



Health-Related Quality of Life Associated Factors in Breast Cancer Patients in 2017-2018

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Abstract

Background: Breast cancer (BC) is the most commonly diagnosed cancer affecting women's quality of life (QoL) in many ways. Identifying QoL-related factors in these patients can help improve their function and treatment.

Objectives: This study aimed to investigate factors related to the QoL of BC patients in Khuzestan province of Iran.

Methods: This descriptive-analytical cross-sectional study was conducted on 180 BC patients in Khuzestan province, Iran. The health-related QoL of patients was measured using the EORTC-QLQ-C30 and EORTC QLQ-BR23 questionnaires. In order to analyze the data and identify relevant factors in health-related quality of life (HRQOL) in BC patients, descriptive statistics and multiple linear regression were performed in SPSS version 22. The statistical significance level was 0.05.

Results: The mean QoL score in the patients was 59.58 ± 20.55 . Among functional dimensions, the social dimension (80.74 ± 25.85) had the highest score, and sexual pleasure (10.27 ± 20.42) had the lowest score. In the dimension of symptoms, financial difficulties (60.37 ± 31.34) and diarrhea (6.23 ± 16.28) obtained the highest and lowest scores, respectively. There was a significant difference in the mean QoL score regarding different categories of education level ($P = 0.01$), residence ($P = 0.02$), supplemental insurance ($P = 0.02$), employment status ($P = 0.02$), and duration of illness ($P = 0.02$).

Conclusions: The results of this study can provide many implications for the clinical outcomes and HRQOL of women with BC. Healthcare systems are advised to implement appropriate interventions and healthcare services to optimize QoL-related factors and boost the HRQOL of these patients.

Keywords: Breast Neoplasms, Quality of Life, Health, Iran

1. Background

About 19.3 million new cancer cases and approximately 10 million cancer-related deaths occurred worldwide in 2020. The global cancer burden is predicted to reach 28.4 million cases in 2040 (i.e., a 47% increase compared to 2020) (1). Breast cancer (BC) is a major and widespread cancer affecting women worldwide (2). Breast cancer is the most common cancer in women, the second most common cancer worldwide, and the fifth cause of death globally (2-4). Over 12% of women have been diagnosed with BC, and the incidence of BC has increased up to 23% worldwide (2, 5). Moreover, every year, 1,700,000 new cases of BC are detected in the world (6). The annual incidence of BC in Iran is 33.2 cases per hundred thousand women (7). A study conducted on the data of Iran's cancer registry from 2008 to 2016 showed that the incidence of BC in

Iranian women would increase by 63% by 2025, and the number of patients diagnosed with BC in that year would reach 25,013 cases. In addition, the incidence of BC in Khuzestan province was reported as 43.8 cases per 100 thousand population (8).

According to the definition of the World Health Organization (WHO), quality of life (QoL) is a person's perception of his/her life with regard to his/her goals, expectations, standards, and concerns. This is a complex concept that includes physical health, mental health, personal beliefs, social interactions, and relationships with the surrounding environment (9, 10). Despite the increase in the prevalence of BC, partly due to the propagation of screening tests, early diagnosis and treatment have reduced mortality in these patients. However, BC continues to be a chronic disease whose

complications and treatment side effects profoundly affect various aspects of a person's life (11, 12). Therefore, BC depresses the overall QoL, as well as the survival of patients (10, 11).

Health-related quality of life (HRQOL) is a multidimensional construct that encompasses the perception of positive and negative aspects of functional dimensions, such as physical, emotional, social, and cognitive dimensions. It also includes the negative aspects of physical discomfort and other symptoms caused by a disease or its treatment and is considered one of the main predictors of the success of cancer treatment (13). Various factors affect HRQOL in BC patients. These factors include socioeconomic status, educational status, employment status, psychosocial challenges, and financial expenses (3). Moreover, some clinicopathological features of BC, such as cancer stage and type of treatment, as well as psychological factors, affect patients' HRQOL (14). A study by El Haidari et al. showed that several factors affect the HRQOL of women with BC, including socio-demographic characteristics such as age, marital status, education level, economic status, employment status, and experiencing daily problems at work, as well as clinical and psychological characteristics (e.g., behavior and symptoms of the disease, duration of illness, stage of the disease, pain, stress, depression, and treatment adverse effects) (13). da Silva et al. pointed out the negative impact of emotional distress, sexual dysfunction, and worries about hair loss on the HRQOL of women with BC, highlighting the relationship between physical symptoms and life functional dimensions (15).

2. Objectives

Considering the considerable incidence of BC and the inflicts caused by its diagnosis and therapeutic modalities on women's lives, more attention has been given to HRQOL criteria in women with BC, which helps patients and caregivers decide whether to continue a specific treatment or not (15). Moreover, identifying the factors associated with HRQOL can help specialists develop effective health interventions and approaches to improve the QoL of BC patients (13). Despite various studies on the relationship between the QoL of women with BC using different research methods, such as literature review, qualitative studies, and cross-sectional experiments, it seems that demographic features and cultural characteristics of each country and region can affect this phenomenon. Khuzestan is one of the southern provinces of Iran, where weather and climatic conditions are unique, and people follow a certain lifestyle, which is believed to have an impact on women's health and QoL

by predisposing them to BC. Therefore, this study aimed to investigate the factors associated with the HRQOL of BC patients in Khuzestan province using specific (EORTC QLQ-BR23) and general (EORTC QLQ-C30) instruments.

3. Methods

This descriptive-analytical cross-sectional study was conducted in the cancer clinic of the Baqai Hospital 2, the chemotherapy unit of the Shafa Hospital, and the oncology clinic of the Golestan Hospital (treatment centers for cancer patients in Khuzestan province) from September 16, 2017, to March 6, 2018. The sample size was calculated as 192 people based on Cochran's formula. According to entry and exit criteria, 180 people were included in the study using the convenience sampling method. The values of p , q , and d coefficients in this formula were 0.5, 0.5, and 0.05, respectively. In this study, all female patients with BC aged 18 years and older in any stage of the disease but no history of recurrence were included in the study. Patients with psychiatric problems or cognitive disorders who were unable to understand or complete the questionnaire were excluded from the study. The data were collected by trained interviewers who visited the clinics of the mentioned hospitals daily for a period of 6 months.

This study was approved by the ethics committee of Ahvaz Jundishapur University of Medical Sciences with the ethics code IR.AJUMS.REC.1396.815. After receiving the necessary permissions, the interviewers visited the predetermined sampling centers and selected the patients who met the inclusion criteria. The patients introduced themselves, and the objectives of the study were explained to them; they were told that their information would be kept confidential, and the patient's consent was obtained in written form.

The data collection tool used in this study consisted of three parts: (1) a demographic information form, (2) the EORTC QLQ-C30 questionnaire, and (3) the EORTC QLQ-BR23 questionnaire. Demographic characteristics in the questionnaire included age, marital status, level of education, residence, type of insurance, supplemental insurance, employment status, disease-related expenses, family history, duration of the illness, and the type of therapeutic interventions.

The European Organization for Research and Treatment of Cancer (EORTC) has developed an integrated measurement tool to assess the QoL of cancer patients in clinical trials. This tool includes the Quality of Life Questionnaire of the European Organization for Research and Treatment of Cancer (EORTC QLQ-C30) along with additional other supplementary modules, including the Quality of Life Questionnaire of the European

Organization for Research and Treatment of Cancer (EORTC QLQ-BR23) (16).

EORTC QLQ-C30 Questionnaire: This questionnaire consists of 30 questions scored on a 4-point Likert scale (0 = not at all, 1 = a little, 2 = very much, 3 = a lot). The questionnaire evaluates QoL in five functional domains (physical, role-playing, emotional, cognitive, and social), 9 symptom domains (fatigue, nausea and vomiting, pain, dyspnea, sleep deprivation, appetite loss, constipation, diarrhea, and financial difficulties), and 1 general domain of QoL (17).

EORTC QLQ-BR23 Questionnaire: This questionnaire examines 4 functional domains (sexual function, sexual pleasure, body image, and future perspective) and 4 symptom domains (discomfort from hair loss, side effects of treatment, arm symptoms, and breast symptoms) and includes 23 questions. All these 23 questions are evaluated on a Likert scale with the same pattern as the EORTC QLQ-C30 questionnaire (15).

In both EORTC QLQ-C30 and EORTC QLQ-BR23 questionnaires, the scores of functional domains, symptoms, and overall QoL fall in the range of 0 to 100. Regarding the functional domains and overall QoL, a higher score indicates a better performance or a better QoL, while in the domain of symptoms, a higher score indicates a higher number of symptoms or difficulties (6, 16).

The validity and reliability of these questionnaires have been confirmed in previous studies (11, 15, 16, 18). Cronbach's alpha coefficient for the reliability of these questionnaires was 0.80, and the test-retest reliability coefficient for all domains was 0.77. Furthermore, the item content validity index (I-CVI) ranged from 0.83 to 1 (1). In a study by Jassim and Al-Ansari, Cronbach's alpha coefficients for EORTC QLQ-C30 and QLQ BR-23 were 0.927 and 0.844, respectively, indicating their high reliability (19). The validity and reliability of the Persian version of the QLQ-C30 questionnaire were approved in the study of Safaee and Moghim Dehkordi (20), who showed that Cronbach's alpha coefficient was between 0.66 and 0.82 for all scales. Convergent validity was approved by a self-item subscale correlation above 0.40 for all multi-item subscales. Item discriminant validity was successful in all analyses except for item 4 of the physical function scale. Also, the Persian version of this questionnaire has been approved by the European Cancer Research and Treatment Association as a valid and reliable tool (21). The validity and reliability of the Persian version of the QLQ-BR23 questionnaire were confirmed by Montazeri et al. (22), who showed that Cronbach's alpha coefficients (i.e., reliability) for multi-item scales varied from 0.63 to 0.95 at the beginning (i.e., pre-test) and from 0.75 to 0.92

in the subsequent implementation of the questionnaire (i.e., post-test). The results of validity analysis using the comparison of known groups showed that all functional scales and symptom domains distinguished between the subgroups of different patients in terms of the clinical status, which was defined based on functional status and stage of the disease.

After collecting the data, descriptive statistics such as frequency, percentage, mean, standard deviation (SD), median, and interquartile range (IR) were used to present the data. In order to analyze the data, inferential tests such as Pearson correlation, independent t-test, ANOVA, and multiple regression by stepwise method were performed in SPSS statistical software version 22. The significance level was considered $P < 0.05$.

4. Results

The mean age of the patients was 47.52 (SD:10.26) years. Most patients (60%) were between 41 and 59 years old, with a minimum age of 25 years and a maximum age of 72 years. The highest expenses for treatment (median = 3000000, IR = 3875000) were between 3000000 and 7499000 Rials (43.9%). The minimum illness duration was 2 months, and the maximum was 120 months. Moreover, the longest duration of illness (median = 12, IR = 17), with 41.1%, was between 21 and 24 months. The mean duration of illness was 19.31 ± 20.63 months. Hybrid interventions (combined surgery, chemotherapy, and radiotherapy) with 84.4% were the most utilized interventions in patients. Most patients were married (86.7%), had a diploma (37.4%), lived in the city (88.3%), had social security insurance (54.4%), did not have supplemental insurance (53.3%), were unemployed (88.3%), and had no family history of BC (73.9%). Other information on the patients is reported in Table 1.

According to the findings, the mean score of overall QoL in patients was relatively desirable (59.58 ± 20.55). In the functional domain, the lowest mean scores were related to the body image (38.99 ± 31.42), sexual function (16.53 ± 22.04), and sexual pleasure (10.27 ± 20.42) dimensions, and in other dimensions, scores were above 50. The highest mean score in the functional field was observed in the social dimension (80.74 ± 25.85). All dimensions in the functional field had a significant relationship with QoL ($P > 0.05$). The score of the body image and future perspective dimensions were inversely related to QoL, but other dimensions directly correlated with QoL. In the dimension of symptoms, financial difficulties (60.37 ± 31.34) and diarrhea (6.23 ± 16.28) obtained the highest and lowest mean scores, respectively. In this dimension, diarrhea ($P = 0.41$) and dyspnea ($P = 0.11$)

Table 1. Socio-demographic and Clinical Characteristics of Breast Cancer Patients in Khuzestan Province, Iran (N = 180)

Variables	Frequency (%)
Age, y	
≤ 40	47 (26.1)
41-59	108 (60)
≥ 60	25 (13.9)
Marital status	
Single	24 (13.3)
Married	156 (86.7)
Level of education	
Illiterate	36 (27)
Elementary	50 (27.8)
Diploma	62 (37.4)
University degree	32 (17.8)
Residence	
Rural	21 (11.7)
Urban	159 (88.3)
Type of insurance	
Social security	98 (54.4)
Healthcare service	25 (13.9)
Armed forces	8 (4.4)
Rural	14 (7.8)
Other	35 (19.4)
Supplemental insurance	
Yes	84 (46.7)
No	96 (53.3)
Employment status	
Employed	21 (11.7)
Unemployed	159 (88.3)
Disease expenses (Rials)	
<3000000	72 (40)
3000000-7499000	79 (43.9)
≥7500000	29 (16.1)
Family history	
Yes	47 (26.1)
No	133 (73.9)
Illness duration, mo	
<12	71 (39.4)
12-24	74 (41.1)
≥25	35 (19.4)
Type of therapeutic intervention	
Surgery	5 (2.8)
Chemotherapy	16 (8.9)
Radiotherapy	7 (3.9)
Hybrid	152 (84.4)

domains were not related to QoL, but other symptoms had a significant and inverse relationship with the QoL score ($P < 0.05$). As symptoms intensified, the QoL of the patients decreased (Table 2). The mean global score for the functional scale and symptoms were as follows: physical functioning (74.5), role-playing (67.2), emotional functioning (63.2), perceptual-cognitive performance (74.2), social functioning (76.3), body image (72.3), sexual function (45.2), sexual pleasure (45.7), future perspective (50.6), fatigue (31.4), nausea (22.5), pain (31.2), dyspnea (21.6), insomnia (34.5), appetite loss (25.3), constipation (27.6), diarrhea (21.6), financial difficulties (37.2), arm symptoms (30.5), breast symptoms (31.7), treatment complications (33.9), and hair loss (44.7) (23). The mean global scores provide a reference for comparing functional scales and symptoms and predict their association with the QoL of patients.

There was a significant difference in the mean score of overall QoL between different categories of education level ($P = 0.01$), residence ($P = 0.02$), supplemental insurance ($P = 0.02$), employment status ($P = 0.02$), and duration of illness ($P = 0.02$). Hence, QoL increased with an increase in the level of education, living in the city, having supplemental insurance, being employed, and a longer duration from diagnosis. No significant relationship was found between other variables and the mean score of QoL ($P > 0.05$).

The results showed that compared with the control group, the mean QoL score was higher in the age group of ≤ 40 years (61.15 ± 21.32), being married (59.93 ± 20.94), holding university degrees (69.62 ± 19.17), living in the city (60.87 ± 21.11), having health service insurance (67.04 ± 19.38), having supplemental insurance (63.27 ± 20.20), being employed (69.43 ± 18.63), paying less than 3 million Rials illness expenses (61.26 ± 21.08), having no family history (59.68 ± 20.55), time passed from diagnosis ≥ 25 months (67.26 ± 22.28), and undergoing surgical interventions (73.00 ± 19.08) (Table 3).

The results of multiple linear regression showed that emotional functioning ($P < 0.001$), breast symptoms ($P < 0.001$), and appetite loss ($P = 0.03$) were strongly correlated with QoL in patients with BC. Considering the value of B, one unit increase in emotional functioning increased QoL by 0.27. Also, one unit increase in breast symptoms and appetite loss decreased QoL in BC patients by -0.28 and -0.12, respectively (Table 4).

5. Discussion

This study aimed to divulge the factors associated with HRQoL in BC patients in Khuzestan province, Iran, using specific (EORTC QLQ-BR23) and general (EORTC QLQ-C30) instruments designed for BC. In this study, the patients'

Table 2. The Scores of Different Functional Domains, Symptoms, and Their Relationship with Quality of Life in Patients with Breast Cancer in Khuzestan Province, Iran

Domains and Dimensions	Mean ± SD	Min	Max	P-Value	Correlation Coefficient (r)
Functions					
Physical	62.85 ± 16.08	20	100	<0.001	0.31 ^a
Role-playing	61.67 ± 23.45	0	100	<0.001	0.27 ^a
Emotional	50.66 ± 24.17	0	100	<0.001	0.38 ^a
Perceptual-cognitive	79.68 ± 21.1	16	100	0.01	0.20 ^a
Social	80.74 ± 25.85	0	100	<0.001	0.30 ^a
Body image	38.99 ± 31.42	0	100	<0.001	-0.22 ^a
Sexual function	16.53 ± 22.04	0	66	0.02	0.17 ^b
Sexual pleasure	10.27 ± 20.42	0	66	0.02	0.17 ^b
Future perspective	66.94 ± 33.74	0	100	<0.001	-0.24 ^a
Symptoms					
Fatigue	43.76 ± 20.91	0	100	<0.001	-0.22 ^a
Nausea	12.57 ± 19.27	0	100	0.02	-0.18 ^b
Pain	42.88 ± 20.49	0	83	<0.001	-0.28 ^a
Dyspnea	12.85 ± 21.68	0	100	0.11	0.12
Insomnia	33.80 ± 32.28	0	100	0.03	-0.16 ^b
Appetite loss	22.02 ± 27.08	0	100	<0.001	-0.28 ^a
Constipation	17.58 ± 27.42	0	100	0.06	-0.14
Diarrhea	6.23 ± 16.28	0	66	0.41	-0.06
Financial Problems	60.37 ± 31.34	0	100	0.01	-0.20 ^a
Arm symptoms	31.86 ± 21.34	0	100	<0.001	-0.22 ^a
Breast symptoms	20.14 ± 15.42	0	66	<0.001	-0.30 ^a
Treatment complications	39.36 ± 18.05	0	88	<0.001	-0.29 ^a
Hair loss	35.51 ± 41.11	0	100	0.03	-0.16 ^b

^a Correlation is significant at the 0.01 level (2-tailed).

^b Correlation is significant at the 0.05 level (2-tailed).

total QoL score was 59.58. In comparison, the QoL score in BC patients in Ethiopia (1), Malaysia (24), Poland (25), Spain (17), Greece (12), Chinese Taipei (26), Morocco (27), Brazil (28), Morocco (29), and worldwide (23) were reported as 65.5, 69.12, 60.7, 63.1, 63.43, 66.4, 50.00, 77.77, 57.2, and 70.5, respectively. These variabilities may be due to different types of treatments, disease stages, the physical and mental conditions of patients, and differences in patients' socioeconomic and clinical variables.

The results of this study showed that in the functional domain, sexual pleasure scored the lowest (10.27), and social functioning scored the highest (80.74). In a study conducted in Ethiopia (1), the scores of the sexual pleasure, which attained the highest score, and social functioning domains were reported as 85.5 and 68.9, respectively. Caceres et al. (17), in Spain, also showed that sexual pleasure (77.33) and social functioning (76.57) obtained

high scores; sexual functioning had the highest score, and the future perspective domain attained the lowest score. In the present study, sexual functioning had a low score, and the future perspective domain obtained a relatively better score. Maridaki and colleagues (12) in Greece showed that the social functioning score was 68.52. Also, Fouhi et al. (27) in Morocco reported a social functioning score of 75.39. Binotto et al. (28) in Brazil showed that the scores of the social functioning and sexual pleasure domains were 87.38 and 68.89, respectively. Gonzalez et al. (23) showed that the global scores of social functioning and sexual pleasure were 76.3 and 45.7, respectively. Differences in sexual pleasure functional scores could be attributed to spiritual states, the mean age of the population under study, frustration, mental conflicts, the attitudes of the sexual partner, and cultural-social differences. Furthermore, the differences and similarities between the results of

Table 3. Mean and Standard Deviation of Quality of Life Based on Socio-demographic and Clinical Variables in Breast Cancer Patients in Khuzestan Province, Iran

Variables and Classification	Mean \pm SD	Confidence Interval (95%)		P-Value	T or F
		Low	High		
Age, y				0.80	0.22
≤40	61.15 \pm 21.32	54.89	67.40		
41-59	58.80 \pm 20.48	54.89	62.70		
≥60	60.04 \pm 20.04	51.77	68.31		
Marital status				0.57	-0.58
Single	57.33 \pm 18.05	-11.5	6.32		
Married	59.93 \pm 20.94				
Level of education				0.01	3.79
Illiterate	53.69 \pm 16.95	47.96	59.43		
Elementary	58.24 \pm 22.25	51.91	64.56		
Diploma	58.91 \pm 20.37	53.73	64.07		
University degree	69.62 \pm 19.17	62.71	76.54		
Residence				0.02	2.33
Rural	49.86 \pm 12.11	1.71	20.31		
Urban	60.87 \pm 21.11				
Type of insurance				0.14	1.76
Social security	58.72 \pm 21.28	54.46	62.99		
Healthcare services	67.04 \pm 19.38	59.04	75.04		
Armed forces	57.00 \pm 19.05	41.07	72.92		
Rural	49.86 \pm 13.42	42.11	57.60		
Other	61.14 \pm 20.92	53.95	68.33		
Supplemental insurance				0.02	2.28
Yes	63.27 \pm 20.20	0.93	12.91		
No	56.35 \pm 20.43				
Employment status				0.02	2.36
Employed	69.43 \pm 18.63	1.85	20.44		
Unemployed	58.28 \pm 20.50				
Disease expenses (Rials)				0.36	1.03
<3000000	61.26 \pm 21.08	56.31	66.22		
3000000 - 7499000	59.81 \pm 20.36	55.25	64.37		
≥7500000	54.79 \pm 19.69	47.30	62.28		
Family history				0.91	0.11
Yes	59.30 \pm 20.79	-7.29	6.52		
No	59.68 \pm 20.55				
Illness duration, mo				0.02	3.76
<12	59.68 \pm 17.62	55.50	63.85		
21-24	55.86 \pm 21.55	50.87	60.86		
≥25	67.26 \pm 22.28	59.60	74.91		
Type of therapeutic intervention				0.36	1.1
Surgery	73.00 \pm 19.08	49.31	96.69		
Chemotherapy	54.81 \pm 20.67	43.80	65.83		
Radiotherapy	55.57 \pm 20.63	36.49	74.65		
Hybrid	59.83 \pm 20.56	56.53	63.12		

Table 4. Predictors of Quality of Life in Breast Cancer Patients in Khuzestan Province, Iran

Predictor Variables	B	SE	Beta	T	P-Value
Emotional functioning	0.27	0.058	0.32	4.70	<0.001
Breast symptoms	-0.28	0.092	-0.21	-3.01	<0.001
Appetite loss	-0.12	0.053	-0.16	-2.23	0.03

these studies, including ours, regarding social functioning might be caused by social support, social attitudes, and the individual's awareness and knowledge of his/her current situation. In other functional dimensions, other variables that can cause this difference are socioeconomic characteristics, education level, age, and stage of disease.

The findings of this study showed that in the domain of symptoms, financial difficulties (60.37) and diarrhea (6.23) had the highest and lowest scores, respectively. Similarly, financial difficulties obtained a high score (51.6) in Tamam et al.'s study (2), and the score of the diarrhea domain was reported as 45.3. In another study by Caceres et al. (17), the scores for financial difficulties and diarrhea were 16.82 and 8.82, respectively, showing that consistent with our study, they reported a low score for the diarrhea domain. Similar to our study, Getu et al. (1) also reported a high score for financial difficulties (50) and a low score for diarrhea (6.4). Fouhi et al. (27) also declared a high score for financial difficulties (61.90), which was consistent with the results of the present study. Akezaki et al. (30) observed a low score for diarrhea (7.3) dimension, and Binotto et al. (28) also affirmed that diarrhea had the lowest score among other BC symptoms at the beginning of treatment (1.01) and three months afterward (9.09), which was consistent with the results of the present study. Ismaili et al. (29) showed that financial difficulties (54.1) had the highest score in the domain of symptoms, which was consistent with the present study. According to Gonzalez et al. (23), the global scores for financial difficulties and diarrhea were 37.2 and 21.6, respectively. Financial difficulties were the second most common complaint, and diarrhea also had the lowest score among other symptoms. The results of the present study and other studies show that financial difficulties have the highest score and greatly affect BC patients' QoL, which can be solved by cost management and financial support for patients. Among other symptoms, demographic characteristics, lifestyle, nutrition, resilience, physical functioning, and cultural differences can also play a fundamental role; however, in most studies, diarrhea obtained the lowest score. Diarrhea can be caused by the side effects of medications or by the disease itself.

The results of this study showed that there was a significant difference in the mean QoL score between different categories of education level ($P = 0.01$), residence ($P = 0.02$), supplemental insurance ($P = 0.02$), employment status ($P = 0.02$), and duration of the illness ($P = 0.02$), but no significant difference was found regarding the variables of age, marital status, type of insurance, illness expenses, family history, and type of therapeutic interventions ($P > 0.05$). Socha and Sobiech (25) in Poland found no significant difference in the QoL of BC

patients regarding the variables of age and therapeutic interventions, which was consistent with the results of the present study. However, unlike the present study, Socha and Sobiech found no significant association between QoL and the variables of education level, residence, and employment status. Getu et al. (1) in Ethiopia showed that QoL had a significant link with residence but not with age and marital status, which was consistent with the results of our study. A study by Park et al. (31) showed that there was a significant difference in QoL regarding the type of therapeutic interventions, which was not consistent with the results of the present study. However, like our study, Park et al. declared no significant association between QoL and age. Akezaki et al. (30) witnessed a significant correlation between the QoL of BC patients and the duration of the illness, which was consistent with the results of the present study. Konieczny et al. (6) also showed that there was no significant difference in QoL with regard to the variables of age and marital status, which was consistent with the results of the present study. Our observations and those of other studies suggest that socio-demographic, economic, and clinical factors are of paramount importance in determining the QoL of BC patients. Therefore, to improve and enhance the QoL of these patients, appropriate interventions and programs should be executed considering the role and weight of these factors.

The results of multiple linear regression particularly showed that emotional functioning ($P < 0.001$), breast symptoms ($P < 0.001$), and appetite loss ($P = 0.03$), all together, could predict 23% ($R^2 = 0.23$) of changes in the QoL of BC patients. Gayatri et al. (32) in Indonesia showed that emotional functioning and appetite loss were predictors of QoL, which was consistent with the results of the present study. Socha and Sobiech (25) in Poland showed that the variables of marital status, physical activity, depression, obesity, chronic comorbidities, living conditions, and pregnancy were the predictors of QoL. Crouch et al. (33) in the United States declared that age, education, number of comorbidities, and mental status were the predictors of QoL in BC patients. Chow et al. (34) in Singapore showed that age, education level, and type of treatment could predict QoL. Akezaki et al. (30) also showed that the type of therapeutic intervention and arm symptoms were the most important predictors of QoL in BC patients. Mohlin et al. (35) demonstrated that physical functioning, physical condition, pain, general health, social functioning, emotional role, mental health, and well-being were the most important predictors of QoL in women with BC. Comparing the results of this study with those of other studies, one can argue that socio-demographic, economic, and clinical factors

can reliably predict QoL in BC patients. Also, based on the results of our study, like other studies, functional, symptomatic, and psychological dimensions were the most prominent predictors. Therefore, the QoL of these patients can be improved by implementing appropriate interventions to address functional dimensions, symptoms, and psychological performance. Identification and analysis of relevant predictors of QoL help physicians and healthcare providers recognize patients who are at risk of low QoL. Thus, restoring the balance between these factors through suitable interventions can improve the patient's QoL (28, 36).

This study had some limitations and strengths. This study was conducted with a cross-sectional design, and it was not possible to measure changes in QoL during different stages of the disease due to difficulties in access to patients secondary to their physical and mental conditions. This study was conducted on a relatively small population. Data were collected through self-reporting instruments, and yet another limitation of this study included the cultural and ethnic differences between the participants. On the other hand, one of the strengths of this study was the use of general and specific BC questionnaires, sampling from all BC treatment centers in Khuzestan, and analyzing a variety of demographic-social and clinical variables.

5.1. Conclusions

Quality of life is an important patient-related outcome that provides insights into disease burden and is useful for patient empowerment, interpretation of clinical results, and decision-making about the treatment (32). The QoL of BC patients can be improved and maintained by implementing appropriate strategies such as avoiding social restrictions and increasing social support (14), offering comprehensive oncology services or palliative care (32), regular monitoring to identify women at risk of poor HRQOL (37), implementing appropriate national policies (8), providing sufficient social and psychological support (38), holding self-care training programs (39), delivering spiritual and acceptance-based therapies (40), managing and relieving stress (18), managing treatment duration (41), improving resilience (35) and giving financial support (29). Finally, the present study identified several factors to be associated with HRQOL in women with BC. Our results can be used to develop and implement policies to improve the QoL of women with BC. Healthcare systems can improve the QoL of BC patients using targeted interventions to address QoL-related factors, especially socio-demographic, economic, clinical, and functional factors, as well as the symptoms of the disease.

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Footnotes

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References

1. Getu MA, Chen C, Wang P, Kantelhardt EJ, Addissie A. Quality of life and its influencing factors among breast cancer patients at Tikur Anbessa specialised hospital, Addis Ababa, Ethiopia. *BMC Cancer*. 2022;22(1):897. [PubMed ID: 35978281]. [PubMed Central ID: PMC9382842]. <https://doi.org/10.1186/s12885-022-09921-6>.
2. Tamam N, Al-Mugren KS, Alrebdi HI, Sulieman A, Abdelbasset WK. Evaluating the Quality of Life and Sleep Quality in Saudi Women with Breast Cancer-Related Lymphedema: A Cross-Sectional Correlational Study. *Integr Cancer Ther*. 2021;20:15347354211046200. [PubMed ID: 34541909]. [PubMed Central ID: PMC8450611]. <https://doi.org/10.1177/15347354211046192>.
3. Yusoff J, Ismail A, Abd Manaf MR, Ismail F, Abdullah N, Muhammad R, et al. Quality of life of women with breast cancer in a tertiary referral university hospital. *Health Qual Life Outcomes*. 2022;20(1):15. [PubMed ID: 35093066]. [PubMed Central ID: PMC8800330]. <https://doi.org/10.1186/s12955-022-01921-1>.
4. Azam M, Aslam M, Basharat J, Mughal MA, Nadeem MS, Anwar F. An empirical study on quality of life and related factors of Pakistani breast cancer survivors. *Sci Rep*. 2021;11(1):24391. [PubMed ID: 34937873]. [PubMed Central ID: PMC8695584]. <https://doi.org/10.1038/s41598-021-03696-9>.
5. Phoosuwan N, Lundberg PC. Psychological distress and health-related quality of life among women with breast cancer: a descriptive cross-sectional study. *Support Care Cancer*. 2022;30(4):3177-86. [PubMed ID: 34950961]. [PubMed Central ID: PMC8857009]. <https://doi.org/10.1007/s00520-021-06763-z>.

6. Konieczny M, Cipora E, Sygit K, Fal A. Quality of Life of Women with Breast Cancer and Socio-Demographic Factors. *Asian Pac J Cancer Prev*. 2020;**21**(1):185–93. [PubMed ID: 31983183]. [PubMed Central ID: PMC7294011]. <https://doi.org/10.31557/APJCP.2020.21.1.185>.
7. Yeganeh Z, Sheikhan Z, Kariman N, Hajian P, Nasiri M. [Is gestational diabetes related to breast cancer: a case-control study]. *Iran J Obstet Gynecol Infertil*. 2022;**25**(2):60–6. Persian.
8. Haghghat S, Omidi Z, Ghanbari-Motlagh A. Trend of Breast Cancer Incidence in Iran During A Fifteen-Year Interval According To National Cancer Registry Reports. *Iran J Breast Dis*. 2022;**15**(2):4–17. <https://doi.org/10.30699/ijbd.15.2.4>.
9. WHOQOL: Measuring Quality of Life. World Health Organization; 2020. Available from: <https://www.who.int/healthinfo/survey/whoqol-qualityoflife/en/>.
10. Koboto DD, Deribe B, Gebretsadik A, Ababi G, Bogale N, Geleta D, et al. Quality of Life Among Breast Cancer Patients Attending Hawassa University Comprehensive Specialized Hospital Cancer Treatment Center. *Breast Cancer (Dove Med Press)*. 2020;**12**:87–95. [PubMed ID: 32636670]. [PubMed Central ID: PMC7335303]. <https://doi.org/10.2147/BCTT.S252030>.
11. Kalhor M, Fathi M, Ghaderi B, Roshani D, Ozairi S, Rashidi K. Effect of Five A Model Self-management on Quality of Life in Patients with Breast Cancer. *Avicenna J Nurs Midwifery Care*. 2019;**27**(4):269–80. <https://doi.org/10.30699/ajnm.27.4.269>.
12. Maridaki M, Papadopetraki A, Karagianni H, Koutsilieris M, Philippou A. The Assessment and Relationship Between Quality of Life and Physical Activity Levels in Greek Breast Cancer Female Patients under Chemotherapy. *Sports (Basel)*. 2020;**8**(3). [PubMed ID: 32168786]. [PubMed Central ID: PMC7183086]. <https://doi.org/10.3390/sports8030032>.
13. El Haidari R, Abbas LA, Nerich V, Anota A. Factors Associated with Health-Related Quality of Life in Women with Breast Cancer in the Middle East: A Systematic Review. *Cancers (Basel)*. 2020;**12**(3). [PubMed ID: 32187972]. [PubMed Central ID: PMC7140018]. <https://doi.org/10.3390/cancers12030696>.
14. Cui C, Wang L, Wang X. Health-related quality of life and social constraints among Chinese breast cancer patients: a cross-sectional study. *Health Qual Life Outcomes*. 2021;**19**(1):238. [PubMed ID: 34641883]. [PubMed Central ID: PMC8507183]. <https://doi.org/10.1186/s12955-021-01871-0>.
15. da Silva JGB, Costa DT, Cavalcanti IDL, de Britto Lira Nogueira MC, Oliveira DAL. Quality of life in women with breast cancer treated at a radiotherapy centre in Caruaru, Pernambuco, Brazil. *Can Oncol Nurs J*. 2022;**32**(2):162–71. [PubMed ID: 35582247]. [PubMed Central ID: PMC9040781]. <https://doi.org/10.5737/23688076322162171>.
16. Gadisa DA, Gebremariam ET, Ali GY. Reliability and validity of Amharic version of EORTC QLQ-C30 and QLQ-BR23 modules for assessing health-related quality of life among breast cancer patients in Ethiopia. *Health Qual Life Outcomes*. 2019;**17**(1):182. [PubMed ID: 31830992]. [PubMed Central ID: PMC6909579]. <https://doi.org/10.1186/s12955-019-1257-z>.
17. Caceres MC, Nadal-Delgado M, Lopez-Jurado C, Perez-Civantos D, Guerrero-Martin J, Duran-Gomez N. Factors Related to Anxiety, Depressive Symptoms and Quality of Life in Breast Cancer. *Int J Environ Res Public Health*. 2022;**19**(6). [PubMed ID: 35329232]. [PubMed Central ID: PMC8955820]. <https://doi.org/10.3390/ijerph19063547>.
18. Safarzadeh A, Shafie F, Ahmadvand Z. Effectiveness of Stress Management and Relaxation Training in Reducing Negative Affect and Improving Quality of Life of Women with Breast Cancer. *J Zabul Med Sch*. 2022. <https://doi.org/10.18502/jzms.v5i1.10322>.
19. Jassim G, AlAnsari A. Reliability and Validity of the Arabic Version of the EORTC QLQ-C30 and QLQ-BR23 Questionnaires. *Neuropsychiatr Dis Treat*. 2020;**16**:3045–52. [PubMed ID: 33335396]. [PubMed Central ID: PMC7737941]. <https://doi.org/10.2147/NDT.S263190>.
20. Safaee A, Moghim Dehkordi B. Validation study of a quality of life (QOL) questionnaire for use in Iran. *Asian Pac J Cancer Prev*. 2007;**8**(4):543–6.
21. Safaee A, Moghimi-Dehkordi B, Zeighami B, Tabatabaee H, Pourhoseingholi M. Predictors of quality of life in breast cancer patients under chemotherapy. *Indian J Cancer*. 2008;**45**(3):107–11. [PubMed ID: 19018114]. <https://doi.org/10.4103/0019-509x.44066>.
22. Montazeri A, Harirchi I, Vahdani M, Khaleghi F, Jarvandi S, Ebrahimi M, et al. The EORTC breast cancer-specific quality of life questionnaire (EORTC QLQ-BR23): translation and validation study of the Iranian version. *Qual Life Res*. 2000;**9**(2):177–84. [PubMed ID: 10983481]. <https://doi.org/10.1023/a:1008918310251>.
23. Gonzalez L, Bardach A, Palacios A, Peckaitis C, Ciapponi A, Pichon-Riviere A, et al. Health-Related Quality of Life in Patients with Breast Cancer in Latin America and the Caribbean: A Systematic Review and Meta-Analysis. *Oncologist*. 2021;**26**(5):e794–806. [PubMed ID: 33554426]. [PubMed Central ID: PMC8100549]. <https://doi.org/10.1002/onco.13709>.
24. Lu Shin KN, Mun CY, Shariff ZM. Nutrition Indicators, Physical Function, and Health-Related Quality of Life in Breast Cancer Patients. *Asian Pac J Cancer Prev*. 2020;**21**(7):1939–50. [PubMed ID: 3271419]. [PubMed Central ID: PMC7573431]. <https://doi.org/10.31557/APJCP.2020.21.7.1939>.
25. Socha M, Sobiech KA. Socio-Demographic and General Health Factors Associated with Quality of Life in Long-Term Breast Cancer Survivors from Southwestern Poland. *Int J Environ Res Public Health*. 2021;**18**(17). [PubMed ID: 34501909]. [PubMed Central ID: PMC8430910]. <https://doi.org/10.3390/ijerph18179321>.
26. Chin CH, Tseng LM, Chao TC, Wang TJ, Wu SF, Liang SY. Self-care as a mediator between symptom-management self-efficacy and quality of life in women with breast cancer. *PLoS One*. 2021;**16**(2). e0246430. [PubMed ID: 33539460]. [PubMed Central ID: PMC7861359]. <https://doi.org/10.1371/journal.pone.0246430>.
27. Foughi ME, Rahou BH, Mesfioui A, Benider A. Quality of life and epidemiological profile of male breast cancer treated at the university hospital of Casablanca, Morocco. *Pan Afr Med J*. 2022;**41**:127. [PubMed ID: 35480411]. [PubMed Central ID: PMC9011913]. <https://doi.org/10.11604/pamj.2022.41.127.28319>.
28. Binotto M, Reinert T, Werutsky G, Zaffaroni F, Schwartsmann G. Health-related quality of life before and during chemotherapy in patients with early-stage breast cancer. *Ecancermedicalscience*. 2020;**14**:1007. [PubMed ID: 32104209]. [PubMed Central ID: PMC7039692]. <https://doi.org/10.3332/ecancer.2020.1007>.
29. Ismaili R, Loukili L, Mimouni H, Haouachim IE, Hilali A, Haddou Rahou B, et al. The Impact of Socioeconomic Determinants on the Quality of Life of Moroccan Breast Cancer Survivors Diagnosed Two Years Earlier at the National Institute of Oncology in Rabat. *Obstet Gynecol Int*. 2021;**2021**:9920007. [PubMed ID: 34257668]. [PubMed Central ID: PMC8249154]. <https://doi.org/10.1155/2021/9920007>.
30. Akezaki Y, Nakata E, Kikuuchi M, Tominaga R, Kurokawa H, Okamoto M, et al. Investigation of Factors Affecting Early Quality of Life of Patients after Breast Cancer Surgery. *Healthcare (Basel)*. 2021;**9**(2). [PubMed ID: 33669376]. [PubMed Central ID: PMC7920245]. <https://doi.org/10.3390/healthcare9020213>.
31. Park JH, Jung YS, Kim JY, Bae SH. Determinants of quality of life in women immediately following the completion of primary treatment of breast cancer: A cross-sectional study. *PLoS One*. 2021;**16**(10). e0258447. [PubMed ID: 34653187]. [PubMed Central ID: PMC8519416]. <https://doi.org/10.1371/journal.pone.0258447>.
32. Gayatri D, Efreimov L, Mikolajczyk R, Kantelhardt EJ. Quality of Life Assessment and Pain Severity in Breast Cancer Patients Prior to Palliative Oncology Treatment in Indonesia: A Cross-Sectional Study. *Patient Prefer Adherence*. 2021;**15**:2017–26. [PubMed ID: 34548783]. [PubMed Central ID: PMC8449683]. <https://doi.org/10.2147/PPA.S320972>.
33. Crouch A, Champion VL, Von Ah D. Comorbidity, cognitive dysfunction, physical functioning, and quality of life in older

- breast cancer survivors. *Support Care Cancer*. 2022;**30**(1):359-66. [PubMed ID: 34287690]. [PubMed Central ID: PMC8636409]. <https://doi.org/10.1007/s00520-021-06427-y>.
34. Chow WL, Tan SM, Aung KCY, Chua SYN, Sim HC. Factors influencing quality of life of Asian breast cancer patients and their caregivers at diagnosis: perceived medical and psychosocial needs. *Singapore Med J*. 2020;**61**(10):532-9. [PubMed ID: 31423539]. [PubMed Central ID: PMC7930309]. <https://doi.org/10.11622/smedj.2019099>.
35. Mohlin A, Bendahl PO, Hegardt C, Richter C, Hallberg IR, Ryden L. Psychological Resilience and Health-Related Quality of Life in 418 Swedish Women with Primary Breast Cancer: Results from a Prospective Longitudinal Study. *Cancers (Basel)*. 2021;**13**(9). [PubMed ID: 34066499]. [PubMed Central ID: PMC8125618]. <https://doi.org/10.3390/cancers13092233>.
36. Zheng C, Yu LX, Jia HY, Cui SD, Tian FG, Fan ZM, et al. Relationship Between Lifestyle Habits and Health-Related Quality of Life of Recently Diagnosed Breast Cancer Patients: A Comparison Between Younger and Older Women in China. *Front Public Health*. 2021;**9**:767151. [PubMed ID: 34976926]. [PubMed Central ID: PMC8714764]. <https://doi.org/10.3389/fpubh.2021.767151>.
37. Fernandez de Larrea-Baz N, Perez-Gomez B, Guerrero-Zotano A, Casas AM, Bermejo B, Baena-Canada JM, et al. Primary breast cancer and health related quality of life in Spanish women: The EpiGEICAM case-control study. *Sci Rep*. 2020;**10**(1):7741. [PubMed ID: 32385335]. [PubMed Central ID: PMC7211017]. <https://doi.org/10.1038/s41598-020-63637-w>.
38. Alquraan L, Alzoubi KH, Rababa'h S, Karasneh R, Al-Azzam S, Al-Azayzih A. Prevalence of Depression and the Quality-of-Life of Breast Cancer Patients in Jordan. *J Multidiscip Healthc*. 2020;**13**:1455-62. [PubMed ID: 33177831]. [PubMed Central ID: PMC7650018]. <https://doi.org/10.2147/JMDH.S277243>.
39. Mahinfar K, Sadooghiasl A, Kazemnejad A. [The effect of self-care program on quality of life of women with Breast Cancer having mastectomy]. *Iran J Nurs Res*. 2021;**16**(2):11-22. Persian.
40. Mohammadzadeh S, Khalatbari J, Ahadi H, Hatami HR. [Comparison of the effectiveness of acceptance and commitment-based therapy, cognitive-behavioral therapy and spiritual therapy on perceived stress, body image and the quality of life of women with breast cancer]. *Thoughts Behav Clin Psychol*. 2020;**15**(55):7-16. Persian.
41. Marcelo Castro EI, Lucia Penteado Lancellotti C. Health-Related Quality of Life in Women with Breast Cancer Undergoing Chemotherapy in Brazil. *Int J Gen Med*. 2021;**14**:10265-70. [PubMed ID: 34992441]. [PubMed Central ID: PMC8711561]. <https://doi.org/10.2147/IJGM.S343804>.