
**“VOPROSY KURORTOLOGII FIZIOTERAPII I
LECHEBNOI FIZICHESKOI KULTURY”
 (“ISSUES IN BALNEOLOGY, PHYSIOTHERAPY AND EXERCISE”)
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The journal covers the studies of mechanisms of physiological and therapeutic action of physical and health-resort factors, methods and results of their therapeutic applications, as well as theoretical and practical issues of application of exercise therapy in complex treatment of various diseases. Journal publishes results of research and articles of practitioners covering experience of using physical methods and spa-factors in clinical practice and organising physical therapy and spa services. It publishes reviews on physiotherapy, balneology and exercise therapy as well as reports about congresses and conferences.

Below we review some articles on balneology from the journal for last decade.

Persyanova-Dubrova AL, Nagiev YuK, Davydova OB. **Effect of general carbon dioxide baths on processes of remodeling and diastolic function of the heart in patients with ischemic heart disease after myocardial infarction.** *Vopr Kurortol Fizioter Lech Fiz Kult* 2002 May-Jun;(3):3-5.

Study aimed at assessing the effect of a course of general carbon dioxide baths on the processes of remodelling and diastolic function in patients with postmyocardial infarction cardiosclerosis.

The study cohort comprised a total of sixty-three 40-to-65-year-old male patients with a history of myocardial infarction endured within previous 4-12 months, diagnosed as having NYHA functional class I-II heart failure and/or LV diastolic dysfunction. Patients were randomized to general carbon dioxide baths (n=32) and control (n=31).

Carbon dioxide baths were prescribed according to the following methodology : carbon dioxide concentration 1.2 – 1.6 g/L, water temperature 35°C, duration 10 – 15 min, 3-4 times a week, with 10-20 procedures for a course. Assessing the values of the LV myocardial function, volumes and mass measured by means of two-dimensional echocardiography revealed no statistically significant differences between the groups after treatment. Hence the absence of enlargement of cardiac volumes and diminished ratio of the LV wall thickness and LV dimensions may be indicative of the fact that the use of general carbon dioxide baths did not induce progression of cardiac remodelling processes.

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The patients were then subdivided into 2 groups – those with EF at baseline less than 50 % and those with the EF above 50 %. In the study group patients with decreased EF showed a significant increase in the EF (at the expense of a decrease in the ESV) from 41.9 ± 4.6 to 46.5 ± 5.7 % ($p < 0,05$). The control group patients with both decreased and normal EF demonstrated no significant alterations therein.

Assessing the transmitral blood flow measured by means of spectral Doppler sonography revealed statistically significant increase in the early diastolic filling rate from $56,5 \pm 8,8$ to $60,4 \pm 7,4$ cm/sec ($p < 0,05$) and in consequence an increase in E/A ratio in patients taking carbon dioxide baths as compared with the patients receiving drug therapy alone. The obtained findings make it possible to suppose that a positive effect of carbon dioxide baths is realized at the expense of the improved LV myocardial diastolic function, in particular at the expense of increased early diastolic filling rate, thus suggesting increased “compliance” of the LV walls and improved relaxation under the effect of balneotherapy with carbon dioxide baths.

Conclusion Balneotherapy with carbon dioxide baths does not induce progression of the cardiac remodelling processes, neither leading to myocardial infarct expansion nor bringing about an increase in the LV volume.

In patients with diminished EF balneotherapy with carbon dioxide baths leads to an increase in the EF and decrease in ESV. This suggests improved contractility of the LV myocardium. Taking general carbon dioxide baths appears to be followed by improved LV diastolic function at the expense of an increase in the early diastolic filling rate.

Zunnunov ZR. **Potentialiation of anti-ischemic and anti-anginal action of nitrates by hydrogen sulfide balneotherapy in patients with angina of effort.** *Vopr Kurortol Fizioter Lech Fiz Kult* 2010 Jan-Feb;(1):11-4.

The study was undertaken to investigate whether hydrogen sulphide balneotherapy (HSB) enhances anti-ischaemic and anti-anginal efficiency of isosorbide dinitrate in patients with angina of effort. The study comprised a total of thirty-nine patients (mean age 54 ± 3.4 years) diagnosed with coronary heart disease (CHD) and functional class II-III angina of effort.

Study included only the patients in whom within the control period the duration of two repeated loads performed till the appearance of marked depth ischaemic-type ST-segment depression amounting to 1 mm and more ($ST \geq 1$ mm) differed by not more than 120 s, i. e. the effects of loads were reproducible. Prior to the beginning of the study patients had been advised to discontinue taking antianginal agents, except for nitroglycerine in order to rapidly relieve angina, if such.

An open-randomization method was used to study anti-ischaemic effect of nitrosorbid (NS) (10 mg three times daily) in nine patients, that of hydrogen sulphide baths in eleven, and a combination thereof in ten patients in a comparative manner.

HSB was used at a hydrogen-sulphide concentration of 50-75 mg/L, with a water temperature of 36-37°C, 10-12 min every other day or two days running followed by a day of rest, with 8-10 procedures per course.

The course of treatment was followed by prolonged supporting HSB used according to an author-devised modality, i. e., once or twice a week, with 4 to 6 procedures (for 2-3 weeks) each 6 months.

The control group patients (9 subjects) took fresh-water baths at a temperature of 36-37°C, 10-12 min.

The effect of treatment was assessed by means of paired exercise testing on a bicycle ergometer prior to and 3 hours after taking NS, HSB or combination thereof. The duration of load till the appearance of $ST \geq 1$ mm was designated as a threshold one (T_{thresh}). Anti-ischaemic effect of a single dose of the NS or HSB (DT_{thresh}) was assessed by a change in the T_{thresh} value 3 hours after taking drug or bath ($T_{\text{thresh}3}$) as compared with baseline load ($T_{\text{thresh}1}$): $DT_{\text{thresh}} = DT_{\text{thresh}3} - DT_{\text{thresh}1}$. An agent was regarded as efficient if the DT_{thresh} amounted to 120 s and more.

After taking NS and HSB T_{thresh} increased significantly, with DT_{thresh} having increased by 129.4 ± 17.8 and 120.6 ± 20.5 s, respectively, whereas patients having taken fresh-water baths showing no appreciable dynamics. A combined use of NS and HSB was followed by a more considerable increase in T_{thresh} (192.1 ± 18.3 s).

Hence the patients with angina of effort after adding HSB on the background of taking NS were found to have experienced enhancement of its anti-anginal and anti-ischaemic action. T_{thresh} value after 4-week course of NS as compared with the first administration did not alter significantly, neither did it after the course of HSB alone or a combination thereof. However, a more substantial considerable increase in the T_{thresh} value compared with initial (nearly 1.5-fold) was noted for a combination of HSB with NS, as compared with HSB or NS taken alone.

After six months the degree of anti-anginal effect of NS decreased (T_{thresh} fell from 675.7 ± 26.3 to 528.4 ± 20.4 s, DT_{thresh} decreased by 147.3 s; $p < 0.05$), whereas the effect of HSB did not alter, with T_{thresh} amounting to 676.7 ± 21.2 and 672.1 ± 21.3 s. T_{thresh} after a combined use of NS and HSB also remained sufficiently high (739.6 ± 22.6 s).

Conclusion Can be drawn that the proposed methodology of combined use of NS and HSB due to its anti-ischaemic, vasodilator, and anti-anginal efficacy is one of the methods of choice in therapeutic decision-making for many patients with angina of effort, especially in case of developing habituation or insusceptibility to nitrates.

Badalov NG, Tupitsyn NN, Grigorieva VD. **Keratinocyte immunophenotypes in patients with psoriatic arthritis and their changes after treatment with deresinated naphthalan.** *Vopr Kurortol Fizioter Lech Fiz Kult* 2001 Nov-Dec;(6):32-4.

The study was aimed at determining immunophenotypic characteristics of epidermal keratinocytes in psoriatic arthritis (PA) patients and their alterations on exposure to deresinated naphthalan.

The immunohistochemical examination of the skin biopsies using monoclonal antibodies was performed before and after treatment in 20 patients with PA (11 men and 9 women).

Preliminarily warmed in a water bath to 36-37°C deresinated naphthalan was applied with a brush onto portions of the affected skin, joints and portions of the vertebral column followed by wrapping. The procedures lasting 30 minutes were performed 5 times a week, 12-14 procedures per courses.

The HLA-DR MCA test was performed in 19 PA patients. Before treatment 9 patients were found to have transplanted antigens class II HLA-DR molecule expression on keratinocytes. This feature was peculiar to disseminated forms of skin damage and stage II psoriasis according to the PASI score.

After completion of therapy with deresinated naphthalan no HLA-DR expression on keratinocytes was observed in three of the nine antigen-positive cases. In the remaining six cases the dynamics of alterations were different, with a general tendency consisting in a decrease in the proportion of HLA-DR⁺-keratinocytes.

Expression of adhesion molecule VLA-β (CD29⁺) on keratinocytes in 20 PA patients was mostly determined in the basal layer. Before treatment cells carrying this antigen were also revealed in the prickle-cell and granular layers, in 35 % of patients. After treatment the incidence rate of revealing CD29⁺-cells decreased to 20 %.

Application of deresinated naphthalan in patients promoted considerable improvement of the clinical course of PA. Improvement of skin condition under the effect of naphthalan-therapy was accompanied and followed by significant decrease in the pain index, articular index and PASI ($p < 0.05$)

The patients having completed treatment with considerable improvement (55 %) and improvement (30 %) were found to have a decrease in the HLA-DR⁺-keratinocytes proportion and a decrease in the frequency of detecting adhesion molecules on the epidermal cells.

Conclusion Clinical effect in PA patients after naphthalan-therapy is mainly achieved at the expense of inhibition of the immunoinflammatory reactions in the skin. It confirms substantiated use of naphthalan in comprehensive rehabilitation treatment of patients with psoriasis and PA.

Akhkubekova NK, Kaisinova AS, Tereshin AT. **Radon therapy as a component of spa-and-resort treatment of patients with functional hyperprolactinemia.** *Vopr Kurortol Fizioter Lech Fiz Kult* 2010 Mar-Apr;(2):22-4.

A total of 80 women (mean age 32.2 ± 3.2 years) with functional hyperprolactinemia induced by adhesive process in the small pelvis were followed up. Only women seeking pregnancy were enrolled into the study.

Patients were randomized to conventional radon therapy (radon baths, gynecological radon irrigation and microenemas of radon water with a radon concentration of 1.5 kBq/L) (control group, n=40) and to acupuncture according to conventional radon therapy (study group, n=40), 10 procedures per course of treatment.

Therapeutic procedures were performed on the background of the basic therapy of the sanatorium-and-health-resort regimen at Pyatigorsk health resort. Total duration of treatment amounting to 21 days.

After treatment in the study group, pain syndrome decreased in 95 % of cases. Values of depression by the Beck Depression Inventory scale fell from the normal values ($p<0.01$) in 91 % of patients. The anxiety level according to Hospital Anxiety and Depression Scale (HADS) decreased in 88.5 % of patients ($p<0.05$).

The menstrual cycle rhythm was noted to have restored in 93 % of women, with algodysmenorrhea having diminished in 96 %.

Ultrasonography showed that health-resort treatment was accompanied and followed by positive changes in the structure of the appendages. The adhesive processes significantly diminished in all the cases.

Blood serum prolactin normalized in 91 % of patients (having felt from $1,235 \pm 83.5$ to 503 ± 71.3 mIU/ml ; $p<0.05$). Blood serum progesterone in the luteal phase increased in 90.3 % of cases from 14.98 ± 1.1 to 21.98 ± 1.3 nmol/L ($p<0.01$).

Examination of patients in the remote follow-up terms showed that on the background of the restored menstrual cycle 29.4 % of the women from the Study Group conceived. The obtained therapeutic outcomes were compared with the respective parameters of those in the control group receiving conventional radon therapy. The obtained findings showed that positive dynamics of the main parameters, characterizing the pathological process (pain syndrome, mental psycho-emotional disturbances, hormonal indices, ultrasonographic findings and restoration of the menstrual function) was by 19-23 % more pronounced in the group of women receiving combined radon therapy and acupuncture. Significantly better QOL indices turned out to be for the study group women as compared with those from the control group along all the 8 scales and two summary measures (PCS ; MCS) ($p<0.05$).

Conclusion Hence, the proposed medical technology of using natural remedial factors and acupuncture in hyperprolactinemia with a commissural process in the small pelvis increased the total effect of health-resort treatment by 18-20 %, thus promoting removal of hyperprolactinemia, hypoluteinism, contributing to restoration of the cyclic menstrual function and fertility, thereby considerably increasing QOL in this patient cohort.

Persiyanova-Dubrova AL, Lvova NV, Tupizina IuIu, Uianaeva AI, Barashkov GN, Badalov NG, Povagnaya EL. **Spa-based water procedures and complications in the course of their performance.** *Vopr Kurortol Fizioter Lech Fiz Kult* 2010 Nov-Dec;(6):40-3.

The last several decades have witnessed a considerable rise in rapidly expanding field of application of hydroprocedures all the world over in Spa-centres, at home, in the settings of hotels, sports centres, etc. All this brings about an increase in the number of registered complications and accidents while taking the procedures involved. The review is aimed at systematizing the current literature data concerning such complications. Most common cause of complications is hyperthermia, that is a main factor in Russian and Finnish bath (sauna), hamam (a Turkish bath), a wide variety of hydro-massaging baths, tubs, capsules, etc.

In the conditions of thermal stress a decrease in total peripheral vascular resistance may cause hypotension, especially in people with cardiovascular diseases or intoxication. A sharp drop in pressure and fall during a procedure increases the risk of death from drowning, risk of injuries is also considerably higher.

Alterations in haemodynamics and vegetative dysbalance may induce impairments of the compensatory mechanisms in elderly and aged people, which is a risk factor of sudden death.

The most common cause of death while taking a hot bath or sauna is overheating in people with cardiovascular diseases (often undiagnosed) and/or with alcohol or narcotic intoxication. Alcohol drinking during taking a sauna or hot tube bathing is one of major factors increasing incidence of complications and accidents.

Taking medications influencing thermoregulation (neuroleptics) or cardiovascular system function (antihypertensive agents) may exert influence on the development of complications during hyperthermic procedures.

Exposure to hyperthermia may be accompanied and followed by deterioration of the condition in patients with lymphedema. Hot baths are contraindicated to patients with chronic venous insufficiency due to risk of the development of the disease exacerbation. Amongst comparably common and frequently rather severe complications of a sauna are burns, with sometimes even lethal outcomes.

A great number of studies investigated the effect of hyperthermia on foetal development. Despite that there are findings suggesting that thermal stress at early stage of gestation may increase the risk of development of neural-tube defects, majority of investigators believe that hyperthermic procedures are not teratogenic if strictly dosed both in time and temperature. Although there are no cases in the literature describing complications after taking a bath with essential oils, cases with various skin reactions after direct contact with essential oils were recorded : contact dermatitis, photo-toxic dermatitis, etc. That means that certain caution is necessary while prescribing aromatherapeutic procedures.

Outbreaks of various infectious diseases induced by *Legionella pneumophila*, *Pseudomonas aeruginosa* and *Mycobacterium avium* complex have regularly been registered in different countries at hot spring spa and after visiting a spa therapy centre. Cases of infectious diseases have been documented after use of hot tub and whirlpool spa and were related to wrong servicing and technical maintenance of spa equipment. It should be taken into consideration that the development of infectious complication is often associated with compromised immune status.

Conclusions

- 1- Compliance with the temperature regimen and limitation of the time of the procedure play a decisive role in prevention of the majority of complications related to hyperthermic procedures. For the patients diagnosed as having cardiovascular diseases, diabetes mellitus, for people taking drugs influencing the thermoregulating mechanisms, as well as people over 65 years old, the duration of a hyperthermic procedure should be limited to 5-10 minutes. Even for apparently healthy people, the time of the procedure should not exceed 10-

- 15 minutes while simultaneously complying with the temperature-related norms (temperature of 40°C in a bath, 70-90°C in a sauna). Hyperthermic procedures in pregnant women should be used with a special caution.
- 2- Taking into consideration an irritating effect of essential oils, their ability to induce allergic reactions, aromatherapeutic procedures should be carried out with care.
 - 3- Bacteriological surveillance of the water condition, strict compliance with the norms concerning the servicing and technical maintenance of the SPA equipment should be obligatory.