

## Study of quality of life and effectiveness of physical therapy of women after mastectomy in the COVID-19 pandemic conditions

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### Abstract

In case of oncological disease there is a deterioration of patients' quality of life as such of its characteristics as physiological, psychological, emotional and social decrease. These problems are especially worsened by additional threats of social life. Today, such a challenge to the health of all mankind, and especially cancer patients, is the global pandemic caused by the spread of coronavirus disease COVID-19. Fear of death and loss of loved ones, isolation, economic shock and uncertainty about the future – all this certainly affects the quality of life, especially for patients after mastectomy, because they were already in emotional and physiological stress. The problem of determining the patients' quality of life after mastectomy and correcting the nature of the personal reaction to the disease in the coronavirus pandemic is an integral part of the physical rehabilitation programme.

**The objective of the study:** to assess the quality of life and effectiveness of physical rehabilitation programmes of women after mastectomy in the conditions of pandemic COVID-19.

**Research methods.** The study involved 36 women aged from 42-69, who underwent radical mastectomy and were receiving adjuvant treatment at the Kherson Regional Oncological Center. To restore their health, the patients passed an author's programme of physical therapy for people after radical mastectomy. The methodology of building the author's programme was based on continuity, phasing and its implementation both in the mammology department and at home. The quality of life parameters and the volume indicators of mobility of the joints of the upper extremity were evaluated by the operated part before the application of physical therapy methods (early hospital period), after physical therapy (late hospital period) and after discharge from a hospital, but women continued to perform rehabilitation measures independently and were at home during the COVID-19 pandemic (post-hospital period + quarantine). To assess the quality of life, we used the questionnaire "MOS SF-36", which was used at each stage of rehabilitation.

**Research results.** Based on the conducted goniometry of women after radical mastectomy, it can be concluded that the amplitude of movements in the shoulder joint differs significantly at all periods of physical therapy (early hospital period, late hospital period and post-hospital period + quarantine) from the standard indicators. Extension of the shoulder among most women after the application of an individual rehabilitation programme has fully recovered, forced quarantine and lack of general physical activity did not affect this indicator. Independent performance of therapeutic gymnastics (in the post-hospital period + quarantine) did not significantly improve this indicator and did not lead to complete recovery of movement. The analysis of the obtained results showed that among women, who underwent mastectomy under the influence of physical exercises, already in the late hospital period of rehabilitation, there was not only an improvement in joint mobility, but there was an improvement in quality of life. At the same time, women in the post-hospital period of physical rehabilitation, which coincided with the quarantine period, there was a slight decrease in quality of life. Namely: there was a decrease in physical activity (PF) by 4.5%, which indicated a decrease in daily physical activity; it was found that the role of physical problems in the limitation of vital functions (RF) decreased by 2.7% (this indicator reflected the impact of physical condition on daily role activities). Low RF values indicate that daily activities are significantly limited by the patient's physical condition; women noted an increase in pain indicator (BP) by 9.6% and its effect on the ability to engage in daily activities, which led to limited activity of patients; deterioration of mental health (MH) – by 3.8%, which was characterized by low mood, depression, anxiety and a decrease in the overall rate of positive emotions. Low scores indicated the presence of depressive, anxious experience and mental distress; decrease of the indicator of role functioning, which is due to emotional state (RE), during forced quarantine by 13.6%, interpreted as a restriction in the performance of daily work, which is due to the deterioration of emotional state; vital activity parameters (VT) decreased during quarantine by 11.7%. The obtained indicators testified to higher fatigue of patients, decrease of their vital activity and decrease of their vivacity.

**Conclusions.** Quarantine conditions and self-isolation, which appeared during the spread of coronavirus disease, are an additional source of concern for patients after mastectomy and have identified a decline in their quality of life and the effectiveness of physical therapy in general. Although before the quarantine measures, the indicators of quality of life and mobility of the shoulder joints on the operated side were significantly increased under the influence of the physical therapy programme for this category of patients. Assessment of the quality of life of patients after mastectomy is an integral characteristic of physical, mental, social and spiritual condition, which allows determining the effectiveness of physical rehabilitation measures. Therefore, the assessment of the life quality of women after mastectomy, which is made by the patients themselves, is a secure and reliable indicator of their general condition under normal conditions and during the pandemic period of coronavirus disease. The obtained data on the quality of life allow for constant monitoring of the patients' general condition after undergoing surgery on the mammary, as well as timely, if necessary, to adjust the physical therapy programme.

**Key words:** *quality of life; physical therapy, women, mastectomy, COVID-19, coronavirus, pandemic conditions,*

## Introduction

According to the WHO, breast cancer ranks the first place in the list of malignant tumours of women and the second one – in the list of the most common diseases [6, 18]. Every year in Ukraine more than 14.5 thousand of new cases of breast cancer are registered, including 25% of women of reproductive age and more than 5.5 thousand of women die annually, more than 20% of them are of reproductive age [4].

The gold standard of such patients' treatment was and still is surgery, radiation therapy and chemotherapy as independent methods and in various combinations. During surgical operation (mastectomy) in addition to removing the mammary gland also large and small pectoral muscles, axillary and subclavian lymph glands with cellular tissue are removed. This, in turn, leads to physical defects, such as: lymphostasis of the upper extremity (46.2% - 68.7%), contracture of the shoulder joint (23%), spinal deformities due to weight asymmetry (8% - 10%), which is disfigured by the scar on the anterior chest wall, retraction of the subclavian area. All these changes belong to post-mastectomy complications that occur after radical mastectomy in 87.5% of cases [2, 3]. Therefore, a comprehensive programme of physical rehabilitation of this category of patients should include preventive measures aimed at prevention of post-mastectomy complications. It is also important to monitor the quality of life of patients at each stage of rehabilitation with its subsequent correction.

Despite the rather high interest in studying of the problem of life quality of cancer patients after mastectomy, such data are insufficiently used in the practice of oncologists and physical therapists. This is due to the fact that in most cases the assessment of quality of life is carried out on a subjective basis and this is not always a reliable fact for the doctor. The next problem is the introduction of the methodology of the questionnaire on the quality of patient's life, as it requires time, resources and careful and individual approach to each patient.

In case of oncological disease there is a deterioration of patients' quality of life as such of its characteristics as physiological, psychological, emotional and social decrease [10]. These problems are especially worsened by additional threats of social life. Today, such a challenge to the health of all mankind, and especially cancer patients, is the

global pandemic caused by the spread of coronavirus disease COVID-19. Fear of death and loss of loved ones, isolation, economic shock and uncertainty about the future – all this certainly affects the quality of life, especially for patients after mastectomy, because they were already in emotional and physiological stress.

## Analysis of recent research and publications

Analysis of the scientific literature has shown that standard medical treatment of women with breast cancer (surgery, chemotherapy, radiation therapy and hormone therapy) leads to adverse effects on the cardiorespiratory, nervous, endocrine and musculoskeletal systems of the body [14]. Such patients have cardiotoxicity, cachexia, muscle atrophy, peripheral neuropathy, and immune system dysfunction, altered body composition, which reduce the quality of life of patients and affect their ability to carry out daily life processes [14]. In addition, pain and fatigue are among the most common symptoms among cancer patients [14].

In foreign literature, the problems of patients' quality of life with breast cancer are disclosed quite fully, they are given quite serious attention [10], but in Ukraine these issues are insufficiently divulged. However, there are differences in demographic characteristics, general living standards, mentality, approaches to the treatment and rehabilitation process, etc., which allows to study the quality of women's life after mastectomy, taking into account the specific conditions of treatment and current challenges, such as the pandemic COVID-19.

Most scientists have proven the positive effect of motion regimen and therapeutic exercises on the tone of the central and peripheral nervous system, the formation of compensatory reactions of the body and improvement of life quality of patients after a course of physical therapy [2, 5, 12]. The question arose as to how the quality of life was changing among women who withstood surgery, sustained rehabilitation, and continued to exercise during the COVID-19 pandemic at home.

Therefore, the study of the dynamics of women's quality of life after mastectomy under the influence of the physical rehabilitation programme in the conditions of the pandemic COVID-19 is quite

urgent. Beyond doubt, the problem of determining the patients' quality of life after mastectomy and correcting the nature of the personal reaction to the disease in the coronavirus pandemic is an integral part of the physical rehabilitation programme.

**Connection of the study with scientific programmes, plans, themes.** The work was performed in accordance with the scientific research plan of the Department of Medicine and Physical Therapy of Kherson State University: "Recovery of health of different ages people through physical therapy and the use of the latest healing technologies" (State registration № 0117U001766).

**The objective of the study:** to assess the quality of life and effectiveness of physical rehabilitation programmes of women after mastectomy in the conditions of pandemic COVID-19.

**Research methods.** The study involved 36 women aged from 42-69, who underwent radical mastectomy and were receiving adjuvant treatment at the Kherson Regional Oncological Center.

To restore their health, the patients passed an author's programme of physical therapy for people after radical mastectomy. The methodology of building the author's programme was based on continuity, phasing and its implementation both in the mammology department and at home. Strict dosing and gradual increase of physical activity in terms of intensity, quantity and complexity of exercises were provided. The clinical peculiarities of the course of the underlying disease and concomitant pathologies, age of patients, analysis of laboratory parameters and instrumental-functional research methods were taken into account.

The process of physical rehabilitation after surgical operation was divided into the following periods – sick-leave (hospital stay) and post-hospital (home stay). There were determined 3 stages in the hospital period: early post-operative (1-3 days), delayed post-operative (4-7 days), restorative (from 8 to 20 days). The duration of the periods varies individually depending on the functional state of the patient and the course of the treatment and rehabilitation process [2, 3].

The author's programme of physical therapy included breathing exercises, remedial positions, physical exercises, manual lymphatic massage, self-massage. Morning hygienic gymnastics, therapeutic gymnastics with complexes of gymnastic exercises of general development character, breathing and special exercises of dynamic character with an emphasis on cervical, cervicothoracic spine were used.

Also, the rehabilitation programme included dosed walking, elements of conditioning to the cold, everyday loads. There was also an educational programme (in the form of lessons and consultations by means of telemedicine, which positively motivated patients to daily classes on the author's methodology of physical therapy, including at home conditions.

The quality of life parameters and the volume indicators of mobility of the joints of the upper extremity were evaluated by the operated part before the application of physical therapy methods (early hospital period), after physical therapy (late hospital period) and after discharge from a hospital, but women continued to perform rehabilitation measures independently and were at home during the COVID-19 pandemic (post-hospital period + quarantine).

To assess the quality of life, we used the questionnaire "MOS SF-36", which was used at each stage of rehabilitation. The questionnaire is quite sensitive, at the same time reliable, standardized, and does not take much time [1]. It consists of 36 questions grouped into eight scales. The indicators of each scale are compiled in such a way that the higher the value of the indicator (from 0 to 100), the better the assessment on the selected scale. From them two parameters are formed: psychological and physical components of health.

**Criteria of HRQOL by «MOS SF-36» are:**

1. Physical form (PF).
2. Role of physical problems in limitation of vital activity (RF).
3. Body pain (BP).
4. General health indicator (GH).
5. Vital activity (VT).
6. Social functioning activity (SF).
7. Role of emotional problems in in limitation of vital activity (RE).
8. Mental health (MH).

The effectiveness of physical therapy was evaluated by the indicators of movements' volume in the joints using a goniometer, which consists of a movable and immovable shoulder connected to a measuring scale graduated from 0 ° to 180°. The anatomical position of the joint was taken as 0 °, the deviation from the anatomical position was determined by the number of degrees in the range from 0 ° to 180°. To examine the amplitude of the shoulder joint used 5 types of movement: shoulder flexion, shoulder extension, shoulder abduction, internal rotation, and external rotation.

Statistical processing was performed using the software package Statisticafor Windows 6.0. Student's t-criterion was used to compare the symptoms. The difference in values was considered as significant at  $p < 0,05$ . The degree of relationship was assessed using the Spearman coefficient.

#### Ethical approval.

Studies, conducted with humans, answered all relevant national regulations and institutional policy, adhered to the principles of the Helsinki Declaration of the World Medical Association "Ethical principles of medical research with human participation as the object of study" Document 990\_005, current version from 01.10.2008

#### Informed consent

Informed consent was obtained from all individuals who were included in this study.

#### Research results and their discussion

Having analyzed the special scientific literature, taking into account medical histories, indications and contraindications to the use of physical therapy, we have developed individual physical therapy programmes for women of the mature age after mastectomy. According to each of the rehabilitation periods, individual tasks were determined, means and methods of physical therapy were selected, treatment methods at this stage were taken into account, the presence of metastases, physical and psychological condition of the patient, as well as possible prognosis of tumour development process and various complications [2, 3, 12].

The American College of Sports Medicine (ACSM) and the American Cancer Society (ACS) recommend that patients with breast cancer seek to return to their normal daily lives as soon as possible

after diagnosis and treatment, avoiding being physically inactive. It is recommended to encourage patients to perform various physical activities: at least 150 or 75 minutes of aerobic exercises of medium or high intensity per week, as well as to include exercises with weights two or three times a week [16]. Adherence to such recommendations is really important for patients with breast cancer, because there is a dose-response relation between levels of physical activity and positive health effect. [5, 12].

Analysis of the conducted goniometry allowed identifying the dynamics of changes in the mobility of the shoulder joint of women after mastectomy by the operated part and to investigate the effectiveness of rehabilitation measures during hospital stay and at home during quarantine (table 1)

**Table 1 Dynamics of indicators' changes in the amplitude of movement in the shoulder joint of women after mastectomy**

Назва руху	Rate indicators	early hospital period	Late hospital period	P	post-hospital period + quarantine	p
Flex at the shoulder	0-180°	49,8 ± 1,4	77 ± 1,5	p<0,01	83,5 ± 1,2	p>0,05
Sholder extension	0-60°	45,6±1,5	58,8±1,8	p<0,01	59,2±1,1	p>0,05
Shoulder abduction	0-180°	58,9±2,1	76±1,8	p<0,01	90±2,4	p>0,05
Internal rotation	0-80°	39, 0±2,4	65±2,6	p<0,01	74±2,0	p>0,05
External rotation	0-90°	54, 0±3,2	77±3,1	p<0,01	82±2,8	p>0,05

Based on the conducted goniometry of women after radical mastectomy, it can be concluded that the amplitude of movements in the shoulder joint differs significantly at all periods of physical therapy (early hospital period, late hospital period and post-hospital period + quarantine) from the standard indicators.

Analysis of the outcome results showed that among most women after mastectomy, such an exercise as flexion of the shoulder joint after surgical operation and before rehabilitation was performed in the range of 49.80°, at the stage of late hospitalization, after rehabilitation measures increased significantly to 77°, which led to function restore by 13.6% ( $p<0,01$ ).

But during the performance of independent physical exercises (in the post-hospital period + quarantine) we did not observe a significant increase of this indicator. The improvement was only 3.25% ( $p > 0.05$ ).

Extension of the shoulder among most women after the application of an individual rehabilitation programme has fully recovered, forced quarantine and lack of general physical activity did not affect this indicator.

After the operation, women had a significant decrease in the amplitude of movement on the abduction, but in the process of rehabilitation it was able to record a significant increase of this indicator from  $58.9^\circ$  to  $76^\circ$  ( $p < 0.01$ ). Unfortunately, independent performance of therapeutic gymnastics (in the post-hospital period + quarantine) did not significantly improve this indicator and did not lead to complete recovery of movement.

The ability to perform external and internal rotation in the shoulder joint is significantly reduced after surgical intervention. Performing physical exercises during the hospital rehabilitation period allowed increasing the range of movement by the external and internal rotation by 23% and 32.5%, respectively.

The "MOS SF-36" questionnaire allowed revealing the sources of concern of the operated women at different stages of rehabilitation in more detail. It was found that the ranking order of the causes of reduced quality of life among patients before and after the pandemic was approximately the same. The following reasons took place for patients as the maximum importance for the decrease of indicators at the beginning of the study: the need for further treatment, limited physical activity and emotional stress, as well as reduced activity in everyday life.

The analysis of the obtained results showed that among women, who underwent mastectomy under the influence of physical exercises, already in the late hospital period of rehabilitation, there was not only an improvement in joint mobility, but there was an improvement in quality of life.

At the same time, women in the post-hospital period of physical rehabilitation, which coincided with the quarantine period, there was a slight decrease in quality of life. Namely:

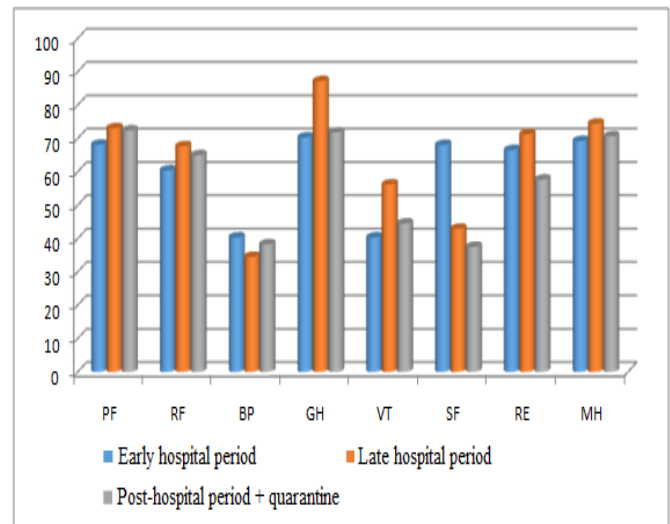


Fig. 1. Quality of life indicators of women after mastectomy (in terms)

- there was a decrease in physical activity (PF) by 4.5%, which indicated a decrease in daily physical activity.
- it was found that the role of physical problems in the limitation of vital functions (RF) decreased by 2.7% (this indicator reflected the impact of physical condition on daily role activities). Low RF values indicate that daily activities are significantly limited by the patient's physical condition.
- women noted an increase in pain indicator (BP) by 9.6% and its effect on the ability to engage in daily activities, which led to limited activity of patients.
- deterioration of mental health (MH) – by 3.8%, which was characterized by low mood, depression, anxiety and a decrease in the overall rate of positive emotions. Low scores indicated the presence of depressive, anxious experience and mental distress.
- decrease of the indicator of role functioning, which is due to emotional state (RE), during forced quarantine by 13.6%, interpreted as a restriction in the performance of daily work, which is due to the deterioration of emotional state.
- vital activity parameters (VT) decreased during quarantine by 11.7%. The obtained indicators testified to higher fatigue of patients, decrease of their vital activity and decrease of their vivacity. The lowest rate during quarantine ( $42.9 \pm 0.68\%$ ), among own indicators and relative to a similar indicator during quarantine (37.5% less) was the scale of social functioning (SF). This scale

determined the degree to which the physical or emotional state may limit the social activity (communication) of patients. The obtained low scores indicated a significant restriction of social contacts, a decrease in the level of communication due to the deterioration of physical and emotional state.

The only high indicator ( $87.2 \pm 1.74\%$ ) for the period of quarantine measures (71.8%) is the scale of general health (GH), which reflects the subjective assessment of one's own health state at the moment and treatment prospects. The lower the score by this scale, the lower the health state assessment.

It is important to note that the indicators responsible for the mental component of quality of life are reduced in relation to the quarantine period to a greater extent than for the physical component.

All components of quality of life in our study are in direct interdependence ( $r = 0,12-0,71$ ). A high degree of correlation was found between the vital activity indicator and the mental health indicator ( $r = 0,71$ ).

Thus, 70% of surveyed women reported an improvement in their physical condition and quality of life in the late hospital period after the proposed physical therapy programme.

In the post-hospital period and during quarantine, the situation changed somewhat. None of the surveyed women indicated an improvement in health and quality of life, despite the fact that they continued to perform the recommended complexes of physical therapy.

The majority of women (62.5 %) indicated that their general health did not change compared to their health before quarantine, but their quality of life declined somewhat.

At the same time, 37, 5 % of women reported that their general health deteriorated during the quarantine period, adding that their physical and emotional condition during quarantine prevented them from spending time with family and friends. Such subjective survey data are coordinated with the reliable indicators obtained from the MOS SF-36 questionnaire.

## Discussion

The loss of the mammary gland for most women causes very serious physical limitations and psychological experiences, which affects their quality of life [10, 11]. The use of exercises has a positive effect in rehabilitation, when they are selected taking into account the adequate capabilities of women, have a training effect and increase the body's adaptive capacity [8, 12, 13, 17], affect the tone of the central and peripheral nervous system, improve trophic processes, create compensatory reactions and recovery body functions.

Despite the above recommendations, current research shows that most people with cancer lead a sedentary life [11, 15]. The question was especially sharp for patients after mastectomy during quarantine of COVID-19, as there was a restriction of physical activity during the day, inability to seek rehabilitation centers (lack of modern mobile devices in the elderly, lack of Internet) and negative psychological mood about the global pandemic.

According to the results of the study, it can be affirmed about the positive impact of the physical rehabilitation programme on women after mastectomy. These conclusions are consistent with previous studies [2, 3, 5, 11, 15]. Such positive changes in increasing the amplitude of movement in the shoulder joint on the operated side are due, in our opinion, to increase muscle strength of the upper extremity, as well as the body as a whole, improving blood and lymph circulation, trophic processes in the joint, development of auxiliary muscles [17]. Self-exercising in the post-hospital period has led to an increase in these indicators, but not in full.

It should be noted that women who were physically active before the operation, or whose work was associated with hard work, those women, after conducted physical therapy methods, had better recovery of movements and they returned more quickly to normal activity. Conversely, women, who did not play sports and worked hard, spent more time in rehabilitation and performed it worse.

Analyzing the obtained data, we note that in the post-hospital rehabilitation period, women were less able to return lost motor function than immediately after surgical operation. In our opinion, this is due to several reasons. First, the restoration of motor abilities of the body during rehabilitation is of periodic nature, due to the fact, that there must be an accumulation of quantitative parameters and their transition to qualitative characteristics.

These data support evidence from previous studies, that support the hypothesis that in such patients, insufficient physical activity is associated with a sedentary lifestyle, which after cancer diagnosis can lead to weight gain and poor quality of life [10, 11].

Strong positive correlations between physical, social and emotional functioning further confirm previous findings that mental health symptoms and isolation affect the functional state of cancer patients. [7, 9, 11].

The COVID-19 pandemic in the post-hospital period of physical therapy among women after mastectomy has led to its specific negative effects. Namely, women experienced a lack of physical activity, lack of control by a physical therapy specialist, limited communication. In addition, women showed insufficient motivation, negative mood and unwillingness to work independently. All this could not but affect the quality of life of such patients.

### **Conclusions and prospects for the future**

1. Quarantine conditions and self-isolation, which appeared during the spread of coronavirus disease, are an additional source of concern for patients after mastectomy and have identified a decline in their quality of life and the effectiveness of physical therapy in general. Although before the quarantine measures, the indicators of quality of life and mobility of the shoulder joints on the operated side were significantly increased under the influence of the physical therapy programme for this category of patients.

2. Assessment of the quality of life of patients after mastectomy is an integral characteristic of physical, mental, social and spiritual condition, which allows determining the effectiveness of

physical rehabilitation measures. Therefore, the assessment of the life quality of women after mastectomy, which is made by the patients themselves, is a secure and reliable indicator of their general condition under normal conditions and during the pandemic period of coronavirus disease.

3. The obtained data on the quality of life allow for constant monitoring of the patients' general condition after undergoing surgery on the mammary, as well as timely, if necessary, to adjust the physical therapy programme.

Future areas of research should focus on improvement of the effectiveness of physical therapy methods based on remote innovative technologies, which could further better adjust the exercise and additional psychological support to improve the quality of life of patients after mastectomy.

Future directions of research should focus on the improvement of the effectiveness of physical therapy methods based on remote innovative technologies, which could further better adjust the exercise and additional psychological support to improve the quality of life of patients after mastectomy.

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### **Conflict of interest**

The authors state that there is no conflict of interest.

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