

# Improvement of living standards of patients with chronic obstructive pulmonary disease

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**Purpose:** to study the effectiveness of the proposed method of physical rehabilitation on the quality of life of patients with chronic obstructive pulmonary disease (COPD).

**Material & Methods:** 162 patients with COPD participated in the study. To determine the effectiveness of the physical rehabilitation, the approved Ukrainian version of the quality of life questionnaire of the World Health Organization. Result: patients of the main group noted a decrease in discomfort, dependence on medications, increased mobility, increased vitality, performance, ability to perform everyday tasks, reducing fatigue, improving sleep, thinking, and improving personal relationships.

**Conclusion:** after applying the proposed program of physical rehabilitation for each patient with chronic obstructive pulmonary disease, we observed an increase in the overall quality of life and health in patients in the main group due to an increase in indicators in problem sub-spheres.

**Keywords:** patients, chronic obstructive pulmonary disease, physical rehabilitation, quality of life.

## Introduction

The medico-social and economic terms, COPD (chronic obstructive pulmonary disease) is a major cause of morbidity and mortality throughout the world; people suffer from this disease for years and die prematurely from it or from its complications. Worldwide, accelerated growth of COPD is observed as a result of long-term exposure to risk factors and aging populations. Proportion of COPD, as one of the leading causes of death, is constantly increasing. COPD suffers from 8 to 22% of adults aged 40 years and over [1; 9; 10].

According to the WHO data, more than 50% of patients with COPD turn to specialists in the late stages of the disease. Meanwhile, it is the early onset of COPD treatment that prevents the progression of the disease and ensures the possibility of active lifestyles for many years. COPD has a significant negative impact on quality of life, including the imposition of restrictions on working capacity, normal physical activity, home occupations, social and family activities, as well as sleep regimes. In addition to these problems with everyday life, there is evidently a large amount of suffering associated with hospitalizations caused by exacerbations [9; 12].

Rehabilitation takes a leading place in the complex treatment of patients with COPD. Introduced in the daily treatment of patients, pulmonary rehabilitation can reduce manifestations of the disease, optimize the functional status of the patient and reduce the cost of treatment by stabilizing or reducing the systemic manifestations of the disease [1; 8; 14].

The quality of life is viewed as a health-related integral characteristic of the physical, psychological and social functioning of a healthy or sick person, based on its subjective perception. Control over the state of health in the process of treatment is impossible without determining the quality of life, as a criterion for the effectiveness of ongoing therapeutic and rehabilitation measures in modern medicine [4; 13]. We see it necessary to determine the quality of life of patients with COPD as a criterion for the effectiveness of the developed programs of

physical rehabilitation.

**Relationship of research with scientific programs, plans, themes.** The research was carried out in accordance with the topic 4.4 "Improving the organizational and methodological foundations of programming the process of physical rehabilitation for dysfunctional disorders in different systems of the human body" of the Consolidated Plan of Research in the field of physical culture and sports for 2011–2015. Ministry of Education and Science, Youth and Sports of Ukraine (state registration number 0111U001737) and research topics of the Department of Human Health and Physical Rehabilitation of the National University of Water Management and Nature Management "Rehabilitation and Physical Culture and Recreational Aspects of Human Development" for 2014–2016. (Number of state registration 0114U001366).

**The purpose of the research:** to study the effectiveness of the proposed method of physical rehabilitation on the quality of life of patients with chronic obstructive pulmonary disease (COPD).

## Material and Methods of the research

The study was conducted on the basis of pulmonology department of the Rivne Regional Clinical Hospital. Accumulation of the results of the study was carried out as patients entered the inpatient treatment. Patients (COPD, II stage, moderate severity) were randomized to control (CG 2 consisted of female (n=40) and male (n=44) sex) and primary (PG 2 – consisted of female (n=38) and the male (n=40) sex) group in accordance with the principles of bioethics. All patients were examined at the beginning and at the end of the study, were under the supervision of doctors. The formulation of the clinical diagnosis was carried out in accordance with the national recommendations of the Order of the Ministry of Health of Ukraine No. 128 of 19.03.2007. The stage of COPD and the degree of pulmonary insufficiency were determined in accordance with clinical changes in the patient, functional condition and spirometric data. To determine the effectiveness of the physical

rehabilitation, in accordance with international standards for assessing the quality of life of the population, we used the approved Ukrainian version of the quality of life questionnaire of the World Health Organization (WHOQL-100), designed to assess the quality of life of the adult population of Ukraine [7].

Patients in control groups underwent protocol treatment and rehabilitation according to the generally accepted method, and patients in the main groups were treatment according to the protocol and rehabilitation according to the proposed methodology, which included several steps: assessment of the patient's condition; patient training; measures for correction of body weight physical training programs; psychological support. For each patient, the COPD selected an individual program of physical rehabilitation taking into account specific physiological and psychopathological disorders caused by the main and/or accompanying disease [5; 6; 11].

## Results of the research and their discussion

Our rehabilitation programs for COPD patients were aimed at slowing the progression and alleviation of the symptoms of the disease in each individual patient, increasing exercise tolerance, prolonging the period of remission, reducing the

number of days spent in a hospital bed and improving the quality of life of patients. An individual program of physical rehabilitation was formed taking into account the stage of the disease, severity, the presence or absence of complications, comorbid diseases.

To assess the quality of life of patients with COPD, the respiratory questionnaire of the St. George (SGRQ), proposed back in 1992 [12]. But, since it is not adapted to the Ukrainian realities, we used the Ukrainian version (according to the science of the editor of Dr. S. V. Phidenka) the quality of life questionnaire of the World Health Organization (WHOQL-100), designed to assess the quality of life of the adult population of Ukraine and recommended to determine the effectiveness of medical and social programs in Ukraine in accordance with international standards for assessing the quality of life of the population. This questionnaire meets all international requirements for such questionnaires, namely it is universal, since it covers all parameters of health. Quality of life is a subjective indicator that combines the components of a person's physical, mental, and social health. WHO recommends determining the quality of life as an individual relationship of one's position in the life of society with the capabilities of the individual. In other words, it is an objective indicator of subjective assess-

**Table 1**  
Quality of life of COPD patients in both male groups,  $\bar{X} \pm m$

Spheres and sub-spheres of quality of life	Control group (n=44)		Main group (n=40)	
	At the beginning	At the end	At the beginning	At the end
<b>G1. Sphere I. Physical sphere</b>	<b>6,51±0,11</b>	<b>6,57±0,12</b>	<b>6,77±0,11</b>	<b>9,25±0,07*</b>
F1. Pain and discomfort	4,73±0,13	5,02±0,14	4,80±0,14	7,30±0,13*
F2. Vital activity, energy and	6,07±0,14	6,05±0,13	6,03±0,13	9,18±0,16*
F3. Dream and rest	8,73±0,25	8,64±0,23	9,48±0,24	11,28±0,16*
<b>G2. Sphere II. Psychological sphere</b>	<b>9,25±0,11</b>	<b>9,30±0,09</b>	<b>9,34±0,12</b>	<b>9,91±0,09*</b>
F4. Positive feelings	9,41±0,21	9,30±0,18	9,40±0,19	10,28±0,17*
F5. Thinking, learning, cognition	13,25±0,20	13,16±0,21	13,65±0,23	14,03±0,18*
F6. Self-evaluation	6,59±0,25	6,93±0,23	6,53±0,27	7,25±0,18*
F7. Body image and appearance	8,75±0,16	8,77±0,12	8,78±0,20	9,13±0,16
F8. Negative feelings	8,25±0,16	8,36±0,13	8,35±0,20	8,88±0,15*
<b>G3. Sphere III. Level of independence</b>	<b>5,98±0,09</b>	<b>6,10±0,08</b>	<b>5,98±0,09</b>	<b>7,70±0,06*</b>
F9. Mobility, ability to move around	7,55±0,19	7,48±0,16	7,58±0,18	8,40±0,14*
F10. Ability to perform everyday tasks	5,84±0,17	6,16±0,18	5,68±0,15	8,75±0,13*
F11. Dependence on medications and treatment	5,91±0,17	6,05±0,20	5,75±0,15	6,05±0,12
F12. Efficiency (ability to work)	4,64±0,16	4,70±0,16	4,90±0,16	7,60±0,11*
<b>G4. Sphere IV. Social relations</b>	<b>7,83±0,14</b>	<b>7,87±0,12</b>	<b>8,05±0,11</b>	<b>9,24±0,10*</b>
F13. Personal relationships	6,64±0,26	6,59±0,25	6,80±0,22	8,13±0,15*
F14. Social support	10,48±0,22	10,48±0,22	10,75±0,22	11,00±0,18
F15. Sexual activity	6,36±0,21	6,55±0,16	6,60±0,20	8,60±0,10*
<b>G5. Sphere V. Environment</b>	<b>7,93±0,08</b>	<b>7,94±0,08</b>	<b>7,98±0,08</b>	<b>8,46±0,07*</b>
F16. Physical security and security	8,05±0,26	8,05±0,26	7,85±0,23	8,25±0,17
F17. Home environment	15,09±0,26	15,09±0,26	14,85±0,26	15,03±0,23
F18. Financial resources	6,91±0,30	6,80±0,29	7,03±0,28	7,35±0,22
F19. Medical and social assistance	6,07±0,22	6,07±0,22	5,88±0,22	6,13±0,19
F20. The possibility of obtaining new information and skills	5,34±0,18	5,34±0,18	5,50±0,16	6,80±0,12*
F21. Leisure / leisure facilities	6,11±0,27	6,98±0,25	6,60±0,24	7,30±0,13*
F22. Surrounding physical environment	10,30±0,21	10,30±0,21	9,80±0,24	10,03±0,20
F23. Transport	5,57±0,26	5,93±0,25	6,30±0,25	6,83±0,19*
<b>G6. Sphere VI. Spiritual sphere</b>	<b>10,64±0,35</b>	<b>10,64±0,35</b>	<b>11,18±0,33</b>	<b>11,58±0,29</b>
F24. Spirituality, religion, beliefs	10,64±0,35	10,64±0,35	11,18±0,33	11,58±0,29
<b>G. Overall quality of life and health</b>	<b>48,13±0,61</b>	<b>48,42±0,58</b>	<b>49,28±0,55</b>	<b>56,14±0,38*</b>

**Remark.** \* – significance of differences  $p < 0,05$  between the indicators at the beginning and at the end of the study in the group.

Table 2  
Quality of life of COPD patients in both female groups,  $\bar{X} \pm m$

Spheres and sub-spheres of quality of life	Control group (n =40)		Main group (n =38)	
	At the beginning	At the end	At the beginning	At the end
<b>G1. Sphere I. Physical sphere</b>	<b>6,46±0,10</b>	<b>6,58±0,09</b>	<b>6,69±0, 09</b>	<b>9,82±0,07*</b>
F1. Pain and discomfort	4,73±0,13	4,90±0,13	4,92±0,13	7,42±0,13*
F2. Vital activity, energy and	6,03±0,12	6,18±0,11	5,97±0,13	9,21±0,17*
F3. Dream and rest	8,63±0,22	8,68±0,23	9,1±0,22	12,82±0,15*
<b>G2. Sphere II. Psychological sphere</b>	<b>9,03±0,90</b>	<b>9,04±0,08</b>	<b>9,24±0,11</b>	<b>10,53±0,09*</b>
F4. Positive feelings	9,15±0,18	9,23±0,17	9,37±0,21	12,18±0,15*
F5. Thinking, learning, cognition	13,10±0,19	13,23±0,19	13,26±0,21	14,18±0,17*
F6. Self-evaluation	6,08±0,22	6,25±0,20	6,68±0,25	7,89±0,23*
F7. Body image and appearance	8,85±0,15	8,70±0,14	8,71±0,17	9,16±0,16*
F8. Negative feelings	7,98±0,14	7,80±0,13	8,16±0,18	9,24±0,19*
<b>G3. Sphere III. Level of independence</b>	<b>6,01±0,10</b>	<b>6,07±0,09</b>	<b>6,01±0,11</b>	<b>8,15±0,09*</b>
F9. Mobility, ability to move around	7,63±0,20	7,48±0,18	7,63±0,19	9,24±0,15*
F10. Ability to perform everyday tasks	5,63±0,17	5,60±0,15	5,55±0,16	8,95±0,18*
F11. Dependence on medications and treatment	5,88±0,17	5,78±0,16	5,84±0,16	6,45±0,16*
F12. Efficiency (ability to work)	4,90±0,15	5,43±0,10	5,03±0,17	7,97±0,12*
<b>G4. Sphere IV. Social relations</b>	<b>8,01±0,13</b>	<b>8,08±0,11</b>	<b>8,11±0,12</b>	<b>9,20±0,10*</b>
F13. Personal relationships	6,78±0,23	6,63±0,23	7,05±0,22	8,03±0,16*
F14. Social support	10,68±0,22	10,55±0,20	10,79±0,20	11,26±0,16*
F15. Sexual activity	6,58±0,21	7,05±0,16	6,50±0,21	8,32±0,16*
<b>G5. Sphere V. Environment</b>	<b>7,92±0,08</b>	<b>7,94±0,07</b>	<b>7,99±0,08</b>	<b>8,52±0,08*</b>
F16. Physical security and security	8,03±0,24	8,03±0,24	7,97±0,21	8,45±0,16*
F17. Home environment	15,33±0,26	15,23±0,24	15,05±0,25	15,26±0,20*
F18. Financial resources	6,73±0,29	6,60±0,26	6,92±0,31	7,66±0,24*
F19. Medical and social assistance	5,93±0,22	6,03±0,21	6,05±0,21	6,16±0,19
F20. The possibility of obtaining new information and skills	5,60±0,17	5,65±0,15	5,50±0,18	6,29±0,18*
F21. Leisure / leisure facilities	6,55±0,25	6,38±0,24	6,61±0,23	7,47±0,18*
F22. Surrounding physical environment	9,60±0,21	9,58±0,21	9,68±0,25	10,13±0,19
F23. Transport	5,58±0,23	6,05±0,19*	6,16±0,24	6,76±0,21*
<b>G6. Sphere VI. Spiritual sphere</b>	<b>10,35±0,27</b>	<b>10,35±0,27</b>	<b>11,34±0,29</b>	<b>11,74±0,21</b>
F24. Spirituality, religion, beliefs	10,35±0,27	10,35±0,27	11,34±0,29	11,74±0,21
<b>G. Overall quality of life and health</b>	<b>47,77±0,51</b>	<b>48,06±0,45</b>	<b>49,39±0,51</b>	<b>57,96±0,28*</b>

**Remark.** \* – significance of differences  $p < 0,05$  between the indicators at the beginning and at the end of the study in the group.

ments, covering a wide range of criteria. The level of quality of life depends on the state of health, psychological status and level of independence, social status, environmental factors and personal perceptions of a person. To study the general quality of life and health of patients with COPD, we used the Ukrainian version of the methodology for assessing the quality of life, including 100 questions, 4 questions for each of the 24 sub-spheres, and 4 "global issues" for assessing the overall quality of life and health. The indicators of spheres were studied: physical, psychological, level of independence, social relations, environment and spiritual sphere [2; 3; 7].

With the help of the quality of life assessment method, we determined the initial level of quality of life at each patient and at the end of the study to follow the changes and assess the effectiveness of the measures performed (Tables 1, 2 and Figures 1 and 2).

At the beginning of the study, both male and female COPD patients in both groups had a low average baseline overall quality of life and health.

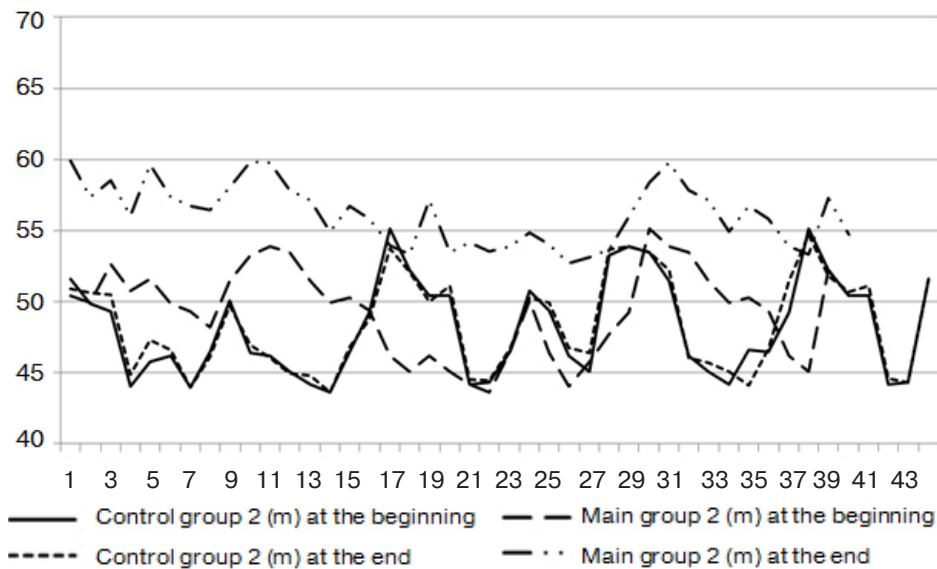
So, in CG 2, he was 48,13±0,61 in men. In some spheres of study, the indicators were as follows: sphere I (physical sphere) 6,51±0,11, sphere II (psychological sphere) 9,25±0,11,

sphere III (level of independence) 5,98±0,09 sphere IV (social relations) – 7,83±0,14, sphere V (environment) – 7,93±0,08, sphere VI (spiritual sphere) – 10,64±0,35.

The same low average baseline level of overall quality of life and health was in male patients with MG 2 – 49,28±0,55. In separate areas of study, they were: sphere I (physical sphere) – 6,77±0,11, sphere II (psychological sphere) – 9,34±0,12, sphere III (level of independence) – 5,98±0,09, sphere IV (social relations) – 8,05±0,11, sphere V (environment) – 7,98±0,08, sphere VI (spiritual sphere) – 11,18±0,33.

The same low average baseline level of overall quality of life and health status was noted in both female and female patients. In patients with CG 2, he was 47,77±0,51 points and 49,39±0,51 points in women with MG 2. The indices of individual fields of study in patients with CG 2 were as follows: sphere I (physical sphere) – 6,46±0,10, sphere II (psychological sphere) – 9,03±0,90, sphere III (level of independence) – 6,01±0,10, sphere IV (social relations) – 8,01±0,13, sphere V (environment) – 7,92±0,08, sphere VI (spiritual sphere) – 10,35±0,27.

For individual fields of study, the baseline level of the overall



**Fig. 1. The overall quality of life and health of male COPD patients in the study**

quality of life and health of patients with MG 2 was: sphere I (physical sphere) –  $6,69 \pm 0,09$ , sphere II (psychological sphere) –  $9,24 \pm 0,11$ , sphere III (level of independence) –  $6,01 \pm 0,11$ , sphere IV (social relations) –  $8,11 \pm 0,12$ , sphere V (environment) –  $7,99 \pm 0,08$ , sphere VI (spiritual sphere) –  $11,34 \pm 0,29$ .

As we see, the decrease in the quality of life was due to the influence of the disease all the subspheres of the patient's life.

At the end of the study, in male patients, CG 2, the average level of overall quality of life and health status changed insignificantly –  $48,42 \pm 0,58$  points. In some areas of study, indicators were close to the initial, with a slight improvement: sphere I (physical sphere) –  $6,57 \pm 0,12$ , sphere II (psychological sphere) –  $9,30 \pm 0,09$ , sphere III (level of independence) –  $6,10 \pm 0,08$ , sphere IV (social relations) –  $7,87 \pm 0,12$ , sphere V (environment) –  $7,94 \pm 0,08$ , sphere VI (spiritual sphere) –  $10,64 \pm 0,35$  points – at the same level.

At MG 2 males, at the end of the study, the average level of overall quality of life and health improved substantially and was  $56,14 \pm 0,38$  points ( $p < 0,05$ ). In some spheres of study, the indicators have become significantly higher than the original ones and made up: sphere I (physical sphere) –  $9,25 \pm 0,07$  ( $p < 0,05$ ), sphere II (psychological sphere) –  $9,91 \pm 0,09$  ( $p < 0,05$ ), sphere III (level of independence) –  $7,70 \pm 0,06$  ( $p < 0,05$ ), sphere IV (social relations) –  $9,24 \pm 0,10$  ( $p < 0,05$ ), sphere V (environment) –  $8,46 \pm 0,07$  ( $p < 0,05$ ), sphere VI (spiritual sphere) –  $11,58 \pm 0,29$  points. There was a significant increase in the overall quality of life and health in all areas and the sub-sphere of quality of life, except for spiritual, in patients in MG 2.

At the end of the study, in female patients in CG 2, the average level of overall quality of life and health improved somewhat and was  $48,06 \pm 0,45$  points. Separate indicators of spheres of study at them were: sphere I (physical sphere) –  $6,58 \pm 0,09$ , sphere II (psychological sphere) –  $9,04 \pm 0,08$ , sphere III (level of independence) –  $6,07 \pm 0,09$ , sphere IV (social relations) –  $8,08 \pm 0,11$ , sphere V (environment) –  $7,94 \pm 0,07$ , sphere VI (spiritual sphere) –  $10,35 \pm 0,27$  points.

In some areas of study, the level of overall quality of life and health of female patients in MG 2 has grown significantly: sphere I (physical sphere) –  $9,82 \pm 0,07$  ( $p < 0,05$ ), sphere II (psychological sphere) –  $10,53 \pm 0,09$  ( $p < 0,05$ ), sphere III (level of independence) –  $8,15 \pm 0,09$  ( $p < 0,05$ ), sphere IV (social relations) –  $9,20 \pm 0,10$  ( $p < 0,05$ ), sphere V (environment) –  $8,52 \pm 0,08$  ( $p < 0,05$ ), sphere VI (spiritual sphere) –  $11,74 \pm 0,21$  points – slightly. The average level of the overall quality of life and state of health rose to  $57,96 \pm 0,28$  ( $p < 0,05$ ) points. A significant increase in the overall quality of life and health of patients in MC occurred in all spheres and the sub-sphere of quality of life, except for the spiritual.

The overall quality of life of each COPD patient in both groups is shown in Figure 1 and 2.

From the above, it can be seen that at the beginning of the study, the level of overall quality of life in both male and female patients in both groups was approximately the same. Analyzing the results of the questionnaire of COPD patients to determine the general quality of life and health at the beginning of the study, we see, comparing them with the average data of a healthy population, in patients CG 2 and MG 2, the indicators of the physical sphere, the level of independence and social relations. Lowest indicators were obtained in the following sub-spheres: discomfort, ability to carry out everyday tasks, work capacity, dependence on medicines and medical treatment, medical and social assistance, recreation/leisure and transportation, requires an appropriate rehabilitation direction. Obtained data prove the necessity of using individualized physical rehabilitation taking into account the motor abilities, in combination with social and psychological rehabilitation of this category of patients.

After applying the proposed physical rehabilitation program for each COPD patient, we observed an increase in the overall quality of life and health in OG patients due to an increase in indicators in problem sub-spheres. Patients in MG noted a decrease in discomfort, dependence on medications, increased mobility, increased vitality, ability to work, ability to perform everyday tasks, reduce fatigue, improve sleep, thinking, and improve personal relationships. Slightly increased only the indicators of the spiritual sphere. In CG patients, no significant changes in the quality of life and health.

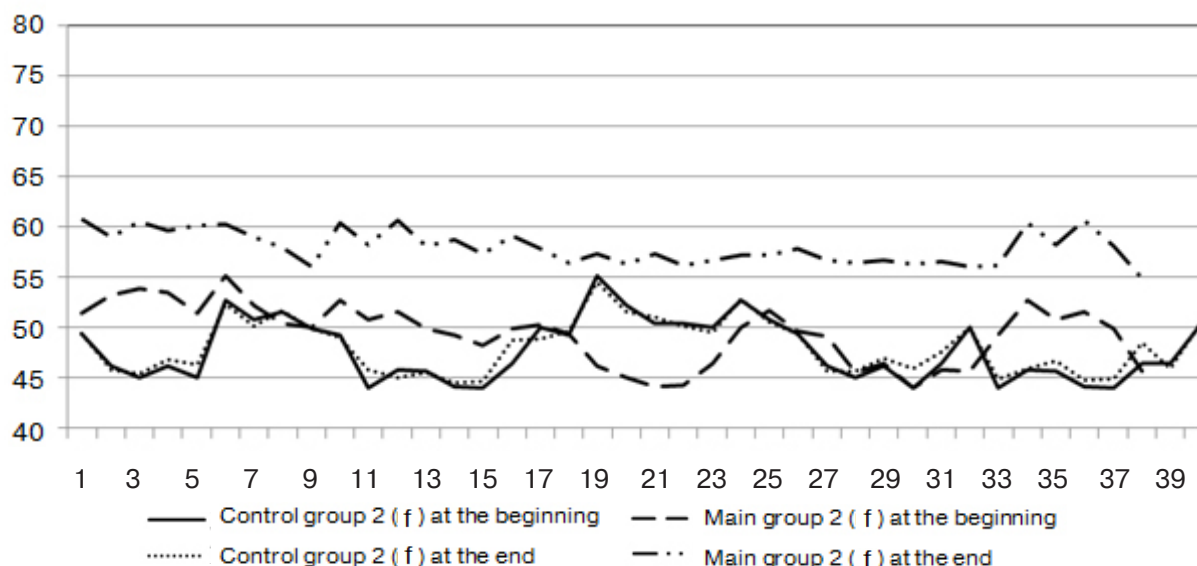


Fig. 2. The overall quality of life and health of female COPD patients in the study

## Conclusions

Physical rehabilitation occupies an important place in the complex treatment of patients with COPD. Thanks to the application of the proposed physical rehabilitation program for each COPD patient, it was possible to achieve a reliable increase in the overall quality of life and health in the patients

of the main group due to the increase in the indicators in the problem sub-spheres. Physical rehabilitation should be recommended to COPD patients to help control symptoms, improve quality of life and increase physical activity.

**Prospects for further research.** Our research will focus on the effectiveness of physical rehabilitation of COPD patients.

**Conflict of interests.** The authors declare that no conflict of interest.

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