Sexual quality of life and body image of breast cancer patients: uncovering the meaning behind the symptoms

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Abstract: Introduction: Breast cancer symptoms and the side effects of treatment can significantly affect different domains of women's functioning. Objective: The aim of this study was to examine the quality of life in women with breast cancer. Method: Our sample consisted of 240 women aged 30-68 (M=52, SD=8.68). Approximately 50% had undergone a mastectomy, while 40% had breast reconstruction. A structured questionnaire consisted of social-demographical data, SQOL-F, EORTC QLQ-C30 & EORTC QLQ-BR23. Results: Results suggest that our BC patients had lower quality of life and more financial difficulties than in most other studies, implying some cultural or health system differences. Not having a mastectomy was associated with better sexual quality of life, global health, and physical functioning. In contrast, women who underwent mastectomy reported impaired body image and sexual functioning, with more prominent breast symptoms. Reconstruction was related to the lower quality of life and no improvement in body image. Conclusions: Sexual quality of life was mainly related to global health status, emotional functioning, treatment side effects and body image. Emotional functioning and side effects were significant predictors of sexual quality of life, while impaired sexual functioning was associated with distorted body image. These findings can serve as guidance for forming interventions aimed at enhancing the quality of life.

Keywords: Breast cancer, sexual quality of life, body image

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ᴱˢᴾ Calidad de vida sexual e imagen corporal de pacientes con cáncer de mama: descubriendo el significado detrás de los síntomas

ᴱˢᴾ **Resumen:** Introducción: Los síntomas del cáncer de mama y los efectos secundarios del tratamiento pueden afectar significativamente a diferentes áreas funcionales de las mujeres. Objetivo: examinar la calidad de vida de mujeres con cáncer de mama. Método: la muestra estuvo compuesta por 240 mujeres de entre 30 y 68 años (M=52; DT=8,68). Aproximadamente el 50% se había sometido a una mastectomía, mientras que al 40% se le había realizado una reconstrucción mamaria. Un cuestionario estructurado constaba de datos sociodemográficos, SQOL-F, EORTC QLQ-C30 y EORTC QLQ-BR23. Resultados: Los resultados sugieren que nuestros pacientes con BC tenían una menor calidad de vida y más dificultades financieras que en la mayoría de los otros estudios, lo que implica algunas diferencias culturales o del sistema de salud. No someterse a una mastectomía se asoció con una mejor calidad de vida sexual, salud global y funcionamiento físico. Por el contrario, las mujeres que se sometieron a mastectomía informaron problemas de imagen corporal y funcionamiento sexual, con síntomas mamarios más prominentes. La reconstrucción se relacionó con una menor calidad de vida y ninguna mejora en la imagen corporal. Conclusiones: La calidad de vida sexual se relacionó principalmente con el estado de salud global, el funcionamiento emocional, los efectos secundarios del tratamiento y la imagen corporal. El funcionamiento emocional y los efectos secundarios fueron predictores importantes de la calidad de vida sexual, mientras que el funcionamiento sexual deteriorado se asoció con una imagen corporal distorsionada. Estos hallazgos pueden servir como guía para formular intervenciones destinadas a mejorar la calidad de vida.
Palabras Clave: Cáncer de mama, calidad de vida sexual, imagen corporal

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1. Introduction

Breast cancer (BC) is one of the most common cancer types and mortality causes in women worldwide accounting for 25% of all cancer cases among females and it is fifth leading cause of cancer mortality[1]. However, data indicate a downward trend of BC death rate, with an average of 1.3% less mortality per year since 2011[2]. According to the American Cancer Society, the 5-year relative survival rate is around 90%[3]. In contrast, the risk for late BC recurrence, which could be predicted with tumor diameter and nodal status, is rising from 8.5% at 15 years up to 16.6% at 32 years mark[4]. In the European Union, BC occupies 13% of all cancer diagnoses, and 7.3% of lethal outcomes. Croatia's rate is even higher at 25%, as it is the third most common newly diagnosed cancer. Projections estimate that the number of women diagnosed with breast cancer will increase by over 40% in the next 20 years[5].

More than 90% of BC's stem from breast epithelial elements which can be invasive or non-invasive[4]. Although some invasive breast cancers can have good outcomes, others, such as metaplastic, are associated with more aggressive symptoms. Surgery used to be the first step in treatment for smaller tumors without lymph node involvement. Depending on the type and the stage of breast cancer, age and overall health, treatment also includes neoadjuvant therapy, such

as chemotherapy (which doubles as postoperative treatment), radiation therapy, and hormone therapy[6], and the risk of relapse is most substantial in the first ten years after treatment[3].

Lukasiewicz et al.[7] summed two broader risk factor categories: modifiable and nonmodifiable. Gender is considered as the most significant nonmodifiable risk factor due to sensitivity of breast cells to disruptions in the levels of hormones such as estrogen and progesterone. Contrary to intuitive beliefs, BC is hereditary in only 5-10% of cases, and it is mostly attributed to BRCA-1 and BRCA-2 gene mutation[8]. While patients with BC are often above the age of 50[9], the role of race and ethnicity is still very ambiguous. The risk of breast cancer (BC) is lowered by factors such as number of pregnancies, pre-eclamptic pregnancy, and extended breastfeeding period. Conversely, exposure to radiation therapy at an early age, infection with an oncogenic virus, and oral contraception increase the risk[10]. Apart from genetic factors, there are various modifiable factors that can contribute to development of breast cancer, recovery rate and likelihood of disease recurrence and mortality[11,12]. For example, the lower incidence of breast cancer in Eastern Mediterranean countries[13] can indicate genetic factors, but also environmental, dietary and other lifestyle factors. Follow-up studies of BC survivors have proven the importance of regular exercise, and weight control, or even reduced cigarette and alcohol consumption[14,15]. Even dietary patterns can partially explain observed differences, as a healthy diet, such as soybean consumption and vitamin D intake, tend to lower the risk of premenopausal breast cancer[8].

The diagnosis of BC and the side effects of cancer treatment affect various aspects of the patient's life. They can lead to impaired physical functioning, i.e., pain, fatigue, difficulties sleeping and decreased physical activity. Besides aggravating daily activities, it can disrupt social functioning vital to our mental health and cause symptoms of depression or anxiety, even in the follow-up surveys[16,17]. An aspect of life that is particularly impaired in women with breast cancer is sexual health[18]. Nonetheless, sexuality and intimacy are often neglected by medical professionals[19] despite the evidence of sexual dysfunction[20] (reduced sexual desire and arousal, difficulty experiencing orgasm and pain during sexual intercourse) years after establishing the initial diagnosis[21] and its impact on overall quality of life. In patients with BC, sexual quality of life is often related to the side effects of the treatment. Chemotherapy, radiotherapy, and hormone therapy usually cause nausea, fatigue, hair loss, weight fluctuation, and skin changes. Numerous studies[22,23] confirm that women with BC have altered perceptions of their own bodies, dissatisfaction with physical appearance, and loss of self-confidence. This is particularly prominent in women who underwent a mastectomy as part of the treatment. Mastectomy can manifest as a subtraction of femininity and attractiveness, resulting in a lack of sexual desire[24]. Breast reconstruction is usually viewed as an important way of restoring sexual quality of life by improving self-esteem and body image. However, some authors[25] suggest that reconstruction does not necessarily lead to a more positive perception of one's own body. It can also be seen as another transformation, where the potential discrepancy between expectations and outcomes can lead to dissatisfaction[10]. At the same time, postoperative complications can entice the fear of further loss[26].

Although the number of newly diagnosed cases is rising and the topic of breast cancer is becoming increasingly important, there are still not enough studies that explore quality of life and sexual functioning regarding mastectomy and breast reconstruction, especially in Republic of Croatia. Therefore, the aim of this study is to analyze the relation between level of functioning in certain domains, severity of cancer symptoms and sexual quality of life in women with breast cancer. An additional objective is to examine the difference in the observed variables regarding mastectomy and breast reconstruction during treatment.

2. Methods and Materials

Participants and procedure

The study was conducted in-vivo on 252 women with an average age of 52 years (SD= 8.66; range 30-69). The exclusion criteria were a diagnosis of another type of cancer, an existing psychological disorder, or the presence of sexual dysfunction before the BC diagnosis. Twelve participants

were excluded from further analyses because they did not fully complete the questionnaires. The final sample consisted of 240 women, mostly in remission (75.7%). Half of them (50%) have undergone a mastectomy, of which 40% also had breast reconstruction. The participants started filling out the questionnaires after signing the informed consent. Participation was entirely voluntary, and the participants received no monetary compensation for the participation.

Measures

A battery of questionnaires included the Sexual Quality of Life-Female (SQOL-F) and European Organization for the Research and Treatment of Cancer Quality of Life Questionnaires (EORTC QLQ-C30 & EORTC QLQ-BR23*: https://qol.eortc.org/).* In addition, socio-demographic data such as age, level of education, marital and employment status, children (YES/NO), BC status (stage, metastases, heredity), BC therapy (surgery, pharmacotherapy, radiation), and received professional support (YES/NO and which type) was gathered

Sexual Quality of Life-Female (SQOL-F)

SQOL-F[11] was designed to assess the impact of sexual dysfunction on a woman's sexual quality of life. It comprises of 18 items rated on a Likert's 6-point scale (from 1- Completely Agree, to 6- Completely Disagree), where a higher score indicates a better sexual quality of life and shows good psychometric properties. The total score is calculated by summing up estimates on each item, with a higher score representing better sexual quality of life. The scale shows good reliability, with Cronbach's alpha in this study $\alpha=0.93$, compared to 0.77 or 0.95 from some previous studies [11,27].

EORTC QLQ-C30

EORTC QLQ-30 was designed to assess the quality of life of oncological patients with 30 items on five functional scales (physical, role, emotional, cognitive, and social functioning), nine symptom scales (fatigue, nausea/vomiting, pain, dyspnea, insomnia, appetite loss, constipation, diarrhea, financial difficulties), global health status and quality of life scale, and several single-item symptom measures. Participants assess the extent to which they agree with the items using a scale between 1 (Not at all) to 4 (Very much) or from 1 (Very poor) to 7 (Excellent). Total score transforms on a scale from 0 to 100. For the functional and global quality of life scales, higher scores mean better functioning, whereas higher scores on the symptom scales represent greater presence of cancer symptoms. Most studies yielded good internal consistency with Cronbach α over 0.70[28]. In current study it ranges from 0.76 to 0.87.

EORTC QLQ-BR23

EORTC QLQ-BR23 consists of 23 items that assess functional and symptomatic aspects of breast cancer. Functional scales incorporate future perspective, body image, sexual function, and sexual enjoyment, while symptom scales cover items regarding side effects of treatment, being upset by hair loss, breast, and arm symptoms. Individual raw scores for QLQ-BR23 are linearly transformed into scores ranging from 0 to 100. Higher values on the functional scales indicate a high level of functioning, while higher scores on the symptom scales imply a more significant presence of cancer symptoms. Reliability varies from 0.60 to 0.85[29], and from 0.63 to 0.94 in our sample.

3. Results

We analyzed the data using the IBM SPSS Statistics program (version 26). The Shapiro-Wilk normality test identified deviations from the normality of distribution which were somewhat expected considering that data was collected on a small clinical sample A descriptive analysis of the data is presented in Table 1, after which Mann-Whitney U test was carried out. Table 2 presents partial correlation coefficients that were the basis for the next step, the hierarchical regression analysis.

Descriptive statistics

The average age of the 240 participants was 52 years (SD=8.68), ranging from 30 to 69 years. Most of them completed high school (52.5%), were on sick leave due to breast cancer (35.9%), married (55%) with children (72.5%), and reported a negative family health history (82.5 %). Almost all women included in the study had surgery (95%), with 50% undergoing a mastectomy. 40% of the sample underwent breast reconstruction after mastectomy. During treatment, 77.5% of women received radiotherapy, 72.5% received chemotherapy, and 65% received hormonal therapy. At the time of the research, 88.9% of the participants declared that they did not have metastases, 75.7% were in remission, and 81.6% sought professional psychological or psychiatric help.

Table 1 shows descriptive data for the observed variables, i.e., SQOL-F, and subscales QLQ-C30 and QLQ-BR23. The highest level of functioning is noticeable in the physical and cognitive domain and when performing everyday activities regarding work or hobbies (role functioning). The lowest average values were established for the sexual and emotional domain. Fatigue and difficulties sleeping were the most pronounced symptoms reported by women in our sample.

Table 1. Descriptive data for all studied variables and summary of Mann-Whitney U test of mean difference for females with and without mastectomy (1) and females with or without breast reconstruction (2)

Measure		Breast cancer (N=240)	(1) Mastectomy		p*	(2) Reconstruction		p*
			Yes	No		Yes	No	
SQoL-F	Mean (SD)	56.86 23.14)	53.15 (25.32)	61.04 (19.7)	< .05	44.44 (24.85)	60.11 (23.67)	<.01
	Min/Max	10; 90	10; 90	31.1; 88.9		10; 81.1	13.33; 9	
EORTC QLQ-C30 scale								
PF	Mean (SD)	67.69 20.32)	62.33 (25.87)	69.67 18.39)	<.05	55.83 29.35)	66.67 (22.43)	<.05
	Min/Max	13.3; 100	0; 100	26.7; 93.3		0; 100	13.3; 100	
RF	Mean (SD)	67.1 (27.66)	65 (31.71)	65.83 26.71)	.945	56.25 (34.66)	70.83 (28.35)	<.05
	Min/Max	16.7; 100	0; 100	16.7; 100		0; 100	16.7; 100	
EF	Mean (SD)	50.43 21.39)	47.08 (25.14)	51.25 (19.5)	.091	39.58 (24.46)	52.08 (24.5)	<.05
	Min/Max	16.7; 100	0; 83.3	25; 100		0; 83.3	16.7; 83.3	
CF	Mean (SD)	63.25 (25.98)	60.83 (25.53)	63.33 (27.8)	.275	47.92 (25.87)	69.44 (21.49)	<.001
	Min/Max	0; 100	16.7; 100	0; 100		16.7;100	33.3; 100	
SF	Mean (SD)	61.11 (27.36)	57.5 (30.62)	63.33 (23.43)	.206	60.42 (34.66)	55.56 (27.7)	.553
	Min/Max	0; 100	0; 100	33.3; 100		0; 100	0; 100	
GHS	Mean (SD)	48.29 (20.21)	38.75 (20.55)	56.25 (16.5)	<.001	38.54 (23.42)	38.89 (18.56)	.555
	Min/Max	0; 83.3	0; 75	16.7; 83.3		0; 75	0; 66.7	
FAT	Mean (SD)	52.71 (20.44)	56.14 (20.32)	49.44 (20.11)	<.01	58.73 (23.83)	54.63 (17.9)	<.01
	Min/Max	11.1; 77.8	11.1; 77.8	22.2; 77.8		22.2; 77.8	11.1; 77.8	
N/V	Mean (SD)	13.25 (16.13)	13.16 (14.95)	13.33 (20.11)	.913	16.67 (18.03)	11.11 (12.51)	.529
	Min/Max	0; 50	0; 50	0; 50		0; 50	0; 33.3	
PA	Mean (SD)	43.16 (28.23)	46.49 (26.37)	40 (29.66)	<.05	45.24 (26.62)	47.22 (26.39)	.237
	Min/Max	0; 100	0; 83.3	0; 100		0; 66.7	0; 83.3	

Measure		Breast cancer (N=240)	(1) Mastectomy		p*	(2) Reconstruction		p*
DY	Mean (SD)	35.9 (32.44)	31.58 (33.43)	40 (31.04)	<.05	33.3 (31.23)	30.56 (34.83)	.568
	Min/Max	0; 100	0; 100	0; 100		0; 66.7	0; 100	
INS	Mean (SD)	51.28 31.96)	56.14 (30.82)	46.67 (32.45)	<.05	47.62 (35.42)	61.11 (26.83)	.051
	Min/Max	0; 100	0; 100	0; 100		0; 100	0; 100	
AL	Mean (SD)	22.22 (29.62)	28.07 (31.23)	16.67 (26.99)	<.01	33.3 (25.5)	25 (33.91)	<.05
	Min/Max	0; 100	0; 100	0; 66.7		0; 66.7	0; 100	
CON	Mean (SD)	17.09 (21.22)	12.28 (19.46)	21.67 (21.89)	<.01	14.29 (16.7)	11.1 (20.93)	<.01
	Min/Max	0; 66.7	0; 66.7	0; 66.7		0; 33.3	0; 66.7	
DIA	Mean (SD)	11.11 (19.04)	8.77 (14.74)	13.33 (22.2)	.198	19.1 (16.7)	2.78 (9.28)	<.001
	Min/Max	0; 66.7	0; 33.3	0; 66.7		0; 33.3	0; 33.3	
FD	Mean (SD)	52.99 (34.43)	50.88 (33.25)	55 (35.54)	.145	57.14 (34.76)	47.22 (32.02)	.363
	Min/Max	0; 100	0; 100	0; 100		0;1 00	0; 100	
EORTC QLQ- BR23 scale								
BI	Mean (SD)	55 (30.21)	44.17 (25.81)	65.83 (30.51)	<.001	50 (24.55)	40.28 (26.05)	.065
	Min/Max	0; 100	0; 91.7	0;100		8.3; 91.7	0; 83.3	
SEXF	Mean (SD)	14.58 (17.19)	8.33 (13.49)	20.83 (18.24)	<.001	10.42 (14.43)	6.94 (12.74)	.151
	Min/Max	0; 66.7	0; 33.3	0; 66.7		0; 33.3	0; 33.3	
SEXE	Mean (SD)	37.78 (27)	33.33 (21.44)	40 (29.3)	.398	50 (17.41)	22.22 (16.17)	<.01
	Min/Max	0; 100	0; 66.7	0; 100		33.3; 66.7	0; 33.3	
FP	Mean (SD)	35.56 (28.62)	46.67 (27.12)	30 (27.92)	.944	41.67 (27.93)	27.78 (33.1)	<.01
	Min/Max	0; 66.67	0; 66.7	0; 66.7		0; 66.7	0; 100	
STSE	Mean (SD)	32.86 (15.16)	34.05 (14.99)	31.67 (15.29)	.113	33.33 (16.67)	34.52 (13.86)	.559
	Min/Max	0; 61.9	0; 61.9	4.7; 57.1		0; 61.9	19.1; 61.9	
BS	Mean (SD)	27.5 (18.88)	25 (20.15)	30 (17.23)	<.05	31.25 (21.78)	20.83 (17.97)	<.05
	Min/Max	0; 75	0; 66.67	0; 75		0; 66.67	0; 58.33	
AS	Mean (SD)	38.33 (24)	36.11 (25.41)	40.56 (22.39)	.054	33.33 (20.24)	37.96 (28.33)	.695
	Min/Max	0; 100	0; 100	0; 77.8		0; 66.7	0; 100	
UHL	Mean (SD)	40.28 23.61)	42.86 (26.67)	36.67 (18.1)	.161	46.67 (16.61)	40.74 (30.83)	.202
	Min/Max	0; 100	0; 100	0; 66.7		33.3; 66.7	0; 100	

Note. *p: sig. of Mann-Whitney U test; SQoL-F: Sexual Quality of Life-Female; PF: Physical functioning; RF: Role functioning; EF: Emotional functioning; CF: Cognitive functioning; SF: Social functioning; GHS: Global health status; FAT: Fatigue; N/V: Nausea/vomiting; PA: Pain; DY: Dyspnea; INS: Insomnia; AL: Appetite loss; CON: Constipation; DIA: Diarrhea; FD: Financial difficulties; BI: Body Image; SEXF: Sexual functioning; SEXE: Sexual enjoyment; FP: Future perspective; STSE: Systemic therapy side-effects; BA: Breast symptoms; AS: Arm symptoms; UHL: Upset by hair loss

Differences based on mastectomy and breast reconstruction

Since the majority of the studied variables have not fulfilled the criteria for parametric procedures, we proceeded with the Mann-Whitney U test to determine the differences in selected studied variables. The first independent variable was mastectomy (females with or without the procedure), and the second was breast reconstruction (have they undergone it or not). The dependent variables were SQOL-F and all subscales from The EORTC QLQ-C30 and The EORTC QLQ- BR23. As shown in Table 1, our results are rather diverse.

Women who have undergone mastectomy had a significantly lower sexual quality of life, physical functioning, and global health status, with more severe symptoms of fatigue, pain, insomnia, and appetite loss, but less dyspnea and constipation. They reported a more negative perception of their physical appearance, i.e., body image and lower sexual functioning. Interestingly, women who opted for mastectomy experienced fewer breast symptoms in comparison to women without mastectomy.

Women who have undergone breast reconstruction procedures had lower sexual quality of life. They had more impaired functioning on all C30 functional subscales, except for social functioning, meaning their physical condition or medical treatment has not interfered with their family life and social activities. Regarding symptoms, on average, they experienced significantly more fatigue, appetite loss, constipation, and diarrhea. When it comes to BR23 subscales, they reported more frequent breast symptoms and were more worried about their health in the future.

The relationship between sexual quality of life in females with breast cancer and quality of life measured with EORTC QLQ-C30 & EORTC QLQ-BR23

Table 2. consists of bivariate correlation coefficients between socio-demographic characteristics, sexual quality of life and certain subscales of quality-of-life measures, when controlling for social functioning and arm symptoms.

Table 2. Correlation matrix between certain predictors and criteria variable (SQOL-F)

	1	2	3	4	5	6	7	8	9	10	11	12	13
SQoL-F (1)	1	-,257**	-,259**	,218**	,441**	,472**	,718**	,126	,521**	,443**	,244**	-,535**	-,027
Age (2)		1	,164*	-,163*	-,170*	,203**	-,236**	,153*	-,407**	-,256**	-,348**	,341**	-,045
Relationship status (3)			1	-,663**	-,172*	-,281**	-,473**	-,026	-,148*	-,427**	,079	,557**	,240**
Children (4)				1	,054	,066	,388**	,00	,358**	,433**	-,002	-,488**	-,287**
PF (5)					1	,552**	,392**	,483**	,378**	,451**	,340**	-,360**	-,045
RF (6)						1	,393**	,380**	,164*	,241**	,206**	-,310**	-,218**
EF (7)							1	,06	,610**	,568**	,271**	-,382**	-,110
CF (8)								1	,059	,138	-,053	-,081	-,094
GHS (9)									1	,571**	,280**	-,379**	-,035
BI (10)										1	,374**	-,566**	-,048
SEXF (11)											1	-,199**	-,019
STSE (12)												1	,327**
BS (13)													1

Note. *p<0.05; **p<0.01; SQoL-F: Sexual Quality of Life-Female; PF: Physical functioning; RF: Role functioning; EF: Emotional functioning; CF: Cognitive functioning; GHS: Global health status; BI: Body Image; SEXF: Sexual functioning; STSE: Systemic therapy side-effects; BS: Breast symptoms

Sexual quality of life was moderately related to physical and role functioning, global health status, body image (positively), and side effects (negatively), while the highest obtained correlation is between sexual quality of life and emotional functioning (feeling tense, worry, irritable or depressed). Women who have children and are married, reported lower satisfaction with health and greater difficulties in emotional domain. Also, these groups felt less feminine and attractive and reported a greater presence of treatment side effects related to breast cancer and treatment. Expected correlations within subscales of both instruments measuring the quality of life is satisfactory, except for cognitive functioning since it is unrelated to emotional functioning or global health status. Distorted body image (feeling less feminine and attractive) was associated with impaired sexual and emotional functioning, lower general health, and more pronounced treatment side effects.

In order to examine the contribution of the observed variables in explaining the sexual quality of life of women with breast cancer, we conducted a hierarchical regression analysis. Considering the amount of Cook's distance (less than 1) and Mahalanobis distance (less than 25), the analyzed data can be considered uniform. Also, we found no deviation from the multicollinearity assumption, as indicated by the Variance Inflation Factor (VIF) and tolerance values. Both indicators did not exceed critical values (VIF<10; tolerance> 0.2).

The first block included individual functional scales of the QLQ-C30 questionnaire, and the second block contained the assessment of sexual functioning, body image, and the symptomatic variable of the QLQ-BR23 questionnaire. The performed regression analysis indicates the statistical significance of both blocks of predictors (FModel1=26.95; p<.001; FModel2=19.92; p<.001). All predictors included in the analysis explained 45% ($R2adj=42.7\%$; p<.001) of the variance in the quality of sexual life, with the first block explaining 40.5% of the variance ($R2adj=39\%$; p<.001). Of the functional scales of the QLQ C-30, only the level of emotional functioning was a significant predictor. Within the second block of predictors, only the treatment side-effects had significant contribution in explaining sexual quality of life of women with breast cancer (Table 3).

Table 3. Multiple regression analysis based on criteria variable (sexual quality of life) and predictors of a studied model on a sample of women with breast cancer

	Model 1	Model 2
	β	β
Physical functioning	0.036	-0.01
Role functioning	-0.003	-0.05
Emotional functioning	0.63*	0.61*
Cognitive functioning	-0.03	-0.01
Global health status	-0.01	-0.06
Body image	-	-0.02
Sexual functioning	-	-0.014
Side effects	-	-0.26*
R	0.64*	0.67*
R²	0.405*	0.45*
*R²*_{adj.}	0.39*	0.427*

Note: *p<0.001

4. Discussion

Lower quality of life of women with breast cancer included in this study is noticeable in all observed domains, especially in emotional and sexual aspects. Compared to the reference norms obtained from breast cancer patients in Germany[30] and Spanish non-metastatic breast cancer patients[31], women in our sample reported lower satisfaction with functioning in all domains, especially regarding sexual quality of life. We also found greater presence of treatment side effects, such as fatigue, pain, nausea, difficulties sleeping, as well as more impaired body image and severe arm and breast symptoms. Women in our study reported significantly greater financial difficulties due to breast cancer and the associated treatments, compared to previous findings [30,31]. However, they presented similar level of physical and role functioning, i.e., performing everyday activities (regarding work, hobbies) to the sample of women with metastatic breast cancer[32]. More frequent side-effects obtained in this study could explain lower functioning in the domains covered by the QLQ-C30 and QLQ-BR23 questionnaires, compared to previous findings[30,31]. We included both women who were diagnosed with a tumor with possible spread (38.5%), and those whose tumors had already metastasized at the time of data collection (18%). Both of these groups are characterized by lower quality of life and more pronounced cancer symptoms[33]. These deviations can also be associated with greater financial difficulties identified in our sample. Most of the participants confirmed that they experienced financial distress and economic burden caused by cancer treatments and absence from work. Some notable differences in yielded results could be associated with health care system differences regarding early diagnosis (screening), informational support of the medical professionals, appointment availability and the extent to which insurance covers costs of the treatment (pharmacotherapy; hormonal therapy).

Mastectomy represents a fragmentation of the female body, in which the symbol of women's femininity and sexuality becomes irreplaceably lost, leaving a permanent mark on the perception of their own body. Several studies emphasize that mastectomy without reconstruction has greater impact on subjective well-being and leads to lower physical, social and emotional functioning compared to other surgical procedures, such as breast reconstruction or breast-conserving surgery[23,34]. In our study, women who underwent mastectomy showed lower satisfaction with physical functioning and global health, as well as more pronounced treatment side effects, especially regarding intensity of pain. Similarly, others reported that patients who opted for mastectomy assessed their overall health and physical functioning lower and exhibited higher pain intensity and shoulder discomfort compared to women who underwent conserving therapy[35]. They also found greater dissatisfaction with physical appearance and sexual functioning in women after mastectomy, which is in accordance with our results. Similar findings showed that mastectomy has a significant impact on body image, sexual functioning and quality of life in women with breast cancer[36]. In one comparable study[37], women who underwent mastectomy had significantly higher sexual distress, while Bober[38] state that mastectomy without reconstruction was related to higher sexual satisfaction.

Impact of surgery on sexual life of BC patients is well documented and examined, however, mostly with severely mixed conclusion in various notable reviews[24,39]. Previous studies[40,41] indicate a better quality of life, sexual functioning and a more positive body image of women who opted for reconstruction after mastectomy. According to results of Konieczny and Fal[35], women who underwent breast reconstructive surgery had higher assessment of the physical, emotional, and role functioning, as well as greater satisfaction with sexual functioning and body image. Better sexual quality of life of women who underwent reconstruction could be result of higher self-esteem and more positive body image. However, in our study, women who underwent reconstruction after mastectomy had a lower quality of life in sexual, emotional, and cognitive domain and more frequent breast symptoms. Although they did express a slightly more positive perception of their physical appearance, i.e., body image, in comparison to women without reconstruction, the difference was not significant. In a similar study[10], patients awaiting delayed reconstruction had lower social well-being. At the reconstruction phase their emotional well-being increased and for those who received delayed reconstruction, body image satisfaction increased. Since we have not

examined the role of timing and stage of reconstruction, it is very difficult to speculate whether observed health outcomes stem from the surgery itself or some other underlying mechanisms. It should be noted that body image and well-being are complex and dynamic constructs influenced by numerous other factors, such as personality, resilience, social and cultural context.

Women in our study with more pronounced treatment side-effects, lower satisfaction with their general health and greater difficulties in physical and role functioning (difficulties in performing everyday activities- regarding work, hobbies) reported lower sexual quality of life. These findings are in line with previous research. Results of qualitative study highlighted the importance of physical symptoms, such as pain and discomfort, in explaining sexual inactivity[42]. Several studies emphasize that, along with impaired physical functioning, receiving breast cancer treatment can result in decreased sexual desire, reduced arousal, premature menopause and therefore lower sexual quality of life[36,42]. After undergoing treatment of reproductive cancer, women experience difficulties adjusting to physical changes and tend to feel less feminine and attractive, which in turn may negatively affect their sexual life[22]. Notions on femininity and gender roles could define the perception of illness and body even beyond experienced symptoms, since many women struggle to appear more ''normal'' or more themselves again after the procedures. In this study, distorted body image (feeling less feminine and attractive) was associated with impaired sexual and emotional functioning, lower general health, and more pronounced STSE. Between two measures of quality of life, we detected consistent moderate linking of physical, emotional functioning and global health status with body image and STSE, further emphasizing the role of emotions and body satisfaction or simply – feeling good, secure and feminine enough.

Further analysis identified emotional functioning and treatment side-effects as the only significant predictors of the quality of sexual life. Emotional functioning prior to treatment or even diagnosis of BC is very important and could predict psychological distress during or after treatment[43]. Our results emphasize the need to address emotional well-being both before and after treatment. One route would be creating specific programs for psychosocial support, such as group therapy. Majority of the studies[44,45] confirm the effectiveness of cognitive-behavioral therapy in improving optimism about the outcomes of the treatment, as well as reducing depression, anxiety and stress. Considering the significance in treatment side-effect, our results are aligned with previous conclusions highlighting the impact of side effects on patients' physical health, mental health, and overall quality of life. For example, the prevalence and management of lymphedema, a common side effect of breast cancer treatment, manifested by a loss of strength for shoulder external rotators and shoulder range of motion[46], resulting in emotional distress, restrictions in social and work activities and it only occurs months after the treatment[47]. Regarding sexual life, females with breast cancer-related lymphedema often report struggles with sexual intimacy and decreased sexual desire[48]. The extent of lymphedema's impact on sexual life varies based on swelling severity and location, the need for compression garment, body image concerns and, least but not less important, on their partner's supportiveness and acceptance[49]. Also, concerns are associated with younger age, higher inter-arm bioimpedance ratio and shorter duration of lymphedema[50]. Women's sexuality after BC is unquestionably altered, accompanied by serious physical and emotional side-effects, with indefinite duration of the disease and possible recurrence.

Limitations and implications

Certain limitations of this study must be considered when interpreting the results. The inconsistency in comparison with the existing literature may be attributed to heterogeneity of observed samples, especially regarding the type and stage of breast cancer. It should be noted that design of our study is cross-sectional which makes it impossible to draw causal conclusions. Our research is missing some key variables that have been used in other models predicting sexual quality of life in female BC patients. While aiming at distinguishing subgroups of patients with and without mastectomy and breast reconstruction and to examine the role of symptom and functional scales, we reduced sexuality to body image and disregarded the role of relationship satisfaction as well as some other dyadic processes; and thus, separated it from any relational context.

There is no certitude regarding the impact of the factors that were not controlled, such as income, following the results on how SQL improved in women whose income was equal to or greater than their expenditures, including the cost of medical treatments[51].

In future research, a more extensive patient population and the inclusion of extended follow-up studies would be beneficial. Additionally, it is essential to conduct in-depth investigations into the impact of different treatment modalities (such as mastectomy, breast conserving surgery, immediate or delayed breast reconstruction) on the interplay between body image, sexual function, psychological well-being, and the underlying motivations for specific surgical interventions. It would be interesting to consider factors that have not been observed in this study, such as patients' income, relationship with partner, emotional competencies, and social support. Further qualitative and quantitative in-depth analysis of differences in health systems could potentially reveal some additional systematic factors affecting treatment outcomes.

5. Conclusion

The sexual quality of life in patients with breast cancer, and particularly those who have undergone mastectomy or breast reconstruction procedure is often overlooked by healthcare professionals and mental health experts. Mastectomy and breast reconstruction are significantly related to negative outcomes for patient's sexual quality of life, global health status, certain areas of daily functioning and body image. The sexual quality of life in patients with breast cancer can be partially predicted by assessing their emotional functioning and systematic side effects. The type of surgical procedure and treatment, sexual functioning and body image should be considered when forming specific patient-centered interventions for increasing QOL. Educating medical staff to recognize and acknowledge issues pertaining to female sexuality during and after breast cancer treatment as well as creating a secure environment for open discussions, is of paramount importance. This is particularly crucial, given that empirical evidence indicates that the majority of women are reluctant to address their sexual concerns with healthcare professional.

6. References

1. Sung H, Ferlay J, Siegel RL, Laversanne M, Soerjomataram I, Jemal A, et al. Global Cancer Statistics 2020: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries. CA Cancer J Clin 2021;71:209-49. https://doi.org/10.3322/caac.21660.
2. Giaquinto AN, Sung H, Miller KD, Kramer JL, Newman LA, Minihan A, et al. Breast Cancer Statistics, 2022. CA Cancer J Clin 2022;72:524–541. https://doi.org/10.3322/caac.21754.
3. Society AC. No Title Treating breast cancer. 2021. p. 119. Available from: https://www.cancer.org/content/dam/CRC/PDF/Public/8581.00.pdf.
4. Richie RC, Swanson JO. Breast cancer: a review of the literature. J Insur Med 2003;35:85–101.
5. Arnold M, Morgan E, Rumgay H, Mafra A, Singh D, Laversanne M, et al. Current and future burden of breast cancer: Global statistics for 2020 and 2040. Breast 2022;66:15–23. https://doi.org/10.1016/j.breast.2022.08.010.
6. Kirby I. Bland, Edward M. Copeland VSKMP. The breast: comprehensive management of benign and malignant disease. 5th ed. Philadelphia: Elsevier Saunders; 2009.
7. Łukasiewicz S, Czeczelewski M, Forma A, Baj J, Sitarz R, Stanisławek A. Breast cancer—epidemiology, risk factors, classification, prognostic markers, and current treatment strategies—an updated review. Cancers (Basel) 2021;13:4287. https://doi.org/10.3390/cancers13174287.
8. Tsai H-H, Yu J-C, Hsu H-M, Chu C-H, Chang T-M, Hong Z-J, et al. The risk of breast cancer between western and mediterranean dietary patterns. Nutrients 2023;15:2057. https://doi.org/10.3390/nu15092057.
9. McGuire A, Brown J, Malone C, McLaughlin R, Kerin M. Effects of age on the detection and management of breast cancer. Cancers (Basel) 2015;7:908–29. https://doi.org/10.3390/cancers7020815.

10. Teo I, Reece GP, Huang S-C, Mahajan K, Andon J, Khanal P, et al. Body image dissatisfaction in patients undergoing breast reconstruction: Examining the roles of breast symmetry and appearance investment. Psychooncology 2018;27:857-63. https://doi.org/10.1002/pon.4586.
11. Symonds T, Boolell M, Quirk F. Development of a Questionnaire on Sexual Quality of Life in Women. J Sex Marital Ther 2005;31:385–397. https://doi.org/10.1080/00926230591006502.
12. Tan K, Naylor MJ. The influence of modifiable factors on breast and prostate cancer risk and disease progression. Front Physiol 2022;13. https://doi.org/10.3389/fphys.2022.840826.
13. Zahedi R, Molavi Vardanjani H, Baneshi MR, Haghdoost AA, Malekpour Afshar R, Ershad Sarabi R, et al. Incidence trend of breast Cancer in women of eastern Mediterranean region countries from 1998 to 2019: A systematic review and meta-analysis. BMC Womens Health 2020;20:53. https://doi.org/10.1186/s12905-020-00903-z.
14. Jordahl KM, Malone KE, Baglia ML, Flanagan MR, Tang M-TC, Porter PL, et al. Alcohol consumption, smoking, and invasive breast cancer risk after ductal carcinoma in situ. Breast Cancer Res Treat 2022;193:477–484. https://doi.org/10.1007/s10549-022-06573-9.
15. Kwan ML, Kushi LH, Weltzien E, Tam EK, Castillo A, Sweeney C, et al. Alcohol consumption and breast cancer recurrence and survival among women with early-stage breast cancer: The Life After Cancer Epidemiology Study. J Clin Oncol 2010;28:4410–16. https://doi.org/10.1200/JCO.2010.29.2730.
16. Van Noyen L, Markovitz S, Broers NJ, Peters ML. Prevalence and predictors of psychological distress in women diagnosed with breast cancer and women without breast cancer: A prospective study of psychological risk and resilience factors. J Psychosoc Oncol Res Pract 2022;4:1-10. https://doi.org/10.1097/OR9.0000000000000085.
17. Lopes C, Lopes-Conceição L, Fontes F, Ferreira A, Pereira S, Lunet N, et al. Prevalence and persistence of anxiety and depression over five years since breast cancer diagnosis—The NEON-BC Prospective Study. Current Oncol 2022;29:2141–53. https://doi.org/10.3390/curroncol29030173.
18. Tat S, Doan T, Yoo GJ, Levine EG. Qualitative exploration of sexual health among diverse breast cancer survivors. J Cancer Educ 2018;33:477–84. https://doi.org/10.1007/s13187-016-1090-6.
19. Brajkovic L. Sexual functioning in women with breast cancer: role of depression, anxiety and coping styles. Psychology and Behavioral Sciences 2022;11:58. https://doi.org/10.11648/j.pbs.20221102.13.
20. Ljungman L, Ahlgren J, Petersson L, Flynn KE, Weinfurt K, Gorman JR et al. Sexual dysfunction and reproductive concerns in young women with breast cancer: Type, prevalence, and predictors of problems. Psychooncology 2018;27:2770-7. https://doi.org/10.1002/pon.4886.
21. von Hippel C, Rosenberg SM, Austin SB, Sprunck-Harrild K, Ruddy KJ, Schapira L, Come S, Borges VF, Partridge AH. Identifying distinct trajectories of change in young breast cancer survivors' sexual functioning. Psychooncology 2019;28:1033–1040. https://doi.org/10.1002/pon.5047.
22. King R, Stafford L, Butow P, Giunta S, Laidsaar-Powell R. Psychosocial experiences of breast cancer survivors: a meta-review. J Cancer Surviv 2023; https://doi.org/10.1007/s11764-023-01336-x.
23. Martins Faria B, Martins Rodrigues I, Verri Marquez L, Da Silva Pires U, Vilges de Oliveira S. The impact of mastectomy on body image and sexuality in women with breast cancer: a systematic review. Psicooncologia 2021;18:91–115. https://doi.org/10.5209/psic.74534.
24. Brajkovic L, Sladic P, Kopilaš V. sexual quality of life in women with breast cancer. Health Psychol Res 2021;9. https://doi.org/10.52965/001c.24512.
25. Aureliano W de A. "… e Deus criou a mulher": reconstruindo o corpo feminino na experiência do câncer de mama. Revista Estudos Feministas 2009;17:49–70. https://doi.org/10.1590/S0104-026X2009000100004.
26. Inocenti A, Santos MA dos, Loyola EAC de, Magalhães PAP de, Panobianco MS. Impact of the effects of the reconstructive surgery in the life of women with breast cancer. Texto & Contexto - Enfermagem 2016;25. https://doi.org/10.1590/0104-07072016004520014.

27. Maasoumi R, Lamyian M, Montazeri A, Azin SA, Aguilar-Vafaie ME, Hajizadeh E. The sexual quality of life-female (SQOL-F) questionnaire: translation and psychometric properties of the Iranian version. Reprod Health 2013;10:25. https://doi.org/10.1186/1742-4755-10-25.

28. Aaronson NK, Ahmedzai S, Bergman B, Bullinger M, Cull A, Duez NJ, et al. The European Organization for Research and Treatment of Cancer QLQ-C30: A quality-of-life instrument for use in international clinical trials in Oncology. J Natl Cancer Ins 1993;85:365–376. https://doi.org/10.1093/jnci/85.5.365.

29. Makluf ASD, Barra AA, Dias RC BC. Quality of life among Brazilian women having undergone surgery for breast cancer: Validity and reliability of the Quality of life Questionnaire (EORTC QLQ-C30) and Breast Cancer Module (QLQ BR-23). Integr Cancer Sci Ther 2015;2. https://doi.org/10.15761/ICST.1000124.

30. Karsten MM, Roehle R, Albers S, Pross T, Hage AM, Weiler K, et al. Real-world reference scores for EORTC QLQ-C30 and EORTC QLQ-BR23 in early breast cancer patients. Eur J Cancer 2022;163:128–139. https://doi.org/10.1016/j.ejca.2021.12.020.

31. Miret C, Orive M, Sala M, García-Gutiérrez S, Sarasqueta C, Legarreta MJ, et al. Reference values of EORTC QLQ-C30, EORTC QLQ-BR23, and EQ-5D-5L for women with non-metastatic breast cancer at diagnosis and 2 years after. Qual Life Res 2023;32:989–1003. https://doi.org/10.1007/s11136-022-03327-4.

32. Mierzynska J, Taye M, Pe M, Coens C, Martinelli F, Pogoda K, et al. Reference values for the EORTC QLQ-C30 in early and metastatic breast cancer. Eur J Cancer 2020;125:69–82. https://doi.org/10.1016/j.ejca.2019.10.031.

33. Hamer J, McDonald R, Zhang L, Verma S, Leahey A, Ecclestone C, Bedard G, Pulenzas N, Bhatia A, Chow R, et al. Quality of life (QOL) and symptom burden (SB) in patients with breast cancer. Suppor Care Cancer 2017;25:409–19. https://doi.org/10.1007/s00520-016-3417-6.

34. Kim MK, Kim T, Moon HG, Jin US, Kim K, Kim J, Lee JW, Kim J, Lee E, Yoo TK, et al. Effect of cosmetic outcome on quality of life after breast cancer surgery. Eur J Surg Oncol 2015;41:426–32. https://doi.org/10.1016/j.ejso.2014.12.002.

35. Konieczny M, Fal A. The Influence of the Surgical Treatment Method on the Quality of Life of Women With Breast Cancer. Eur J Breast Health 2023;19:121-7. https://doi.org/10.4274/ejbh.galenos.2023.2022-9-1.

36. Kowalczyk R, Nowosielski K, Cedrych I, Krzystanek M, Glogowska I, Streb J, Kucharz J, Lew-Starowicz Z. Factors affecting sexual function and body image of early-stage breast cancer survivors in Poland: A short-term observation. Clin Breast Cancer 2019;19:e30–e39. https://doi.org/10.1016/j.clbc.2018.09.006.

37. Raggio GA, Butryn ML, Arigo D, Mikorski R, Palmer SC. Prevalence and correlates of sexual morbidity in long-term breast cancer survivors. Psychol Health 2014;29:632–50. https://doi.org/10.1080/08870446.2013.879136.

38. Bober SL, Giobbie-Hurder A, Emmons KM, Winer E, Partridge A. Psychosexual functioning and body image following a diagnosis of ductal carcinoma in situ. J Sex Med 2013;10:370–377. https://doi.org/10.1111/j.1743-6109.2012.02852.x.

39. Male DA, Fergus KD, Cullen K. Sexual identity after breast cancer. Curr Opin Support Palliat Care 2016;10:66–74. https://doi.org/10.1097/SPC.0000000000000184.

40. Zehra S, Doyle F, Barry M, Walsh S, Kell MR. Health-related quality of life following breast reconstruction compared to total mastectomy and breast-conserving surgery among breast cancer survivors: A systematic review and meta-analysis. Breast Cancer 2020;27:534–566. https://doi.org/10.1007/s12282-020-01076-1.

41. Archangelo S de CV, Sabino M, Veiga DF, Garcia EB, Ferreira LM. Sexuality, depression and body image after breast reconstruction. Clinics 2019;74:e883. https://doi.org/10.6061/clinics/2019/e883.

42. Cairo Notari S, Favez N, Notari L, Panes-Ruedin B, Antonini T, Delaloye J-F. Women's experiences of sexual functioning in the early weeks of breast cancer treatment. Eur J Cancer Care (Engl) 2018;27:e12607. https://doi.org/10.1111/ecc.12607.

43. Nakatani Y, Iwamitsu Y, Kuranami M, Okazaki S, Shikanai H, Yamamoto K, Watanabe M, Miyaoka H. The relationship between emotional suppression and psychological distress in breast cancer patients after surgery. Jpn J Clin Oncol 2014;44:818–25. https://doi.org/10.1093/jjco/hyu089.

44. Guarino A, Polini C, Forte G, Favieri F, Boncompagni I, Casagrande M. The effectiveness of psychological treatments in women with breast cancer: A systematic review and meta-analysis. J Clin Med 2020;9:209. https://doi.org/10.3390/jcm9010209.

45. Bellver-Pérez A, Peris-Juan C, Santaballa-Beltrán A. Effectiveness of therapy group in women with localized breast cancer. Inter J Clin Health Psychol 2019;19:107–14. https://doi.org/10.1016/j.ijchp.2019.02.001.

46. Belmonte R, Messaggi-Sartor M, Ferrer M, Pont A, Escalada F. Prospective study of shoulder strength, shoulder range of motion, and lymphedema in breast cancer patients from pre-surgery to 5 years after ALND or SLNB. Suppor Care Cancer 2018;26:3277–87. https://doi.org/10.1007/s00520-018-4186-1.

47. Hidding JT, Beurskens CHG, van der Wees PJ, Bos WCAM, Nijhuis-van der Sanden MWG, et al. Changes in volume and incidence of lymphedema during and after treatment with docetaxel, doxorubicin, and cyclophosphamide (TAC) in patients with breast cancer. Support Care Cancer 2017; https://doi.org/10.1007/s00520-017-3907-1.

48. Radina ME, Fu MR, Horstman L, Kang Y. Breast cancer-related lymphedema and sexual experiences: a mixed-method comparison study. Psychooncology 2015;24:1655–62. https://doi.org/10.1002/pon.3778.

49. Winch CJ, Sherman KA, Koelmeyer LA, Smith KM, Mackie H, Boyages J. Sexual concerns of women diagnosed with breast cancer-related lymphedema. Support Care Cancer 2015;23:3481–3491. https://doi.org/10.1007/s00520-015-2709-6.

50. Hoyle E, Kilbreath S, Dylke E. Body image and sexuality concerns in women with breast cancer-related lymphedema: a cross-sectional study. Support Care Cancer 2022;30:3917–3924. https://doi.org/10.1007/s00520-021-06751-3.

51. Telli S, Gurkan A. Examination of sexual quality of life and dyadic adjustment among women with mastectomy. Eur J Breast Health 2020;16:48–54. https://doi.org/10.5152/ejbh.2019.4969.