

An assessment of reliability and validity of the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire C30 among breast cancer patients in Qatar

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ABSTRACT

Introduction: Breast cancer has been the most common cancer type that affects women worldwide and subsequent treatment is often associated with considerable psychological and quality of life (QoL). **Aim:** This study aimed to assess psychometric properties of the Arabic version of the European Organization for Research and Treatment of Cancer (EORTC) general QoL questionnaire (QLQ-C30) for breast cancer patients in Qatar. **Materials and Methods:** This is a cross-sectional hospital-based study conducted on 678 breast cancer patients using Arabic version of the EORTC QLQ-C30 tool. **Results:** The mean age of women was 47.7 ± 10.2 years and 33.4% of women had consanguineous parents. Six subscales out of the nine met the standards of reliability with coefficients ranging from 0.55 to 0.89. The mean score of all functioning scales was high >55 . Advanced breast cancer stages of III-IV had higher symptomatic scores significantly than those in early stages for the physical function, cognitive, fatigue, insomnia, appetite loss, constipation, and financial difficulties. Correlation coefficients between each item ranged from -0.113 to 0.960, and item 21 (tense) and item 23 (irritable) had strongest negative correlations with their corresponding emotional functioning subscale, whereas items 29 (physical condition) and 30 (overall QoL) had the strongest positive correlation with Global Health/QoL subscale. Item 6 (limited work) showed a higher correlation with fatigue ($r = 0.749$). Likewise, item 19 (pain interfered with daily activities) of the pain subscale had higher correlations with physical functioning, role functioning, and fatigue subscales. **Conclusion:** Qatari Arabic version of the EORTC QLQ-C30 showed acceptable psychometric properties, which is a reliable and valid instrument, that can be used by oncologists.

Keywords: European Organization for Research and Treatment of Cancer and Quality of Life Questionnaire-C30, functional scale, internal consistency, oncology, quality of life, symptom scale, women

Introduction

Breast cancer is one of the most common and important health problems of women in developed and developing countries and

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accounts for almost 30% of all cancer types among women.^[1,2] As for Qatar, breast cancer has been the most common cancer type that affects women and in the majority of developed and developing countries.^[3] Cancer is one of the most common causes of death worldwide, accounting for 7.6 million deaths in 2008,^[1] and it has been estimated that this number will rise to 11 million in 2030. The breast cancer mortality rate is also expected to rise significantly in developed and in developing countries.^[4] Breast cancer is one of the most frequent causes of morbidity and mortality among women in the world and receiving a diagnosis of cancer is extremely stressful and depressive.^[5] Breast cancer can have major adverse psychological, social, psychosocial, physical, and economic consequences for both the individuals with the illness and their families.^[5] Psychological distress is frequently observed in cancer patients during the clinical course of this disease. The prevalence of psychiatric disorders following a primary diagnosis of cancer has been reported to range from 14% to 38%, and the feeling of depression is a common psychiatric disorder in cancer patients.^[5,6] An extensive literature review has shown that nearly a third to a half of female breast cancer patients are likely to experience psychological distress,^[7] and up to one-third suffer from psychological morbidity, such as anxiety or depression.^[5,8]

The diagnosis and subsequent treatment of cancer is often associated with considerable psychological and social difficulties for patients. Quality of life (QoL) has become a part of the evaluation criteria for cancer therapy besides the classical biomedical criteria.^[5-7] It is the most frequently used outcome measure in oncology research.^[9] The most commonly used QOL tool in oncology is the European Organization for Research and Treatment of Cancer QoL questionnaire (EORTC QLQ-C30).^[9-11] In Qatar, there is very little information available about the QoL of cancer patients.^[5] The EORTC QLQ-C30 is a questionnaire used to assess the QoL in breast cancer patients. The QLQ-C30 questionnaire has been used worldwide. It has been translated to over 55 languages^[11] and its psychometric properties have been studied in different cultures.^[11-13] The aim of this study was to assess the psychometric properties of the Arabic version of the EORTC general QLQ-C30 for breast cancer patients in Qatar.

Materials and Methods

In Asian and Arabian Gulf countries, breast cancer is the leading cancer among women,^[1,2] and the increasing morbidity and mortality rates could be due to the late diagnosis of the disease. Qatari patients accounted for 32% of all the breast cancer diagnoses in females aged 40–50 years and 36% of all affected women.^[3,15-17]

This is an observational cohort hospital study based on the National Cancer Disease Registry of Al-Amal hospital, Hamad Medical Corporation. All cancer cases were coded using the International Classification of Diseases-10 (ICD-10) criteria. According to the ICD-10, malignant neoplasms of breast were coded under C50.

A list of 964 eligible breast cancer patients was prepared from the disease registry from December 2012 to June 2015 who could be contacted. From the list, 678 breast cancer patients agreed to take part in this study, thus a response rate of 68.1%. Meanwhile, 317 women either refused or were not available to take part in the study due to personal reasons and lack of time. The data of sociodemographic information, type of consanguinity, menopause status, medical history, lifestyle habits, and dietary intake were collected using a questionnaire. The anthropometric measures of the studied patients were collected and measured by qualified and well-trained nurses. Height and weight were measured using standardized methods. Body mass index was calculated as weight in kilograms divided by height in meter squared.

Questionnaire

The EORTC QLQ-C30^[12-15] is a 30-item questionnaire composed of five functional subscales (physical, role, cognitive, emotional, and social), three symptom scales (fatigue, pain, and nausea and vomiting), and a Global Health (GH) Status and QoL scale.^[10] The remaining five single items assess symptoms commonly reported by cancer patients (dyspnea, insomnia, appetite loss, constipation, and diarrhea).^[18] Scores of subscales are calculated based on the scoring manual of the instrument. All subscale scores range from 0 to 100, where high scores represent better levels of functioning, in contrast to symptom scales, where higher scores indicate higher levels of problems.^[12,13]

The study was approved by the Research Ethics Committee of Hamad General Hospital, Hamad Medical Corporation, and conducted in accordance with the Declaration of Helsinki. All the individuals who agreed to participate in this study gave their informed consent prior to their inclusion in the study.

The data were analyzed using the Statistical Package for the Social Sciences (IBM SPSS Statistics for Windows, Version 22.0. IBM Corp., Armonk, NY). Reliability (internal consistency) of the questionnaire was tested by Cronbach's alpha coefficient and the acceptable value to be met was >0.70. Multitrait scaling analysis was used for evaluating item convergent and discriminant validity. In addition, convergent validity was predicted if the correlation value of an item with its own scale was >0.40 and discriminant validity was predicted if the correlation of an item with its own scale was higher than that with other scales. Meanwhile, construct validity was evaluated under the hypothesis that the QLQ-C30 subscales correlated with each other (acceptable correlation coefficients were >0.40) and by known-groups comparisons analyzing the correlation between subgroups of patients differing in disease stage and education level. Student's *t*-test was used to ascertain the significance of differences between the mean values of two continuous variables and it was confirmed by nonparametric Mann–Whitney test. Chi-square and Fisher's exact tests were performed to test for differences in proportions of categorical variables between two or more groups. One Way Analysis of variance (ANOVA) and non-parametric statistical method the Kruskal-Wallis one way analysis of variance were

employed for comparison of several group means and to determine the presence of significant differences between group means. The Spearman rank correlation coefficient was used to evaluate the strength association between two variables. The level $P < 0.05$ was considered as the cutoff value for significance.

Results

Table 1 shows the sociodemographic characteristics of the breast cancer patients ($n = 678$). The mean age of the studied women was 47.7 ± 10.2 years. Among the studied patients,

34.7% were Qataris and 65.3% were Arab expatriates. Nearly 43% of the patients were in premenopausal status and 57% in postmenopausal status. About 86.1% of women were married, 14.6% were illiterate women, 20.9% were university graduates, 37.2% were homemakers, and 33.4% of the women had consanguineous parents. Smoking habit was less common in the studied Arab women (9.1%), but shisha smoking was more common (17.7%).

Table 2 presents the lifestyle and clinical characteristics of the study sample. Daily physical activity was less practiced among women during hot climates, only 25.7% walked 30 min per day and 14% walked 60 min per day. Breastfeeding was practiced among 67.7% of women and over 73% were considered overweight and obese. Furthermore, over 75% of breast cancer

Table 1: Sociodemographic characteristics of breast cancer patients (n=762)

	n (%)
Age groups, mean±SD (range)	47.7±10.2 (19-75)
<35	71 (9.3)
35-44	275 (36.1)
45-55	253 (33.2)
≥55	163 (21.4)
Ethnicity	
Qatari	254 (33.5)
Other Arabs	508 (66.7)
Age of menarche (years)	
<12	126 (16.5)
12-14	519 (68.1)
>14	117 (15.4)
Menopausal	
Premenopausal (nonmenopause)	328 (43.0)
Postmenopausal (menopause)	434 (57.0)
Marital status	
Single	48 (6.2)
Married	714 (93.8)
Education level	
Illiterate	105 (13.8)
Primary	115 (15.1)
Intermediate	137 (18.0)
Secondary	212 (27.8)
University or higher	193 (25.3)
Occupation	
Homemaker	259 (34.0)
Sedentary/teacher	263 (34.5)
Clerk/officer/administrator	170 (22.3)
Businesswomen	70 (9.2)
Household income	
<\$4000	277 (36.3)
\$4000-6000	214 (28.1)
>\$6000	271 (35.6)
Consanguinity	
Yes	258 (33.9)
No	504 (66.1)
Smoking	
Yes	62 (9.1)
No	616 (90.9)
Shisha smoking	
Yes	120 (17.7)
No	558 (82.3)

SD: Standard deviation

Table 2: Lifestyle and clinical characteristics of the study sample (n=762)

Variables	Frequency, n (%)
Physical activity (walking per day)	
30 min	236 (31.0)
60 min	200 (26.2)
None	326 (42.8)
Parity	
<3 children	525 (68.9)
>3 children	2237 (31.1)
Breastfeeding	
Yes	525 (67.7)
No	219 (32.3)
BMI group (kg/m ²)	
20-24.99 (normal)	211 (27.7)
25-30 (overweight)	317 (41.6)
>30 (obese)	234 (30.7)
Birth control pills	
Yes	142 (18.6)
No	620 (81.4)
First-degree family history of cancer	
Yes	96 (12.6)
No	666 (87.4)
Illness duration in years	
1-2	189 (24.8)
3-4	316 (41.5)
≥5	257 (33.7)
Stage of cancer	
Stage I	106 (13.9)
Stage II	321 (42.1)
Stage III	274 (36.0)
Stage IV	61 (8.0)
Treatment modality*	
Mastectomy	377 (49.4)
Lumpectomy	412 (50.6)
Chemotherapy	592 (81)
Radiotherapy	564 (84)
Hormonal therapy	
Tamoxifen	252 (33.1)
Aromatases	163 (21.4)
None	347 (45.5)

*Multiple choice. BMI: Body mass index

women were at the Stage 3 (40.9%) and Stage 4 (35.8%) of the disease. The percentage of patients who underwent mastectomy and lumpectomy was 49.3% and 50.7%, respectively.

Reliability

Table 3 shows the Cronbach's alpha coefficients and the mean scores of the subscales. Six subscales out of the nine met the standards of reliability with coefficients ranging from

0.55 to 0.89. Cognitive subscale had the lowest alpha value of 0.55, indicating an adequate scale reliability. The mean score of all functioning scales was >55, thus indicating a higher level of functioning. Similarly, the mean scores of symptom scales were found to be <50, thus representing less symptomatology and problems with the exception of the financial impact.

Table 3: Mean scores and internal consistency of each subscale/item of European Organization for Research and Treatment of Cancer Quality of Life Questionnaire-C30 among breast cancer patients (n=762)

Variables	Item number	Mean±SD	Cronbach's α coefficients [†]
Functioning scale*			
Physical functioning	1-5	79.3±17.9	0.81
Role functioning	6-7	65.2±25.5	0.84
Emotional functioning	21, 22, 23, 24	62.5±27.5	0.86
Cognitive functioning	20, 25	86.2±20.2	0.55
Social functioning	26, 27	51.3±28.8	0.81
Global health QoL	29, 30	75.6±22.71	0.89
Fatigue	10, 12, 18	35.5±28.5	0.88
Nausea and vomiting	14, 15	25.3±26.4	0.77
Pain	19, 19	31.5±27.5	0.75
Dyspnea	8	15.7±22.4	
Insomnia/sleep disturbance	11	42.8±30.2	
Appetite loss	13	29.3±26.3	
Constipation	16	22.1±26.8	
Diarrhea	17	16.2±21.2	
Financial impact	28	50.7±39.7	

[†]All values significant at the alpha <0.01 level, *EORTC Cronbach's α coefficient values ≥70 indicate adequate scale reliability. QoL: Quality of life; SD: Standard deviation; EORTC: European Organization for Research and Treatment of Cancer

Table 4 presents summary of the EORTC-C30 subclasses by disease stage among breast cancer patients. As shown in table, findings of known-group comparisons according to the disease stage generally showed that patients with advanced stages of breast cancer (Stages III–IV) had higher symptomatic scores significantly than those in early stages for the physical function, cognitive, fatigue, insomnia, appetite loss, constipation, and financial difficulties.

Multitrait scaling analysis

Table 5 summarizes Pearson's correlation coefficients between each item and its own scales. With the exception of item 5 (help in eating/dressing), all item-scale correlation coefficients exceeded the set value of 0.40, indicating satisfactory convergent validity (96.2%). The correlation coefficients ranged from -0.113 to 0.960. For example, item 21 (tense) and item 23 (irritable) had the strongest negative correlations with their corresponding emotional functioning subscale, whereas items 29 (physical condition) and 30 (overall QoL) had the strongest positive correlation with its corresponding GH/QoL subscale. In terms of discriminant validity, item 6 (limited work) showed a higher correlation with fatigue (r = 0.749) rather than its corresponding role functioning subscale. Likewise, item 19 (pain interfered with daily activities) of the pain subscale had higher correlations with physical functioning, role functioning, and fatigue subscales.

Table 4: Summary of the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire-C30 subclasses by disease stage among breast cancer patients (n=762)

Variables	Disease stage (mean±SD)				ANOVA (P) significance
	Stage I (n)	Stage II (n)	Stage III (n)	Stage IV (n)	
Functioning scale [‡]					
Physical functioning	84.2±14.5	79.0±17.7	78.2±17.5	78.5±18.8	0.022
Role functioning	69.2±26.3	67.4±22.8	65.1±22.8	63.9±25.4	0.180
Emotional functioning	65.6±28.6	60.3±25.4	67.4±22.8	65.1±22.8	0.196
Cognitive functioning	90.2±16.4	88.7±20.1	85.1±20.0	80.4±21.6	0.050
Social functioning	53.7±27.9	52.2±29.1	50.8±29.0	44.6±27.8	0.221
Global health QoL	66.4±17.7	63.8±17.5	62.1±16.4	61.8±17.9	0.126
Symptom scale and/or items [§]					
Fatigue	22.3±27.3	34.7±28.7	33.9±27.9	41.2±29.9	0.010
Nausea and vomiting	25.0±26.1	23.8±26.4	26.9±26.6	26.5±25.3	0.547
Pain	31.4±27.6	31.3±27.4	31.5±27.5	32.3±27.5	0.881
Dyspnea	12.5±20.8	15.2±21.3	15.7±22.4	17.7±24.2	0.190
Insomnia/sleep disturbance	22.4±32.3	30.0±24.1	34.9±29.7	42.9±30.4	0.030
Appetite loss	22.9±23.1	26.3±26.7	30.4±27.2	35.0±24.1	0.025
Constipation	12.1±25.8	14.5±26.6	17.6±28.9	22.4±24.3	0.012
Diarrhea	14.7±19.5	14.2±18.7	16.6±21.2	16.6±22.2	0.738
Financial impact	46.1±40.6	48.1±40.6	50.5±39.8	65.0±35.7	0.015

[‡]Scores range from 0 to 100, with a higher score representing a higher level of functioning; [§]Scores range from 0 to 100, with a higher score representing a greater degree of symptoms. QoL: Quality of life; SD: Standard deviation; ANOVA: Analysis of variance

Table 5: Pearson's correlation coefficient between the items and scales in the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire-C30

Item correlations ^a	Physical functioning	Role functioning	Emotional functioning	Cognitive functioning	Social functioning	Global health	Fatigue	Nausea and vomiting	Pain
1. Strenuous activity ^b	-0.696* ^c	-0.390*	-0.175**	-0.470*	0.093	-0.225*	-0.730*	0.025	0.041
2. Short walk	-0.846* ^c	-0.237*	-0.165**	-0.346*	-0.125**	-0.312*	0.150**	-0.162**	0.066
3. Long walk	-0.790* ^c	-0.290*	-0.219*	-0.29*	-0.259*	-0.333*	0.142**	0.251*	0.179**
4. Stay in bed/chair	-0.759* ^c	-0.339*	-0.231*	-0.379*	-0.248*	-0.385*	0.141**	0.248*	0.170**
5. Eating/dressing	-0.589* ^c	-0.135**	-0.137	-0.428*	-0.056	-0.356*	-0.169**	0.149*	-0.120
6. Limited work	-0.391*	-0.745* ^c	-0.382*	-0.212*	-0.403*	-0.367*	0.749*	0.395*	0.162**
7. Limited hobbies	-0.260*	-0.755* ^c	-0.376*	-0.175**	-0.428*	-0.334*	-0.184**	0.406*	0.148**
21. Tense	-0.212*	-0.377*	-0.903* ^c	-0.268*	-0.399*	-0.376*	-0.127	0.321*	0.144**
22. Worried	-0.235*	-0.333*	-0.917* ^c	-0.259*	-0.380*	-0.418*	-0.224*	0.308*	0.145**
23. Irritable	-0.244*	-0.336*	-0.913* ^c	-0.266*	-0.424*	-0.414*	-0.113	0.307*	0.133
24. Depressed	-0.275*	-0.308*	-0.865* ^c	-0.316*	-0.314*	-0.395*	0.188*	0.332*	0.114
20. Concentration	-0.455*	-0.125	-0.243*	-0.878* ^c	-0.122	-0.322*	-0.165**	0.204*	0.130
25. Memory	-0.415*	-0.155**	-0.256*	-0.864* ^c	-0.622*	-0.257*	-0.180*	0.130	0.149**
26. Family life	-0.155**	-0.434*	-0.455*	-0.044	-0.779* ^c	-0.415*	-0.140	0.351*	0.154**
27. Social life	-0.196*	-0.423*	-0.462*	-0.074	-0.788* ^c	-0.470*	-0.157**	0.361*	0.133
29. Physical condition	0.383*	0.311*	0.398*	0.295*	0.396*	0.950* ^c	-0.266*	-0.279*	-0.155**
30. Overall QoL	0.365*	0.270*	0.395*	0.356*	0.394*	0.960* ^c	-0.349*	-0.264*	-0.128
10. Need rest	-0.440*	-0.361*	-0.307*	-0.332*	-0.291*	-0.464*	0.313* ^c	0.310*	0.169**
12. Felt weak	-0.344*	-0.445*	-0.410*	-0.229*	-0.322*	-0.362*	0.339* ^c	0.459*	0.189*
18. Tired	-0.309*	-0.351*	-0.367*	-0.257*	-0.332*	-0.402*	0.343* ^c	0.439*	0.205*
14. Nausea	-0.287*	-0.374*	-0.397*	-0.193*	-0.360*	-0.399*	0.254*	0.741* ^c	0.105
15. Vomiting	-0.256*	-0.388*	-0.374*	-0.108	-0.426*	-0.628*	0.173**	0.717* ^c	0.131
9. Had pain	-0.409*	-0.412*	-0.328*	-0.367*	-0.355*	-0.435*	0.165**	0.314*	0.850* ^c
19. Pain interfered	-0.410*	0.411*	-0.494*	-0.377*	-0.363*	-0.498*	0.138	0.422*	0.840* ^c

^aCorrelation is significant at the 0.001 level (two tailed); ^b**Correlation is significant at the 0.05 level (two tailed); ^cThe item number corresponds to the number of each item in the questionnaire; ^dShort description briefly explains the questions asked in each item of the questionnaire; ^eSpearman's correlation coefficients between the subscales and items within the same subscale (in bold). QoL: Quality of life

Table 6 presents the correlation coefficients among the 16 subscales. All the inter-scale correlation coefficients were statistically significant.

Discussion

The current study was designed to validate the psychometric properties of the Qatari's Arabic EORTC QLQ-C30 in a heterogeneous sample of 762 breast cancer patients in Qatar. For the reliability tests of the new Arabic EORTC QLQ-C30, six subscales out of the nine met the standards of reliability with coefficients ranging from 0.55 to 0.89. Cognitive subscale had the lowest alpha value of 0.55, indicating an adequate scale reliability. The mean score of all functioning scales was >55, thus indicating a higher level of functioning. Similar results were found in other studies reporting for Cronbach's alpha for six subscales.^[19-21]

Multitrait scaling analysis results revealed that all correlation coefficients between an item with its own subscales were >0.40 with the exception of item number 5 ($r = -0.135$), thus successfully supporting convergent validity. A similar finding regarding item number 5 (help in eating/dressing) was reported by Abo Huijer^[19] and Hoopman *et al.*^[22]

To some extent, our results were similar and confirmative in the area of role functioning with other reported studies in Kuwaiti women with breast cancer^[21] and in UAE Awad *et al.*^[20] and

Lebanese patients with breast cancer.^[19] In total, there was 85.6% scaling success with respect to item discrimination which is probably attributed to the heterogeneity of the current Qatari sample in terms of different cancer types compared to studies by Kontodimopoulos *et al.*^[23] that reported 86.5% item discrimination success among Greek patients with breast cancer.

The validity of the Arabic version of the QLQ-C30 was evident by its ability to discriminate between subgroups of patients known to differ in clinical condition. The role function subscale, which measures the effect of the disease on the ability to carry out job and home duties, discriminated well between stages of patients with disease. Results of known-group comparison analysis showed that there were no statistically significant differences between patients differing in disease stage. Our results were compatible with studies that reported that the stage of disease is not associated with QoL. This finding is consistent with previous studies in Western patients with breast cancer.^[23-25] Overall, Qatari Arab women in the current study population reported generally high QoL outcomes and good physical, role, emotional, cognitive, social functioning symptoms, and well-being. These results are confirmative with earlier reported studies in Albania,^[9] Turkey,^[24,25] the UAE,^[20] Lebanon,^[19] Singapore,^[23] Sweden,^[26] and Japan.^[28]

The present study had some limitations. First of all, it is an observational cohort hospital-based study and may not precisely

Table 6: Pearson's correlation coefficient of subscales among the Arabic version of the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire-C30

	QoL	Physical functioning	Role functioning	Emotional functioning	Cognitive functioning	Social functioning	Global health	Fatigue	Nausea and vomiting	Pain	Dyspnea	Insomnia	Appetite loss	Constipation	Diarrhea	Financial impact
QoL	1															
Physical functioning	0.651	1														
Role functioning	0.096	0.284*	1													
Emotional functioning	0.106	0.252*	0.357*	1												
Cognitive functioning	0.342*	0.507*	0.155**	0.288*	1											
Social functioning	-0.090	-0.162**	0.334*	0.408*	0.094	1										
Global health	0.234*	0.393*	0.306*	0.417*	0.342*	-0.416*	1									
Fatigue	0.065	0.889	-0.110	-0.123	0.081	-0.184**	-0.061	1								
Nausea and vomiting	0.074	-0.221*	-0.311*	-0.308*	-0.142	-0.304*	-0.286*	0.116	1							
Pain	0.340*	-0.174**	-0.164**	-0.142	-0.108	-0.162	-0.149	0.99	0.056	1						
Dyspnea	-0.272*	-0.358*	-0.123	-0.201*	-0.378*	-0.280*	-0.187*	-0.007	0.126	0.015	1					
Insomnia	-0.187*	-0.336*	-0.279*	-0.486*	-0.351*	-0.212*	-0.346*	0.004	0.299*	0.103	0.228*	1				
Appetite loss	-0.135	-0.298*	-0.266*	-0.480*	-0.248*	-0.309*	-0.374*	0.310*	0.434*	0.068	-0.164**	0.578*	1			
Constipation	-0.141	-0.276*	-0.140	-0.207*	-0.358*	-0.198*	-0.246*	0.065	0.203*	0.064	0.233*	0.212*	0.294*	1		
Diarrhea	-0.155**	-0.271*	-0.145	-0.204*	-0.282*	-0.205*	-0.237*	0.110	0.262*	0.058	0.205*	-0.241*	0.410*	0.410*	1	
Financial impact	-0.370*	-0.102	-0.296*	-0.260*	0.055	-0.521*	-0.343*	0.150**	0.291*	0.099	-0.043	0.115	0.273*	0.054	0.064	1

*Correlation is significant at the 0.001 level (two tailed); **Correlation is significant at the 0.05 level (two tailed). QoL: Quality of life

assess participants' changes over time accurately. A second limitation of the study is that the EORTC QLQ-C30 was tested only in patients with breast cancer. This questionnaire is applicable to all cancer patients, and the researchers are planning to conduct additional testing on a larger group of Arab patients with different types of malignancies. Another limitation is the absence of intervention, and further study is thus needed to generalize the findings.

Conclusion

The present study indicates that the translated Qatari Arabic version of the psychometric properties of the EORTC QLQ-C30 is a reliable and valid instrument that can be used by Oncologist, clinicians and researchers in Qatar in order to enhance research related to the quality of life of patients diagnosed or living with breast cancer. Given these findings' concordance with our previous analysis, these QLQ-C30 cut-offs could be implemented in clinical practice and their usefulness evaluated.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patients have given their consent for their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

References

- World Health Organization. The Global Burden of Disease. Geneva, Switzerland: WHO Press; 2014. Available from: http://www.who.int/healthinfo/global_burden_disease/. [Last accessed on 2016 Nov 25].
- Globocan cancer fact sheet. Breast Cancer Incidence and Mortality Worldwide in 2017. Available from: <http://www.wcrf.org/int/cancer-facts-figures/worldwide-data>. [Last accessed on 2017 Sep 28].
- Bener A, El Ayoubi HR. The role of Vitamin D deficiency and osteoporosis in breast cancer. *Int J Rheum Dis* 2012;15:554-61.
- Bener A, Zirie MA, Kim EJ, Al Buz R, Zaza M, Al-Nufal M, *et al.* Measuring burden of diseases in a rapidly developing economy: State of Qatar. *Glob J Health Sci* 2012;5:134-44.
- Bener A, Alsulaiman R, Doodson L. Comparison of reliability and validity of breast cancer depression, anxiety stress scales (DASS21) with Beck Depression, inventory-(BDI-III) and hospital anxiety and depression scale (HADS). *Int J Behav Res Psychol* 2016;4:197-203.
- Koopman C, Angell K, Turner-Cobb JM, Kreshka MA, Donnelly P, McCoy R, *et al.* Distress, coping, and social support among rural women recently diagnosed with primary breast cancer. *Breast J* 2001;7:25-33.
- Knobf MT. Psychosocial responses in breast cancer survivors. *Semin Oncol Nurs* 2007;23:71-83.
- Helgeson VS, Snyder P, Seltman H. Psychological and physical adjustment to breast cancer over 4 years: Identifying distinct trajectories of change. *Health Psychol* 2004;23:3-15.
- Shuleta-Qehaja S, Sterjev Z, Shuturkova L. Evaluation of reliability and validity of the European organization for research and treatment of cancer quality of life questionnaire (EORTC QLQ-C30, Albanian version) among breast cancer patients from Kosovo. *Patient Prefer Adherence* 2015;9:459-65.
- Ahn SH, Park BW, Noh DY, Nam SJ, Lee ES, Lee MK, *et al.* Health-related quality of life in disease-free survivors of breast cancer with the general population. *Ann Oncol* 2007;18:173-82.
- Cull A, Sprangers M, Bjordal K, Aaronson N, West K, Bottomley A. Guidelines for Translating EORTC Questionnaires. Brussels, Belgium: Quality of Life Study Group Publications, EORTC Publication; 2002.
- Fayers P, Bottomley A; EORTC Quality of Life Group, Quality of Life Unit. Quality of life research within the EORTC-the EORTC QLQ-C30. European organisation for research and treatment of cancer. *Eur J Cancer* 2002;38 Suppl 4:S125-33.
- Fayers PM, Aaronson NK, Bjordal K, Groenvold M, Curran D, Bottomley A; EORTC Quality of Life Group. The EORTC QLQ-C30 Scoring Manual. 3rd ed. Brussels, Belgium: European Organisation for Research and Treatment of Cancer; 2001.
- EORTC QLQ-C30. Brussels, Belgium: EORTC Quality of Life Department. Available from: <http://www.groups.eortc.be/qol/eortc-qlq-c30>. [Last accessed on 2016 Nov 26].
- Forman D, Bray F, Brewster DH, Gombe Mbalawa C, Kohler B, Piñeros M, *et al.* Cancer incidence in five continents. Vol. 10. Lyon, France: International Agency for research on Cancer (IARC) and World Health Organization (WHO) Pub # 164, 2013. p. 616.
- Bener A, Ayub H, Kakil R, Ibrahim W. Patterns of cancer incidence among the population of Qatar: A worldwide comparative study. *Asian Pac J Cancer Prev* 2008;9:19-24.
- Bener A, Ayoubi HR, Ali AI, Al-Kubaisi A, Al-Sulaiti H. Does consanguinity lead to decreased incidence of breast cancer? *Cancer Epidemiol* 2010;34:413-8.
- Waldmann A, Pritzkeleit R, Raspe H, Katalinic A. The OVIS study: Health related quality of life measured by the EORTC QLQ-C30 and -BR23 in German female patients with breast cancer from Schleswig-Holstein. *Qual Life Res* 2007;16:767-76.
- Huijjer HA, Sagherian K, Tamim H. Validation of the Arabic version of the EORTC quality of life questionnaire among cancer patients in Lebanon. *Qual Life Res* 2013;22:1473-81.
- Awad MA, Denic S, El Taji H. Validation of the European organization for research and treatment of cancer quality of life questionnaires for Arabic-speaking populations. *Ann*

- N Y Acad Sci 2008;1138:146-54.
21. Alawadhi SA, Ohaeri JU. Validity and reliability of the European organization for research and treatment in cancer quality of life questionnaire (EORTC QLQ): Experience from Kuwait using a sample of women with breast cancer. *Ann Saudi Med* 2010;30:390-6.
 22. Hoopman R, Muller MJ, Terwee CB, Aaronson NK. Translation and validation of the EORTC QLQ-C30 for use among Turkish and Moroccan ethnic minority cancer patients in the Netherlands. *Eur J Cancer* 2006;42:1839-47.
 23. Kontodimopoulos N, Ntinoulis K, Niakas D. Validity of the Greek EORTC QLQ-C30 and QLQ-BR23 for measuring health-related quality of life in breast cancer patients. *Eur J Cancer Care (Engl)* 2011;20:354-61.
 24. Cankurtaran ES, Ozalp E, Soygur H, Ozer S, Akbiyik DI, Bottomley A, *et al.* Understanding the reliability and validity of the EORTC QLQ-C30 in Turkish cancer patients. *Eur J Cancer Care (Engl)* 2008;17:98-104.
 25. Guzelant A, Goksel T, Ozkok S, Tasbakan S, Aysan T, Bottomley A, *et al.* The European organization for research and treatment of cancer QLQ-C30: An examination into the cultural validity and reliability of the Turkish version of the EORTC QLQ-C30. *Eur J Cancer Care (Engl)* 2004;13:135-44.
 26. Michelson H, Bolund C, Nilsson B, Brandberg Y. Health-related quality of life measured by the EORTC QLQ-C30 - Reference values from a large sample of Swedish population. *Acta Oncol* 2000;39:477-84.
 27. Tan ML, Idris DB, Teo LW, Loh SY, Seow GC, Chia YY, *et al.* Validation of EORTC QLQ-C30 and QLQ-BR23 questionnaires in the measurement of quality of life of breast cancer patients in Singapore. *Asia Pac J Oncol Nurs* 2014;1:22-32.
 28. Snyder CF, Blackford AL, Okuyama T, Akechi T, Yamashita H, Toyama T, *et al.* Using the EORTC-QLQ-C30 in clinical practice for patient management: Identifying scores requiring a clinician's attention. *Qual Life Res* 2013;22:2685-91.