

Effect of physical therapy on general physical health of patients with pulmonary tuberculosis

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Abstract

The paper is devoted to the problem of physical therapy for patients with pulmonary tuberculosis. The modern aspects and tendencies concerning physical therapy treatment for patients with pulmonary tuberculosis are generalized. A new comprehensive approach to solving this problem is presented, in particular, to increasing the efficiency and quality of the recovery process of patients with pulmonary tuberculosis. The study involved 68 patients who were first diagnosed with pulmonary tuberculosis, with no bacterial excretion (–BC), of whom 40 (58.82%) participants were men and 28 (41.18%) – women. By randomization, patients were divided into control and experimental groups with 34 participants each, including 20 men and 14 women. The control group underwent the generally accepted therapy program recommended by the Ministry of Health of Ukraine. The participants of the experimental group were engaged in the developed comprehensive program of physical therapy. The complex program of physical therapy included morning hygienic gymnastics, therapeutic massage, physiotherapy treatments (UHF therapy), hydrotherapy, manipulative interventions and educational programs. The results of statistically significant improvement of the general level of physical health of patients with pulmonary tuberculosis of the experimental group are highlighted and explained by the correctness of components and effectiveness of the proposed program of physical therapy. At the end of the study, the overall assessment of the level of physical health (sum of points) of the male patients with pulmonary tuberculosis in the control group was as follows: 5 (25.00%) patients had an average level, 4 (20.00%) – below average and in 11 (55.00%) patients it remained low; in the male patients with pulmonary tuberculosis of the experimental group, the overall assessment of physical health looked much better: 1 (5.00%) patient had above average level, 8 (40.00%) – average, 5 (25.00%) – below average and in only 6 (30.00%) patients it remained low ($p < 0,05$). In the female patients with pulmonary tuberculosis of the control group, the overall assessment of the level of physical health (sum of points) at the end of the study was as follows: 7 (50.00%) patients had below average level and in 7 (37.50%) patients the level remained low; in female patients with pulmonary tuberculosis of the experimental group, the overall assessment of the level of physical health differed significantly in the direction of improvement: 2 (14.29%) patients had an average level, in 8 (57.14%) patients it remained below average and only 4 (28.57%) women had a low level ($p < 0,05$). The overall physical health of patients with pulmonary tuberculosis in both groups changed at the end of the study. Indicators of the overall assessment of the level of physical health of the participants of the experimental group, engaged in the recommended program, exceed the same in the participants of the control group. The effectiveness of the comprehensive physical therapy program aimed at improving the overall level of physical health of patients with pulmonary tuberculosis has been proved.

Key words: pulmonary tuberculosis, physical therapy program, overall assessment, level of physical health.

Introduction

The situation with tuberculosis in Ukraine began to deteriorate after 1990, and since 1995 there has been an epidemic threshold and there is still an epidemic of tuberculosis in Ukraine. The WHO has classified Ukraine as a country with a high tuberculosis incidence, where up to 40.000 first-time tuberculosis patients are registered in the country each year, and about 10.000 die (Aleksandrina, 2012; Frieden et al., 2005; Migliori et al., 2007). The tuberculosis epidemic, as well as an increase in the incidence of significant pulmonary lesions (50-60%), heavily affects the average duration of temporary disability and the growth of primary disability from this pathology (Dye et al., 2005; Maher et al., 2005; Terleieva et al., 2020).

The problem of physical therapy (Grygus et al., 2019) in tuberculosis is now more relevant than in the past. The main method of tuberculosis treatment is drug therapy, but its use causes significant side effects of other body organs and systems (Feshchenko et al., 2007, 2013; Tsyhanenko et al., 2004; Raviglione et al., 2006). Therefore, among the therapeutic factors in this disease, of great importance is a complex functional therapy, which causes certain positive reactions and changes in various physiological body systems (Grygus et al., 2019; Feshchenko et al., 2019; Petrenko, 2008; Donner, 2000).

Analysis of studies conducted by various scientists (Kalmykova, 2010; Melnyk, 2004; Nogas, 2009) suggests that antibacterial therapy of pulmonary tuberculosis often requires supplementation with pathogenic agents that can positively affect the inflammatory process and the state of patient's body protection. First of all, it is therapeutic exercise (TE), massage, physiotherapy treatments, as well as hardening procedures and occupational therapy (Kalmykova, 2013; Murza, 2004; Mukhin, 2005; Nogas, 2011). However, along with sufficient legal and regulatory approaches to the provision of rehabilitation care for patients with pulmonary tuberculosis, the use of physical therapy in the rehabilitation process in specialized institutions of Ukraine is at a fairly low level.

The available research mainly concerns sanatorium treatment of patients with pulmonary tuberculosis (Kornilova, 2004; Kovhanko et al., 2007), application of physiotherapy treatment techniques (Lomanchenkov et al., 1989; Klymenko, 2000; Savytska, 2003; Savchenko, 2005). There are some works that describe the application method of therapeutic physical culture, therapeutic massage, elements of psychocorrection in the rehabilitation of patients with pulmonary tuberculosis (Murza, 2004; Stepashko et al., 2006; Chmil et al., 2007; Kalmykova, 2013). At the same time, considering the variety of pulmonary tuberculosis forms and the peculiarities of medical history, in the literature available to us, there is almost no systematic data on a complex combination of means and methods of physical therapy in the rehabilitation of this group of patients, as well as there are no substantiated physical therapy programs and characteristics of their impact on the functional and general physical condition of patients.

The imperfection of the existing methods of prevention, treatment and physical therapy of patients, the further spread of tuberculosis with all its negative consequences necessitate a new comprehensive approach to solving this problem (Nogas et al., 2019; Feshchenko, 2008; WHO, 2011).

Given the above, the modernization of familiar and the search for new means of physical therapy to improve the efficiency and quality of the recovery process of patients with pulmonary tuberculosis are relevant.

The purpose of the study is to evaluate the effectiveness of the developed comprehensive physical therapy program aimed at improving the general health of patients with pulmonary tuberculosis.

Material and Methods

The study was conducted on the basis of the municipal enterprise "Rivne Regional Phthysiopulmonology Medical Center" of Rivne Regional Council. It was attended by 68 patients with newly diagnosed pulmonary tuberculosis, with no bacterial excretion (BE-), of which there were 40 (58.82%) men and 28 (41.18%) women with a mean age of 29.38 ± 1.18 years. By randomization, patients were divided into control and experimental groups of 34 people each, including 20 men and 14 women. The control group (CG) underwent a generally accepted physical therapy program recommended by the Ministry of Health of Ukraine. The experimental group (EG) was engaged in the development of a comprehensive program of physical therapy. Gender, age, and severity of the pathological process were the same in both groups. The complex program of physical therapy included: morning hygienic gymnastics (MHG), therapeutic gymnastics (TG), therapeutic massage, physiotherapeutic procedures (UHF-therapy), hydrotherapy, manipulative interventions and educational programs.

During the study, we used the following methods: sociological methods (study of medical histories, surveys, questionnaires); pedagogical (pedagogical experiment, pedagogical observation); clinical (examination, express method by Apanasenko G. L.); instrumental and functional diagnostics (radiography, computer spirometry, electrocardiography); methods of mathematical statistics.

To prove the effectiveness of the physical therapy program, we used Student's t-test (at $p \leq 0,05$), comparing the results obtained at the beginning and end of the study to determine a significant difference in the results.

Research Results and Discussion

To determine the effectiveness of the proposed comprehensive program of physical therapy, a comparative pedagogical experiment was conducted.

The effectiveness of a comprehensive program of physical therapy was evaluated in two groups of patients with pulmonary tuberculosis: control ($n=34$) and experimental ($n=34$). The pedagogical experiment lasted for 16 months.

We considered the results of physical therapy of patients with pulmonary tuberculosis in the dynamics, which allowed to objectively establish the effectiveness of the rehabilitation program.

The overall assessment of the level of physical health (sum of points) in patients with pulmonary tuberculosis of the male control group at the beginning of the study was the following: 4 (20.00%) patients had an average level, 2 (10.00%) – below average and 14 (70.00%) – low level (fig. 1).

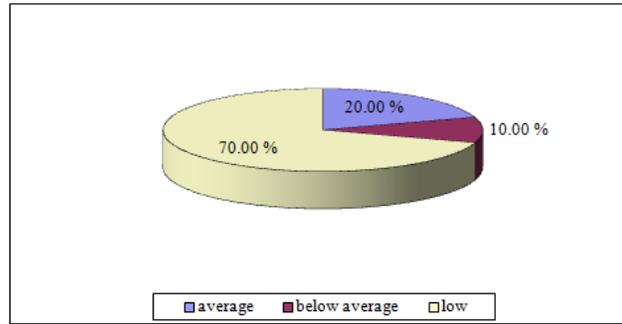


Fig. 1. Overall assessment of the level of physical health (sum of points) in male patients with pulmonary tuberculosis of the control group at the beginning of the study, in %

After analyzing the results of determining the level of physical health of male patients with pulmonary tuberculosis of the control group at the beginning of the study, we see that the overall assessment of physical health corresponded to a low level.

When determining the level of physical health in patients with pulmonary tuberculosis of the experimental group at the beginning of the study, the overall score (sum of points) was as follows: 6 (30.00%) patients had below average and 14 (70.00%) – low level (fig. 2).

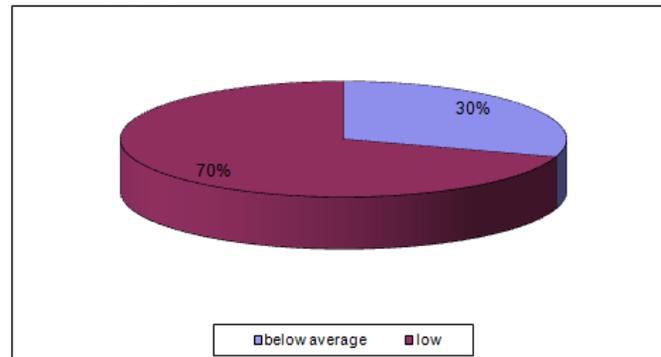


Fig. 2. Overall assessment of the level of physical health (sum of points) in male patients with pulmonary tuberculosis of the experimental group at the beginning of the study, in %

Analyzing the results, we see that the overall assessment of the level of physical health (sum of points) of patients with pulmonary tuberculosis in the experimental group at the beginning of the study corresponded to a low level.

Among female patients with pulmonary tuberculosis of the control group, the overall assessment of physical health at the beginning of the study was the following: 4 (28.57%) patients were below average and 10 (71.43%) – low (fig. 3).

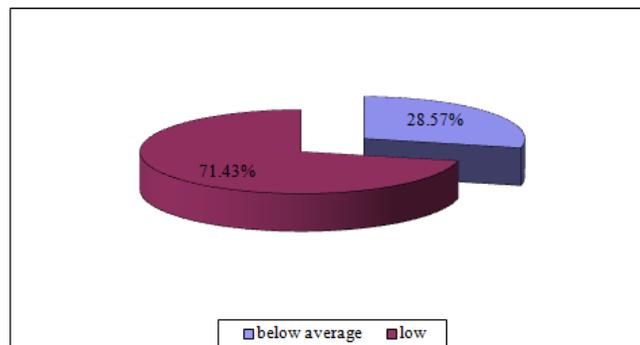


Fig. 3. Overall assessment of the level of physical health (sum of points) in female patients with pulmonary tuberculosis of the control group at the beginning of the study, in %

From the above data, we see that the overall level of physical health (sum of points) of female patients with pulmonary tuberculosis in the control group at the beginning of the study was low. When determining the overall level of physical health (sum of points) of the female patients with pulmonary tuberculosis of the experimental group at the beginning of the study, the overall assessment was as follows: 2 (14.29%) patients had below average level and 12 (85.71%) patients – low level (fig. 4).

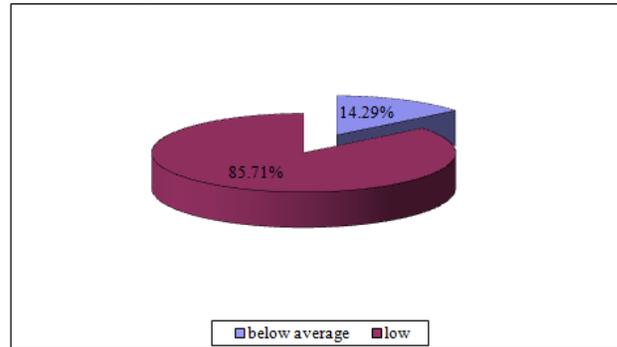


Fig. 4. Overall assessment of the level of physical health (sum of points) in female patients with pulmonary tuberculosis of the experimental group at the beginning of the study, in %

Thus, the level of physical health of women in the control and experimental groups at the beginning of the study was almost identical.

After applying our proposed program of physical therapy for patients with pulmonary tuberculosis of the experimental group, we determined the level of physical health of patients in both groups at the end of the study. At the end of the study, the overall assessment of the level of physical health (sum of points) of male patients with pulmonary tuberculosis in the control group was as follows: 5 (25.00%) patients had an average level, 4 (20.00%) – below average and with 11 (55.00%) patients it remained low (fig. 5) ($p < 0,05$).

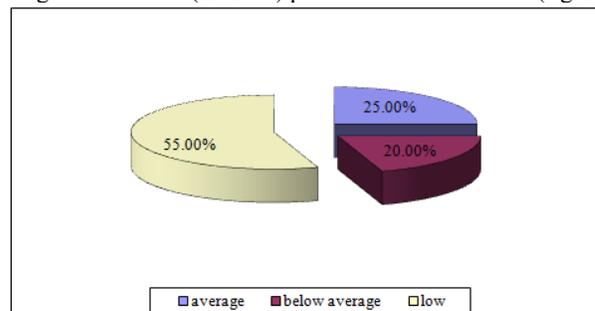


Fig. 5. Overall assessment of the level of physical health (sum of points) in male patients with pulmonary tuberculosis of the control group at the end of the study, in %

The overall assessment of the level of physical health (sum of points) of male patients with pulmonary tuberculosis of the experimental group at the end of the study looked much better: 1 (5.00%) patient had an above average level, 8 (40.00%) – average level, 5 (25.00%) – below average level, and only with 6 (30.00%) patients it remained low (fig. 6) ($p < 0,05$).

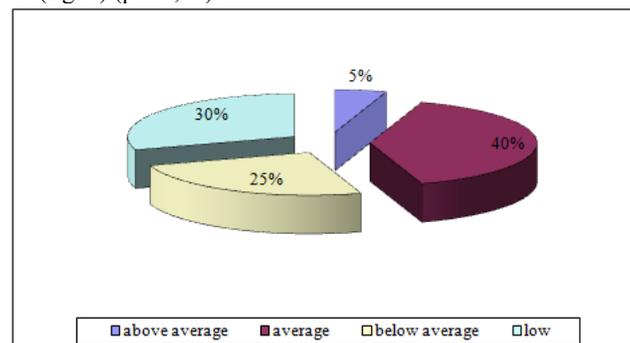


Fig. 6. Overall assessment of the level of physical health (sum of points) in male patients with pulmonary tuberculosis of the experimental group at the end of the study, in %

After analyzing the results of determining the overall physical health of male patients with pulmonary tuberculosis of the control and experimental groups at the end of the study, we see that the overall health of male patients of the experimental group is much higher than in control group patients, that is due to the effectiveness of the used physical therapy. Among female patients with pulmonary tuberculosis of the control group, the overall assessment of the level of physical health (sum of points) at the end of the study was as follows: 7 (50.00%) patients were below average and for 7 (37.50%) women the level remained low (fig. 7) ($p < 0,05$).

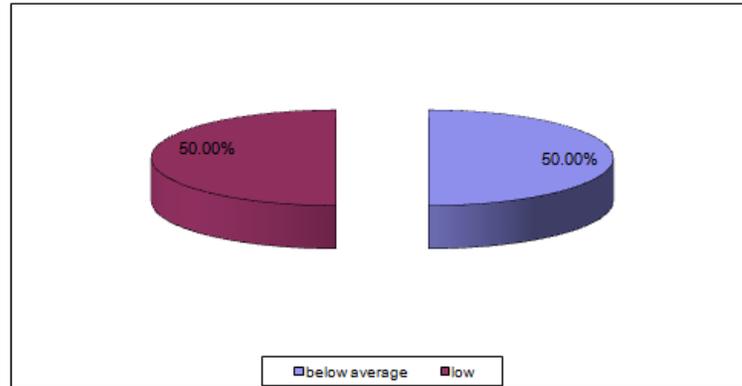


Fig. 7. Overall assessment of the level of physical health (sum of points) in female patients with pulmonary tuberculosis of the control group at the end of the study, in %

At the end of the study, the overall assessment of the level of physical health (sum of points) of female patients with pulmonary tuberculosis of the experimental group differed significantly: 2 (14.29%) patients had an average level, 8 (57.14%) remained below average, and only 4 (28.57%) women had a low level (fig. 8) ($p < 0,05$).

The indicators of the overall assessment of the level of physical health of female patients with pulmonary tuberculosis of the experimental group, engaged in the developed comprehensive program of physical therapy, exceed the same in the studied control group.

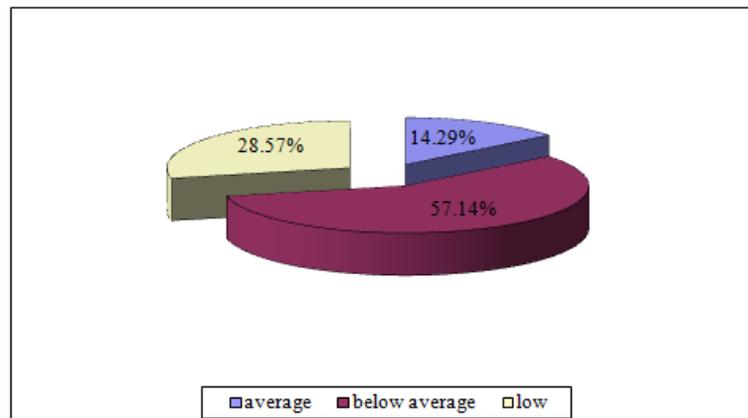


Fig. 8. Overall assessment of the level of physical health (sum of points) in female patients with pulmonary tuberculosis of the experimental group at the end of the study, in %

Therefore, at the end of the study among female patients of the experimental group, the indicators of the overall assessment of physical health significantly exceed those of patients in the control group, which indicates a positive effect of physical therapy on the health of these patients.

Based on the analysis of indicators of general physical health of patients with pulmonary tuberculosis of male and female sexes of both groups, we can say that at the beginning of the study these indicators did not differ significantly, and at the end of the study there was a significant improvement in patients of the experimental group. Statistically significant improvement in the overall level of physical health in patients of the experimental group is explained by the correctness of the composition and effectiveness of the proposed program of physical therapy.

Conclusions

As a result of the comparative analysis of the examination data of patients with pulmonary tuberculosis in the control (n=34) and experimental (n=34) groups, a number of features were identified. Thus, the patients in the experimental group had earlier signs of positive trend: the use of a comprehensive program of physical therapy helped to reduce the main clinical signs of the disease, normalize respiratory function, restore dysfunction of the respiratory and cardiovascular systems, strengthen respiratory muscles, increase the effectiveness of drug therapy, improve physical health, and reduce the incidence of complications. At the same time, as for the participants of the control group, who were engaged in the generally accepted physical therapy process, these changes were much slower.

Complex application of individually selected breathing and physical exercises, therapeutic massage, physiotherapy procedures (UHV therapy), hydrotherapy, manipulative interventions and educational programs has made it possible to purposefully influence the identified functional disorders and improve the physical health of patients with tuberculosis. The overall physical health of patients with pulmonary tuberculosis in both groups changed at the end of the study. Indicators of the overall assessment of the physical health level of participants of the experimental group for pulmonary tuberculosis, engaged in the developed program, exceed the same in the participants of the control group. There was a statistically significant difference between the indicators of the general level of physical health of patients in the experimental and control groups according to the Student's t-test ($p < 0,05$), which is confirmed by the effectiveness of the proposed program of physical therapy.

Compliance with Ethical Standards

Conflict of Interest. The authors declare that there is no conflict of interest that could be perceived as interfering with publication of the article.

Competing Interests. The authors declare that they have no competing interests.

Ethical Approval. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent. Informed consent was obtained from all individual participants included in the study. All subjects of the institutional survey gave consent for anonymized data to be used for publication purposes. Funding sources. This study has not received any financial support from any government, community or commercial organization.

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