DOI https://doi.org/10.30525/978-9934-26-439-9-15

THE USE OF PROBIOTICS OF THE GENUS BACILLUS IN THE PROCESS OF COMPLEX REHABILITATION IN PATIENTS WITH REFRACTORY PERIODONTITIS

ВИКОРИСТАННЯ ПРОБІОТИКІВ РОДУ BACILLUS В ПРОЦЕСІ КОМПЛЕКСНОЇ РЕАБІЛІТАЦІЇ У ПАЦІЄНТІВ З РЕФРАКТЕРНИМ ПАРОДОНТИТОМ

Symonenko R. V.
Candidate of Medical Sciences, Associate Professor, Associate Professor at the Department of Prosthetic Dentistry Bogomolets National Medical University Kyiv, Ukraine

Симоненко Р. В.
кандидат медичних наук, доцент, доцент кафедри ортопедичної стоматології Національний медичний університет імені О. О. Богомольця м. Київ, Україна

Melnychuk T.A.
Candidate of Medical Sciences, Associate Professor, Associate Professor at the Department of Dentistry of the Institute of Postgraduate Education Bogomolets National Medical University Kyiv, Ukraine

Мельничук Т. А.
кандидат медичних наук, доцент, доцент кафедри стоматології Інституту післядипломної освіти Національний медичний університет імені О. О. Богомольця м. Київ, Україна

Etnis L. O.
Assistant at the Department of Dentistry of the Institute of Postgraduate Education Bogomolets National Medical University Kyiv, Ukraine

Етніс Л. О.
асистент кафедри стоматології Інституту післядипломної освіти Національний медичний університет імені О. О. Богомольця м. Київ, Україна

Introduction. Periodontitis is a chronic disease with local and systemic manifestations that leads to tooth loss. The issues of etiopathogenesis, clinical manifestations and planning of high-quality local and general treatment of periodontitis remain relevant, since its prevalence and intensity do not tend to decrease among the population [1, p. 72–80]. Despite the progress of modern medicine, the treatment of periodontitis remains an

extremely difficult task. The imbalance in the microbiome of the oral cavity is considered to be the leading factor influencing the occurrence and progression of periodontitis. In recent years, there can be noted an increase in prevalence of progressive forms of chronic periodontitis, resistant to standard antibacterial therapy with a course without noticeable signs of recovery [2, p. 1–5].

The concept of a multidisciplinary approach to the treatment of patients with generalized periodontitis remains the most popular among specialists. Therefore, reducing the infectious load on the periodontium during non-surgical interventions and supportive therapy is important. Antimicrobial agents are usually prescribed as supportive therapy, but the capabilities of many drugs, especially antibiotics, are significantly limited due to the rapid habituation and loss of sensitivity to them of the periodontopathogenic microflora [3, p. 1–12]. Pronounced antimicrobial properties of probiotic strains make it possible to consider the possibility of using drugs based on them as an alternative to antibiotics, which is especially relevant in the era of the rapid spread of resistant forms of pathogenic microorganisms and the decrease in the effectiveness of a number of antimicrobial agents [4, p. 1–17].

As a result of numerous preclinical and clinical studies of Bacillus subtilis and Bacillus licheniformis strains, good perspectives of these microorganism's usage for the treatment and prevention of periodontal tissue diseases were established [5, p. 1353–1356]. Previously conducted microbiological studies have shown that the proposed mixture of silica gel and bacteria strains of B. subtilis and B. licheniformis has a pronounced antimicrobial activity both on the test strains of microorganisms and on the mixed microbial flora of the periodontal pockets of patients with generalized periodontitis [6, p. 49–51]. This provided the basis for the clinical use of this medicinal composition for complex treatment and prevention of inflammatory diseases of periodontal tissues [7, p. 87–88; 8, p. 26].

The aim of the study: to evaluate the effectiveness of the local application of a medicinal composition based on highly dispersed silica gel and bacteria strains of Bacillus subtilis B-7812(AX20) and Bacillus licheniformis IMB B-7811(EA22) for reducing the risk of complications during prosthodontic rehabilitation of patients with periodontitis.

Materials and methods. 22 patients (10 male, 12 female) of the main group and 20 patients (10 male, 10 female) of the control group, aged from 25 to 60 years, with refractory generalized periodontitis of the 1–2 degree of severity, who underwent adhesive splinting and occlusal correction in Dental Medical Center of Bogomolets National Medical University, were under our observation. Examination of patients included clinical and X-ray assessment of dental status. Periodontal and oral hygiene status was

evaluated using Russell′s Periodontal Index (PI) and Greene-Vermillion Simplified Oral Hygiene Index (OHI-S), which were calculated before and 1, 2 and 3 months after prosthodontic treatment (splinting and occlusal equilibration). Re-examination and correction were carried out every two weeks. In the main group the prosthodontic treatment was combined with local medication therapy in the form of mouth rinse using proposed medicinal composition of highly dispersed silica gel and bacteria strains of Bacillus subtilis B-7812(AX20) and Bacillus licheniformis IMB B-7811(EA22) (1g of the mixture contains silica gel and 2,5 x 10^9 CFU of live microbial cells of B. Subtilis and B. Licheniformis in equal parts). Patients diluted the mixture with boiled water in a ratio of 1 to 10 and rinsed oral cavity once a day (in the evening before going to bed) during the entire treatment period.

Results. The analyzis of periodontal and oral hygiene status in patients of the main group after using a medicinal mixture of silica gel and bacteria B. subtilis B-7812(AX20) and B. licheniformis IMB B-7811(EA22) has showed a pronounced reduction in the manifestations of periodontal inflammation and an improvement in the hygienic condition of the oral cavity, while among the patients of control group with only prosthodontic interventions more inflammation manifestations and worse hygienic status were observed.

In main group after the mean value of PI decreased significantly from 5.63±0.33 before the prosthodontic treatment in combination with probiotic usage to 2.95±0.36 after and the mean value of OHI-S decreased from 2.98±0,26 to 0.49±0.16 after the treatment. Thus, after the treatment, in main group PI value significantly decreased on average by 47.6% from the initial level, the OHI-S value decreased by 83.5%.

The patients of control group after the prosthodontic intervention have also showed decrease of mean values of PI (from 5.47±0.25 to 4.98±0.26) and OHI-S (from 3.06±0.13 to 1.01±0.12), but it was not as significant as in main group. Thus, after the treatment, in control group PI value decreased only on average by 8.9% from the initial level, the OHI-S value decreased by 66.9%.

3 months after intervention the therapeutic effect in the main group was stable and PI value remained 3.06±0.35, while among the control group it increased to 5,26±0,27. Mean value of OHI-S in main group remained 0.67±0.1 3 months after the intervention, while among the control group it increased to 1.37±0.13.

Conclusions. The conducted study showed that the proposed medicinal composition of silica gel and bacteria strains of B. subtilis B-7812(AX20) and B. licheniformis IMB B-7811(EA22) has a pronounced therapeutic effect on periodontal tissues and significantly improves the local hygienic status of patients with refractory generalized periodontitis during prosthodontic treatment, so it can be recommended to reduce the risks of complications.

Bibliography:

1. Nazir M. A. Prevalence of periodontal disease, its association with systemic diseases and prevention. International journal of health sciences. 2017. 11(2). P. 72–80.

2. Ramalingam K., Peeran S. W. Chapter 27. Refractory Periodontitis / Recurrent Periodontitis. Essentials of Periodontics & Oral Implantology. Chennai, Tamil Nadu, India, 2021. P. 1–5.

3. Ng E., Tay J. R. H., Boey S. K., Laine M. L., Ivanovski S., Seneviratne C. J. Antibiotic resistance in the microbiota of periodontitis patients: an update of current findings. Critical Reviews in Microbiology. 2023. 4 May. P. 1–12. https://doi.org/10.1080/1040841X.2023.2197481.

4. Hardan L., Bourgi R., Cuevas-Suárez C.E., Flores-Rodríguez M., Omaña-Covarrubias A., Nicastro M., Lazarescu F., Zarow M., Monteiro P., Jakubowicz N. et al. The Use of Probiotics as Adjuvant Therapy of Periodontal Treatment: A Systematic Review and Meta-Analysis of Clinical Trials. Pharmaceutics. 2022, 14, 1017. https://doi.org/10.3390/pharmaceutics14051017

5. Tsubura S., Mizunuma H., Ishikawa S., Oyake I., Okabayashi M., Katoh K., Shibata M., Iizuka T., Toda T. The effect of Bacillus subtilis mouth rinsing in patients with periodontitis. *European journal of clinical microbiology & infectious diseases: official publication of the European Society of Clinical Microbiology*. 2009. Vol. 28. P. 1353–1356. https://doi.org/10.1007/s10096-009-0790-9

6. Symonenko R. V., Martynuk I. O. Microbiological justification of the use of bacillus subtilis bacteria for the treatment of inflammatory periodontal diseases: International scientific conference “Medicine and health care in modern society: topical issues and current aspects” proceedings (November 3–4, 2022. Riga, the Republic of Latvia). Riga, Latvia : Publishing House “Baltija Publishing”. 2022. P. 49–51. https://doi.org/10.30525/978-9934-26-260-9-13

7. Symonenko R., Martynuk I. Analysis of the antimicrobial action of bacteria Bacillus licheniformis in relation to the microflora of periodontal pockets. *Proceedings of the VIII International Scientific and Practical Conference*. Zagreb, Croatia. 2024. P. 87–88.

8. Симоненко Р. В., Мартинюк І. О., Етніс Л. О., Жегулович З. Є. Використання пробіотиків Bacillus subtilis в комплексному лікуванні запальних захворювань пародонту на фоні антибіотикорезистентності. *Вісник проблем біології і медицини*. 2023. Випуск 2(169) (додаток). С. 26. https://dx.doi.org/10.29254/2523-4110-2023-2-169/addition-26