

PHYTOADAPTOGENIC COCKTAIL USE "BIORITHM-E" IN THE COMPLEX TREATMENT OF ODONTOGENIC INFLAMMATORY DISEASES OF THE MAXILLOFACIAL REGION

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ABSTRACT

Over the past decades in Russia, the most common form of proinflammatory diseases of the maxillofacial region (MFO) has remained odontogenic inflammatory diseases, accounting for 26% of the total number of inflammatory diseases. The question of the diagnosis and treatment of abscesses and phlegmons, leading to a large number of formidable complications, remains quite relevant. The development of new approaches in the treatment of inflammatory diseases with the use of phytoadaptogenic was the aim of the study. According to the results obtained, in animals that were on classical antibacterial treatment in combination with an adaptogen, there was an improvement in clinical symptoms in the early stages, a significant decrease in the qualitative and quantitative composition of microflora. Thus, the use of adaptogens in the treatment of inflammatory diseases is advisable. As result, it is concluded that adaptogens must be pronounced modifiers of the body's reactivity, which makes it expedient to use them in the treatment of inflammatory diseases of the maxillofacial region.

Key words: Odontogenic inflammatory diseases, Phyto-cocktail, "Biorhythm-E", Antibacterial therapy.

Introduction

Over the past decades in Russia, the most common form of proinflammatory diseases of the maxillofacial region (MFO) remains odontogenic inflammatory diseases [1-5]. Currently, 26% of patients who visit specialized hospitals belong to the category of patients suffering from infectious and inflammatory diseases of the maxillofacial region and neck of infectious origin [2, 3, 6-8]. The problem of diagnostics and treatment of odontogenic diseases of the maxillofacial region, among which abscesses and phlegmon take a significant place, remains one of the most pressing in the clinic of maxillofacial surgery. Over the past 30-50 years, the number of patients suffering from this pathology, not only has not decreased but is increasing [9-11]. According to most authors, along with aggressive forms of diffuse phlegmons and abscesses, accompanied by a clinically pronounced intoxication syndrome, the proportion of patients with a sluggish course, erased clinical symptoms is growing, against the background of which the diagnosis of complications of these diseases becomes extremely difficult [4, 12-14]. At the same time, complications of odontogenic inflammatory diseases are very dangerous and can be fatal [11, 15, 16].

Among the main factors determining the development of this pathology, there is a change in microflora and its biological properties, in particular, an increase in the number of antibiotic-resistant strains of microorganisms, which are

various pathological associations [17, 18]. Associations can include both non-spore-forming anaerobic bacteria and facultative anaerobic species consisting of synergistically interrelated 2-3 types of microorganisms [14, 17, 19]. This circumstance determines a significant deterioration in the clinical picture of the disease, the emergence of resistant forms of microorganisms [20]. According to Bernadsky Yu.I. (2000), the most common (19-23%) anaerobic components in microbial associations in inflammatory processes of the maxillofacial region are representatives of the group *Bacteroides* spp., Less often, in about 8% of cases, fusobacteria, veilonella, propionibacteria [21]. A large number of open questions in the diagnosis and treatment of odontogenic inflammatory diseases of the maxillofacial region remain relevant in the practice of maxillofacial surgeons and determine the constant attention of several researchers to them [20]. Improving the effectiveness of the therapy remains an urgent problem. Currently, the active introduction of biotherapeutic approaches to treatment into practical health care begins, including the use of natural remedies that mediate their therapeutic effect through the body's defense systems [22, 23]. It is reliably known that the incidence of proinflammatory diseases of the maxillofacial region is steadily fluctuating and corresponds to the general somatic status and the state of the patient's immune system [24-26]. The composition of phytoadaptogens includes polysaccharides, biologically active substances (alkaloids, triterpenes, glycosides), fatty acids (linolenic, octacedonic),

vitamins, flavonoids, essential oils, which act on several systems, improving immunological parameters. A direct effect on the cell membrane was noted, which was accompanied by an increase in structural stability and a change in selective permeability [27]. Under the influence of phytoadaptogens, the accumulation of peroxide compounds stops, stabilizing hemostatic barriers. An increase in resistance to toxic effects is due to the stimulation of the biosynthesis of cytochrome p450 and free myrosomal oxidation by adaptogens [28, 29]. The most commonly used drugs are Eleutherococcus, ginseng, licorice, lemongrass, aralia, *Rhodiola rosea*, which have harmlessness and breadth of therapeutic application, immunoprotective, stress-protective action, launching the program of formation of a "state of nonspecifically increased resistance" [24, 30, 31].

The study aims to experimentally substantiate the use of the phytoadaptogenic cocktail "Biorhythm-E" in complex therapy of odontogenic inflammatory diseases of the maxillofacial region.

Materials and Methods

The work was performed on 42 male Wistar rats (Wistar) weighing 270-310 grams. Experiments on animals were carried out following the Federal Law "On the protection of animals from cruelty" (1.12.99) and the Declaration of Helsinki on the humane treatment of animals. During the experiment, the rats were on a standard diet and had free access to water and food at any time of the day. The light regime is natural. Animals were randomly divided into two groups: main (I) and control (II), 21 animals in each, respectively. The evaluation of the study was carried out by clinical examination and microbiological diagnostics.

During the first stage, animals were infected under experimental conditions with a mixed virulent flora, including *Staphylococcus aureus*, *Streptococcus pyogenes*, representatives of the group *Bacteroides* spp. ... Under anesthesia with a 1.5% sodium thiopental solution (at a rate of 40 mg/kg), the rat oral mucosa was incised in the projection of the roots of the front teeth, 0.05 mm away from the marginal gums. Next, a portion of the microorganism and tamponade of the incision zone were introduced on the sterile pin. After 3-4 days, the clinical state of the studied animals was assessed and the bacteriological determination of the contents was carried out at the stage of the active phase of clinical manifestations.

Group I rats on the 4th day was treated with an antibacterial drug belonging to the group of cephalosporins - Cefepimum

50 mg/kg. The treatment was carried out according to the classical method of intramuscular injection into the rat thigh muscle of 15 mg of the drug (taken into account in dilution in a 0.5% solution of Novocainum) 2 times a day at intervals of 12 hours for 7 days.

Individuals of group II, along with the classical antibacterial therapy described earlier, took phytococktails in addition to the treatment [32, 33]. In this work, phytococktails (FC) "Biorhythm-E" (BR-E) (trademark (TZ) No. 2010734191 of 18.10.2011) were used, which was made up of a mixture of alcohol extracts in certain proportions - *Eleutherococcus prickly*, *Rhodiola rosea*, licorice naked, *elecampane* high. The phyto cocktail was created and tested in the laboratory of traditional medicine of the Institute for Biomedical Research [20]. During the week before using the phyto-cocktail, the daily water intake was measured in terms of 100 g of the rat's body weight. At a concentration calculated based on the average daily volume of consumed liquid, the phyto-cocktail was added to the drinkers. The dosage of adaptogens was calculated based on the recommendations in the instructions for use of the drug-taking into account the coefficient ($\times 10$) for small laboratory animals and was 0.05 ml per 100 g of body weight per day (solvent - drinking water).

After the treatment, on the 7th day, the clinical condition of the objects of the study was assessed, as well as the control microbiological study.

Material for bacteriological research was collected using a transport system containing Ames medium.

The technique of anaerobic cultivation included the isolation of pure cultures on a 5% blood heminagar using Himedia anaerostats (Great Britain) and subsequent identification by cultural and biochemical characteristics (API An test system, France).

To identify the most significant in the diagnostic sense factors and to reduce the dimension of the array of features that make them up, the results of the study were processed by multivariate factor analysis using Statistica software from StatSoft Inc., USA, taking into account the representativeness of the Student's test, the values of $p \leq 0.05$.

Results and Discussion

During the bacteriological examination of the seized material, various types of microorganisms were obtained.

Among anaerobic species, it should be noted the presence of frequent etiological agents of various purulent-inflammatory diseases, such as Porphyromonas gingivalis, Prevotella melaninogenica, Fusobacterium nucleatum, Peptostreptococcus anaerobius.

Also, several facultative representatives of the anaerobic flora were found: Staphylococcus epidermidis, Streptococcus sanguis, Enterococcus spp, Staphylococcus aureus;

The quantitative indicators of the identified microorganisms were expressed by determining the average lg value (Figure 2); for each species, the frequency of occurrence was determined as a percentage (Figure 1).

On the 3rd day, the appearance of clinical symptoms characteristic of an inflammatory reaction was noted, namely: the appearance of purulent discharge from the infection zone, an increase in rectal temperature to 42-43.7 degrees Celsius, atypical behavior.

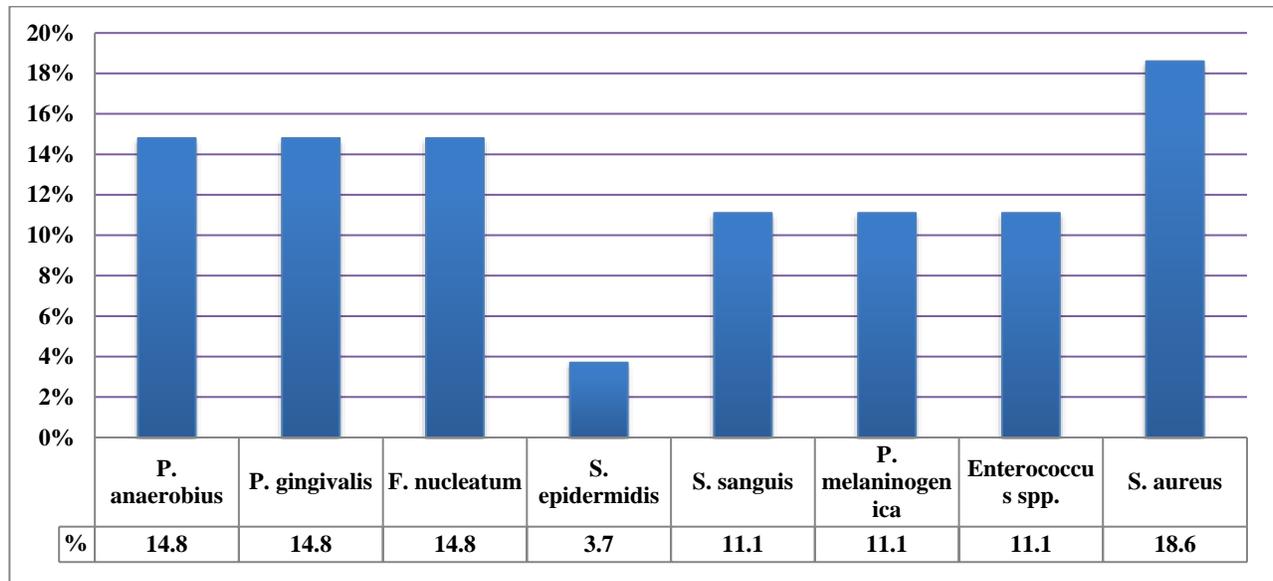


Figure 1. The frequency of occurrence of various types of microorganisms in purulent exudate in animals on the 3rd day in the active phase of inflammation.

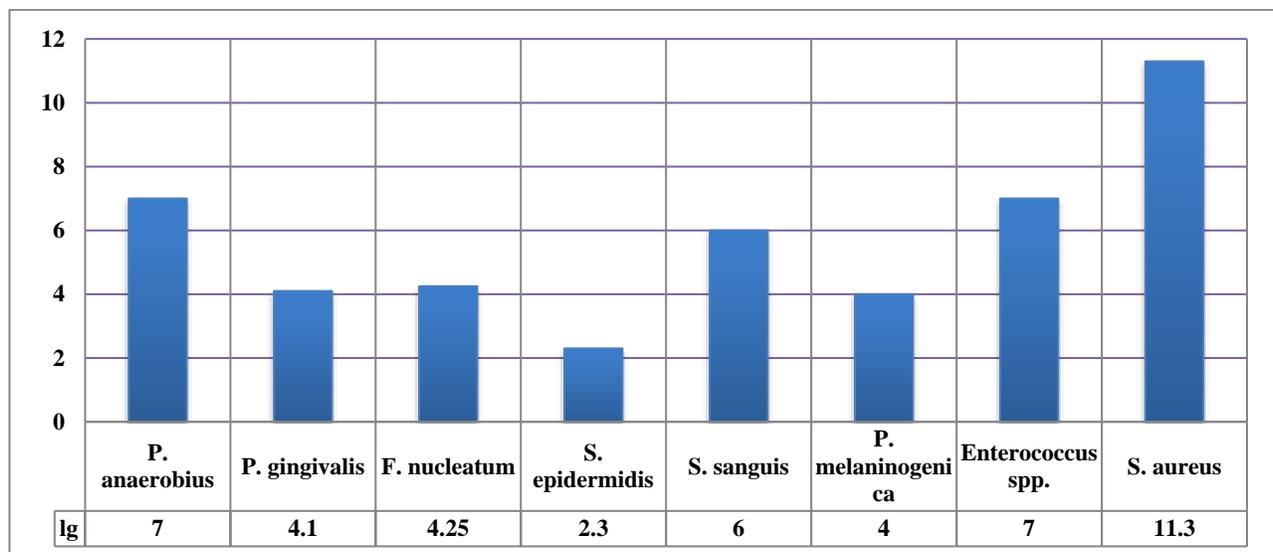


Figure 2. Quantitative indicators of bacterial species in purulent exudate in animals on the 3rd day in the active phase of inflammation.

According to the results of the treatment, the decline in clinical manifestations in the heads of group I was recorded on the 8th day. A decrease in the detectable microflora was noted: the occurrence of *P. anaerobius* was 5.5 ± 0.21 , *P. gingivalis* - 3.8 ± 0.20 , *P. melaninogenica* - 3.7 ± 0.20 , *S. Sanguis* - 5.4 ± 0.20 , *S. aureus* - 10.8 ± 0.20 .

The indicators of the therapy performed significantly differed in the control group. Thus, an improvement in the indicators of protective factors of the organism in animals was observed on the 6th day. According to the microbiological study, the quantitative indicators of the flora significantly correlated in comparison with the results of the main group (**Figure 3**).

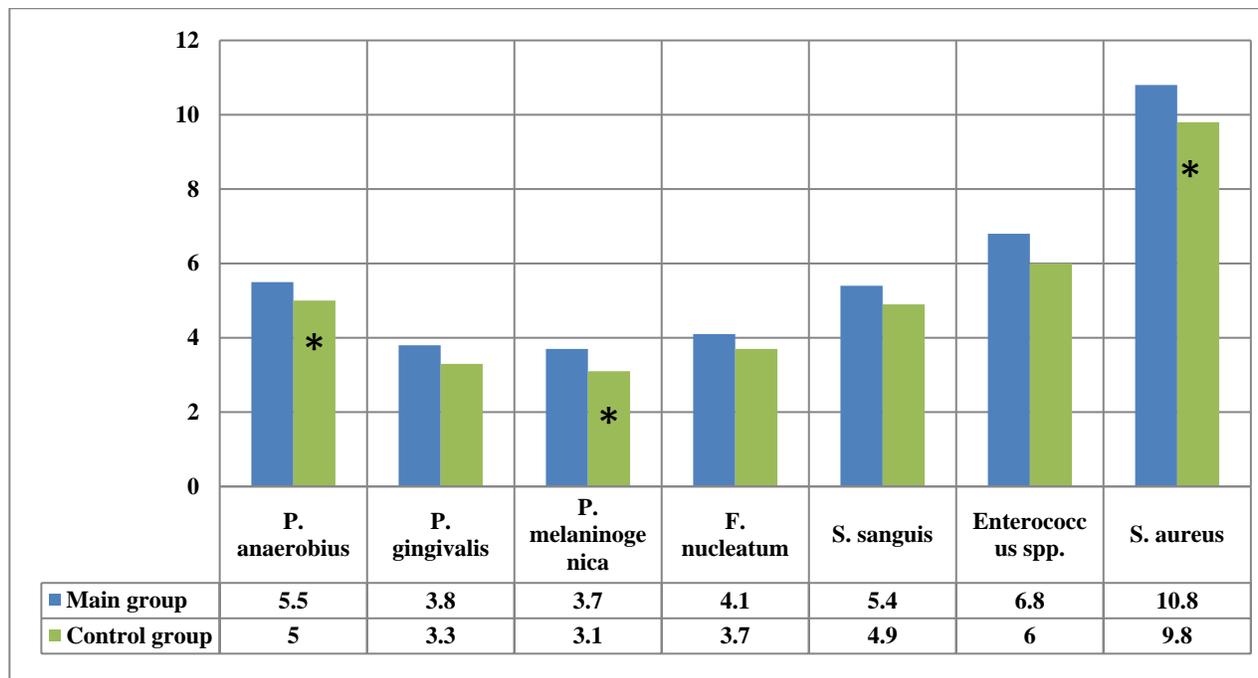


Figure 3. Comparative indicators of changes in the quantitative composition of microflora in experimental animals.

Conclusion

Thus, analyzing the data obtained, several conclusions follow indicating that drug therapy in combination with the phytoadaptogenic complex "Biorhythm-E" improves the quality of the therapeutic measures, which is possible due to the corrective effect on the main mechanisms of neurodegeneration, improving the body's immune ability to bacterial resistance. flora, mediate the general strengthening effect. Adaptogens must be pronounced modifiers of the body's reactivity, which makes it expedient to use them in the treatment of inflammatory diseases of the maxillofacial region.

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References

- Hite GJ, Mishvelov AE, Melchenko EA, Vlasov AA, Anfinogenova OI, Nuzhnaya CV, et al. Holodocor Planning Software Real-Time Surgical Intervention. *Pharmacophore*. 2019;10(3):57-60.
- Blinov AV, Yasnaya MA, Blinova AA, Shevchenko IM, Momot EV, Gvozdenko AA, et al. Computer quantum-chemical simulation of polymeric stabilization of silver nanoparticles. *Physical and chemical aspects of the study of clusters nanostructures and nanomaterials*. 2019;11:414-21.
- 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.
- Sadovoy VV, Selimov MA, Slichedrina TV, Nagdalian AA. Usage of biological active supplements in technology of prophylactic meat products. *Res J Pharm Biol Chem Sci*. 2016;7(5):1861-5.
- Salins SS, Siddiqui SA, Reddy SVK, Kumar S. Parametric Analysis for Varying Packing Materials and Water Temperatures in a Humidifier. In: *Proceedings of*

- the 7th International Conference on Fluid Flow, Heat and Mass Transfer (FFHMT'20) [conference proceedings on the Internet]; 2020 Nov 15-17; Niagara Falls, Canada. Canada: FFHMT; 2020. p. 196(1)-196(11). Available from: FFHMT
6. Arieva GT, Soloviev MM, Aryev AL. Ksefokam with odontogenic periostitis in elderly and senile patients. *Clin Gerontol.* 2008;7:22-9.
 7. Selimov MA, Nagdalian AA, Povetkin SN, Statsenko EN, Kulumbekova IR, Kulumbekov GR, et al. Investigation of CdCl₂ Influence on red blood cell morphology. *Int J Pharm Phytopharmacol Res.* 2019;9(5):8-13.
 8. Blinova A, Blinov A, Baklanova O, Yasnaya M, Baklanov I, Siddiqui A, et al. Study of Wound-Healing Ointment Composition based on Highly Dispersed Zinc Oxide Modified with Nanoscale Silver. *Int J Pharm Phytopharmacol Res.* 2020;10(6):237-45. <https://doi.org/10.51847/Cu6KX0JDE322>.
 9. Demchenkov EL, Nagdalian AA, Budkevich RO, Oboturova NP, Okolelova AI. Usage of atomic force microscopy for detection of the damaging effect of CdCl₂ on red blood cell membrane. *Ecotoxicol Environ Saf.* 2021;208:111683.
 10. Pushkin SV, Tsymbal BM, Nagdalian AA, Nuzhnaya KV, Sutaeva AN, Ramazanova SZ, et al. The Use of Model Groups of Necrobiont Beetles (Coleoptera) for the Diagnosis of Time and Place of Death. *Entomol Appl Sci Lett.* 2019;6(2):46-56.
 11. Nagdalian AA, Oboturova NP, Povetkin SN, Ahmadov V, Karatunov VT, Gubachikov VA, et al. Insect's Biomass as a Livestock Feed Study of the Impact of Insectoprotein on the Livestock Vitals. *Pharmacophore.* 2020;11(1):27.
 12. Areshidze DA, Mischenko DV, Makartseva LA, Rzhepakovsky IV, Nagdalian AA. Some functional measures of the organism of rats at modeling of ischemic heart disease in two different ways. *Entomol Appl Sci.* 2018;5(4):2349-864.
 13. Luneva A, Koshchayev A, Nesterenko A, Volobueva E, Boyko A. Probiotic potential of microorganisms obtained from the intestines of wild birds. *Int Trans J Eng Manag Appl Sci Technol.* 2020;11(12):11A12E.
 14. Hight GY, Mishvelov AE, Melchenko EA, Nuzhnaya CV, Epanov VA, Dolgalev AA et al. New Image Modeling Features For Planning Surgical Interventions. *Res J Pharm Biol Chem Sci.* 2019;10(1):140-3.
 15. Akhmedov GD, Tsareva TV. Correction of violations of the cytokine status in infectious and inflammatory complications of surgical interventions in the oral cavity. *Inst Dent.* 2012:17-21.
 16. Nagdalian AA, Pushkin SV, Povetkin S, Nikolaevich K, Egorovna M, Marinicheva MP, et al. Migalomorphic Spiders Venom: Extraction and Investigation of Biological Activity, *Entomol Appl Sci Lett.* 2018; 5(3):60-70.
 17. Tsarev VN, Ushakov RV. The use of antimicrobial drugs in dental and maxillofacial surgery. Ed. A.A. Kulakova, T.G. Robustova, A.I. Nerobeeva. In the book: *Surgical dentistry and maxillofacial surgery. National leadership.* M: GEOTAR-Media 2010; 916.
 18. Poeschl PW, Spusta L, Russmueller G, Seemann R, Hirschl A, Poeschl E, et al. Antibiotic susceptibility and resistance of the odontogenic microbiological spectrum and its clinical impact on severe deep space head and neck infections. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 2010;110(2):151-6.
 19. Al-Qamachi LH, Aga H, McMahan J, Leanord A, Hammersley N. Microbiology of odontogenic infections in deep neck spaces: a retrospective study. *Br J Oral Maxillofac Surg.* 2010;48(1):37-9.
 20. Osipchuk GV, Povetkin SN, Ashotovich A, Nagdalian IA, Rodin MI, Vladimirovna I, et al. The issue of therapy postpartum endometritis in sows using environmentally friendly remedies. *Pharmacophore.* 2019;10(2):82-4.
 21. Bernadsky YI. *Fundamentals of Maxillofacial Surgery and Surgical Dentistry.* Med Lit. 2000; 406.
 22. Nagdalyan AA, Oboturova NP, Povetkin SN, Ziruk IV, Egunova A, Simonov AN, et al. Adaptogens Instead Restricted Drugs Research for An Alternative Items to Doping In Sport. *Res J Pharm Biol Chem Sci.* 2018;9(2):1111-6.
 23. Bledzhyants GA, Mishvelov AE, Nuzhnaya KV, Anfinogenova OI, Isakova JA, Melkonyan RS. The Effectiveness of the Medical Decision-Making Support System "Electronic Clinical Pharmacologist" in the Management of Patients Therapeutic Profile. *Pharmacophore.* 2019;10(2):76-81.
 24. Datieva FS. Complex study of the influence of phytoadaptogens on the macro-and microhemodynamic system of hemostasis and thromboresistance of the vascular wall in the experiment. *Vladikavkaz. Honey. Biol Bull.* 2010;11(18):50-6.
 25. Blinov AV, Kravtsov AA, Krandievskii SO, Timchenko V, Gvozdenko AA, Blinova A. Synthesis of MnO₂ Nanoparticles Stabilized by Methionine. *Russ J Gen Chem.* 2020;90(2):283-6.
 26. Nagdalian AA, Rzhepakovsky IV, Siddiqui SA, Piskov SI, Oboturova NP, Timchenko LD, et al. Analysis of the Content of Mechanically Separated Poultry Meat in

- Sausage Using Computing Microtomography. *J Food Compost Anal.* 2021;100:103918.
27. Botoeva NK. Pathogenetic substantiation of the use of chronotherapeutic restorative technologies in the prevention of mental and physical fatigue in young people. *Bull RUDN.* 2008;7:717-21.
 28. Barabanov PV, Gerasimov AV, Blinov AV, Kravtsov AA, Kravtsov VA. Influence of nanosilver on the efficiency of *Pisum sativum* crops germination. *Ecotoxicol Environ Saf.* 2018;147:715-9.
 29. Nuzhnaya KV, Mishvelov AE, Osadchiy SS, Tsoma MV, AM RS KK, Rodin IA, et al. Computer simulation and navigation in surgical operations. *Pharmacophore.* 2019;10(4):46-52.
 30. Salins SS, Siddiqui SA, Reddy SVK, Kumar S. Experimental investigation on the performance parameters of a helical coil dehumidifier test rig. *Energy Sources, Part A: Recovery, Utilization, and Environmental Effects [Internet].* 2021 Apr [cited 2021 Apr 9];43(1):35-53.
 31. Yaremenko KV. The teachings of N.V. Lazarev on SNPS and adaptogens as a basic theory of preventive medicine. *Psychopharmacol Biol Narcol.* 2005;5(4):1086-91.
 32. Choudhary NK, Mallya R. Phytochemical investigation and antibacterial activity of a medicinal plant. *Int J Pharm Phytopharmacol Res.* 2019;9(4):53-8.
 33. Mirza AS, Baig MT, Huma A, Ibrahim S, Shahid U, Jabeen A, et al. Antibacterial Activity of Methanol Extract Of *Capparis Decidua* Edgew (Forssk.) Against *Staphylococcus Aureus*, *Bacillus Cereus*, *Salmonella Typhi*, and *Escherichia Coli*. *Pharmacophore.* 2020;11(4):46-50.