

Effects of physiotherapy on improving quality of life in women after mastectomy

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Abstract

Background: Breast cancer is the most common malignancy affecting the female population and the second most common cause of death from malignant tumors in this group. Increasing morbidity is observed all over the world. Deterioration of both physical and mental functioning leads to significant changes in a woman's family, social, and professional life and is a major cause of reduced quality of life.

Aims: The purpose of this study was to assess the impact of physiotherapy on the improvement of the quality of life in women after mastectomy.

Material and methods: A group of 100 women participated in the research. The study group consisted only of women diagnosed with breast cancer, after mastectomy and undergoing oncological treatment. All participants were referred to the day rehabilitation unit, where for 5 weeks they received physiotherapeutic treatments 5 times a week, including kinesiotherapy, manual lymphatic drainage, scar mobilization, whirlpool massage, pneumatic massage, and bandaging. Before and after the treatment, the range of motion in the shoulder joint and the circumference of the upper limb on the operated side were measured. Additionally, the women were asked to complete

3 questionnaires investigating their well-being during the treatment process: a proprietary questionnaire, Rotterdam Symptom Checklist (RSCL), and the Hospital Anxiety and Depression Scale (HADS).

Results: As a result of physiotherapeutic procedures, there was a statistically significant improvement in the range of flexion, abduction, as well as internal and external rotation in the shoulder joint, and a decrease in the measurements values at each examined level in the upper limb on the operated side. A statistically significant improvement in the quality of life was also observed in women after rehabilitation.

Conclusions: Physiotherapeutic treatment contributes to the improvement of the quality of life in women after mastectomy.

Key words

quality of life, physiotherapy, breast cancer, oncology, mastectomy.

Introduction

Breast cancer is considered a disease of civilization, the etiology of which in most cases remains unknown. Age and genetic predisposition are considered the most important risk factors [1]. The first worrisome signs are mammary glands asymmetry and skin changes around the nipples [2]. Breast cancer is the most common malignancy affecting the female population and the second most common cause of death from malignant tumors in this group. Increasing morbidity is observed all over the world [3,4]. The incidence of breast cancer is estimated to increase 3 times by 2050 compared to 2013 [4].

The implementation of treatments of a systemic nature increases the life expectancy of women diagnosed with breast cancer but may leave behind chronic side effects in the form of functional deficits and mental health problems [3,5,6,7]. Deterioration of both physical and mental functioning leads to significant changes in a woman's family, social, and professional life and is a major cause of reduced quality of life [5,7,8]. Improving physical fitness influences the patient's independence, which then reflects on the patient's quality of life [9].

Aims

The aim of this study was to assess the impact of physiotherapy on the quality of life of women after mastectomy. Deterioration of women's physical functioning, as a result of surgery and systemic treatment, was considered. The effect of physiotherapeutic management on the range of mobility in the upper limb shoulder joint on the operated side and, if present, also on lymphedema covering the upper limb of the operated side was examined. Furthermore, the psychological and psychosocial spheres of patients struggling with breast cancer were investigated.

Materials and methods

The sample group consisted of 100 women diagnosed with breast cancer who underwent a mastectomy and are receiving oncological treatment. All participants were referred to the day rehabilitation unit for rehabilitation. 53 women underwent Patey mastectomy, 11 had a simple mastectomy and seven underwent Halsted mastectomy. The remaining 29 women declared a different type of performed mastectomy. Patients attended 2-hour rehabilitation, 5 times a week for a duration of 5 weeks. Inclusion criteria were: no contraindications to rehabilitation, ability to participate in classes 5 times a week for 5 weeks, a history of mastectomy, and a signed consent form. Exclusion criteria were: contraindication to rehabilitation, discontinuation of rehabilitation, breast-conserving surgery, and lack of consent to participate in the study. All participants gave their written consent to participate after receiving information about the purpose and course of the study.

Proprietary questionnaire

Following 5 weeks of rehabilitation, the patients were asked to complete a questionnaire about: surgical procedures, sequelae and complications, pre-surgery condition, quality of life, rehabilitation, and basic information about the patient.

Rotterdam Symptom Checklist

The Rotterdam Symptom Checklist (RSCL) is a questionnaire used to measure the impact of cancer treatment on patients' quality of life and psychosocial functioning. It includes four basic dimensions of quality of life: psychological, physical, social, and occupational aspects. It consists of 30 items on psychological and physical symptoms and 8 questions on patients' daily activities. Participants were asked to complete it prior to rehabilitation.

Hospital Anxiety and Depression Scale

The Hospital Anxiety and Depression Scale (HADS) is a questionnaire used to screen for anxiety and depression in patients hospitalized due to an illness. The original version has 7 questions investigating anxiety and 7 questions related to depression. Polish version of the scale is supplemented with questions regarding irritability and aggression. Prior to rehabilitation, each participant was asked to fill out the questionnaire.

Measurement of shoulder angular range of motion

The shoulder angular range of motion was measured using a goniometer and recorded using the SFTR method. In the sagittal plane, flexion and extension movements were examined, in the frontal plane, the motion of abduction was assessed, and in the plane for rotational movements R(F0), internal and external rotations were evaluated [10]. Measurements were taken at the beginning and end of rehabilitation.

Measurement of upper limb circumferences

The circumferences of the upper extremities were measured using a centimeter tape, with the results recorded to the nearest millimeter. The upper limb on the operated side and the upper limb on the opposite side were evaluated. Measurements were taken before and after rehabilitation, at four different heights: 10 cm above the ulnar styloid process, 10 cm below the ulnar styloid process, at the height of the ulnar styloid process, and the height of the metacarpal heads.

Description of the intervention

During the two-hour rehabilitation session, a standardized program was used, in which the patients performed active weight-bearing exercises (**Figures 1 and 2**), self-assisted exercises (**Figure 3**), and free-form active exercises using balls and a gymstick (**Figure 4**). The training was supplemented with elements of stretching, involving the chest, shoulder girdle, and upper limb on the oper-

ated side. Each patient, regardless of the presence of lymphedema, was applied manual lymphatic drainage interchangeably with whirlpool massage and scar therapy. In women with stage II or III lymphedema, BOA pneumatic massage (**Figure 5**) and bandaging were additionally applied (**Figure 6**). Kinesio Taping was also used for patients experiencing shoulder girdle pain. Participants had access to psychological support throughout the course of rehabilitation. In addition, the patients were educated on preventive health care and further management in their everyday lives and were taught how to perform self-massage.

Statistical analysis

Microsoft Excel and Statistica 13.3 PL were used to analyze the obtained results. Data were presented as mean and standard deviation, as well as frequencies and percentages. The Shapiro-Wilk test was used to assess the normality of the distribution of the variables. The significance of the changes after therapy was assessed using the dependent samples t-test. A significance level of $\alpha=0.05$ was assumed. A change was considered statistically significant if the test probability level was lower than the accepted level of significance.

Results

Merely 25 patients entered the improvement process less than 6 months after surgery (**Figure 7a**). The presence of pain during oncological treatment was reported by 61% of surveyed women (**Figure 7b**). The development of lymphedema as a result of systemic cancer treatment was reported by 77% of the respondents (**Figure 7c**).

Difficulties with daily activities were reported by 77% of the participants (**Figure 7d**), 64% of whom were forced to stop carrying out these activities (**Figure 7e**). Discontinuation of hobbies after mastectomy was reported by 52% of women (**Figure 7f**), while loss of career opportunities by 49% of them (**Figure 7g**).



Figure 1. Weight-bearing exercises in the sitting position.



Figure 2. Weight-bearing exercises in the supine position.



Figure 3. Self-assisted exercises in the sitting position.



Figure 4. Exercise equipment.

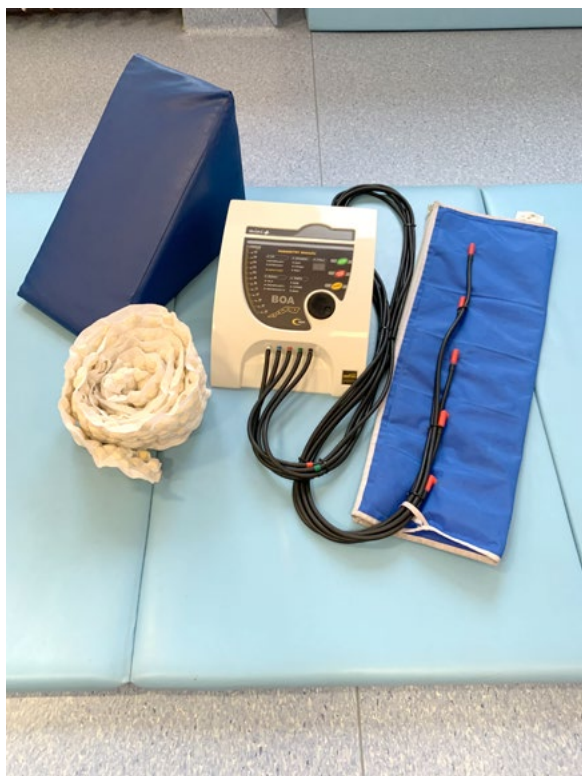


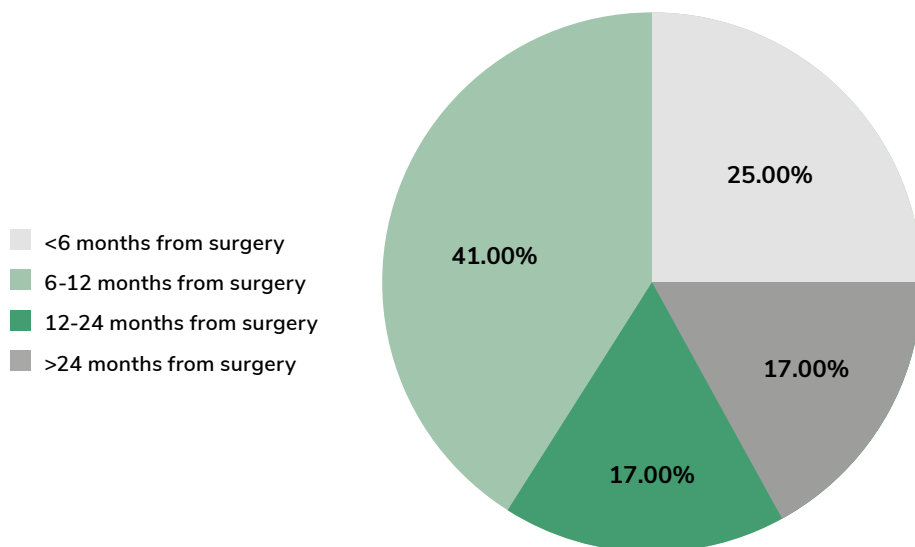
Figure 5. The BOA apparatus.



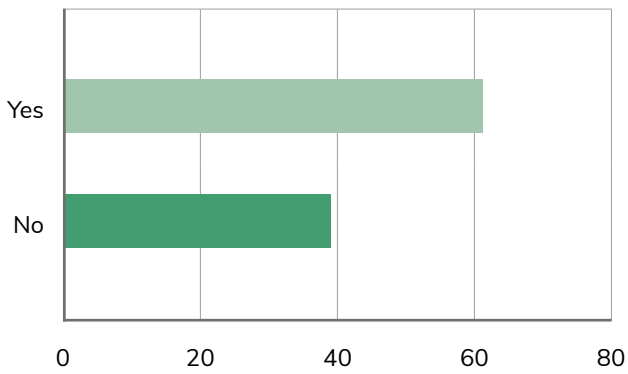
Figure 6. Banding instruments.

Figure 7. Summary of results: 7a. Beginning of rehabilitation; 7b. Presence of pain; 7c Formation of lymphedema; 7d. Difficulty in performing activities of daily living; 7e. Discontinuation of performing activities of daily living; 7f. Resignation from hobbies; 7g. Ability to perform professional work.

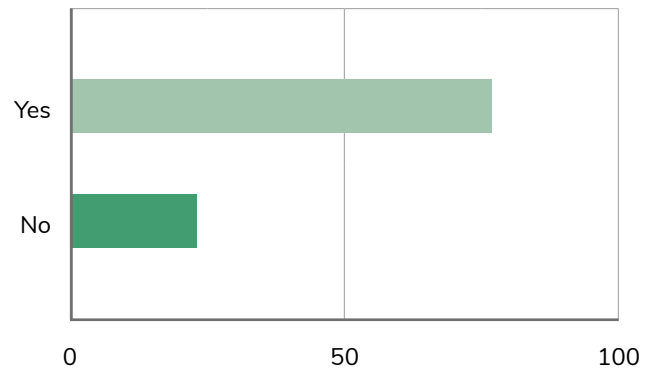
7a. Beginning of rehabilitation



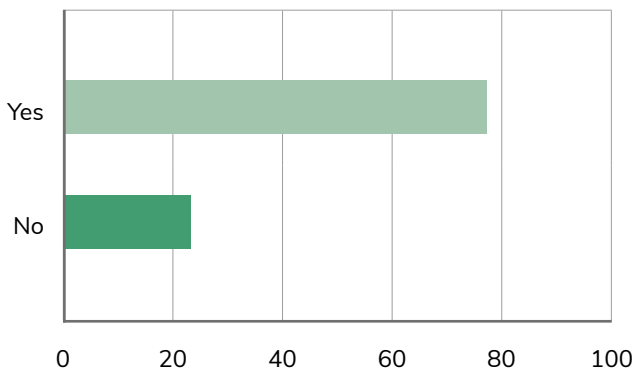
7b. Presence of pain



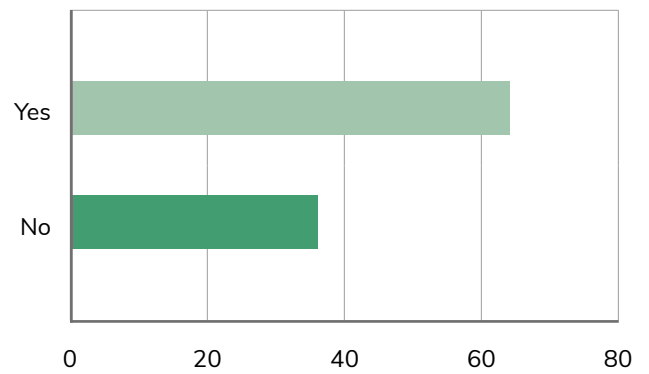
7c. Formation of lymphedema



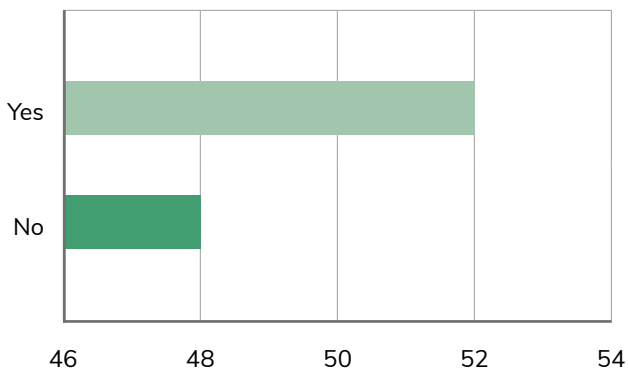
7d. Difficulty on ADLs



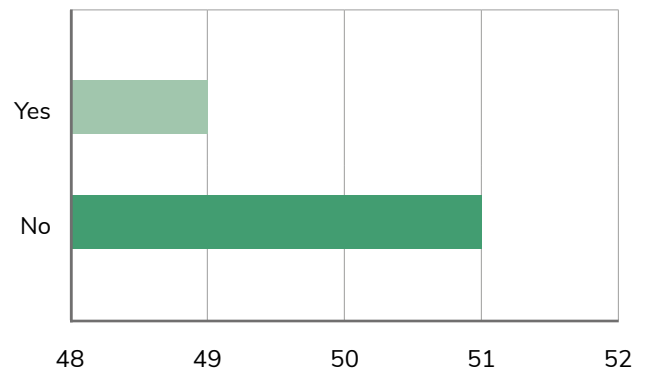
7e. Discontinuation of ADLs



7f. Resignation from hobbies



7g. Ability to work



An increase in quality of life, as reported by the patients, was observed after the therapy. The participants assessed their well-being using a scale of 1 to 5, where 1 was the worst imaginable well-being

and 5 was the best imaginable well-being. This change was statistically significant ($p < 0.05$). Data were presented in **Table 1**.

Table 1. Assessment of quality of life before and after therapy.

	Before [mean ± SD]	After [mean ± SD]	Difference (after - before) [Mean ± SD]	p-value
Quality of life	3.14 ± 0.83	4.52 ± 0.60	1.38 ± 0.83	<0.001*

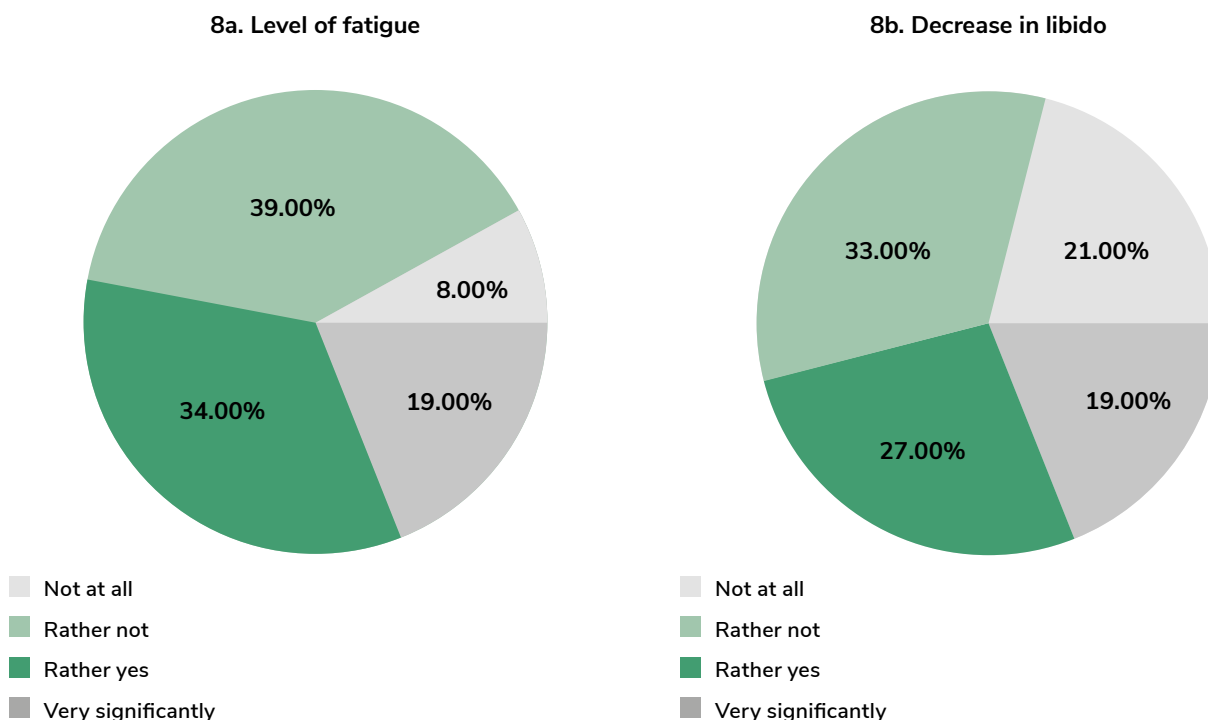
Abbreviations: SD, standard deviation.

Notes: * - p-value for Student's t-test for paired samples (two-sided significance).

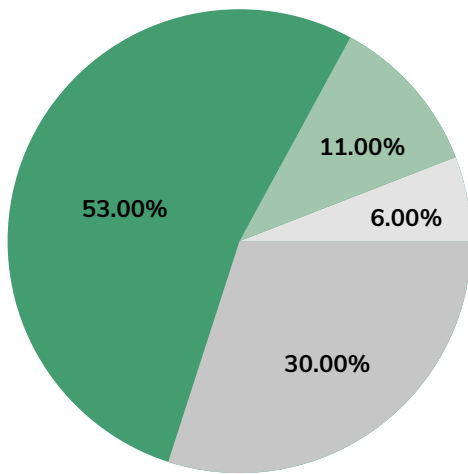
Women after mastectomy frequently complained about accompanying fatigue (**Figure 8a**). A decrease in sexual drive was observed in 46% of the women (**Figure 8b**). Feelings of being stuck in a dark psychological hole accompanied 70% of

mastectomy patients (**Figure 8c**). Of the 100 women interviewed, 41% admitted having a reduced interest in their physical appearance after mastectomy (**Figure 8d**).

Figure 8. Summary of results: 8a. Level of fatigue; 8b. Decrease in libido; 8c. Mental decline; 8d. Physical appearance.

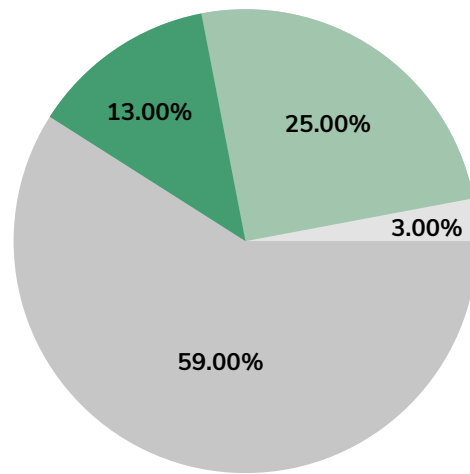


8c. Mental decline



- All the time
- Very often
- From time to time
- Not at all

8d. Physical appearance



- Completely
- I don't care as much as I should
- Not the way I used to
- I care like I always have

When measuring the shoulder angular range of motion, the greatest restrictions were observed during internal rotation (96%), abduction (92%), and flexion (89%). An increase in shoulder range of motion was observed after 5 weeks of therapy. These changes were statistically significant ($p < 0.05$). Data were presented in **Table 2**.

Significant changes in circumference reduction were found in the upper limb on the operated side after therapy ($p < 0.05$). Data were demonstrated in **Table 3**.

Table 2. Ranges of movement in the shoulder joint before and after therapy.

	Before [mean ± SD]	After [mean ± SD]	Difference (after - before) [Mean ± SD]	p-value
Flexion [°]	141.15 ± 21.65	157.53 ± 14.65	16.39 ± 13.72	<0.001*
Abduction [°]	137.63 ± 27.70	155.68 ± 20.87	18.05 ± 17.27	<0.001*
Internal rotation [°]	36.39 ± 13.22	48.27 ± 12.84	11.88 ± 10.37	<0.001*
External rotation [°]	47.32 ± 9.43	56.44 ± 6.40	9.12 ± 7.34	<0.001*

Abbreviations: SD, standard deviation.

Notes: * – p-value for Student's t-test for paired samples (two-sided significance).

Table 3. Upper limb circumferences before and after therapy.

	Before [mean ± SD]	After [mean ± SD]	Difference (after - before) [Mean ± SD]	p-value
Measurement 1 [cm]	31.80 ± 4.31	31.17 ± 4.06	-0.64 ± 0.65	<0.001*
Measurement 2 [cm]	26.05 ± 3.64	25.60 ± 3.49	-0.45 ± 0.69	<0.001*
Measurement 3 [cm]	17.37 ± 1.72	17.11 ± 1.56	-0.26 ± 0.40	<0.001*
Measurement 4 [cm]	19.94 ± 1.25	19.58 ± 1.12	-0.37 ± 0.47	<0.001*

Abbreviations: SD, standard deviation.

Notes: * - p-value for Student's t-test for paired samples (two-sided significance).

Legend: measurement 1 - 10cm above the ulnar process of the ulnar bone; measurement 2 - 10cm below the ulnar process of the ulnar bone; measurement 3 - at the height of the stylo mastoid processes; measurement 4 - at the height of the heads of the metacarpal bones.

Discussion

The aim of this study was to analyze the impact of physiotherapy on the improvement of quality of life in women after mastectomy. In addition to assessing the physical and functional performance of patients undergoing surgical breast amputation, the study paid great attention to the evaluation of the emotional aspects. Measurements were taken before and after the patients entered the rehabilitation program. Analysis of results for shoulder range of motion and upper limb circumferences on the operated side showed statistically significant changes. As a result of the 5-week rehabilitation, during which patients underwent treatments such as manual lymphatic drainage, scar mobilization, whirlpool massage, pneumatic massage, and bandaging, a significant reduction was observed in upper limb circumference values on the operated side at each tested level, indicating a reduction in lymphedema in the limb. Furthermore, there was a significant improvement in the shoulder range of motion on the operated side. The greatest changes were observed during flexion, abduction, and internal and external rotation movements. Styczynska et al. [11], focused on a group of women who participated in an ex-

ercise rehabilitation program for six weeks after mastectomy. Just like in the present study, statistically significant changes were observed in circumference and mobility in all joints of the upper limb on the operated side.

The results obtained in the current study showed that up to 61% of the surveyed women reported shoulder pain as a consequence of the performed surgical procedure. In order to reduce the pain, Kinesio Taping is being increasingly applied in the treatment of women after mastectomy. In the study conducted by Tantawa et al. [12], participants were divided into 2 groups - control and experimental. Both groups received a routine rehabilitation program consisting of exercises designed to increase shoulder range of motion, stretching exercises, and strengthening exercises. In the experimental group, Kinesio Taping was additionally applied on the shoulder girdle. In the control group, only an improvement in shoulder flexion movement was statistically significant, while in the experimental group, in addition to an improvement in shoulder flexion, abduction, and external rotation movement, an improvement in pain intensity scores was also observed.

The outcomes of the current study showed that 77% of the surveyed women developed secondary lymphedema as a result of the surgery and follow-up treatment for breast cancer. A high percentage of women who struggle with this type of complications indicate the validity of comprehensive antiedema therapy when helping women after mastectomy. Atalay et al. [5], evaluated the influence of comprehensive antiedema therapy, in patients with lymphedema, on the circumference and range of motion in the upper limb on the operated side. A statistically significant difference in the measurement of the circumference of the upper limb affected by lymphedema and in all shoulder ranges of motion of the operated side were observed after the therapy. Furthermore, in a study conducted by Motow-Czyz et al. [13], in a group of women with secondary lymphedema as a result of breast cancer treatment, the outcomes obtained suggested that lymphatic drainage has a statistically significant impact on reducing upper limb circumference on the operated side.

In a study conducted by Gradalski et al. [8], in a group of people with lymphedema, attention was paid to the psychosocial aspect associated with the presence of lymphedema. The participants most often reported problems such as increased limb size, subjective deterioration in limb appearance, and difficulty performing daily activities. Women who participated in the present study, most often experienced poor mental health, fatigue, lack of energy, and difficulty performing daily activities. The participants highlighted the associated negative emotions. These restrictions negatively impact the quality of life of patients undergoing breast cancer treatment. Only 14% of the respondents rated their quality of life before entering the rehabilitation program and after surgery as very good. Analysis of the results of the present study demonstrated a statistically significant improvement in the quality of life as assessed by the patients after therapy. Atalay et al. [5], observed a statistically significant positive correlation between a decrease in lymphedema in the upper limb and a decrease in patients' severity

of depression. Research conducted by Puszczalska-Lizis et al. [7], demonstrated a statistically significant relationship between women taking up physical activity after mastectomy and the overall perception of quality of life and the overall perception of health. Physically active women perceived their overall quality of life as better and rated their health status higher compared to women after mastectomy.

Analysis of the results of the current study revealed that a decrease in sexual drive affects 46% of the examined women, 19% of whom described it to an extreme extent. Tarkowska et al. [14], found that women after mastectomy show lower self-esteem and poorer sexual functioning, as indicated by results obtained from the desire domain. The findings presented in this study demonstrated that the physiotherapeutic management of women after mastectomy positively affects not only the functional performance of the treated area but also has a beneficial effect on their mental and emotional spheres. Any constraints involving the aforementioned areas of functioning contribute to the deterioration of quality of life of women after mastectomy. For this reason, in order to prevent a decline in the quality of life of patients treated for breast cancer, it is essential to implement physiotherapy management into the treatment process as soon as possible.

This current study has several limitations, including the lack of a control group and the failure to estimate the placebo effect. Participants were not subjected to extended follow-up. Despite the numerous limitations, the results obtained indicate the need for further research in this area. These findings encourage the search for new solutions to restore the fitness of women undergoing mastectomy as much as possible and enable them to continue to function well in family, social, and professional life while finding alternatives to the necessary limitations associated with the nature of the disease, such as breast cancer.

Conclusions

As a result of the treatment associated with breast cancer, both physical and mental health deterioration occurs in affected women. Functional dysfunctions manifest primarily as pain, limited mobility in the shoulder joint on the operated side, and the occurrence of secondary lymphedema in the upper limb on the operated side. Feelings of anxiety, tension, irritation, and worry are promi-

nent among the dominant emotions. Physiotherapeutic management improves both the range of motion in the shoulder joint on the operated side and helps to reduce secondary lymphedema. In conclusion, the results obtained in the presented study demonstrate that physiotherapy has a positive influence on the quality of life in women after mastectomy.

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