinical manifestations of dental caries and diseases of the oral mucosa.

2. The use of local therapy with the use of anti-inflammatory agents for the care of the oral cavity in the complex treatment of generalized periodontitis in patients with coronary heart disease reduces the level of inflammatory-dystrophic processes in the tissues of the periodontium and increases the activity of protective systems.

3. The action of the newly created Apifil rinse at the expense of the constituent ingredients has proven to be more effective in terms of time and intensity than the Aseptia rinse.

References

1. Sokhova I.A. Osobennosti stomatologicheskogo statusa paczientov s ishemicheskoy bolezn`yu serdca [Features of the dental status of patients with coronary heart disease]. Sb. Klinicheskaya mediczina. 2015;4:41-46.

2. Karimov B.M. Rol` obshhesomaticheskogo statusa v razvitii vospalitel`no-destruktivny`kh porazhenij parodonta [The role of somatic status in the development of inflammatory and destructive lesions of periodontal]. Vestnik Aviczenny, 2015;1(58):115-119.

3. Van der Bil` P. Vzaimosvyaz` zabolevanij parodonta i serdechno-sosudistoj sistemy` [The relationship of periodontal disease and the cardiovascular system]. Problemy` stomatologii. 2014; 6: 4-8.

4. Skochko O.V. Vzaimosvyaz` zabolevanij parodonta s faktorami riska razvitiya ishemicheskoy bolezn`i serdca / [The relationship of periodontal disease with risk factors for coronary heart disease]. Ukrainskij kardiologicheskij zhurnal. 2015;2:87-94.

5. Mishhenko I.S. Bolezni parodonta [Periodontal Disease]. Dnepropetrovsk: Kolo. 2003: 272.

6. Patent na korisnu model` 129913 Ukrayina MPK (2018.01) A61K31/19, A61K897 Opoli`skuvach rotovoyi porozhnini dlya mi`scevoyi profi`laktiki ta li`kuvannya zapal`nikh zakhvoryuvan` tkanin slizovoyi obolonki [Oral rinse for local prevention and treatment of inflammatory diseases of the mucous membranes]. Kravchenko L.S., Fi`zor N.S.; zayavnik i` patentovlasnik ONMedU – zayav. u201801440 vi`d 14.02.2018, opub. 26.11.2018, Byul. 22.

7. Leviczkiy A.P. Salivacziya u zdorovy`kh licz raznogo vozrasta i stomatologicheskikh bol`ny`kh [Salivation in healthy individuals of different ages and dental patients]. Vi`snik stomatologi`yi. 2005;2:7-8.

8. Lowry O.H. Protein measurement with Folin phenol reagent. Biol. Chem. 1951;193:265-275.

9. Stal'naya I. D. Metod opredeleniya malonovogo dial`degida s pomoshh`yu tiobarbiturovoj kisloty [Method for determination of malondialdehyde using thiobarbituric acid]. *Sovremennyye metody` v biokhimii. M. Mediczina. 1977:66-68.*
10. Leviczkiy A.P. Metody` opredeleniya aktivnosti e`lastazy` i eyo ingibitorov [Methods for determining the activity of elastase and its inhibitors]. Kiev: GFCz, 2002: 15.
11. Gavrikova L.M. Ureaznaya aktivnost` rotovoj zhidkosti u bol`ny`kh s ostroj i odontogennoj infekciej chelyustno-liczevoj oblasti /L.M. Gavrikova, I.T. Sechen` [Urea activity of oral fluid in patients with acute and odontogenic infection of the maxillofacial region]. *Stomatologiya (Speczvy`pusk). 1996:.49-50.*
12. Girin S.V. Modifikacziya metoda opredeleniya aktivnosti katalazy` v biologicheskikh substratakh [Modification of the method for determining the activity of catalase in biological substrates]. *Laboratornaya diagnostika. 1999;4:45-46.*
13. Leviczkiy A.P. Lizocim vmesto antibiotikov [Lysozyme instead of antibiotics]. Odessa: KP OGT, 2005: 74.
14. Visnovok derzhavnoyi sani`tarno-epi`demi`ologichnoyi ekspertizi derzhavnoyi sluzhbi Ukrayini z pitan` bezpechnosti` kharchovikh produkti`v ta zakhistu spozhivachi`v «Opoli`skuvach dlya porozhnini rota «Api`fi`l» [Opinion of the State Sanitary and Epidemiological Expertise of the Civil Service of Ukraine on Food Safety and Consumer Protection "Apifil Oral Rinse] № 602-123-20-1/36502 vi`d 28.08.2018.