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Factors affecting quality of life in women post mastectomy for breast cancer in Baheya Foundation (Egypt): 'A retrospective cohort study'

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Abstract

Background Breast cancer treatment has many strategies, each with its own effects on survivors' quality of life (QoL). The current study evaluated factors influencing QoL in women who have undergone mastectomy and compared different treatments based on sociodemographic and clinical factors.

Methods A retrospective cohort study was conducted utilizing the EORTC Quality of Life breast cancer specific tool and the FACT-B and FBSI questionnaires to measure functional and symptom scales impacting QoL. The questionnaire was administered to 318 Egyptian women post-mastectomy and at 6-month follow-up. Results were reported as median and interquartile range (IQR) or frequency and percentage. Fisher's exact and Kruskal-Wallis tests were used for statistical inferences. Generalized linear models were used to predict QoL measures (outcome) by sociodemographic and clinical variables (independent) with adjusting for potential confounders. Independent variables were selected by elastic net regression.

Results The Global QoL score for this cohort was 42.0 (IQR 25.0–67.0). The functional scale most affected was role (62%), with the cognition having the lowest effect. The most distressing symptoms on the symptom scale were fatigue (65%), insomnia (61%), and pain (60%). FACT-B had a median score of 79.0 (IQR 63.0–95.0). Generalized linear regression indicated that higher cognitive functioning (22.45; $p < 0.050$) and BCS (6.026, $p < 0.010$) was positively correlated with women > 60 years old. Urban women correlated with a lower SWB (-2.679, $p < 0.05$) and higher degree of insomnia. A BMI > 30 correlated negatively with many of the QoL domains. SM or MRM with reconstruction correlated positively with TQOL ($8.109 < p < 0.050$). Women who received chemotherapy had lower social functioning (-12.41, $p < 0.050$), BCS (-3.473, $p < 0.010$), greater association with diarrhoea (8.865, $p < 0.010$) and financial difficulties (15.23, $p < 0.050$). In contrast, women who received hormonal therapy had higher role functioning (17.64, $p < 0.010$), with less complaints of diarrhoea (-10.38, $p < 0.010$), nausea (-8.668, $p < 0.010$) and pain (-8.265, $p < 0.050$).

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Conclusion These results indicate that sociodemographic and clinical factors affect QoL in Egyptian women post-mastectomy. The worst functioning was the role and emotional scales, and the most distressing on the symptom scale were fatigue, insomnia, and pain making an imperative case for a more multidisciplinary team approach to treatment.

Keywords Breast cancer, Mastectomy, Post-mastectomy, Quality of life, EORTC, FACT-B, FBSI

Background

Female breast cancer (BC) is the leading cancer in Egyptian women, accounting for 34.9% of the cancers diagnosed and an estimated age-standardized incidence rate of 55.4 per 100 000 [1]. BC rates are higher in females over 50 years of age [2] whilst in young women, it is likely to be a more aggressive disease depending on clinicopathologic factors such as poorly differentiated lymph node positive, higher human epidermal growth factor receptor 2 (HER-2) and ER and PR receptor-negative, thus leading to a more advanced stage at presentation [3, 4]. Therefore, treatment strategies are more aggressive as surgical options become more limited and there is need for additional exposure to chemotherapy and radiation [3–5]. As a result, all BC treatment options affect the patient's quality of life (QoL). Furthermore, we chose to focus exclusively on women who underwent mastectomy because this treatment plan remains the most common surgical intervention for breast cancer in Egypt and in our study population. There are several factors, including socio-demographic characteristics and clinical variables influencing QoL. These include (1) clinical symptoms (fatigue, pain, appetite loss, nausea/vomiting, constipation, diarrhoea, and insomnia), (2) additional clinical variables (stage at presentation, histological cancer grade, metastasis presence, and time from diagnosis), (3) the type of surgical approach and (4) the types of therapy and their resulting side effects [6–9].

An analysis of 13 studies in Egypt by Azim et al. [10] among 11,382 patients with BC, it was estimated that approximately 85% of BC cases result in modified radical mastectomy (MRM) as the treatment option. In a cross-sectional study conducted by Jassim et al. [8], it was reported that women who received a mastectomy had poor QoL compared to those receiving lumpectomy. Baczewska et al. [11] and Enien et al. [12], showed that women receiving breast conservation treatment (BCT) had a better QoL compared to women who had mastectomy. Socio-demographic variables such as age, menopausal status, family history of cancer, body mass index (BMI), level of education, employment status, monthly family earnings including family and community support have also been shown to impact QoL [6, 13, 14]. Khangar et al. [13] revealed that age and level of education had a positive impact on QoL, whereas Hammam et al. [15] reported low QoL scores among working women. Furthermore, Yan et al. [9] showed that adequate social support and higher income considerably improved the QoL of BC patients. Given the high proportion of MRM, the QoL in postmastectomy women is a critical topic due to its significant impact on the physical, emotional, and social well-being of BC survivors. Thus, an understanding of a comprehensive list of factors in a single cohort and their interplay impacting QoL is essential for improving patients' overall well-being.

The purpose of this study was therefore to assess the QoL of Egyptian women post mastectomy at Baheya foundation. It aimed at providing a comprehensive understanding of the various factors affecting postmastectomy QoL, including physical recovery, psychological well-being, body image, and social support in Egyptian female BC survivors. The results from this study are envisaged to make a significant contribution in improving their survival experience and long-term outcomes.

Materials and methods

Study design and participants

This was a retrospective cohort study conducted at Baheya Foundation, a non-profit early detection and therapy centre for breast cancer in Cairo, Egypt. The study included all females who underwent mastectomy (with or without reconstruction) due to breast cancer between September 2018 and February 2019. A total of 413 women were identified from records and invited telephonically to participate in this study. Amongst those contacted, 84 women declined the invitation, whilst the investigator was informed that 11 women had passed away. Informed consent was subsequently obtained from 318 women, who were included and their six-month follow-up history, commencing March 2019, was documented. Women who were diagnosed with other malignancies were excluded. All patients were surveyed in a private space by the principal investigator at the Baheya Foundation.

Data collection

Socio-demographics such as age, marital status, residence, education level, occupation, age at menarche, age at first child, number of children, history of breastfeeding, family history, menopausal state, and oral contraceptive use were obtained from patient interviews. Clinical characteristics such as BMI, previous history of breast cancer, treatment method, clinical staging, tumor grading, and type of surgery were collected from hospital records.

The Arabic versions of the Functional Assessment of Cancer Therapy-Breast (FACT-B) Symptom Index (version 4), and European Organization for Research and Treatment of Cancer (EORTC) QoL (QOL EORTC QLQ-C30 - version 3) questionnaire, which are considered valid and reliable tools, were used to collect QoL data [16, 17].

The EORTC QLQ-C30 evaluated five functional characteristics (physical, functional, mental, cognitive, and social well-being), global QoL, three symptom domains (pain, nausea/vomiting and fatigue) and six single items (loss of appetite, insomnia, diarrhoea, dyspnoea, constipation, financial impact) [17, 18]. As per the EORTC QLQ-C30 scoring methodology [19], manual scoring was performed and each functional scale was scored from 0 to 100. For the functional and the global QoL scales, a higher score indicated a high level of functioning. For the symptom scales, a higher score indicated greater symptom burden. The QLQ-C30 summary score was calculated as the mean of the combined QLQ-C30 scale and item scores (excluding global QoL and financial impact), with a higher score indicating a better HRQoL.

The FACT-B and FBSI are self-administered 37-item questionnaires for breast cancer patients. The assessment evaluated five areas: physical well-being (7 items), social/family well-being (7 items), mental well-being (6 items), functional well-being (7 items), and other issues such as body image, arm swelling, and tenderness (10 items). The scoring of the FACT-B and FBSI were performed manually by summing up the response scores for each scale. Higher scores, when combined, constituted better overall well-being or better global quality of life. The final score ranged from 0 to 164, with a higher final score reflecting a better quality of life [20].

Statistical analysis

Statistical analysis was conducted using Stata version 15 (Stata Corp Inc., College Station, TX, USA). Sociodemographic and symptom characteristics were described as frequencies (number of cases) and percentages when appropriate, while age and age at puberty were described as a median with their interquartile range (IQR). Fisher's exact test was used to measure the associations between BMI and age-group, education level, and marital status, as well as associations between the clinical stage with type of surgery, and comorbidities with age group. Comparison between groups was undertaken using the Kruskal-Wallis test. The multi-item scales of EORTC QLQ-C30 and all subscales of FACT-B and FBSI were described using median scores and IQR. Generalized linear regression models were fitted to estimate least square means and standard errors (SE) of QoL measures (outcome) by sociodemographic and clinical variables (independent) with adjustment for potential confounders. Any missing data was handled in Stata with listwise deletion. This meant that if even a single variable was missing from a list of covariates in our model, that observation was excluded from analysis. Upon examining the variables with missing data, it was found that the data were missing at random. Due to the large number of independent variables, elastic net regression was used to select the truly significant variables amongst all of the potential predictors. This powerful statistical tool of selecting independent variables is particularly useful in handling large datasets with numerous variables where multiple interrelated factors often influence outcomes. This approach also prevents overfitting while maintaining model accuracy where predictors can be correlated. A p-value ≤ 0.05 was accepted as a statistically significant result in all of the analyses conducted.

Ethical consideration

The study received ethical clearance from the Health Research Committee of Stellenbosch University (South Africa) (HREC Reference#: S18/10/228), National Research Centre, Cairo and Baheya Foundation, Cairo (Egypt) ethics community. Written informed consent was obtained from all participants through an interview by the principal investigator. All data were transferred and saved in excel sheet.

Results

Sociodemographic characteristics

A total of 318 patients were included in this study, aged between 23 and 84 years with the median age of 54 years (IQR 43–63). Most patients (84%) were 40 years or older, 70% were married, whilst 82% resided in an urban residence. Most woman (78%) had a BMI greater than 30 Kg/m^2 (Table 1). The median age at puberty was 13 years (IQR 12–14). Most participants (89%) had children and majority of them had breast fed (81%). Most of the participants were between 14 and 32 years of age when they had their first child (Fig. 1). Oral contraceptive use was noted in only 36% of participants with 15% having used for 6 + years. 53% of the women had a family history of cancer (Table 1). Based on the WHO classification for BMI [26], 77% of participants were classified as obese and there were only 6% with a BMI between 18.5 and 24.9 Kg/m^2, which is classified as normal weight. The Fisher's exact test showed a significant association between BMI and age-group ($p = 0.032$), with 83% of the 40–60 year age-group and 77% of ≥ 60 years age-group being classified as obese (BMI ≥30).

Table 1 Sociodemographic characteristics of Egyptian women ($N=318$), surveyed at Baheya Center for early detection and treatment of women's cancer

Variables	Category	Frequency (%)
Age at diagnosis	< 40 years	50 (16)
	40–60 Years	172 (54)
	> 60 years	96 (30)
Marital status	Unmarried	94 (30)
	Married	224 (70)
Area of residence	Rural	52 (16)
	Urban	266 (82)
Education level	No formal education	135 (42)
	High School	12 (4)
	Post-school	171 (54)
Employed	No	234 (74)
	Yes	84 (26)
Have children	No	34 (11)
	Yes	284 (89)
Number of Children	0	34 (11)
	1–2	77 (24)
	3–4	153 (48)
	5+	54 (17)
Family history of cancer	No	150 (47)
	Yes	168 (53)
BMI (Kg/m^2)	< 18.5	1 (0,3)
	18.5–24.9	19 (6)
	25.0-29.9	49 (16)
	≥ 30	244 (78)
	unknown	5 (1.6)
Oral contraceptive use	No	197 (62)
	Yes	121 (38)
Duration of oral contraceptive use	≤ 5 Years	68 (21)
	6–10 Years	28 (9)
	> 10 years	20 (6)
	unknown	202 (64)

Clinical characteristics

Breast cancer affected the right side in 51% of the participants with only 4% being affected on both sides (Table 2). 35% of participants were diagnosed with stage II and 53% of the participants underwent modified radical mastectomy (MRM), with 58% of the women being postmenopausal. Regarding the presence of comorbidities, 7% of participants had diabetes mellitus (DM) only, 19% presented with hypertension (HPT) only, and 20% with combined DM and HPT (Table 2). The Fisher's exact test showed significant associations between the comorbidities and age group ($p < 0.001$) whereas hypertension increased with age.

Exclusive chemotherapy was only received by 26% of the patients, while exclusive radiotherapy and hormonal therapies were received by 0.3% and 25% of participants respectively. Combined CT, RT and HT was received by 26% of the participants (Table 2). The Fisher's exact test showed a significant association between clinical stage and type of surgery ($p < 0.001$). Simple mastectomy (SM) was performed on 60% of the participants diagnosed at clinical stage 0–1, whereas 60% of those diagnosed at stage II and 72% at stage III underwent MRM.

Functional items of EORTC QLQ-C30 questionnaire

The global QoL and functional scales were categorized as < 33.3% (poor functioning), 33.3–66.6% (average functioning) and ≥ 66.7% (good functioning). For symptom scales however, the inverse applied where participants scoring < 33.3%, 33.3–66.6% and ≥ 66.7% were characterized into less-, moderately- and most-severe symptoms, respectively [27, 28]. 47% of participants had a poor global QoL while 35% and 18% of participants had an average and good global QoL, respectively. The global QoL median score was 42 (IQR 25–67). The most affected factor in the functional scales was role (62%), followed by emotional (54%), whereas the least affected was the cognitive scale, as 50% of participants had a good score (Fig. 2A). On the symptom scale, fatigue (65%), insomnia (61%) and pain (60%) were the most common symptoms experienced (Fig. 2B). Diarrhoea, nausea and vomiting were, however, the least displeasing symptoms.

Assessment of functional and symptom scales by sociodemographic characteristics

Table 3 indicates that age-group was significantly associated with physical ($p < 0.001$), role ($p < 0.001$) and cognitive ($p = 0.032$) functioning, with the lower age-group producing higher mean scores. In addition, physical and role functioning was significantly associated with marital status, educational level, number of children, and BMI. Educational level was significantly associated with emotional well-being ($p = 0.023$) and functional score ($p < 0.002$) with the post-school category producing higher mean scores.

An assessment of the QoL measures using the EORTC symptom scales (Table 4) revealed that age-group was significantly associated with fatigue ($p = 0.009$) and financial difficulties ($p = 0.043$). Insomnia was significantly associated with marital status ($p = 0.018$), residential status ($p = 0.010$) and BMI ($p = 0.043$) with married urban residents with BMI ≥ 30 Kg/m^2 providing higher mean (67) scores compared to other categories. No associations were observed between oral contraceptive use and any of the symptoms assessed.

Assessment of symptom and functional scales by clinical characteristics

Postmenopausal status was significantly associated with physical ($p < 0.001$) and role ($p < 0.001$) functioning with a decrease in mean scores (Table 5). Although a smaller number of patients ($N = 40$) underwent SM or MRM

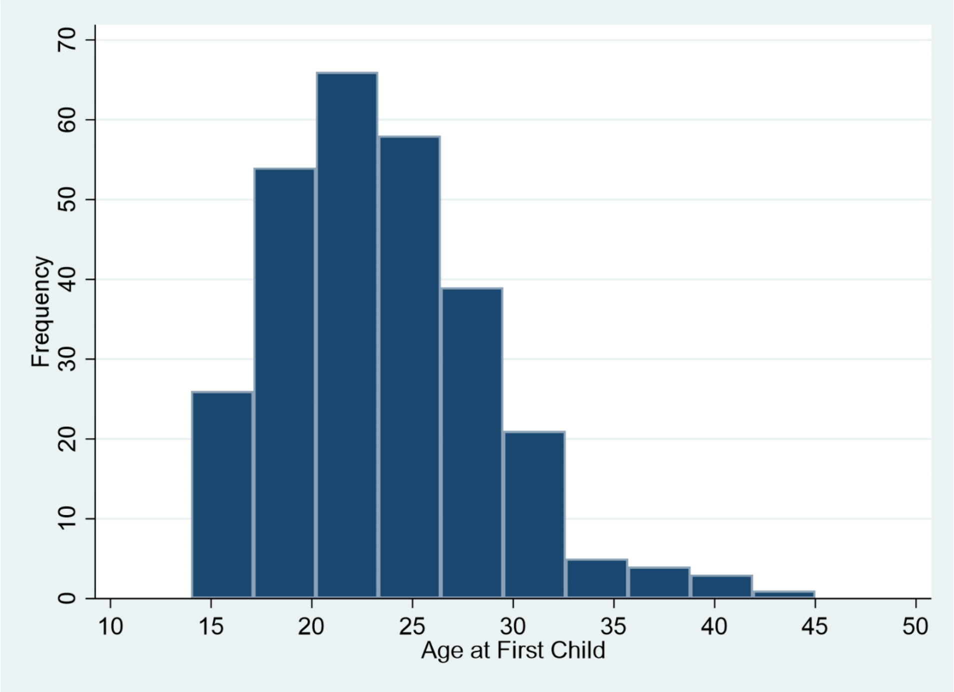


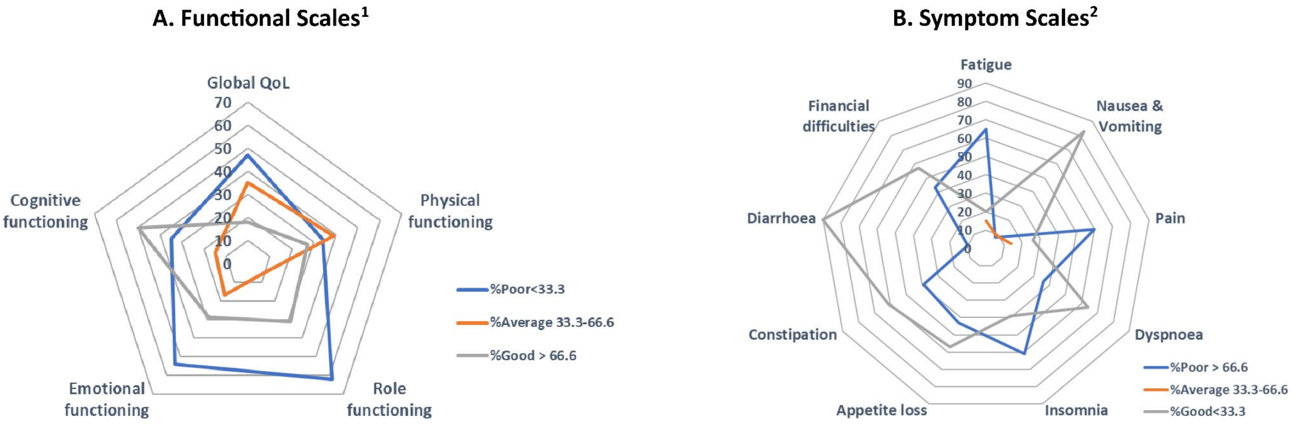
Fig. 1 Histogram of age at first child, showing that the majority of participants were between 14 and 32 years of age when they had their first child

Table 2 Clinical characteristics of the study cohort

Variables	Category	Frequency (%)
Menopausal state	Premenopausal	68 (21)
	Perimenopausal	66 (21)
	Postmenopausal	184 (58)
Breast cancer side	Right	161 (51)
	Left	144 (45)
	Both	13 (4)
Type of surgery	Simple mastectomy (SM)	111 (35)
	Modified radical mastectomy (MRM)	167 (53)
	SM or MRM, with reconstruction	40 (13)
Stage at diagnosis	0-I	103 (32)
	II	111 (35)
	III	99 (31)
	IV	5 (2)
Comorbidities	No	136 (43)
	Diabetes mellitus (DM) only	21 (7)
	Hypertension (HPT) only	62 (19)
	DM & HPT	63 (20)
	Unknown	36 (11)
Treatment	No therapy	7 (2)
	Chemotherapy (CT) only	83 (26)
	Radiotherapy (RT) only	1 (0.3)
	Hormonal therapy (HT) only	79 (25)
	CT + RT	12 (4)
	RT + HT	17 (5)
	CT + HT	36 (11)
	CT + RT + HT	83 (26)

with reconstruction, functional mean scores were statistically associated with physical ($p < 0.001$) and role ($p = 0.002$) functioning scores. The mean scores for both these functional domains approached good functioning capabilities. The stage of diagnosis was also significantly associated with role ($p = 0.006$), emotional ($p = 0.025$) and social ($p = 0.007$) functioning. The presence of comorbidities was significantly associated with physical ($p = 0.002$) and role ($p = 0.005$) functioning. Breast cancer side was not associated with any of the functional domains whilst treatment modality was significantly associated with social functioning ($p = 0.039$).

An evaluation of the symptom scales by clinical characteristics (Table 6) revealed that menopausal status is statistically associated with fatigue ($p = 0.004$) and insomnia ($p = 0.013$). Postmenopausal patients had poor functioning as evidenced by their mean score ($p = 0.003$). Type of surgery was associated with appetite loss ($p = 0.016$). Patients who underwent SM or MRM with reconstruction reported good functioning in comparison to SM or MRM only. Stage of diagnosis was also associated with appetite loss ($p = 0.017$) with increased diagnosis stage reporting poor functionality. The treatment modality was observed to be significantly associated with nausea and vomiting ($p = 0.040$), pain (0.042), appetite loss ($p = 0.027$), diarrhoea ($p = 0.016$) and financial difficulties ($p = 0.009$) with patients receiving a combination of chemotherapy (CT), radiotherapy (RT) and hormonal therapy (HT) providing the highest mean scores in the above functional domains, reflecting the poorest functionality. In addition,


A. Functional Scales^1

B. Symptom Scales^2

Fig. 2 Quality of life assessment in breast cancer patients using (**A**) Functional and (**B**) Symptom scales as per the EORTC QLQ-C30 questionnaire. ^{1}*For functional scales; participants had scoring < 33.3% have problems and those scoring ≥ 66.6% have good functioning. Higher score manifests better functioning.*^{2}*For symptom scales, participants scoring < 33.3% have good functioning and those scoring ≥ 66.6% have symptoms. Higher score equates to worse functioning*

Table 3 Comparison of Quality-of-life measures of breast cancer patients using the EORTC functional scales assessment tool, by sociodemographic characteristics

Characteristics	Sample (*N*)	Physical	Role	Emotional	Functional score
Age group					
< 40	50	60 (40–70)	50 (20–80)	32 (0–70)	50 (40–70)
40–60	172	50 (30–67)	30 (0–67)	30 (10–67)	40 (30–60)
> 60	96	40 (20–60)	10 (0–50)	30 (0–70)	40 (20–67)
†***p*-value**		< 0.001*	< 0.001*	0.763	0.081
Marital status					
Unmarried	94	40 (20–60)	20 (0–50)	30 (0–67)	40 (30–60)
Married	224	50 (30–67)	30 (0–70)	30 (10–70)	50 (30–67)
†***p*-value**		0.009*	0.004*	0.595	0.131
Educational level					
No formal education	135	50 (20–60)	0 (0–50)	25 (0–67)	40 (20–60)
High school	11	40 (30–50)	40 (10–65)	10 (0–58)	30 (20–60)
Post-school	171	50 (40–70)	30 (20–70)	40 (20–70)	50 (33–67)
†***p*-value**		< 0.001*	< 0.001*	0.023*	< 0.002*
Number of Children					
0	34	55 (30–70)	25 (0–70)	25 (0–60)	40 (30–60)
1–2	77	50 (30–70)	30 (20–70)	40 (20–80)	50 (30–70)
3–4	153	50 (30–60)	20 (0–70)	30 (0–67)	40 (30–60)
5+	54	40 (20–53)	0 (0–33)	40 (10–70)	40 (30–60)
†***p*-value**		0.011*	0.011*	0.114	0.098
BMI (Kg/m^2)					
< 18.5	1	40 (40–40)	70 (70–70)	40 (40–40)	40 (40–40)
18.5–24.9	19	50 (20–70)	20 (0–80)	20 (0–60)	40 (20–60)
25.0-29.9	49	60 (50–70)	50 (20–80)	50 (20–70)	60 (40–670)
≥30	244	50 (30–60)	20 (0–67)	30 (0–70)	40 (30–60)
†***p*-value**		0.016*	0.019*	0.271	0.052

Denotes statistical significance, *$p \leq 0.050$, using Kruskal-Wallis test†

Data presented as median and (interquartile range)

co-morbidities such as diabetes and hypertension were also statistically associated with fatigue ($p = 0.040$) and pain ($p = 0.046$) and found to produce higher mean scores associated with poor functioning.

The assessment using FACT-B and FBSI as a function of sociodemographic and clinical characteristics are shown in Tables 7 and 8 respectively. Physical wellbeing (PWB) was associated with educational level ($p = 0.002$), BMI ($p = 0.004$), menopausal status ($p = 0.018$), type of surgery ($p = 0.005$), clinical stage ($p = 0.005$), type of treatment ($p = 0.021$), and comorbidities ($p = 0.038$). Social wellbeing (SWB) was associated with residence ($p = 0.015$), clinical

Table 4 Comparison of Quality-of-life measures of breast cancer patients using the EORTC symptom scales assessment tool, by sociodemographic characteristics

Characteristics	Sample (*N*)	Fatigue	Pain	Insomnia	Financial difficulties	Symptom score
Age group						
< 40	50	57 (33–77)	59 (33–83)	84 (33–100)	33 (0–67)	42 (33–57)
40–60	172	67 (43–90)	67 (33–83)	67 (33–100)	33 (0-100)	50 (33–63)
> 60	69	67 (57–100)	67 (33–83)	67 (0-100)	17 (0-100)	47 (33–63)
†*p*-value		0.009*	0.168	0.078	0.043*	0.258
Marital status						
Unmarried	94	67 (57–90)	67 (50–83)	67 (0-100)	33 (0-100)	50 (33–63)
Married	223	67 (43–90)	67 (33–83)	67 (33–100)	33 (0-100)	50 (33–63)
†*p*-value		0.483	0.754	0.018*	0.275	0.642
Residence						
Rural	51	67 (57–90)	67 (33–83)	33 (0–84)	33 (0-100)	47 (33–63)
Urban	266	67 (43–90)	67 (33–83)	67 (33–100)	33 (0-100)	50 (33–63)
†*p*-value		0.967	0.697	0.001*	0.461	0.822
Educational level						
No formal education	135	67 (57–100)	67 (50–83)	67 (33–100)	67 (0-100)	50 (37–63)
High school	11	77 (67–90)	83 (67–100)	67 (17–100)	33 (0-100)	57 (33–67)
Post-school	171	67 (43–90)	67 (33–83)	67 (33–100)	33 (0–67)	47 (33–60)
†*p*-value		0.022*	0.132	0.517	0.076	0.043*
Employed						
No	233	67 (43–90)	67 (33–83)	67 (33–100)	33 (0-100)	50 (33–63)
Yes	84	67 (56–90)	67 (33–83)	67 (17–100)	67 (0-100)	50 (33–60)
†*p*-value		0.418	0.536	0.257	0.006*	0.901
Number of children						
0	34	67 (43–77)	50 (33–67)	84 (33–100)	33 (0-100)	47 (33–50)
1–2	77	67 (33–90)	67 (33–83)	67 (0-100)	33 (0-100)	40 (30–60)
3–4	153	67 (57–90)	67 (50–83)	67 (33–100)	33 (0-100)	50 (33–63)
5+	54	67 (67–90)	67 (50–83)	67 (33–100)	33 (0-100)	50 (33–63)
†*p*-value		0.088	0.043*	0.378	0.466	0.104
BMI (Kg/m^2)						
< 18.5	1	67 (67–67)	33 (33–33)	0 (0–0)	67 (67–67)	50 (50–50)
18.5–24.9	19	67 (57–90)	67 (50–83)	33 (0-100)	33 (0-100)	50 (33–60)
25.0-29.9	49	67 (33–77)	50 (33–67)	33 (0–67)	33 (0–67)	40 (30–53)
≥30	243	67 (43–90)	67 (50–83)	67 (33–100)	33 (0-100)	50 (33–63)
†*p*-value		0.195	0.073	0.043*	0.771	0.351

* Signifies statistical significance, *$p \leq 0.050$, using Kruskal-Wallis test†

Data presented as median and (interquartile range)

Nausea and vomiting, dyspnoea, appetite loss, constipation and diarrhoea, were not significantly associated with any of the sociodemographic variables and thus not included in the table

stage ($p = 0.015$), and treatment ($p = 0.020$). An association was observed between breast cancer subscales (BCS) and age group ($p < 0.001$), marital status ($p = 0.002$), educational level ($p = 0.021$), number of children ($p = 0.033$), family history of cancer ($p = 0.028$), menopausal status ($p < 0.001$), clinical stage ($p < 0.001$), treatment ($p < 0.001$), and comorbidities ($p = 0.003$). Overall, total quality of life (TQOL) had significant association with BMI ($p = 0.006$), type of surgery ($p = 0.028$), clinical stage ($p = 0.002$), and treatment ($p = 0.003$).

Generalized linear regression modelling

The data from the generalized linear regression models of QoL EORTC QLQ C30 functional scales (Additional File 1), symptom scales (Additional File 2) and Health-related QoL FACT-B and FBSI (Additional File 3) by sociodemographic and clinical variables following adjustment for potential confounders is reported. The independent variables were selected by elastic net regression. Higher cognitive functioning (22.45; $p < 0.050$) and BCS (6.026, $p < 0.010$) was correlated with women greater than 60 years old while the 40–60-year group was correlated with financial difficulties (17.82, $p < 0.050$). Women living in urban areas correlated with a lower SWB (-2.679,

Table 5 Comparison of Quality-of-life measures of breast Cancer patients using the EORTC Functional Scale Assessment Tool, by clinical characteristics

Characteristics	Sample (*N*)	Physical	Role	Emotional	Social	Functional score
Menopausal state						
Premenopausal	68	50 (37–69)	30 (0–67)	30 (0–67)	30 (0–67)	40 (30–60)
Perimenopausal	66	60 (50–70)	50 (20–80)	40 (20–70)	50 (30–70)	53 (40–70)
Postmenopausal	184	40 (20–60)	20 (0–67)	30 (0–67)	50 (0–80)	40 (30–60)
†***P*-value**		< 0.001*	< 0.001*	0.233	0.116	0.003*
Type of surgery						
Simple mastectomy (SM)	111	50 (30–60)	30 (0–67)	30 (0–60)	50 (20–80)	40 (30–60)
Modified radical mastectomy (MRM)	167	50 (30–60)	20 (0–67)	33 (0–70)	50 (0–80)	40 (30–60)
SM or MRM, with reconstruction	40	64 (50–80)	67 (25–80)	40 (20–70)	50 (30–70)	52 (40–70)
†***P*-value**		< 0.001*	0.002*	0.261	0.784	0.018*
Stage at diagnosis						
0-I	103	50 (30–70)	50 (0–80)	30 (0–70)	67 (30–100)	50 (30–70)
II	111	50 (30–60)	30 (0–67)	20 (0–60)	30 (0–67)	40 (20–60)
III	99	50 (30–60)	20 (0–50)	40 (20–70)	33 (0–70)	40 (30–63)
IV	5	50 (50–50)	30 (30–70)	50 (40–80)	50 (30–50)	50 (40–50)
†***P*-value**		0.423	0.006*	0.025*	0.007*	0.123
Comorbidities						
No	136	53 (37–70)	33 (0–80)	33 (0–70)	50 (20–82)	50 (30–70)
Diabetes mellitus (DM) only	21	50 (30–60)	0 (0–30)	20 (0–40)	20 (0–67)	40 (23–50)
Hypertension (HPT) only	62	50 (30–60)	20 (0–50)	30 (10–70)	40 (0–70)	40 (20–67)
DM & HPT	63	40 (20–60)	20 (0–67)	30 (0–67)	50 (20–80)	43 (30–67)
†***P*-value**		0.002*	0.005*	0.605	0.162	0.162

* Signifies statistical significance, *$p \leq 0.050$, using Kruskal-Wallis test†;

Data presented as median and (interquartile range)

$p < 0.050$) and higher degree of insomnia than women living in rural areas (18.47, $p < 0.010$). Role functioning was positively correlated (9.903, $p < 0.050$) amongst married women, whereas pain was significantly correlated amongst women with children (11.93, $p > 0.050$). Compared to no formal education, education was positively correlated to role functioning (10.99, $p < 0.010$), functional score (7.270, $p < 0.010$), PWB (1.604, $p < 0.050$), SWB (2.235, $p < 0.050$), FWB (2.172, $p < 0.010$), and global QoL score (7.904, $p < 0.010$). A negative correlation between education and financial difficulties (-12.28, $p = 0.050$) was also observed. Family history of cancer was negatively correlated with emotional functioning (-12.70, $p < 0.010$). In addition, BMI > 30 was negatively correlated on many of the QoL domains. Reconstruction with SM or MRM surgery was positively correlated with TQOL ($8.109 < p < 0.050$). Women who received chemotherapy had lower social functioning (-12.41, $p < 0.050$), BCS (-3.473, $p < 0.010$), greater association with diarrhoea (8.865, $p < 0.010$) and financial difficulties (15.23, $p < 0.050$). In contrast, women who received hormonal therapy had higher role functioning (17.64, $p < 0.010$), with less complaints of diarrhoea (-10.38, $p < 0.010$), nausea (-8.668, $p < 0.010$) and pain (-8.265, $p < 0.050$).

Discussion

Breast cancer is one of the most traumatic experiences that can occur in a woman's life. As it has psychological, physical, and social impacts on their lives [21]. In this study, we identified factors that influence QoL in women who have undergone mastectomy and compared the different types of treatment by means of the EORTC QLQ-C30, FACT-B and FBSI, based on sociodemographic and clinical factors.

In EORTC QLQ-C30, the participants had low to average QoL scoring and experience of symptoms. The global health median score (QoL) was 42 (IQR 25–67), a value slightly lower when compared to other studies conducted in Egypt [15] Kuwait [22], Ethiopia [23], and China [24] and much lower when compared to studies done in Bahrain [8] and Nepal [25]. Additionally, in the current study, women had a higher global QoL compared to a previous study done in Egypt where the mean global QoL was 28.0 [12]. These differences in mean global QoL score may be attributed to several aspects such as functioning and symptomatic factors.

The median score for global health showed good functioning and 18% of women met the 66.6% basis for good functioning whilst the worst functioning scores were for role and emotional scale compared to the functional scores. These findings are in agreement with results from studies conducted in the Middle East region [8, 12, 26,

Table 6 Comparison of Quality-of-life measures of breast cancer patients using the EORTC symptoms scales assessment tool, by clinical characteristics

Characteristics	Sample (*N*)	Fatigue	Nausea & Vomiting	Pain	Insomnia	Appetite loss	Diarrhoea
Menopausal state							
Premenopausal	68	67 (43–77)	17 (0–33)	67 (33–83)	67 (33–100)	33 (0–67)	0 (0–33)
Perimenopausal	65	57 (33–77)	17 (0–33)	67 (33–83)	67 (33–100)	33 (0-100)	0 (0–33)
Postmenopausal	184	67 (57–100)	17 (0–33)	67 (33–83)	67 (0-100)	33 (0-100)	0 (0–33)
†***p*-value**		0.004*	0.826	0.814	0.013*	0.122	0.841
Stage at diagnosis							
0-I	103	67 (33–90)	0 (0–17)	67 (33–83)	67 (33–100)	33 (0–67)	0 (0–0)
II	110	67 (57–90)	17 (0–33)	67 (50–83)	67 (33–100)	33 (0-100)	0 (0–33)
III	99	67 (57–90)	17 (0–33)	67 (50–83)	67 (33–100)	67 (0-100)	0 (0–33)
IV	5	67 (57–67)	17 (0–50)	83 (67–100)	100 (67–100)	33 (33–100)	0 (0–0)
†***p*-value**		0.303	0.029*	0.272	0.550	0.002*	0.034*
Treatment							
No therapy	7	77 (43–100)	0 (0–50)	67 (50–100)	67 (67–100)	33 (0-100)	0 (0–0)
Chemotherapy (CT) only	83	67 (57–90)	17 (0–50)	83 (50–100)	67 (33–100)	67 (0-100)	0 (0–33)
Radiotherapy (RT) only	1	23 (23–23)	0 (0–0)	0 (0–0)	67 (67–67)	33 (33–33)	0 (0–0)
Hormonal therapy (HT) only	79	67 (43–90)	0 (0–17)	67 (33–83)	67 (0-100)	33 (0–67)	0 (0–0)
CT + RT	11	67 (57–90)	17 (9–33)	50 (33–67)	67 (33–100)	67 (17–84)	0 (0–33)
RT + HT	17	67 (43–100)	0 (0–17)	50 (17–67)	33 (0-100)	33 (0–67)	0 (0–0)
CT + HT	36	67 (33–67)	0 (0–25)	59 (33–83)	84 (17–100)	33 (0–67)	0 (0–33)
CT + RT + HT	83	67 (57–90)	17 (0–33)	67 (33–83)	67 (33–100)	67 (33–100)	0 (0–33)
†***p*-value**		0.145	0.040*	0.042*	0.781	0.027*	0.016*
Comorbidities							
No	135	67 (43–90)	17 (0–33)	67 (33–83)	67 (33–100)	33 (0-100)	0 (0–33)
Diabetes mellitus (DM) only	21	67 (67–90)	17 (0–50)	67 (67–100)	67 (33–67)	67 (33–100)	33 (0–33)
Hypertension (HPT) only	62	67 (43–100)	17 (0–33)	67 (50–100)	67 (0-100)	33 (0–67)	0 (0–33)
DM & HPT	63	77 (57–100)	17 (0–33)	67 (33–83)	67 (33–100)	33 (0-100)	0 (0–0)
†***p*-value**		0.040*	0.694	0.046*	0.559	0.523	0.141

* Signifies statistical significance, **p* ≤ 0.050, using Kruskal-Wallis test†

Data presented as median and (interquartile range)

Table 7 Comparison of Health-related quality-of-life measures of breast cancer patients using the FACT-B and FBSI assessment tool, by selected sociodemographic characteristics

Characteristics	Sample (*N*)	PWB	SWB	FWB	BCS	TQOL	FBSI
Age group							
< 40	50	14 (8–18)	23 (18–26)	17 (14–22)	15 (10–20)	46 (37–54)	16 (12–19)
40–60	172	11 (7–16)	21 (16–26)	14 (10–19)	17 (13–24)	43 (34–55)	14 (10–19)
< 60	69	11 (8–17)	20 (14–27)	13 (6–18)	24 (17–31)	48 (36–61)	14 (10–18)
†***p*-value**		0.124	0.508	0.002*	< 0.001*	0.245	0.360
Educational level							
No formal education	135	11 (6–15)	19 (13–26)	12 (8–18)	21 (15–28)	43 (34–56)	13 (9–17)
High school	12	10 (5–16)	21 (16–25)	17 (10–20)	17 (11–25)	45 (32–52)	12 (8–16)
Post-school	171	13 (9–17)	22 (18–26)	16 (11–20)	17 (13–24)	46 (36–58)	15 (11–19)
†***p*-value**		0.002*	0.095	< 0.001*	0.021*	0.381	0.009*
BMI (Kg/m^2)							
< 18.5	1	18 (18–18)	14 (14–14)	16 (16–16)	12 (12–12)	46 (46–46)	17 (17–17)
18.5–24.9	19	10 (8–13)	17 (11–24)	12 (9–17)	20 (16–24)	46 (36–49)	12 (10–16)
25.0-29.9	49	16 (12–19)	23 (17–27)	17 (14–22)	22 (15–28)	52 (43–65)	17 (14–20)
≥30	244	11 (7–17)	21 (15–26)	14 (9–19)	18 (13–25)	43 (33–55)	14 (10–18)
†***p*-value**		0.004*	0.150	0.027*	0.098	0.006*	0.008*

* Signifies statistical significance, **p* ≤ 0.050, using Kruskal-Wallis test†

PWB, Physical well-being; SWB, Social well-being; FWB, Functional well-being; BCS, Breast cancer subscales; TQOL, Total quality of life; FBSI, FACT Breast Symptom Index;

Data presented as median and (interquartile range)

Table 8 Comparison of Health-related quality-of-life measure of breast Cancer patients using the FACT-B and FBSI Assessment Tool, by clinical characteristics

Characteristics	Sample (*N*)	PWB	SWB	FWB	BCS	TQOL	FBSI
Menopausal state							
Premenopausal	68	12 (7–17)	21 (15–25)	14 (11–18)	16 (11–20)	41 (32–50)	14 (9–19)
Perimenopausal	66	16 (10–18)	24 (18–27)	16 (12–22)	17 (12–24)	47 (37–61)	17 (12–20)
Postmenopausal	184	11 (7–15)	21 (14–27)	14 (8–19)	21 (15–28)	46 (35–58)	14 (10–18)
†***p*-value**		0.018*	0.089	0.005*	< 0.001*	0.081	0.027*
Type of surgery							
Simple mastectomy (SM)	111	11 (7–17)	19 (14–25)	14 (9–18)	20 (15–28)	45 (37–57)	14 (10–18)
Modified radical mastectomy (MRM)	167	11 (7–16)	21 (15–27)	14 (9–19)	18 (12–24)	43 (32–55)	14 (9–17)
SM or MRM, with reconstruction	40	16 (12–18)	23 (19–26)	18 (14–22)	17 (13–26)	47 (42–63)	17 (14–21)
†***p*-value**		0.0050*	0.1110	0.0029*	0.0890	0.0277*	0.0082*
Clinical Stage							
0-I	103	14 (9–19)	21 (15–27)	15 (10–20)	22 (16–29)	48 (39–62)	16 (11–20)
II	11	11 (7–16)	19 (13–25)	15 (8–19)	17 (13–25)	43 (32–53)	14 (9–17)
III	99	11 (6–15)	23 (18–27)	14 (10–19)	18 (11–24)	41 (32–54)	14 (9–18)
IV	5	12 (7–15)	18 (18–23)	14 (12–15)	16 (11–20)	37 (33–40)	11 (9–12)
†***p*-value**		0.005*	0.015*	0.803	< 0.001*	0.002*	0.084
Treatment							
No therapy	7	13 (8–20)	27 (25–28)	13 (11–18)	23 (17–27)	47 (41–58)	14 (10–19)
Chemotherapy (CT) only	83	10 (6–15)	23 (17–27)	14 (10–18)	16 (10–23)	39 (30–53)	13 (9–18)
Radiotherapy (RT) only	1	28 (28–28)	11 (11–11)	17 (17–17)	35 (35–35)	80 (80–80)	27 (27–27)
Hormonal therapy (HT) only	79	12 (8–17)	18 (13–25)	14 (8–18)	23 (16–30)	48 (37–62)	14 (10–18)
CT + RT	12	12 (8–17)	20 (17–24)	15 (11–17)	16 (15–28)	44 (39–49)	15 (12–18)
RT + HT	17	14 (9–20)	20 (14–26)	18 (10–22)	26 (20–33)	56 (47–72)	17 (14–22)
CT + HT	36	14 (11–18)	23 (19–27)	17 (11–20)	17 (16–24)	47 (42–58)	16 (13–21)
CT + RT + HR	83	12 (7–16)	20 (14–25)	16 (9–20)	18 (11–22)	43 (35–53)	14 (10–17)
†***p*-value**		0.021*	0.020*	0.555	< 0.001*	0.003*	0.071
Comorbidities							
No	136	13 (8–18)	21 (16–26)	16 (11–20)	17 (13–24)	45 (36–58)	15 (11–19)
Diabetes mellitus (DM) only	21	7 (5–15)	20 (14–25)	11 (9–17)	16 (11–22)	40 (25–52)	11 (8–16)
Hypertension (HPT) only	62	11 (5–17)	20 (15–27)	14 (6–18)	20 (14–27)	44 (33–58)	14 (10–17)
DM & HPT	63	12 (7–15)	21 (14–27)	14 (9–19)	23 (16–30)	48 (37–62)	14 (9–18)
†***p*-value**		0.038*	0.949	0.050*	0.003*	0.164	0.113

* Signifies statistical significance, $^*p \le 0.050$, using Kruskal-Wallis test†

PWB, Physical well-being; SWB, Social well-being; EWB, Emotional well-being; FWB, Functional well-being; BCS, Breast cancer subscales; TQOL, Total quality of life; FBSI, FACT Breast Symptom Index;

Data presented as median and (interquartile range)

27]. The complication of breast cancer treatment impacts both women and their partners on daily functional activity and life roles [28]. Furthermore, the changes in body image in women who have undergone mastectomy can cause emotional disruption, pervading their thinking during their daily activities, especially when taking a shower, looking in the mirror, dressing up, and fearing rejection by her partner, all potentially effecting their functioning and QoL [8, 29].

Similar to many other studies [8, 27, 30] regarding symptomatic scales, fatigue, insomnia, and pain were found to be the most distressing symptoms, while diarrhea, nausea, and vomiting identified as least displeasing. Cancer-related fatigue (CRF) is a significant health issue that affects QoL in breast cancer patients [31]. Approximately 33% of breast cancer patients record persistent fatigue ten years into survivorship [32]. Fatigue and insomnia is associated with breast cancer before, during, and after treatment, but the difficulty is in determining the relationship between these variables as both could be as a result of various factors such as medications, pain, inflammation, and mood [33]. On the other hand, pain is clearly associated with fatigue, insomnia, and emotional distress [34]. These symptoms greatly overlap with each other and have a role and influence on levels of daily function and QoL of women.

With the FACT-B and FBSI questionnaire, the median score was 79.0 (IQR 63.0–95.0) and 14.0 (IQR 10–18) respectively. Our results were similar to those obtained by Khater et al. [35], where the median FACT-B score was 81, but lower to that reported by Akel et al. [37], who reported a mean FACT-B score of 108.7± 18.8. The lower FACT-B score obtained in the current study may be due to the fact that the women were interviewed 6 months after undergoing mastectomy, and most of them were still receiving treatment and suffering from treatment side effects. Whereas, in the study conducted by Akel et al. 86.7% of participants were interviewed at least 3 years post-diagnosis.

Factors associated with QoL scores

In the present study, the median age was 54 years, these results differ slightly from those reported by the National Cancer Institute in Cairo, where the mean age obtained was 48±11.0 years [34]. In another study conducted by Darwish et al. [36], the mean age was 50±8.54 years. The association between age and QoL showed conflicting results in many studies. This study agreed with studies conducted by Maharjan et al. [25] and Khater et al. [35], where the women > 50 years reported better QoL than younger women ≤ 50 years old. The generalized linear regression models showed that the older women (> 60years old) had higher cognitive functioning and BCS. It was observed that younger women were more concerned about body changes such as disfigurement, hair loss, and weight change. Furthermore, young women with children may be concerned with multiple responsibilities such as childcare and their family's future. In contrast, studies conducted in Yemen and Jordan reported no difference between the two groups [26, 38]. Moreover, a Korean study revealed that young women have better QoL compared to old women [39]. They justified the younger age group are more likely to have a higher level of daily activity, higher educational level, and more jobs, these factors contributed to the age effect on QOL.

A study done in China reported that married women had a significantly higher QoL score for SWB and a lower score of BCS using FACT-B [9]. In our study, associations were observed between physical and role functioning using EORTC and BCS using FACT-B with marital status. The potential explanation is that married women are more concerned with body image and have more responsibility to fulfil their roles as spouses and mothers. Residence was significantly associated with global QoL [24]. Currently, rural communities have more communication and assistance between the people than urban communities, which explains the significant association of SWB using FACT-B. Additionally, the generalized linear regression model also revealed that women in urban areas had lower SWB scores and complained of insomnia more than those in rural areas.

The current study is also in agreement with other studies that revealed a significant association between the level of education and QoL [23, 25, 26, 38]. Educated women understood the nature of breast cancer and responded better to treatment recommendations, compared to the less educated women. In addition, employment status was associated with financial difficulties but did not have an association with the other QoL scales. These results are in line with those obtained by Al-Naggar and co-workers but is in contradiction to that obtained by Khater et al. who reported that working women had improved PWB than housewives [35, 38]. This was contrary to Hammam et al. who reported that working women had poor QoL [15]. Our results indicated that educated women had higher scores of many QoL domains.

In our study, 89% of participants had children. In addition, the number of children the participants had was also significantly associated with BCS using FACT-B, and physical and role functional scales using EORTC. In a study done in Iran it was revealed that women who have children had a higher health-related quality of life (HRQOL) than other women [40].

53% of participants in our study had a family history of cancer, and 30% of those had a history of breast cancer in the family. Family history of cancer was associated with BCS using FACT-B and emotional functional scale using EORTC. Further, women with a family history of cancer had lower emotional functioning. Our results were in contrast to a study done at the National Cancer Institute in Cairo; where 37% of participants had a family history of cancer and there was no association between cancer family history and QoL [35]. Whereas, a study in Jordan reported 58.5% of participants had breast cancer family history, and they revealed that women who have a family cancer history had a low QoL score [26].

Obesity (BMI ≥ 30) affected 78% of our study participants; body weight changes were associated with the physical, role functioning, and function score using EORTC and associated with PWB, FWB, FBSI, and TQOL using FACT-B. BMI ≥30 had lower scores in many of our QoL domains. Briefly, obesity has a role in affecting QoL. This corresponds to a study done by Al-Naggar et al. in Yemen, where it was reported that BMI had a significant association with QoL in women with breast cancer [38]. Obesity had a significant risk factor for chronic pain after breast cancer surgery [41]. Furthermore, obesity increased the number of comorbidities [42], which have a corresponding influence on QoL. Studies done by Maharjan et al. [25] and Khater et al. [35] showed that patients with comorbidities had poor cognitive, emotional, and physical functioning than other women. Furthermore, comorbidities also have a negative influence on symptoms such as fatigue, insomnia, pain, and dyspnoea [43].

In our study, we found no significant association between the side that participants were affected by breast cancer and QoL. The majority of our patients had unilateral mastectomies, with only a few (less than 20 patients) undergoing bilateral mastectomies. This result differed from an Egyptian study by Zeeneldin et al [44]. which reported that the majority of participants were affected by breast cancer on the left side (53.46%), and patient survival was worse when affected by left side breast cancer due to possible radiation toxicity to the heart.

The stage of disease at diagnosis and metastasis incidence had a significant association with QoL; which is in agreement with other studies [8, 37]. In a study done by Hamer et al. [45], it was found that women with advanced disease had poor QoL compared to all other breast cancer stages. Similarly, women who have advanced breast cancer had worse pain, dyspnea, and drowsiness compared to all other stages. Whilst, another study reported that diagnosis of breast cancer in women is stressful regardless of disease stage therefore, there is no association between cancer stage at diagnosis and QoL [46]. Although, women who have recurring breast cancer disease suffer with poor QoL [35].

In our study, all patients had a mastectomy, however, patients who had undergone SM or MRM with reconstruction surgery had higher TQOL. The most common complication of mastectomy surgery is chronic arm and shoulder disability, defined as pain in arm/shoulder, restricted mobility in the shoulder, and lymphedema affecting 30–50% of breast cancer patient survivors [47, 48]. Chrischilles et al. [49] reported that patients who suffer from arm/shoulder disability had a worse QoL. Akca et al. [21] reported that women who underwent SM or breast-conserving surgery (BCS) had better function and global QoL when compared to women who underwent MRM. Moreover, women who underwent mastectomy had a lower level of cognitive, emotional, physical, and social functioning than women who underwent a lumpectomy [8, 12, 38].

The type of treatment had a significant association with QoL. As expected, pain, appetite loss, nausea & vomiting, and diarrhea were associated with treatment. A study done in Malaysia showed a strong correlation between chemotherapy with fatigue and QoL [31]. Chemotherapy side-effects hinder women from performing general activities and social functioning. Also, the inability to do their daily chores leads to dissatisfaction with herself because of an inability to fulfil their roles as spouses and mothers. Chemotherapy, hormonal therapy, and radiotherapy have been shown to contribute to the incidence and persistence of upper extremity disability, cognitive impairment, and physical symptoms such as fatigue, pain and insomnia; all these side-effects negatively influence daily activities and QoL [23, 27, 35, 36, 49]. Furthermore, we observed that women who received chemotherapy complain to a larger extent about financial difficulties. The potential justification is that the price of chemotherapy plus treating symptoms associated with chemotherapy negatively affects family financial footing.

Despite the study providing a deeper understanding of QoL outcomes in the selected patient cohort, there are potential limitations that need to be acknowledged. The study was a single institution study, hence the generalisability of the findings to the rest of the Egyptian population are limited. Selection bias may also have resulted from the lack of representativity of the participants to the general population of women with BC. Follow-up was only undertaken for 6-months only. A longer follow-up could have provided for a steadier environment for the cancer patient resulting in a more inclusive view of the patients' cancer journey post mastectomy and resultant QoL domains. Potential confounders unaccounted for in the linear regression model may have impacted on the prediction model.

The findings of this study highlight several critical public health imperatives for women with breast cancer, requiring systematic changes across multiple levels of healthcare delivery. There is indeed a need for comprehensive care programs that encompass integrated multidisciplinary healthcare teams assisting in psychological, nutritional, weight management, pain management, and physiotherapy needs. Coordinated support services addressing both physical and psychosocial needs, integration of family support services, creation of personalised care and survivorship plans, and a regular assessment of QoL metrics to guide care modifications can improve the quality of life of affected women.

The implications of our findings for public health include (1) integration of quality of life assessments into standard care protocols; (2) strengthening of primary healthcare infrastructure to support early detection; (3) development of public awareness campaigns about early detection; (4) implementation of comprehensive breast cancer screening programs; (5) creation of psychosocial support networks for patients and families; (6) development of financial assistance programs for treatment costs and (7) continued evaluation of intervention effectiveness. Thus, a more holistic approach to breast cancer care in public health systems is advocated, emphasizing the importance of comprehensive, accessible, and culturally sensitive care delivery models that address both medical and psychosocial needs throughout the cancer journey.

Conclusion

Quality of life in post-mastectomy Egyptian women is influenced by various sociodemographic and clinical factors. The worst functioning was the role and emotional scales, and the most distressing symptoms scales were fatigue, insomnia, and pain. Breast cancer is a systematic disease. Subsequently, it has effects on all aspects of life. The results of this study have a number of clinical applications ranging from the provision of psychosocial services and management of symptoms through adequate planning and resource allocation. The study results provide a strong impetus for women with breast cancer to be treated using a multidisciplinary team. This should include psychological, nutritional, pain, and physiotherapy management specialists in the treatment team. Early diagnoses of comorbid conditions such as depression, weight changes, pain incidence, or upper extremity disability can lead to a decrease in patient suffering, resulting in improved patient functioning and quality of life. Our research underscores the necessity of providing comprehensive care that extends beyond medical treatment to improve the overall well-being of post-mastectomy women. As we move forward, it's imperative that healthcare providers recognize the significant role they can play in improving the well-being of post-mastectomy patients. By addressing not only the medical aspects but also the psychological, nutritional, and pain-related dimensions, we can substantially enhance the quality of life for these individuals, reducing their suffering and improving their overall health and functionality.

Abbreviations

BMI	Body Mass Index
EORTC QLQ-C30 (version 3)	European Organization for Research and Treatment of Cancer
HRQOL	Health-Related Quality Of Life
IQR	Inter Quartile Range
FACT-B	Functional Assessment of Cancer Therapy-Breast questionnaire
FBSI	Breast Symptom Index specific
MRM	Modified Radical Mastectomy
QoL	Quality of Life
SM	Simple Mastectomy

Supplementary Information

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Supplementary Material 1

Supplementary Material 2

Supplementary Material 3

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Author contributions

SA and VS conceptualized the idea for the research and designed the study. SA gathered the data. VS supervised the project and undertook the statistical analysis. SA and VS jointly wrote the manuscript. MHI and HA co-supervised the project. All authors read and approved the final version of the manuscript.

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Data availability

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Declarations

Competing interests

The authors declare no competing interests.

Ethics approval

The study received ethical clearance from the Health Research Committee of Stellenbosch University (South Africa) (HREC Reference#: S18/10/228), National Research Centre, Cairo and Baheya Foundation, Cairo (Egypt) ethics community. All research was conducted in accordance with the Declaration of Helsinki.

Participants consent and consent for publication

Written informed consent was obtained from all participants through an interview by the principal investigator. All informed consent was saved in PDF files.

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