



## Research Article

# The Problem of Kinesiophobia and Physical Activity in Women after Mastectomy - Scale of the Problem and its Selected Determinants- A Cross Sectional Study

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### Abstract

The quality of life of women after mastectomy deteriorates in many areas. Many researchers believe that physical activity - PA is a key strategy to help alleviate the negative psychosocial and physical side effects of breast cancer and its treatment, reduce the risk of comorbidities and secondary malignancies, and improve overall quality of life. However, many women do not meet the criteria for a level of PA with health benefits. The barrier is the fear of taking up activity - kinesiophobia. This problem has been poorly understood so far, therefore it was the aim of the presented research to get to know its scale and conditions. A serious scale of the occurrence of kinesiophobia was found, affecting over 46% of the respondents. The level of perceived pain, low PA and the level of psychological well-being were predictors of the severity of kinesiophobia. The determinants of kinesiophobia are very complex, which requires further research. The rationale is the positive association of PA with the survival prognosis as well as the physical and mental well-being of women after mastectomy.

**Keywords:** Kinesiophobia; Breast cancer; Physical activity; Quality of life; TSK

### Introduction

Breast cancer - BC is the most common cancer of women in the world, occurring in all countries [1,2]. In 2020, 2.3 million women were diagnosed with it [3]. In Europe, about 500,000 cases are diagnosed annually, and in the European Union it accounts for 29.2% of all cancers in women [4,5]. In Poland, almost 19,000 new cases of BC in women were recorded in 2018 and was the second cause of mortality after lung cancer, and the number of deaths due to this cause was 6.9 thousand [6]. The prognosis of BC survival is individual. They depend, among other things, on the type of cancer, its stage and spread, the specificity of cancer cells, susceptibility to treatment, age, lifestyle and general health. The course of the disease and the therapies used - most often of a combined nature: mastectomy, chemotherapy, radiation, hormone

therapies - have various consequences that affect the quality of life of patients [7-11]. Pain, lymphedema, chronic fatigue, anxiety, sexual function - especially in young patients and future prospects - are factors that negatively affect the physical and mental well-being of women suffering from breast cancer [12-15]. A number of reports from various research centers around the world confirm the beneficial effect of Physical Activity (PA) on the survival of BC [16-19]. According to some researchers, it is the most important and well-established lifestyle factor positively influencing survival [20,21]. There is ample evidence of the beneficial effects of PA in alleviating BC symptoms and treatment outcomes such as lymphedema, fatigue, anxiety and depression. The beneficial effect of PA on the immune system is emphasized [22]. The developed activation programs improve self-esteem, muscle strength, flexibility, bone density and cardio-respiratory efficiency [22-27]. However, a number of researchers report that in practice few women meet the guidelines developed in many centers [28-31]. This leads to a hypothesis that kinesiophobia may

be the cause of this motor passivity. It was decided to investigate the intensity of this problem and the potential impact of selected sociodemographic variables on its occurrence.

## Material and Methods

### Participants

The study included 249 women aged 33-75 years. The selection for the study was deliberate - they were women diagnosed with BC and underwent mastectomy during the treatment. 3 months were arbitrarily assumed as the minimum time from surgery. The respondents were recruited among the members of the associations of women after mastectomy - "Amazons" (89 people) and among the participants of sanatoriums for women who underwent this surgery (160 people). Participation in the study was completely voluntary, and its participants were informed about the purpose of the study and the complete anonymity of its participants.

### Measurements and Procedures

The research tool was an anonymous questionnaire consisting of a metric part - where the sociodemographic data of the respondents were collected, closed questions about the self-assessment of physical activity of the respondents and an adapted Polish version of the Tampa Scale for Kinesiophobia - TSK [32].

The metric part takes into account age, height and weight - based on which the BMI was calculated. Participants were asked to provide the time since the last mastectomy. The subjects also marked the level of pain they felt at present: on a scale from 1 (no pain) to 10 (maximum, difficult to bear pain). The respondents were also asked about the place where they felt pain in particular. The range was: neck, upper torso, lower torso, arms, legs. The respondents could indicate several places of experiencing pain ailments.

Data were also collected on: education (vocational, secondary, higher), the way of running a household (alone, with a spouse only, with family), work (no / yes) and other chronic diseases. Due to the wide variety of diseases, they are grouped into: cardiovascular diseases, respiratory system diseases, locomotor system diseases, metabolic diseases, neurological diseases and other diseases, not mentioned before. The sum of the chronic diseases was taken into account for the statistical analyzes. The respondents were also asked whether the mastectomy operation was sparing (no / yes), whether they had used rehabilitation before (no / yes) and whether they had used the support of a psychologist (no / yes).

Taking into account the criteria of the subjects' selection, age and morbidity, some questions from the Baecke physical activity questionnaire were used to estimate the level of PA [33]. The estimation of PA included: self-esteem of activity (I), its intensity (II), passivity (III) and walking - frequency (IV) and time (V).

These questions were closed and the answers to them were assigned ranks (points).

I. I believe that my activity - compared to other people my age is:

1) much smaller; 2) smaller; 3) the same; 4) greater; 5) much greater

II. In my spare time, I do activities, exercise, and sports:

1) never; 2) rarely; 3) sometimes; 4) often; 5) very often

III. In my spare time I spend my time sitting or lying:

1) very often; 2) often; 3) sometimes; 4) rarely; 5) never

IV. In my spare time I walk:

1) never; 2) rarely; 3) sometimes; 4) often; 5) very often

V. How many minutes a day do you walk (away from home - e.g. shopping, other activities):

1) less than 5; 2) 5-15 minutes; 3) 15-30 minutes; 4) 30-45 minutes; 5) more than 45 minutes

The scores for the answers and the Physical Activity Index (PAI) calculated on the basis of them - being the average of these five questions, ranged from 1 to 5 [34].

TSK used in this study concerns the attitude towards physical effort (activity) and psychological reactions to the effort undertaken [35]. In the presented study, the sum of points assigned to individual statements was used - the higher the sum of TSK points, the higher the level of kinesiophobia. The commonly accepted criterion was adopted as the high level of kinesiophobia: TSK > 37 points [36].

The respondents were also asked to assess their current physical and mental well-being. A five-point scale was adopted here, where 1 - means malaise, 2 - rather bad; 3 - average; 4 - good; 5 - very good.

### Statistical analysis

The internal consistency of TSK was tested by calculating the Cronbach's alpha coefficient. Descriptive statistics of the parameters tested were performed. Non-parametric tests were used for comparisons. Quantitative variables were compared using the Mann-Whitney U test, qualitative variables using the chi<sup>2</sup> test. Linear regression was used to investigate TSK predictors (quantitative and qualitative variables). The relationships between the variables were calculated using Pearson's correlation coefficients. Level of significance adopted:  $p < 0.05$ .

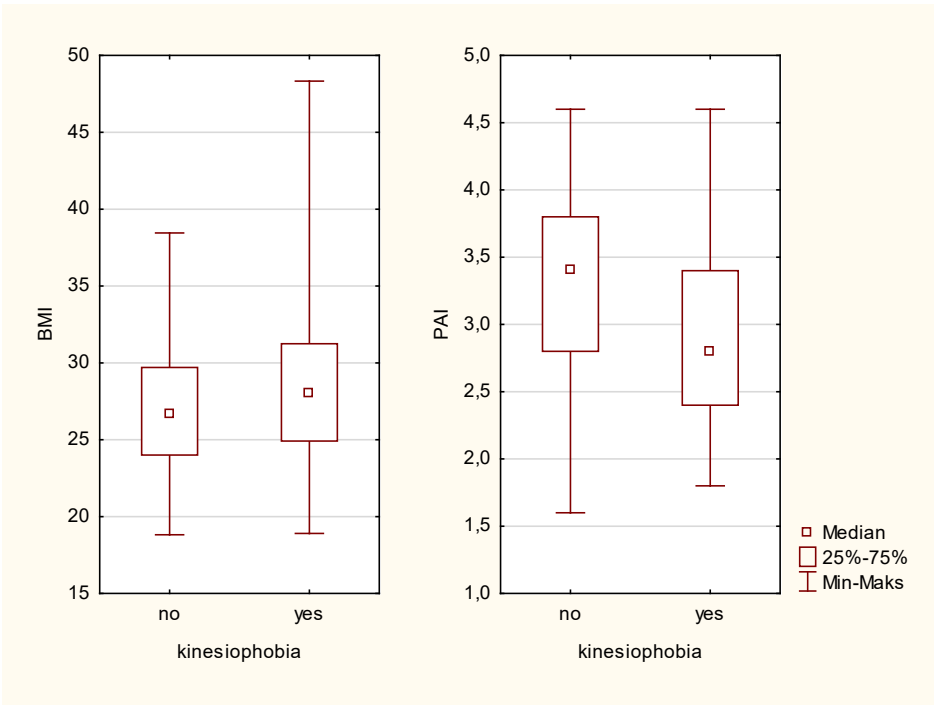
### Results

The preliminary analysis of internal consistency of the TSK scale used showed a satisfactory level - Cronbach's alpha coefficient was 0.76. The half-time reliability was also satisfactory - 0.71. The analysis of TSK descriptive statistics shows that the mean is close to the adopted cut-off point, which is confirmed by the data on the qualitative assessment of kinesiophobia. Below the adopted criterion (TSK-37 points) there were 129 respondents (52.87%), above - 115 people (46.18%). Descriptive statistics of quantitative variables and a comparison of people with and without kinesiophobia showed in Table 1.

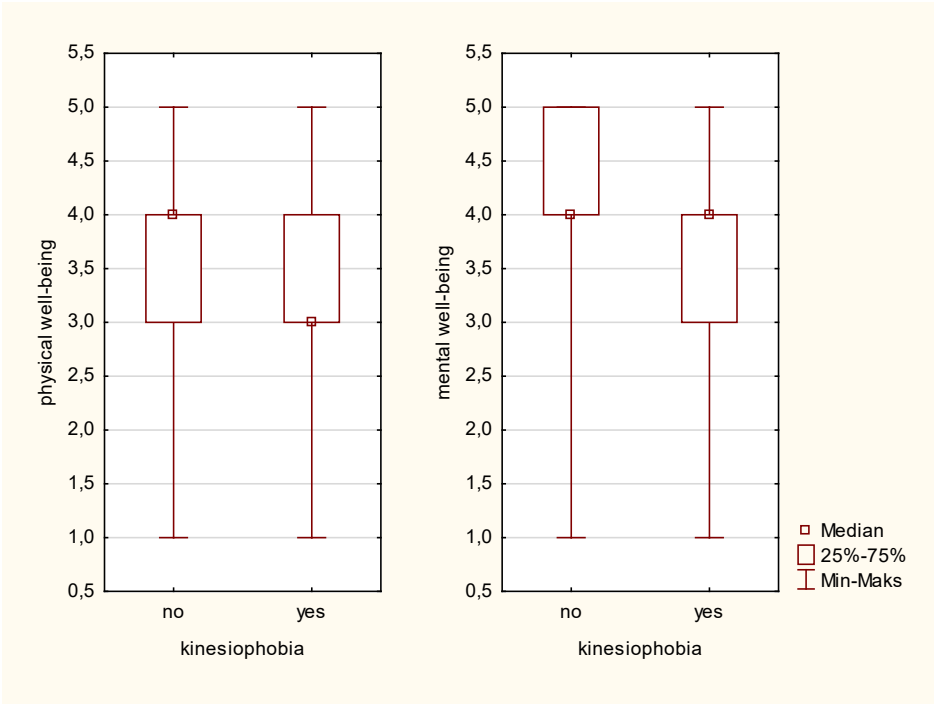
Variable	Total			Group 1: TSK<37	Group2: TSK>37	1-2: p
	mean (SD)	±95%CI	min-max	median	median	
age	56.13 (8,86)	55.02–57.23	33–75	56.00	56.00	ns
BMI	27.52 (4.57)	26.94–28.09	18.82–48.33	26.67	28.01	<0.05
period from surgery [months]	68.53 (69.64)	59.53–77.53	3–312	39.50	40.00	ns
sum of other chronic diseases	1.15 (1.08)	1.01–1.28	0–4	1.00	1.00	ns
pain	4.26 (2.07)	4.00–4.52	1–10	4.00	4.00	ns
TSK	35.66 (7.57)	34.71–36.62	17–57	31.00	41.00	<0.0001
PAI	3.12 (0.66)	3.04–3.21	1.60–4.60	3.40	2.80	<0.001
physical well-being	3.65 (0.85)	3.54–3.76	1–5	4.00	3.00	<0.0001
mental well-being	3.81 (0.98)	3.69–3.94	1–5	4.00	4.00	<0.0001
ns: not statistically significant						

**Table 1:** Descriptive statistics of quantitative variables and a comparison of people with and without kinesiophobia.

Comparisons of the group of women without kinesiophobia with the group of women who, according to the adopted criterion, were characterized by kinesiophobia showed differences in BMI, physical activity - PAI (Figure 1), physical well-being and mental well-being (Figure 2). Qualitative analysis of BMI according to WHO criteria showed that only 32.93% had this index within the normal range. 39.84% had pre-obesity, 21.54% obesity class I, 4.88% obesity class II, 0.88% obesity class III.



**Figure 1:** Comparison of BMI and PAI of women without kinesiophobia with women with kinesiophobia.



**Figure 2:** Comparison of physical well-being and mental well-being of women without kinesiophobia with women with kinesiophobia.

Among the respondents, one third- $n=81$  (32.53%) did not report any other chronic disease, the remaining 168 women (67.47%) had at least one other disease. These were: cardiovascular diseases ( $n=71$ ; 28.51%), respiratory system ( $n=22$ ; 8.84%), locomotor system ( $n=78$ ; 31.33%), metabolic diseases ( $n=28$ ; 11.24%), neurological diseases ( $n=18$ ; 7.23%) and other diseases ( $n=78$ ; 26.91%).

Analysis of the location of pain showed that 22.49% of respondents experienced neck pain; the upper torso 28.11%, the lower torso 30.92%, the upper limbs 44.18%, and the lower limbs 35.34% of the total number of respondents.

The correlation of pain with self-esteem of health was also investigated. It turned out that the correlation coefficients were low. For physical well-being:  $r=-0.240$  ( $p<0.001$ ), for mental well-being:  $r=-0.145$  ( $p=0.025$ ). On the other hand, PAI correlated with physical well-being:  $r=0.366$  ( $p<0.001$ ), while no correlation with mental well-being was found:  $r=0.105$ .

The comparison of the studied sociodemographic variables according to the criterion of the presence of kinesiophobia (TSK  $\geq 37$  points) showed no differences in any case (Table 2).

Variable		Total		TSK: n		chi <sup>2</sup>	p
		n	%	<37	$\geq 37$		
education	professional	32	12.85	14	18	0.85	ns
	medium	112	44.98	58	54		
	higher	105	42.17	57	48		
household	alone	54	21.69	28	26	1.32	ns
	only with your spouse	76	30.52	43	33		
	with family	119	47.79	58	61		
work	no	119	47.79	63	56	0.18	ns
	yes	130	52.21	66	64		
sparing treatment	no	133	53.41	75	58	3.05	ns
	yes	116	46.59	54	62		
chronic diseases	no	81	32.53	43	38	0.03	ns
	yes	168	67.47	86	82		
rehabilitation	no	47	18.88	26	21	0.14	ns
	yes	202	81.12	103	99		
psychological support	no	140	56.22	75	65	0.44	ns
	yes	109	43.78	54	55		

ns: not statistically significant

**Table 2:** Kinesiophobia and sociodemographic variables.

All investigated qualitative and quantitative variables were included in the identification of TSK severity predictors (dependent variable). The original linear regression model turned out to be statistically significant ( $R^2=0.23$ ;  $p<0.0001$ ). The performed stepwise backward linear regression showed that the predictors of TSK were pain:  $\beta=0.21$ ;  $p=0.0006$ ; PAI:  $\beta=-0.25$ ;  $p<0.0001$  and mental well-being -  $\beta=-0.29$ ;  $p<0.0001$ .

## Discussion

Originally the term “kinesiophobia” was used to describe the fear of movement caused by lower back pain. Pain ailments occur in many diseases, often constituting a barrier to the desired level of PA for health. Hence, the kinesiophobia research tool, TSK, began to be applied to other conditions. The presented results clearly show the importance of the problem of kinesiophobia in women after mastectomy - in the study group, the problem concerned almost half of the respondents, and the median TSK of all respondents was close to the adopted cut-off point.

In univariate analyzes comparing TSK  $<37$  points and TSK  $\geq 37$  groups, no differences were found in age, time since surgery, number of other chronic diseases and pain. A similar lack of relationships between kinesiophobia and age, disease duration and the number of chronic diseases has already been reported in patients with coronary artery disease [34]. In turn, among people suffering from neurological diseases, age was a predictor of kinesiophobia, which was most likely due to the progressive nature of these diseases.

However, no relationship with disease duration and pain was found [37]. The influence of age on kinesiophobia is not entirely clear. As you age, your activity naturally decreases and the barriers to physical activity increase. This process leads to the hypothesis that women without kinesiophobia should be younger. This assumption was confirmed here. Apart from the similar age in both groups, other factors probably contributed to this lack of differences. Above all, similar - other than breast cancer, morbidity. The location of the pain felt could be a second factor. Various areas where women experienced pain and the lack of differences in its intensity in the compared groups do not allow to conclude unequivocally that its direct cause was only mastectomy. This suggestion should be combined with the lack of differences between the compared groups with regard to the period after the surgery.

The reported differences in BMI seem to confirm the relationship between excess body weight and the severity of kinesiophobia and lower PA. This observation seems important. Among all respondents, only one third had a normative BMI. Obesity is a known risk factor for the incidence of BC [38]. There is often a multifactorial weight gain after diagnosis [1]. Obesity also increases the risk of recurrence [39]. This emphasizes the importance of recognizing and reducing PA barriers, promoting it and implementing activation programs among women after BC - including diet control [40]. On the other hand, the observed differences between groups regarding PAI are natural, confirming the effect of kinesiophobia on PA and the relationship with weight control. It should be noted, however, that the PA level estimated here in the total of respondents was rather moderate. On the one hand, it can be explained according to the continuation theory. According to this theory, human behavior is relatively constant, and continuing it for many years is an adaptive strategy [41]. This also applies to the problem of motor passivity [42]. On the other hand, the observations of Cho, et al., a significant percentage of women limiting their PA after diagnosis of BC [43]. This motor passivity continues, and most women are not active at levels that bring health benefits [28,29,44].

The quality of life of patients after surgery most often deteriorates in many areas [45-47], which is confirmed by the results presented here. The comparison of groups 1 and 2 showed differences in physical and mental well-being. These differences may be explained by treating the problem of kinesiophobia in biopsychosocial categories. They take into account the complexity of human views, behaviors and their determinants [48,49]. According to this model, kinesiophobia is defined as a relatively constant personality disposition expressed as a fear of physical and / or mental discomfort [50]. This relative stability may explain to some extent the lack of differences in comparisons due to the socio-demographic variables analyzed in this study. In this comparison - in the context of kinesiophobia, the lack of differences in two cases seems particularly worrying: between women who underwent rehabilitation - with women who did not undergo it, and women who did not have psychological support - with women who received such support. Presumably, in the case of rehabilitation, the focus was primarily on emergency relief and

rehabilitation of patients, and the recommendations for maintaining PA after its completion were often not effective enough. The same applies to psychological help, as long as the problem of activity and overcoming its barriers was raised at all.

Among women suffering from BC, there are a number of determinants that affect individual views and decisions about behavior regarding PA. These are attitudes towards being active before falling ill, social roles, symptoms and treatment related symptoms, level of social support, perceived stress, level of self-acceptance, occurrence of affective disorders in the form of anxiety and depression, and a number of others. The problem of kinesiophobia has a broad context and will require a lot of research. This explains that in the study presented here, regression explained only 23% of variability of the variance. Determinants: pain, motor passivity and mental disposition turned out to be statistically significant.

According to many authors, PA is considered a key strategy helping to alleviate the negative psychosocial and physical side effects of cancer and its treatment, reduce the risk of comorbidities and secondary malignancies, and improve the overall quality of life [51-54]. These views emphasize the importance of kinesiophobia and the need to study it [55,56].

## Conclusions

Comprehensive care for women after mastectomy should also include physical activity and the problem of its barriers, as well as education in this area as part of physioprophyllaxis.

## Conflict of Interest

The authors declare that the research was not a potential conflict of interest.

## Author Contributions

AK: conceptualization, data curation, formal analysis, methodology, resources, and writing—original draft. All authors contributed to the article and approved the submitted version.

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## Data Availability Statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## Ethics Statement

The studies involving human participants were reviewed and approved by the Bioethics Committee of the Medical University of Silesia in Katowice.



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