

## Improving the effectiveness of therapeutic measures for generalized periodontitis in patients with hypertension

### Abstract

The program of standard therapeutic measures in 45 patients with chronic generalized periodontitis (CGP) and background hypertension, group I(a), included hirudotherapy, for comparison, the effectiveness of traditional treatment was evaluated in 40 patients, group I(b), who refused to use medical leeches. In the second comparison group (35 patients), patients with CGP, but normal blood pressure, also received only a set of traditional methods of treatment. The inclusion of hirudotherapy in the program of therapeutic measures in patients with CGP and background hypertension makes it possible to optimize the onset of a persistent therapeutic effect, lengthen the period of remission of the pathological process in periodontal disease and significantly improves the quality of life of patients.

**Key words:** *chronic generalized periodontitis, hypertension, hirudotherapy, medical leeches*

### Introduction

At the present stage of cardiology development, a comprehensive approach to the treatment of hypertension is being implemented, which is based on drug therapy [1-3]. Despite the fact that the main successes in the treatment of hypertension are associated with pharmacotherapy, it is not always possible to achieve high treatment efficiency. In the last decade, non-drug treatment methods have been increasingly used for hypertension: magnetotherapy, physiotherapy, balneotherapy, etc [4-6]. An important component of the complex therapy of hypertension is an adequate correction of hemorheological and microcirculatory disorders characteristic of the disease in the tissues of the entire body [7]. Most

**Comment [AR1]:** The correct sequence of the words is: Generalized Chronic Periodontitis. Please re-write, and also correct all the related abbreviations throughout the manuscript.

**Comment [AR2]:** Change to: Patients with GCP and hypertension, and correct throughout the manuscript.

researchers have established a more severe course of pathological processes in the tissues of the dental system with background vascular dystonia [8,9].

Unfortunately, the use of a standard arsenal of tools in modern clinical dentistry in the presence of background disorders of systemic hemodynamics cannot achieve complete rehabilitation of the pathological process in periodontitis [10-12]. The problems of effective and pathogenetically justified therapy of chronic generalized periodontitis (CGP) of hypertonia today remain not completely solved [13-16].

The emerging trend in clinical dentistry in recent years is the use of herbal preparations [17-20]. Clinicians over the past decade have also turned to the use of an undeservedly forgotten effective folk method -hirudotherapy [21,22]. All of the above served as the basis for the inclusion of hirudotherapy in the complex of standard methods of therapy for chronic generalized periodontitis.

**The aim of the study** was to evaluate the effectiveness of hirudotherapy in combination with standard methods of treatment of chronic generalized periodontitis in patients with hypertension.

### Materials and Methods

The study included middle-aged patients - 35-44 years old. Hirudotherapy was included in the comprehensive program of standard therapeutic measures in 45 patients with a chronic course of the inflammatory process in periodontal disease and background hypertension (group I(a)). For comparison, the effectiveness of traditional treatment was evaluated in 40 patients with CGP on the background of hypertension (group I(b)) who refused to use medical leeches. In the second comparison group (35 patients), patients with CGP, but normal blood pressure, also received only a set of standard traditional methods of treatment.

Patients of both groups were prescribed comprehensive dental treatment, including traditional CGP therapy (removal of dental deposits, anti-inflammatory and antiseptic agents, closed curettage, splinting, etc.). Medical leeches grown in artificial conditions by the company "Girud I.N.", Balakovo, Saratov region, were

**Comment [AR3]:** Baseline and after intervention measurements of periodontal disease need to be put in the methods section. Three most important measurements include: probing pocket depths of all the periodontal pockets around each tooth, attachment level for each tooth, and bleeding index which indicates percent or mean of bleeding sites in the whole dentition of each patient. Without these measurements, the diagnosis, and treatment results would not be reliable and not scientifically acceptable.

**Comment [AR4]:** Include the country name.

used in the work. Leeches from a jar of water were deposited in a warm glass tube and its open end was applied to the inflamed vestibular surface of the alveolar processes of the jaws. The leeches sucked the blood for 30 to 35 minutes. After the procedure, the leech was revitalized - it was dipped in ethyl alcohol. After the procedure, the patient rinses the oral cavity with a solution of hydrogen peroxide (0.5%). It was recommended to abstain from eating for at least 3 hours. During the first application, one leech was used, for the second and subsequent procedures - two. The course of treatment was 10 sessions conducted in one day.

To assess the condition of periodontal tissues before and after treatment, the Schiller-Pisarev test was used, as well as indices: papillary-marginal-alveolar index (I.A. Barannikova, 1990), periodontal index (I.S. Ivanov, 1998), communal periodontal index [21-24].

## Results and Discussion

The results of the studies showed that the inclusion of hirudotherapy in the complex of standard methods of treatment was more effective compared to therapy when medical leeches were not used.

The appointment of hirudotherapy in patients of group I(a) was accompanied in almost all by an improvement in the general condition the very next day after the first session of application of a medical leech. On the second and third days, bleeding disappeared and hyperemia in the inflammatory process significantly decreased, unpleasant sensations, burning sensation and pain in the gum area disappeared, bad breath disappeared. On day 7, in 91.1% of patients, the Schiller-Pisarev test confirmed the absence of manifestations of the inflammatory process. The absence of separable from the dentoalveolar pockets and a clear tendency to their sclerosis were noted. The pathological mobility of the teeth was no longer determined.

In patients of group I(b), with CGP and background hypertension, who underwent a complex of traditional standard therapy, the results obtained differed significantly from patients with hirudotherapy and from the results of treatment of

**Comment [AR5]:** Which statistical tests were used? Explain in detail all the indices used here. Moreover, the results of using all these indices should have been reported in the results section using proper tables and figures.

**Comment [AR6]:** A proper bleeding index should have been used to determine the extent and severity of bleeding before and after treatment in all three groups. Using general terms such as: bleeding disappeared, is not acceptable in a scientific paper.

**Comment [AR7]:** How did you measure the amount of inflammation? Which index was used and give the numbers such as mean and standard deviation before and after treatment.

**Comment [AR8]:** How did you measure these variables? Did you use any questionnaire?

patients of group II. Positive dynamics in the clinic of CGP in patients of group I(b) was revealed only on the 11th-12th day of treatment, while against the background of improvement in general condition, cessation of pain and bleeding gums, burning and itching in 57.5% of patients, 52.5% retained separate areas of inflammation, confirmed by the Schiller-Pisarev test. 40.0% retained serous discharge from periodontal pockets. Pathological mobility of teeth was not noted[21].

In patients of the second group with normal blood pressure, whose treatment was also carried out according to the traditional standard program, without the use of hirudotherapy, positive dynamics in clinical manifestations of the disease in 62.8% of patients was noted after 9-10 days. At the same time, patients noted an improvement in well-being, cessation of itching, burning, soreness and bleeding in the gum area, almost complete disappearance of hyperemia and swelling of the mucous membrane. However, some representatives of the group – 37.1% in the gingival margin retained areas of inflammation, decreased, but not completely disappeared serous discharge from periodontal pockets. The Schiller-Pisarev test also remained positive in 28.6% of group II patients.

Thus, the relief of inflammatory phenomena in periodontal disease in most patients of group I(a) with background GB with the inclusion of hirudotherapy in the complex of standard treatment methods occurred much earlier, as indicated by the indicators of papillary-marginal-alveolar index, periodontal index, communal periodontal index (Figure 1), significantly different from the initial values already on 6-7 days after the start of therapeutic measures with the use of medical leeches.

A similar positive dynamics of laboratory parameters, indicating a decrease in inflammatory phenomena in periodontal disease in patients of group I(b) with hypertension, who did not undergo hirudotherapy, was recorded only after 11-12 days. However, the indicators of the activity of the pathological process significantly exceeded similar values of patients of both group I(a) with hirudotherapy and the second group (patients with CGP, but with normal blood pressure), which indicated a significant contribution of hemodynamic disorders in

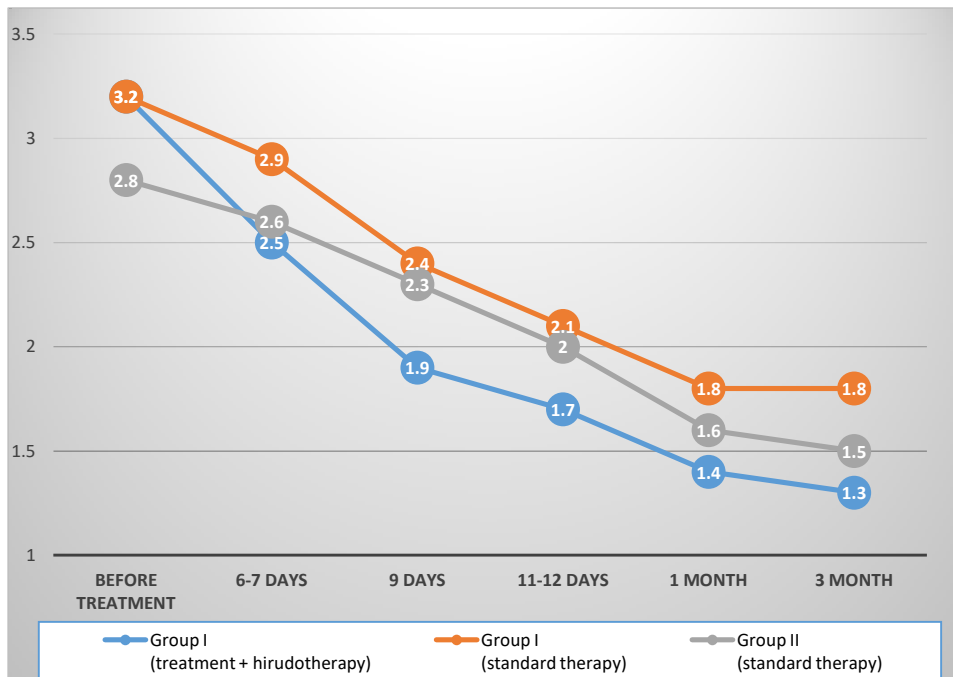
**Comment [AR9]:** In evaluating periodontal health and disease, periodontal pockets and probing depth, attachment level, and bleeding on probing are basic variables to be considered. Giving the percent of patients who experienced pain, or bleeding, or itching gums, does not provide any reliable scientific data and is not acceptable.

**Comment [AR10]:** How did you measure the well-being of patients? There are many validated questionnaires for evaluating quality of life. Did you use any of them?

**Comment [AR11]:** Which laboratory tests have you used??? There is no laboratory test explained in the methods section.

**Comment [AR12]:** Which indicators? Give the values.

background hypertension to the nature of blood supply to periodontal tissues, manifested by deterioration of metabolic processes and a more torpid course of the disease to therapy [25,26].



**Figure 1** - Dynamics of PI indicators in patients with CGP in the course of therapy

Evaluation of the effectiveness of various treatment options for patients with CGP was carried out in the catamnesis, 6 and 12 months after the course of treatment. When examining patients of group I(a) with background hypertension treated with hirudotherapy, complete remission of the disease after 6 months was maintained in 43 patients (95.5%), after 12 months - in 35 (77.7%). Of the 40 patients in the Ib group whose complex of therapeutic measures did not include hirudotherapy, remission during CGP persisted in 19 patients (47.5%) after 6 months, and in 16 patients (40.0%) after 12 months. In the second group - with CGP, but normal blood pressure, after 6 months, indicators of inflammatory

**Comment [AR13]:** How long did you follow-up the patients and what do you mean by remission of the disease? The term remission is not used for periodontal treatment success.

process activity were absent in 22 patients (62.8%), after 12 months, 19 patients (54.2%) remained in clinical remission.

According to the data obtained, complete clinical remission persisted after 6 and 12 months in the vast majority of patients of group Ia with GB with the use of hirudotherapy in complex treatment, whereas in representatives of group I(b), without hirudotherapy, remission was observed in less than half of the patients.

Thus, the results of the work indicate the high efficiency of the use of hirudotherapy in the complex of traditional methods of rehabilitation of patients with chronic generalized periodontitis and background hypertension. The relief of the chronic inflammatory process in periodontal was characterized by a significant improvement in the quality of life of patients and had a more persistent and prolonged character.

### Conclusion

The inclusion of hirudotherapy in the program of therapeutic measures in patients with chronic generalized periodontitis and background hypertension made it possible to optimize the onset of a persistent therapeutic effect, lengthen the period of remission of the pathological process in periodontitis and significantly improve the quality of life of patients. These results allow us to recommend the widespread use of the method in clinical dentistry.

### COMPETING INTERESTS DISCLAIMER:

Authors have declared that no competing interests exist. The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

**Comment [AR14]:** Give scientific explanation with true measurements of probing pocket depths, clinical attachment level, and valid bleeding index scores where ever you intend to explain periodontal successful treatments. Otherwise, successful treatment could not be measured and claimed.

**Comment [AR15]:** Since you have not used any valid questionnaire to scientifically measure the quality of life of the patients, such conclusion is irrelevant to your research and should be removed from the conclusion section.

## References

1. Remizova A A, Dzgoeva M G, Tingaeva Y I, Hubulov S A, Gutnov V M, Bitarov P A, et al. Tissue Dental Status and Features of Periodontal Microcirculation in Patients with New COVID-19 Coronavirus Infection.. Pharmacophore. 2021; 12(2):6-13. <https://doi.org/10.51847/5JIbnUbHkT>.
2. Gurevich S, Prins KW. The evolving role of interventional cardiology in the treatment of pulmonary hypertension. Catheter CardiovascInterv. 2021 Mar;97(4):E446-E453. doi: 10.1002/ccd.29146.
3. Dzgoeva M.G., Tibilova F.L., Dzgoeva Z.G., Khetagurov S.K., Cerekova A.A. Features of microcirculation in periodontal tissues in patients with arterial hypertension during orthopedic treatment using implants. Modern orthopedic dentistry. Voronezh.2018, p.128-130. (In Russian)
4. Flack JM, Adekola B. Blood pressure and the new ACC/AHA hypertension guidelines. TrendsCardiovascMed. 2020 Apr;30(3):160-164. doi: 10.1016/j.tcm.2019.05.003.
5. Dmitry AnatolyevichDomenyuk, Vladimir AlexandrovichZelensky, Igor Vladimirovich Rzhepakovsky, Oksana Ivanovna Anfinogenova, Application of Laboratory and X-Ray General Studies un Early Diagnostics of Metabolic Disturbances of Bone Tissue in Children with Autoimmune Diabetes Mellitus , EntomolApplSci Lett, 2018, 5 (4): 1-12
6. Blinov AV, Siddiqui SA, Nagdalian AA, Blinova AA, Gvozdenko AA, Raffa VV, et al. Investigation of the influence of Zinc-containing compounds on the components of the colloidal phase of milk. Arab J Chem. 2021;14(7):103229

7. RzhepakovskyI., SiddiquiS.A., AvanesyanS., BenlidayiM., DhingraK., DolgalevA., EukashvilyN., FritschT., HeinzV., KocherginS., NagdalianA., SizonenkoM., TimchenkoL., VukovicM., PiskovS., GrimmW-D. Anti- arthritic effect of chicken embryo tissue hydrolyzate against adjuvant arthritis in rats (X-ray microtomographic and histopathological analysis). *Food Science & Nutrition* 2021, 00:1-22. <https://doi.org/10.1002/fsn3.2529>
8. Remizova A A, Sakaeva Z U, Dzgoeva Z G, Rayushkin I I, Tingaeva Y I, Povetkin S N, et al. The Role Of Oral Hygiene In The Effectiveness Of Prosthetics On Dental Implants. *Ann. Dent. Spec.* 2021;9(1):39-46. <https://doi.org/10.51847/HuTuWdD0mB>
9. Kaloeva Z.D., Dzilikhova K.M., Dzgoeva Z.G., Cerekova A.A., Dzgoeva M.G., Ataeva M.V. Tuaeve N.O. Features of hemodynamic disorders in adolescents with primary arterial hypotension. *G.N.Speransky Pediatrics*, 2017; 96(5):236-238 (In Russian).
10. Orlandi M, Graziani F, D'Aiuto F. Periodontal therapy and cardiovascular risk. *Periodontol* 2000. 2020 Jun;83(1):107-124. doi: 10.1111/prd.12299.
11. Avolio A, Kim MO, Adji A, Gangoda S, Avadhanam B, Tan I, Butlin M. Cerebral Haemodynamics: Effects of Systemic Arterial Pulsatile Function and Hypertension. *CurrHypertens Rep.* 2018 Mar 19;20(3):20. doi: 10.1007/s11906-018-0822-x.
12. Valensise H, Farsetti D, Pisani I, Tiralongo GM, Lo Presti D, Gagliardi G, Vasapollo B, Novelli GP. Friendly help for clinical use of maternal hemodynamics. *J Matern Fetal Neonatal Med.* 2021 Sep;34(18):3075-3079. doi: 10.1080/14767058.2019.1678136.
13. Galabueva AI, Biragova AK, Kotsoyeva GA, Borukayeva ZK, Yesiev RK, Dzgoeva ZG, et al. Optimization of Modern Methods of Treating Chronic Generalized Periodontitis of Mild Severity. *Pharmacophore* 2020;11(1):47-51

14. Yusupova M I, Mantikova K A, Kodzokova M A, Mishvelov A E, Paschenko A I, Ashurova Z A K, et al. Study Of The Possibilities Of Using Augmented Reality In Dentistry. *Ann. Dent. Spec.* 2021;9(2):17-21. <https://doi.org/10.51847/BG1ZAzqXRc>.

15. Malezhik LP, Pinelis IuI, Malezhik MS. Some aspects of immune reaction in chronic generalized parodontal disease in elderly patients. *Stomatologiya (Moscow)*. 2011;90(6):8-10 (In Russian).

16. Seshima F, Nishina M, Namba T, Saito A. Periodontal Regenerative Therapy in Patient with Chronic Periodontitis and Type 2 Diabetes Mellitus: A Case Report. *BullTokyoDentColl.* 2016;57(2):97-104. doi: 10.2209/tdcpublication.2015-0041.

17. Ali Redha, Ali & Siddiqui, Shahida & Ibrahim, Salam. Advanced extraction techniques for Berberis species phytochemicals: A review. *InternationalJournalofFoodScience&Technology.* 2021, 1-12, doi:10.1111/ijfs.15315.

18. Siddiqui, S.A.; Blinov, A.V.; Serov, A.V.; Gvozdenko, A.A.; Kravtsov, A.A.; Nagdalian, A.A.; Raffa, V.V.; Maglakelidze, D.G.; Blinova, A.A.; Kobina, A.V.; et al. Effect of Selenium Nanoparticles on Germination of Hordéum Vulgáre Barley Seeds. *Coatings* 2021, 11, 862. <https://doi.org/10.3390/coatings11070862>

19. Moghadam ET, Yazdanián M, Tahmasebi E, Tebyanian H, Ranjbar R, Yazdanián A, Seifalian A, Tafazoli A. Current herbal medicine as an alternative treatment in dentistry: In vitro, in vivo and clinical studies. *Eur J Pharmacol.* 2020 Dec 15;889:173665. doi: 10.1016/j.ejphar.2020.173665.

20. Leiva-Cala C, Lorenzo-Pouso AI, Centenera-Centenera B, López-Palafox J, Gándara-Vila P, García-García A, Pérez-Sayáns M. Clinical efficacy of an Aloe Vera gel versus a 0.12% chlorhexidine gel in preventing traumatic ulcers in patients with fixed orthodontic appliances: a double-blind randomized clinical trial. *Odontology.* 2020 Jul;108(3):470-

478. doi: 10.1007/s10266-019-00468-w.

21. Jha K, Garg A, Narang R, Das S. Hirudotherapy in Medicine and Dentistry. *J ClinDiagn Res.* 2015 Dec;9(12):ZE05-7. doi: 10.7860/JCDR/2015/16670.6918.

22. Gödekmerdan A, Arusan S, Bayar B, Sağlam N. Tibbisülüklervehirudoterapi (Medicinal leeches and hirudotherapy). *TurkiyeParazitDerg.* 2011;35(4):234-9. Turkish. doi: 10.5152/tpd.2011.60.

23. Guts IuV. Rol' stepenikeratinizatsiislizistoïobolochkipolostirta v otsenkerezul'tatovprobyShillera--Pisareva (The role of the degree of oral mucosal keratinization in assessing the results of the Schiller-Pisarev test). *Stomatologiiia (Moscow).* 1989 Mar-Apr;68(2):72-3. (In Russian).

24. Nazaryan R, Kryvenko L, Zakut Y, Karnaukh O, Gargin V. Application of estimated oral health indices in adolescents with tobacco addiction. *PolMerkurLekarski.* 2020 Oct 23;48(287):327-330.

25. Gillette WB. Periodontal index. *J Am Dent Assoc.* 1987 May;114(5):580, 582. doi: 10.14219/jada.archive.1987.0140.

26. Benigeri M, Brodeur JM, Payette M, Charbonneau A, Ismaïl AI. Community periodontal index of treatment needs and prevalence of periodontal conditions. *J ClinPeriodontol.* 2000 May;27(5):308-12. doi: 10.1034/j.1600-051x.2000.027005308.x.