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DYNAMICS OF ORAL CAVITY CONDITION CHANGES IN PATIENTS WITH EARLY AND STAGE I PERIODONTITIS DURING THERAPEUTIC AND PREVENTIVE MEASURES

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Background. Periodontitis affects nearly half of the adult population worldwide, underscoring the urgent need for effective preventive strategies. Multifactorial preventive regimens that combine antibacterial, antioxidant, and prebiotic components may offer sustained periodontal benefits.

Objective. To evaluate the two-year clinical dynamics of periodontal status and oral hygiene in adults with early-stage (stage I) periodontitis undergoing treatment with a therapeutic–preventive complex.

Materials and Methods. Thirty-one patients aged 35–60 years were enrolled: 20 received the therapeutic–preventive complex twice yearly (test group), while 11 received routine care only (control group). Clinical assessments included the papillary-marginal-alveolar index (PMA%), Schiller–Pisarev test, Muhlemann bleeding index, and oral hygiene indices (Silness–Loe, Stallard). Examinations were performed at baseline, 6 months, 1 year, and 2 years. Statistical analysis was conducted using Student's t-test, with significance set at $p < 0.01$.

Results. After 6 months, PMA% in the test group decreased from 21.24 ± 2.11% to 8.57 ± 0.82% ($p < 0.001$), compared with 14.53 ± 1.32% in the control group. The bleeding index fell to 0.50 ± 0.04, while it increased to 1.04 ± 0.10 in controls. Improvements persisted through year 2: PMA% remained at 9.12 ± 0.84% and bleeding at 0.57 ± 0.05 in the test group, accompanied by significantly better oral hygiene scores (Silness–Loe 0.49 ± 0.04; Stallard 0.75 ± 0.08) compared with controls (1.23 ± 0.21; 1.86 ± 0.16).

Conclusions. Twice-yearly application of the therapeutic–preventive complex significantly reduced gingival inflammation and improved oral hygiene in patients with early periodontitis, maintaining a stable protective effect over two years.

Keywords: periodontitis; gingival inflammation; oral hygiene; adults; therapeutic–preventive complex.

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ДИНАМІКА ЗМІН СТАНУ ПОРОЖНИНИ РОТА У ПАЦІЄНТІВ ІЗ ПАРОДОНТИТОМ ПОЧАТКОВИМ – І СТУПЕНЕМ ТЯЖКОСТІ ПІД ЧАС ЛІКУВАЛЬНО-ПРОФІЛАКТИЧНИХ ЗАХОДІВ

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Стаття присвячена клінічній оцінці ефективності багатокомпонентного лікувально-профілактичного комплексу d дорослих пацієнтів віком 35–60 років із пародонтитом початкового – І ступеня тяжкості. У дослідженні взяла участь 31 особа, з яких 20 двічі на рік застосовували розроблений комплекс, тоді як 11 пацієнтів отримували базову терапію. Оцінювали стан тканин пародонта та гігієну порожнини рота у вихідному стані, через 6 місяців, 1 та 2 роки. Уже через пів року спостерігалося достовірне зниження стану пародонта, що було майже вдвічі краще, ніж у групі порівняння. Позитивна динаміка зберігалася протягом двох років. Отримані результати свідчать про стійкий лікувально-профілактичний ефект комплексу та його перспективність для персоніфікованої профілактики початкових форм пародонтиту.

Ключові слова: пародонтит, запалення ясен, дорослі пацієнти, ротова порожнина, лікувально-профілактичний комплекс.

Introduction

The health of periodontal tissues plays a prominent role in maintaining human somatic well-being, as chronic inflammatory periodontal diseases are common in almost half of the adult population worldwide and have a systemic effect on the body [1]. According to the World Health Organization, the burden of periodontitis, together with other common oral pathologies, exceeds 3.5 billion cases and shows a stable upward trend, which has a significant socio-economic impact and requires the improvement of preventive programs [2].

The modern concept of prevention is based on an interdisciplinary approach, in which lifestyle modification, behavioral interventions, and individualized hygiene measures are regarded as key factors in controlling the progression of gingival inflammation. [3]. At the same time, numerous epidemiological and clinical studies prove the close relationship between periodontitis and metabolic, cardiovascular and endocrine disorders, which further increases the medical and social significance of this condition and requires comprehensive solutions aimed not only at local control of infection, but also at correction of systemic risk factors [4]. Experimental radiological data also indicate that diabetes mellitus, especially in combination with opioid exposure, significantly alters bone density and mineral composition, emphasizing the systemic nature of metabolic disorders [5]. The search for new compounds with anti-caries activity continues [6].

In this context, multi-component therapeutic and preventive complexes combining antibacterial, anti-inflammatory, antioxidant and prebiotic components are gaining increasing attention. Their use makes it possible to simultaneously affect the microbial biofilm, improve local metabolic processes and stimulate the resistance of the oral mucosa. In particular, combinations containing natural bioflavonoids, inulin, and antiseptic rinses with prolonged action are considered promising, the effectiveness of which has been partially confirmed by clinical trials using propolis preparations [7].

Despite isolated reports of the positive effects of such regimens, there is still a lack of data in the literature on the long-term clinical effectiveness of comprehensive preventive programs in patients with early and stage I periodontitis, especially in terms of the dynamic assessment of inflammatory signs and hygienic status over several years of observation. This gap necessitates a thorough analysis of the results of the use of new compositions combining prebiotic, antioxidant and antimicrobial components under clinical conditions.

The aim of this study was to evaluate the dynamics of changes in periodontal status and oral hygiene in patients with early and stage I periodontitis during the use of a therapeutic and preventive complex.

Materials and methods

In studies of the effectiveness of the proposed therapeutic and preventive complex, 31 patients aged 35–60 years with early and stage I periodontitis were selected from the examined patients (20 – main group, 11 – comparison group).

Treatment of patients in the main group was accompanied by the use of the developed therapeutic and preventive complex (TPC) twice a year (Table 1). Before the start of treatment and every three months in both groups, oral sanitation and professional hygiene were performed.

The comparison group received only basic therapy. In both groups, the condition of periodontal tissues (degree of inflammation) was assessed at baseline, after 6 months, 1 year and 2 years.

The following indices were used to assess the condition of periodontal tissue [8]:

Papillary-marginal-alveolar index PMA% to assess the severity of inflammatory changes in the periodontium. The PMA% index is calculated using the formula: PMA = (total score / 3 x number of teeth) x 100%; (0% – normal, up to 30% – mild severity, 31–60% – moderate severity, 61% and above – severe);

Schiller–Pisarev test (S-P) – intravital staining of gingival glycogen, the amount of which increases with inflammation. Depending on the intensity of the staining, a negative test (straw-yellow color), a weakly positive test (light brown), and a positive test (dark brown) are distinguished;

Gum bleeding (Muhlemann bleeding index) was determined using a periodontal probe.

The following indices were used to assess oral hygiene: the Silness–Loe and Stallard oral hygiene indices [8].

The studies were conducted at the Department of Epidemiology and Prevention of Major Dental Diseases, Pediatric Dentistry and Orthodontics, Biophysics and Functional Diagnostics Sector of the State Establishment "The Institute of Stomatology and Maxillo-facial Surgery National Academy of Medical Sciences of Ukraine". All patients provided informed consent to participate in the study, which was conducted in accordance with the principles of the World Medical Association's Code of Ethics (Helsinki Declaration). Accordingly, the meeting of the Bioethics Commission of the State Institution "Institute of Dentistry and Maxillofacial Surgery of the National Academy of Medical Sciences of Ukraine" (protocol No. 1011 of 14.04.2022) approved this study.

The STATISTICA 6.1 computer program was used for statistical processing of the results obtained to assess their

Table 1

Therapeutic and preventive complex for the patients with early and stage I periodontitis

Preparations	Dosage	Terms	Mechanism of action
Inulin (Scientific and Production Association "Odesa Biotechnology", Ukraine)	2 tablets 3 times a day after meals	1–30 days	Sugar-lowering, hepatoprotective, normalizes lipid metabolism, restores intestinal flora
Biotryt Plus – biological supplement (Scientific and Production Association "Odesa Biotechnology", Ukraine), Ukraine	1 tablet 3 times a day	1–30 days	Antioxidant, membrane-stabilizing and immunostimulating effect
Meridol – toothpaste (Colgate-Palmolive, Germany)	2 times a day after meals	1–30 days	Antibacterial action, prevention of plaque formation, caries prevention
Meridol – mouthwash (Colgate-Palmolive, Germany)		1–30 days	Prolonged antibacterial and anti-inflammatory action

reliability and measurement errors. A statistically significant difference between alternative quantitative characteristics with a distribution corresponding to the normal law was assessed using Student's t-test. The difference was considered statistically significant at $p < 0.01$ [9].

Presentation of the main research material

Table 2 shows the results of the dynamics of the PMA index and the level of bleeding in patients during prophylaxis. According to the initial data, both groups had a similar degree of inflammation: 21.24 ± 2.11 versus 21.30 ± 2.08 according to PMA.

After six months of using the TPC, patients in the test group showed a significant decrease in PMA to 8.57 ± 0.82 ($p < 0.001$), which is more than one and a half times better than in the control group, where the indicator was 14.53 ± 1.32. This difference remained after a year of observation, and at the end of the second year, the PMA index in the test group ranged from 9.12 ± 0.84, while in the control group it reached 20.98 ± 2.32. The almost twofold advantage in reducing the inflammatory process in the gums indicates a lasting effect of preventive measures.

A similar trend was observed with regard to gum bleeding. Initially, the indicators in both groups were approximately the same (0.58 ± 0.06 and 0.56 ± 0.07). However, after 6 months, they decreased to 0.50 ± 0.04 in the test group, while in the control group, on the contrary, they increased to 1.04 ± 0.10. After 1 and 2 years, these differences became even more pronounced, confirming the possibility of effectively preventing the progression of periodontitis.

Table 3 shows the dynamics of changes in oral hygiene in patients with early and stage I periodontitis during preventive measures.

After 6 months of preventive measures in the test group, both indicators decreased significantly: Silness–Loe to 0.50 ± 0.05 and Stallard to 0.63 ± 0.06 ($p < 0.001$). At the same time, in the control group, both indices showed an increase (1.08 ± 0.12 and 1.43 ± 0.12) over the same period.

Further monitoring after 1 and 2 years confirmed the positive dynamics in patients who regularly received the TPC. At the end of the second year, Silness–Loe in the test

Table 2

Condition of periodontal tissues in patients with early and stage I periodontitis during preventive treatment, M ± m

Group \ Indicator		PMA%	Bleeding
Main group	At baseline	21.24 ± 2.11 p > 0.1	0.58 ± 0.06 p > 0.1
	After 6 months	8.57 ± 0.82 p < 0.001	0.50 ± 0.04 p < 0.001
	After 1 year	8.81 ± 0.97 p < 0.001	0.65 ± 0.8 p < 0.001
	After 2 years	9.12 ± 0.84 p < 0.001	0.57 ± 0.05 p < 0.001
Comparison group	At baseline	21.30 ± 2.08	0.56 ± 0.07
	After 6 months	14.53 ± 1.32	1.04 ± 0.10
	After 1 year	19.60 ± 1.95	1.39 ± 0.14
	After 2 years	20.98 ± 2.32	1.61 ± 0.16

Note: p – the probability of the difference from the comparison group.

Table 3

Oral hygiene in patients with early and stage I periodontitis during preventive treatment, M ± m

Group \ Indicator		Silness–Loe	Stallard
Main group	At baseline	1.02 ± 0.11 p < 0.1	1.03 ± 0.09 p < 0.1
	After 6 months	0.50 ± 0.05 p < 0.001	0.63 ± 0.06 p < 0.001
	After 1 year	0.52 ± 0.05 p < 0.001	0.70 ± 0.07 p < 0.001
	After 2 years	0.49 ± 0.04 p < 0.001	0.75 ± 0.08 p < 0.001
Comparison group	At baseline	1.04 ± 0.10	1.05 ± 0.10
	After 6 months	1.08 ± 0.12	1.43 ± 0.12
	After 1 year	1.19 ± 0.15	1.59 ± 0.14
	After 2 years	1.23 ± 0.21	1.86 ± 0.16

Note: p – the probability of the difference from the comparison group.

group returned to 0.49 ± 0.04, and Stallard to 0.75 ± 0.08, while in the control group these indicators remained at 1.23 ± 0.21 and 1.86 ± 0.16, respectively.

Conclusions

The use of the developed therapeutic and preventive complex twice a year in patients with early and stage I periodontitis significantly reduced the severity of gum inflammation, as the PMA% index decreased from (21.24 ± 2.11)% to (9.12 ± 0.84)% over two years, which was nearly twice as effective compared to the comparison group.

Clinical signs of bleeding according to the Muhlemann bleeding index decreased 1.9 times after 6 months and remained at a low level until the end of the observation period, confirming the stable anti-inflammatory effect of the complex.

Oral hygiene indicators improved significantly, while in the comparison group they increased, demonstrating the significant preventive efficacy of the developed complex.

Further research should focus on the assessment of biochemical indicators of oral fluid in patients with varying degrees of periodontal disease severity and the effect of the therapeutic and preventive complex.

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