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The use of radon baths in the rehabilitation of patients with osteochondrosis

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Abstract. – OBJECTIVE: One of the most common methods of rehabilitation for this disease is balneotherapy. Radon therapy is one of the types of balneotherapy based on radon radiation (Rn) for therapeutic, prophylactic, and rehabilitation purposes. A significant number of authors report a positive effect of radon baths on the condition of patients with osteochondrosis. Some authors report the absence of a real therapeutic effect when using radon therapy. The work aimed at investigating the therapeutic efficacy of radon baths in patients suffering from osteochondrosis.

PATIENTS AND METHODS: We examined 40 patients with osteochondrosis of various parts of the spine with radicular syndrome. The patients were randomly divided into two groups of 20 people with an equal number of men and women. The study group received a course of balneotherapy using radon water (general baths at a temperature of 34-36°C, duration 10-15 minutes, every other day, No. 10). The control group received balneotherapy using ordinary tap water in the same regimen to decrease placebo effects.

RESULTS: Decreased pain and movement difficulties were observed only in the study group. These changes refer only to the spine but not to the joints of the extremities.

CONCLUSIONS: Our studies have shown that using radon baths helps to reduce pain and increase the mobility of the spine in patients with osteochondrosis. These data substantiate the prospects for further research of this technique in the complex rehabilitation of osteochondrosis.

Key Words:
Osteochondrosis, Radon, Rehabilitation.

Introduction

According to the International Classification of Diseases, osteochondrosis is included in the group of diseases of the musculoskeletal system, mainly the spine[1,2].

One of the most common rehabilitation methods for this disease is balneotherapy, using a variety of mineral waters (MW)[3]. A special place is occupied by radon waters, which serve as the basis for using various variants of radon therapy (RT)[4]. Radon therapy is one of the types of balneotherapy based on radon radiation (Rn) for therapeutic, prophylactic, and rehabilitation purposes[5]. According to the type of radiation used, RT refers to α-therapy. Low-dose radiation therapy has beneficial effects on patients suffering from chronic painful diseases of the musculoskeletal system[6]. Although the alpha radiation which results from radon decay has high ionization energy, it has a minimum penetration depth. Thus, it can be used to affect the whole body. This treatment method is beneficial and valuable for patients suffering from multiple pains in the joints and back. A significant number of authors report a positive effect of radon baths on the condition of patients with osteochondrosis[7]. At the same time, some authors declare the absence of a real therapeutic effect when using radon therapy[8].

The work aimed to investigate the therapeutic efficacy of radon baths in patients suffering from osteochondrosis.

Patients and Methods

We examined 40 patients with osteochondrosis of various parts of the spine with radicular syndrome. All patients were on sanatorium treatment in the sanatorium "Radon", Khmelnyk (Vinnytsa region, Ukraine). The vast majority of patients were women (80%). The mean age was 50.2±10.95. After the initial examination, the patients were randomly divided into two groups of 20 people with an equal number of men and women – the study group and the control group.

Inclusion criteria for study participation: osteochondrosis of various sections of the spine; the duration of the disease of at least three years.

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Table I. Dynamics of symptoms in patients of the study and control groups under the influence of treatment, %.

Symptoms	Study group, n=20			Control group, n=20		
	Before treatment	After treatment	p	Before treatment	After treatment	p
Back pain	80.0	20.0	<0.05	90.0	65.0	>0.05
Pain in the knee joints	15.0	0.0	>0.05	10.0	0.0	>0.05
Pain in the hip joints	10.0	0.0	>0.05	15.0	15.0	>0.05
Pain in the ankle joints	20.0	5.0	>0.05	15.0	5.0	>0.05
Pain in the shoulder joints	5.0	0.0	>0.05	15.0	10.0	>0.05
Restriction of movement in the spine	60.0	20.0	<0.05	65.0	40.0	>0.05
Restriction of movement in the knee joints	20.0	10.0	>0.05	25.0	20.0	>0.05
Restriction of movement in the ankle joints	5.0	0	>0.05	10.0	5.0	>0.05
Restriction of movement in the shoulder joints	20.0	10.0	>0.05	15.0	5.0	>0.05
Restriction of movement in the hip joints	5.0	5.0	>0.05	10.0	5.0	<0.05

Note: The value of *p* is calculated in the groups before and after treatment.

Exclusion criteria for study participation: mental illness, bleeding, circulatory disorders II B-III stages, malignant and benign tumors. Additional criteria for women were adrenal adenoma, adenocarcinoma of the uterus after extermination, uterine fibroids, and fibrocystic mastopathy.

Both groups received a standard sanatorium treatment course, which included:

- magnetotherapy, lasting from 5 to 20 minutes daily, 10-12 sessions;
- ultrasonic therapy paravertebral, lasting 10-15 minutes daily, course -8-10 procedures.

The study group also received a balneotherapy course using radon water (general baths at a temperature of 34-36°C, duration 10-15 minutes, every other day, No. 10).

The control group received balneotherapy using ordinary tap water in the same regimen to decrease placebo effects. The whole course of treatment was 21 days. The study used radon mineral water from well No. 604-e of the Ostrovny site of the Khmelnitsky deposit, Vinnitsa region.

The radon concentration in this MW is 484-674 Bq/dm^3, which allows it to be qualified as a natural healing very slightly radon mineral water[9].

Statistical Analysis

Statistical processing of the obtained data was carried out using the XLSTAT 2021 program. To assess the significance of differences between the samples, the φ* - criterion, Fisher's angular transformation, was used. The differences $p<0.05$ were considered significant.

Ethics Statements

The study was a prospective, explorative and observational trial. This trial was performed in accordance with the Declaration of Helsinki; it was approved by the Commission on Bioethics of the Ukrainian Research Institute of Medical Rehabilitation and Resort Therapy of the Ministry of Health of Ukraine No. 20 of 01.09.2015. Before inclusion in the study, all patients provided written informed consent.

Results

The most frequent complaints of patients in both groups were:

- moderate pain in the spine (80.0 ± 8.9)%;
- pain in the legs (55.0 ± 11.1)%;
- minor pain in the joints (20-25 ± 7.3)%;
- slight restriction of movement in the spine (60.0±10.9)%.

After the course of treatment, the following changes in symptoms occurred (Table I). Reliable positive changes in symptoms were: decreased pain and movement difficulties were observed only in the study group. Significantly, these changes refer only to the spine but not to the joints of the extremities.

Discussion

The registered selectivity of the effectiveness of radon baths can be explained by an improvement in blood circulation and a decrease in muscle spasms in the areas where the spinal nerves exit. As shown by the works of some authors, radon baths have a pronounced anti-inflammatory and analgesic effect[7,10]. In addition, under the influence of radon, the threshold of pain sensitiv-

ity increases, including a decrease in conductivity in unmyelinated nerve fibers, which reduces pain sensitivity and reduces pathological impulses from the affected organ[11]. The results of our study confirm the above statemenwwwwwts.

Our study has several limitations. The main ones are the small sample size and the chosen mode of carrying out the procedures. Changing these parameters will provide additional information about the effects of radon baths on osteochondrosis.

Conclusions

Our study has shown that using radon baths helps to reduce pain and increase the mobility of the spine in patients with osteochondrosis. These data substantiate the prospects for further research of this technique in the complex rehabilitation of osteochondrosis.

Conflict of Interest

The authors declare that they have no conflict of interest to declare.

Authors' Contribution

The work was done at the request of the Radon Sanatorium, Khmelnyk, Ukraine.
All authors contributed equally to the writing of the article.

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The datasets generated and analyzed during the current study are available from the corresponding author on reasonable request.

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References

1) Becheva MSV, Ivanova SA, Kirkova-Bogdanova AG. Pharmaceutical care and active treatment in patients with osteochondrosis. Pharmacia 2021; 68: 223-226.
2) Danger F, Wasyliw C, Varich L. Osteochondroses. Semin Musculoskelet Radiol 2018; 22: 118-124.
3) Oncel S. The effectiveness of balneotherapy in prevention and treatment of osteoarthritis. Turk Geriatri Derg 2011; 14: 111-117.
4) Pawlik-Sobecka L, Gorka-Dynysiewicz J, Kuciel-Lewandowska J. Balneotherapy with the Use of Radon-Sulphide Water: The Mechanisms of Therapeutic Effect. Appl Sci 2021; 11: 2849.
5) Winklmayr M, Kluge C, Winklmayr W, Kuchenhoff H, Steiner M, Ritter M, Hartl A. Radon balneotherapy and physical activity for osteoporosis prevention: a randomized, placebo-controlled intervention study. Radiat Environ Biophys 2015; 54: 123-136.
6) Dondoladze K, Nikolaishvili M, Zurabashvili D. The effect of balneotherapy on the oxidative system and changes in anxiety behavior, enhanced by low doses of radon. Int J Radiat Biol 2021; 97: 1461-1469.
7) Schroder J, Mueller EA, Siegert J, Goltz L, Maywald U, Kirch W. Efficacy of ambulant radon balneotherapy in rheumatic diseases. Br J Clin Pharmacol 2010; 70: 28-29.
8) Nagy K, Berhes I, Kovacs T, Kavasi N, Somlai J, Bender T. Does balneotherapy with low radon concentration in water influence the endocrine system? A controlled non-randomized pilot study. Radiat Environ Biophys 2009; 48: 311-315.
9) Babov KD, Polshchakova TV, Bevz LV. Report on RW "Study of the dynamics of clinical and functional parameters in patients under the influence of external use of radon water of the Khmilnytsky field of Vinnytsa region". Odessa, 2015.
10) Ruhle PF, Klein G, Rung T, Phan HT, Fournier C, Fietkau R, Gaipl, Frey B. Impact of radon and combinatory radon/carbon dioxide spa on pain and hypertension: Results from the explorative RAD-ON01 study. Mod Rheumatol 2019; 29: 165-172.
11) Samosiuk IZ, Vladimirov AA, Galachenko AA, Tkalina AV, Samosiuk NI, Chukhraeva EN, Zukow WA. Radon therapy: theoretical background, mechanism of therapeutic action, application techniques. Radom University, Radom, 2011.