



Health-related quality of life of breast cancer patients in the Eastern Mediterranean region: a systematic review and meta-analysis

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Abstract

Purpose Breast cancer is the most common type of cancer in women around the world, and this applies to the Middle East as well. The goal of all medical care and treatment is to improve the quality of life (QoL) of patients. Accordingly, the present study aimed at evaluating the QoL of patients with breast cancer in the Middle East region.

Methods In this meta-analysis, three electronic databases (PubMed, Web of Science, and Scopus) were searched from inception until August 2018. The hox et tool was used to evaluate the quality of the articles included in the meta-analysis. The search, screening, quality evaluation, and data extraction were carried out by two of the researchers.

Results Thirty-six studies conducted on 8347 Middle Eastern women with breast cancer entered the final stage. QoL was assessed by the European Organization for the Research and Treatment of Cancer Quality of Life Questionnaire in 20 studies, with 6034 patients. The mean of the reported QoL was between 31.1 and 75.6. Based on the results of the random effect method, the overall mean of the QoL was 60.5 (95% confidence interval 56.0, 65.0; I² = 99.0%). In six studies performed on 1053 individuals, QoL was classified as good, moderate, or poor. Less than one-third of patients (21%) had a good QoL.

Conclusions Since less than one-third of patients had a good QoL, it seems necessary to design and implement an integrated and multidimensional educational program to improve QoL of patients with breast cancer.

Keywords Quality of Life · Breast neoplasms · Middle east · Systematic review

Introduction

Breast cancer, considered one of the most costly challenges both from the human point of view and in terms of economic public health worldwide, is the most commonly diagnosed

cancer among women [1]. According to the latest GLOBOCAN statistics, breast cancer is the second most common type of cancer, with 2,088,849 new cases in 2018. Although detection of breast cancer is relatively good in developed

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countries, in 2018, it remained the fifth cause of death among all cancers with more than 626,679 deaths [2].

Global registry surveys also demonstrate that the incidence of breast cancer will increase by 46% and affect more than 3,059,829 people by 2040. The rate of breast cancer deaths will increase by 58.3% and affect more than 356,225 people [3]. Breast cancer accounted for the highest prevalence (21.9%), incidence (17.7%), and mortality (11.6%) caused by various types of cancers in the Middle East in 2018 [4]. Breast cancer has irreversible physical and psychological effects due to treatments and prognosis. Patients are usually faced with various chronic and prolonged diagnostic procedures and chemotherapy courses [5]. These procedures cause sleep disturbances, depression, fatigue, and anxiety [6–8]. All these symptoms have negative effects on the quality of life (QoL) of patients, especially in developing countries in the Eastern Mediterranean region where breast cancer diagnosed in advanced stages can have more negative impacts on QoL owing to poor general knowledge regarding the disease [9, 10].

In view of the importance of high QoL for the proper management of symptoms and pain and reducing complications and costs of treatment, and since there is a lack of comprehensive studies on the exact status of QoL in women with cancer in this region, the present study aimed to bridge the epidemiological gap, determine the exact QoL of patients with breast cancer, and help health care providers and health planners.

Methods

Eligibility criteria

The methods adopted for this systematic review are consistent with the guidelines detailed in the PRISMA checklist [11]. The inclusion criteria were studies that (1) were performed on patients with known breast cancer, (2) used standard tools, (3) were published in English, and (4)

were performed on patients from Eastern Mediterranean countries. Exclusion criteria were (1) non-English studies conducted as reviews, letters to the editor, and brief communications, (2) studies that were performed on patients with cancer other than breast or a combination of breast and other cancers, (3) studies with a high risk of bias, and (4) studies that lacked full text and for which the required information was not found in the abstracts.

Search strategy

Searches were conducted with the help of a librarian specializing in health academic resources. The search strategy was implemented using the MESH keywords and free words according to the PRESS standard. The keywords used are presented in Table 1. Three databases were searched from inception to August 31, 2018: PubMed, Web of Science, and Scopus. The search strategy was finalized at PubMed and then modified to include other databases. The PROSPERO database was also searched for similar ongoing studies (Table 1).

Selection of studies and data extraction

Two researchers independently screened the titles and abstracts for eligibility. The full text was then reviewed to confirm that eligibility criteria were met and for extraction of requisite information, which included basic information (first author, year of publication and country, questioner, design, setting, participants, sampling method, mode of data collection, risk of bias, tools, target population, and age) and outcome measures (QoL). Duplicate studies were then removed. Where there was a disagreement between the researchers regarding the inclusion of a study, the study authors held discussions until a consensus was reached.

Table 1 Keywords used for database searches

Participant	Outcome	Location
Breast cancer OR Breast neoplasm	Quality of life, qol, health-related quality of life	Middle east OR “Eastern Mediterranean” OR Afghanistan OR Bahrain OR Manama OR Djibouti OR Egypt OR Cairo OR Iran OR Tehran Iraq OR Baghdad OR Jordan OR Amman OR Kuwait OR Lebanon OR Beirut OR Libya OR Tripoli OR Morocco OR Rabat OR Oman OR Muscat OR Pakistan OR Islamabad OR Qatar OR Doha OR Saudi Arabia OR Riyadh OR Somalia OR Mogadishu OR Sudan OR Khartoum OR Syria OR Damascus OR Tunisia OR Tunis OR “United Arab Emirates” OR Abu Dhabi OR Yemen OR Sana’a OR Palestine OR Israel

Quality assessment and abstraction

To assess the risk of bias of included studies, Hoy critical appraisal checklist was used [12]. This 10-item checklist evaluates the quality of studies along two dimensions: external validity (items 1–4 assess target population, sampling frame, sampling method, and minimal non-response bias) and internal validity (items 5–9 assess data collection method, case definition, study instrument, and mode of data collection). Item 10 assesses bias related to the analysis. Each study was evaluated for risk of bias by two independent project researchers with disagreements resolved through consensus.

Results

Study selection

A total of 2531 articles were retrieved from the initial search in different databases. Out of 1863 non-duplicate studies in the title and abstract screening process, 1779 studies were excluded owing to unrelated titles. Of the remaining 83 studies, 36 met the eligibility criteria. Of the 47 excluded studies, seven were review articles, six were focused on other cancer populations, two were letters to the editor, four did not have full text, two were qualitative studies, five were in a language other than English, one was a protocol study, and 20 did not meet the quality requirements for inclusion in the study (Fig. 1).

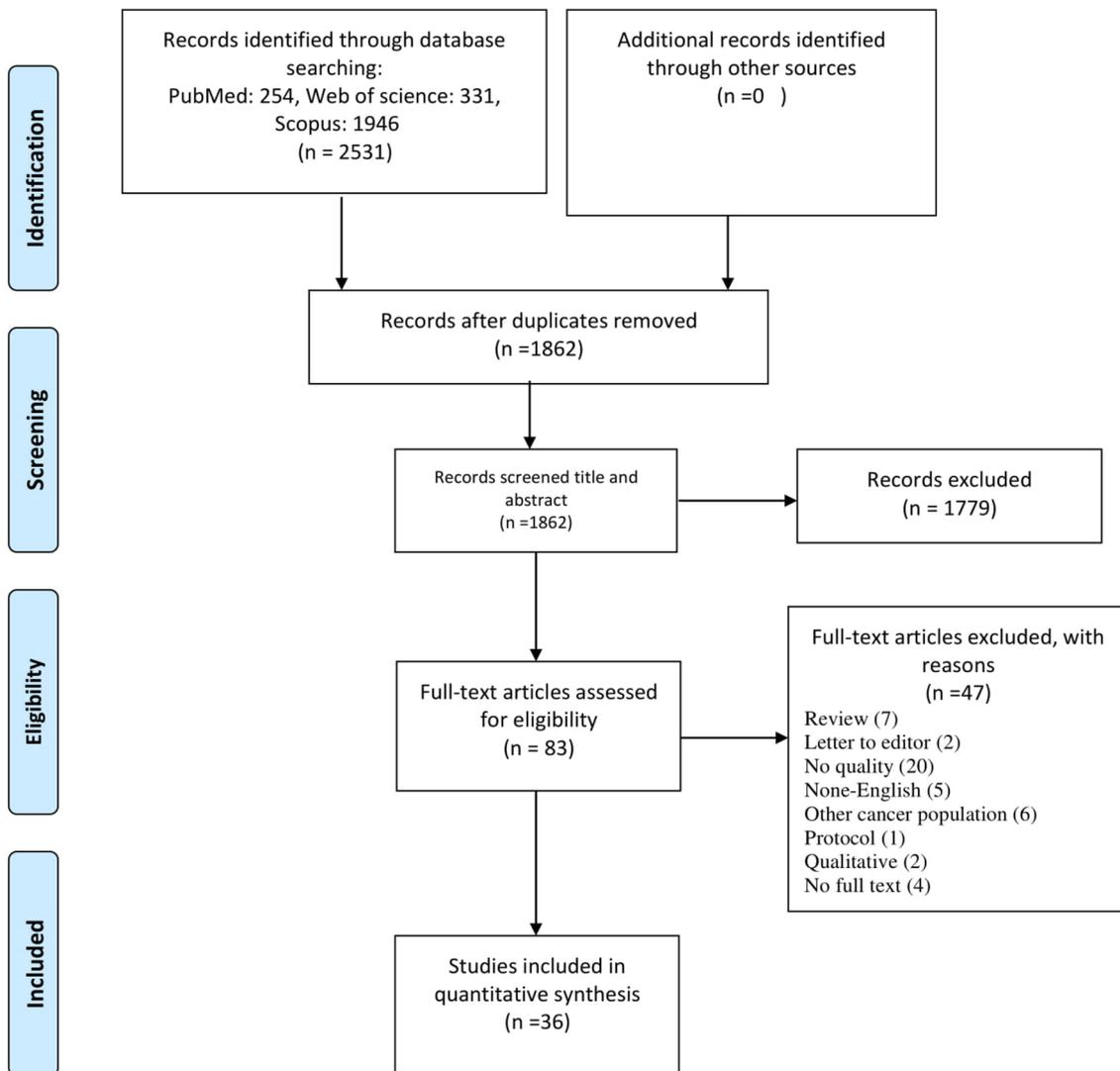


Fig. 1 PRISMA flow diagram

Study characteristics

Thirty-six studies conducted on 8347 Middle Eastern women with breast cancer from 2008 to 2018 entered the final stage. Most studies were performed in Iran ($n = 18$) and Saudi Arabia ($n = 3$). Also, two studies had been conducted in Iraq, Morocco, Lebanon, and Palestine, and one had been conducted in other countries. The sampling method in most studies was convenience sampling ($n = 35$). The method of completing the questionnaires in most studies was interview ($n = 35$). In terms of quality, most of the studies ($n = 35$) had a low risk of bias. In most studies, the setting was a hospital ($n = 25$) (Table 2).

Main results

Instruments

All studies used standard tools. The European Organization for the Research and Treatment of Cancer Quality of Life Questionnaire (EORTC QLQ-C30) was most commonly used ($n = 20$). Other instruments included the Functional Assessment of Cancer Therapy-Breast Cancer (FACT-B) ($n = 4$), The breast cancer impact scale (BCIS) ($n = 2$), EuroQol-5 Dimension (EQ-5D) ($n = 2$), Ferrans and Powers Quality of Life Index (FPQLI) ($n = 1$), Life Quality Index (LQI) ($n = 1$), National Medical Center and Beckman Research Institute Questionnaire (NMCBRI-Q) ($n = 1$), Quality of Life Instrument-Breast Cancer Patient Version (QOL-BC) ($n = 1$), Short Form (36) Health Survey (SF-36) ($n = 2$), and WHOQOL-EREF26 ($n = 1$).

Meta-analysis of the EORTC QLQ-C30

Of the 36 studies included in the systematic review, QoL was assessed by the EORTC QLQ-C30 in 20 studies, with 6034 people. In the present study, the mean of the reported QoL was between 31.1 and 75.6. Based on the results of the random effect method, the overall mean QoL was 60.5 (95% confidence interval (CI): 56.0, 65.0; $I^2 = 99.0\%$) (Fig. 2).

Functional and symptom scales of the EORTC QLQ-C30

Out of 20 studies, 19 reported functional and symptoms. The pooled score of all functional scales except emotional functioning was higher than 70.0. Emotional functioning was reported to be between 42.9 and 83.3 and had the lowest pooled score equivalent to 61.0% (95% CI 57.3, 64.7) (non-healthy functioning). In contrast, cognitive functioning, reported to be between 60.7 and 86.2, had

the highest pooled score equivalent to 74.3% (95% CI 70.4, 78.2) (healthy functioning) (Table 3).

Nine symptoms were assessed in 19 studies. Meta-analysis based on the random effect model demonstrated that financial difficulties (caused by the disease and undergoing treatments) and fatigue were the most frequent problems with pooled effect sizes of 45.6 (95% CI 37.6, 53.6) and 40.3% (95% CI 34.1, 46.6), respectively. Diarrhea was the least frequent problem with a pooled score of 16.7 (95% CI 9.6, 17.2) (Fig. 2). The pooled scores of insomnia, pain, and appetite loss were from 30 to 40: 38.1 (95% CI 30.8, 45.3), 32.6 (95% CI 25.9, 39.3), and 31.6 (95% CI 24.8, 38.5), respectively. The pooled scores of dyspnea, constipation, and nausea and vomiting were from 20 to 30: 28.2 (95% CI 21.6, 34.7), 24.7 (95% CI 17.8, 31.6), and 23.9 (95% CI 18.4, 29.4), respectively (Fig. 3).

QoL based on other tools

Four studies assessed QoL with the FACT-B tool. The range of QoL with this tool is from 0 to 148. In these four studies, QoL was reported to be between 78.0 and 108.8, and the pooled mean score in the random effect model was 93.2 (95% CI 75.7, 110.7). Two studies assessed QoL in breast cancer patients with the SF-26 and EQ-5D.

In six studies, QoL score was categorized into three categories (poor, moderate, and good) with five different tools. The total number of participants in these studies was 1,053. Poor QoL was reported by between 0 and 35.0% of people and the pooled effect size in the random model was 18.9% (95% CI 6.6, 31.3). Moderate QoL was reported by between 46.5 and 87.0% of people and the pooled effect size in the random model was 59.1% (95% CI 47.7, 70.4). Good QoL was reported by between 13.0 and 44.0% of people and the pooled effect size in the random model was 21.2% (95% CI 14.4, 28.0) (Table 4).

Meta-regression finding based on the EORTC QLQ-C30

There was no statistically significant linear trend in univariate meta-regression to explain effect size variation by the mean age of participants with coefficient = 0.52 (95% CI -1.9, 2.9), $P = 0.654$ (Fig. 3) and by publication year of study with coefficient = 0.72 (95% CI -94, 2.4), $P = 0.372$ (Fig. 4). Also, none of the functional and symptom scales of the EORTC QLQ-C30 not significant in meta-regression with mean age (P value > 0.05) (Fig. 5).

Discussion

According to GLOBOCAN 2018, breast cancer is the most prevalent type of cancer in Asia, including in the Eastern Mediterranean. The main goal of all medical care is to

Table 2 Demographic characteristics for the included studies

Author	Year	Country	Sampling method	Instrument	Study design	Mode of data collection	Setting	Participants	Age mean \pm SD or range	Risk of bias
Abu Farha [13]	2017	Palestine	Convenience	EQ-5D	Cross-sectional	Interview	Hospital	170	46 \pm 1.2	Moderate
Abu-Saad Huijjer [14]	2012	Lebanon	Convenience	EORTC QLQ-C30	Cross-sectional	Interview	Outpatient Clinic	89	49.19 \pm 11	Low
Ahmed [15]	2017	Saudi Arabia	Consecutive	SF-36	Cross-sectional	Interview	Outpatient Clinic	145	50.3 \pm 13.5	Low
Ahrifzadeh [16]	2017	Iran	Census	Whoqol-Eref26	Cross-sectional	Interview	Hospital	100	46.85 \pm 11.5	Low
Akel [17]	2017	Lebanon	Convenience	FACT-B	Cross-sectional	Interview	Hospital	150	53.5 \pm 10.4	Low
Alawadi [18]	2009	Kuwaiti	Consecutive	EORTC QLQ-C30	Cross-sectional	Interview	Outpatient Clinic	348	48.3 \pm 10.3	Low
Albatain [19]	2018	Saudi Arabia	Convenience	EORTC QLQ-C30	Cross-sectional	Interview	Hospital	95	40–59	Low
Ali [20]	2011	Yemen	Convenience	FACT-B	Cross-sectional	Interview	Outpatient Clinic	106	NR	Low
Al-Jabi [21]	2018	Palestine	Convenience	EQ-5D	Cross-sectional	Interview	Oncology Center	244	52.7 \pm 12.2	Low
Almutairi [22]	2016	Saudi Arabia	Convenience	EORTC QLQ-C30	Cross-sectional	Interview	Oncology Center	145	NR	Low
Al-Naggar [23]	2016	Iraq	Convenience	FACT-B	Cross-sectional	Interview	Oncology Center	166	49.6 \pm 8.2	Low
Al-Natour [24]	2017	Jordan	Convenience	FACT-G	Cross-sectional	Self-Report	Oncology Center	150	47.92 \pm 9.74	Low
Bener [25]	2017	Qatar	Convenience	EORTC QLQ-C30	Cross-sectional	Interview	Outpatient Clinic	762	47.7 \pm 10.2	Low
Daher [26]	2017	Iraq	Systematic random	BCIS	Cross-sectional	Interview	Hospital	247	NR	Low
Denewer [27]	2012	Egypt	Convenience	BCIS	Cross-sectional	Interview	Hospital	200	45 \pm 9.72	Low
El Fakir [28]	2016	Morocco	Convenience	EORTC QLQ-C30	Cross-sectional	Interview	Oncology Center	1463	55.6 \pm 11.2	Low
Homae Shandiz [29]	2017	Iran	Convenience	EORTC QLQ-C30	Cross-sectional	Interview	Hospital	94	45.2 \pm 8.63	Low
Jafari [30]	2013	Iran	Convenience	EORTC QLQ-C30	Cross-sectional	Interview	Hospital	68	48 \pm 10.3	Low
Jassim [31]	2013	Bahrain	Simple random	EORTC QLQ-C30	Cross-sectional	Interview	Hospital	239	50.2 \pm 11.1	Low
Khalili [32]	2013	Iran	Convenience	EORTC QLQ-C30	Cross-sectional	Interview	Hospital	62	45.81 \pm 6.78	Low
Montazeri [33]	2008	Iran	Census	EORTC QLQ-C30	Cross-sectional	Interview	Hospital	167	47.4 \pm 13.3	Low
Musarezaie [34]	2015	Iran	Convenience	NMCBRI-Q	Cross-sectional	Interview	Hospital	87	48.25 \pm 11.9	Low
Najafi [35]	2016	Iran	Consecutive	EORTC QLQ-C30	Cross-sectional	Interview	Hospital	148	47.6 \pm 10.1	Low
Nikmanesh [36]	2017	Iran	Census	EORTC QLQ-C30	Cross-sectional	Interview	Oncology Center	42	30–50	Low
Rohani [37]	2015	Iran	Simple random	EORTC QLQ-C30	Cross-sectional	Interview	Hospital	162	46.1 \pm 9.8	Low
Safa [38]	2014	Iran	Cluster sampling	QOL-BC	Cross-sectional	Interview	Hospital	92	42.9 \pm 8.7	Low
Safaei [39]	2008	Iran	Simple random	EORTC QLQ-C30	Cross-sectional	Interview	Hospital	119	48.27 \pm 11.4	Low
Saleha [40]	2010	Pakistan	Consecutive	EORTC QLQ-C30	Cross-sectional	Interview	Hospital	200	46.3 \pm 9.52	Low
Sehati Shafaei [41]	2018	Iran	Convenience	EORTC QLQ-C30	Cross-sectional	Interview	Hospital	166	50 \pm 11.4	Low
Shakeri [42]	2016	Iran	Convenience	LQI	Cross-sectional	Interview	Hospital	98	47.6 \pm 14.05	Low
Sharif [43]	2010	Iran	Simple random	EORTC QLQ-C30	Pre-posttest follow-up and control Group design	Interview	Hospital	99	40–49	Low

Table 2 (continued)

Author	Year	Country	Sampling method	Instrument	Study design	Mode of data collection	Setting	Participants	Age mean ± SD or range	Risk of bias
Sinaei [44]	2017	Iran	Simple random	EORTC QLQ-C30	Case-control	Interview	Hospital	45	50.21 ± 8.5	Low
Tirgari [45]	2012	Iran	Convenience	FPQLI	Cross-sectional	Interview	Hospital	50	47.3 ± 8.62	Low
Traore [46]	2018	Morocco	Convenience	EORTC QLQ-C30	Cross-sectional	Interview	Hospital	1463	50.51 ± 10.9	Low
Zamanian [47]	2015	Iran	Convenience	FACT-B	Cross-sectional	Interview	Oncology Center	224	47.06 ± 9.07	Low
Zargani [48]	2018	Iran	Sequential	SF36	Cross-sectional	Interview	Hospital	84	54.71 ± 10.4	Low

NR none report, *EORTC QLQ-C30* The European Organization for Research and Treatment of Cancer quality of life questionnaire, *LQI* Life Quality Index, *SF-36* Short Form (36), *FACT-B* Functional Assessment of Cancer Therapy-Breast Cancer, *BCIS* The breast cancer impact scale, *EQ-5D* Europe Quality-5 D, *FPQLI* Ferrans and Powers Quality of Life Index, *NMCBRI-Q* National Medical Center and Beckman Research Institute questionnaire

improve the QoL of patients, and this is particularly important in the case of breast cancer, considering the fact that the disease is more likely than other forms to be diagnosed at a late stage. To the researchers' knowledge, this is the first meta-analysis and systematic review carried out in the Eastern Mediterranean region with the aim of investigating the QoL of breast cancer patients. Thirty-six studies from 12 countries conducted on 8,347 Middle Eastern women with breast cancer from 2008 to 2018 entered the final stage of the study. Compared to the meta-analyses related to breast cancer patients in the countries of Latin America (22 studies) [49] and Spain (22 studies) [50], more studies have been carried out in the Eastern Mediterranean region, indicating more attention to psychological aspects, such as the quality of life, in patients with breast cancer in this region. All the tools used were standard. The most frequently used tool was the EORTC QLQ-C30, like the meta-analysis study carried out in Spain [50]. The results of the study demonstrated that the mean overall QoL score was 60.5 in the case of the EORTC QLQ-C30, which was used in 20 studies with a sample size of 6,034 people. There was no meta-analysis that exclusively examined the QoL of breast cancer patients using the EORTC QLQ-C30 questionnaire. Unlike the present study, the results of individual studies revealed that the QoL of cancer patients in Japan (73.4) [51], Spain (69.2) [52], and Germany (68.2) [53] was better than that of patients in the Eastern Mediterranean region. Unlike the population of the present study, Adults with Extremity Sarcoma Survivors had a better quality of life in another systematic review study [54]. Since the EORTC QLQ-C30 questionnaire is a common tool for measuring the quality of life, interpreting and generalizing its outcomes to specific populations, such as patients with breast cancer, should be performed cautiously, since it is a general questionnaire that does not consider different and special aspects which may affect the quality of life of these patients, because patients with any type of cancer have their own unique needs.

Patients obtained a score of above 70 in the functional dimensions of QoL including cognitive, role, social, and physical, and the mean score was less than 70 only in the emotional dimension, as was the case in the studies carried out in Spain and Germany [52, 53]. Patients also obtained a score of above 70 in the functional dimensions of QoL (cognitive, role, social, and physical) in the studies conducted in Japan, Spain, and Germany [51–53]. Fatigue (45.6) and financial problems (40.3), among the nine symptoms of QoL, were identified as the most common symptoms, which was consistent with Sun's study, which referred to common fatigue (28.9) and financial problems (25.7) as the most common symptoms [51].

This can be because of the similarity in pathological symptoms and cancer treatment in all populations [55]. However, insomnia was the most common symptom that

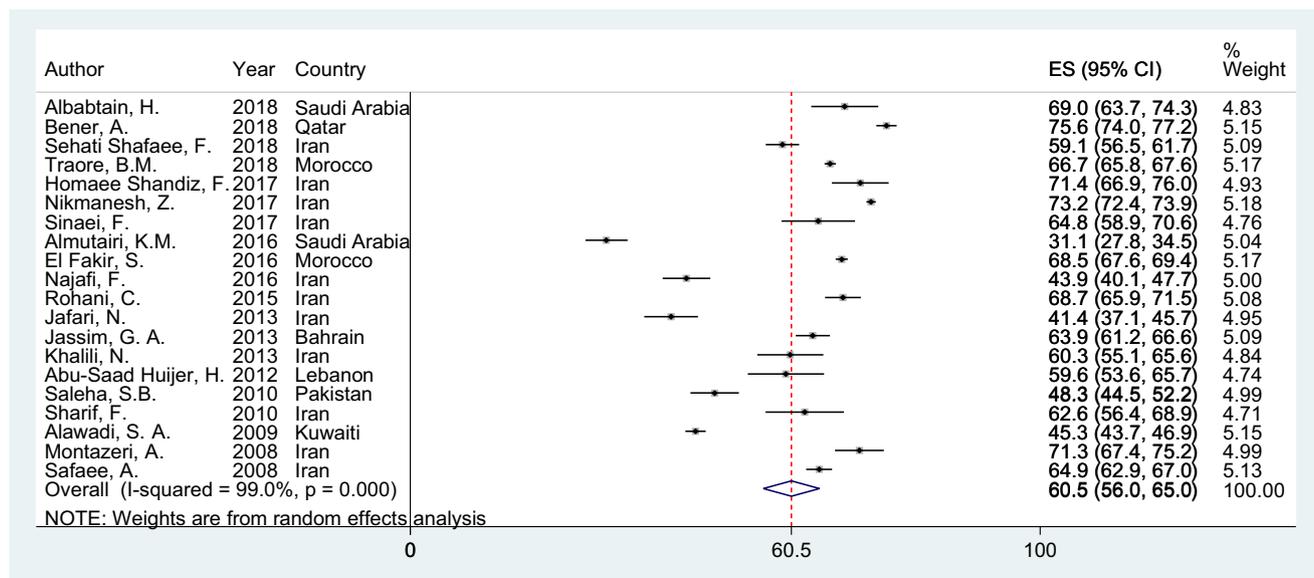


Fig. 2 Global health status based on EORTC QLQ-C30 in breast cancer patients in Middle East

Table 3 Meta-analysis of functional QoL based on the EORTC QLQ-C30 in breast cancer patients in the EMRO

First author (year)	Country	Cognitive functioning ES (95% CI)	Social functioning ES (95% CI)	Role functioning ES (95% CI)	Physical functioning ES (95% CI)	Emotional functioning ES (95% CI)
Albertain (2018) [19]	Saudi Arabia	79.2 (74.4, 84.1)	83.3 (78.0, 88.6)	78.1 (72.3, 84.0)	68.1 (63.7, 72.4)	70.8 (64.8, 76.7)
Bener (2018) [25]	Qatar	86.2 (84.8, 87.6)	51.3 (49.3, 53.3)	65.2 (63.4, 67.0)	79.3 (78.0, 80.6)	62.5 (60.5, 64.5)
Sehati Shafae (2018) [41]	Iran	74.9 (71.3, 78.5)	68.1 (65.1, 71.1)	61.4 (57.9, 64.9)	60.6 (58.0, 63.2)	51.4 (48.2, 54.6)
Traore (2018) [46]	Morocco	84.8 (83.7, 86.0)	87.9 (86.7, 89.0)	75.7 (74.2, 77.1)	80.9 (79.9, 81.9)	63.0 (61.5, 64.5)
Homae Shandiz (2017) [29]	Iran	81.6 (78.1, 85.0)	89.2 (85.9, 92.4)	86.7 (83.0, 90.4)	91.4 (89.4, 93.3)	78.6 (74.8, 82.3)
Sinaei (2017) [44]	Iran	79.3 (72.9, 85.7)	83.1 (76.2, 90.0)	85.1 (77.9, 92.4)	72.2 (66.8, 77.6)	69.1 (61.8, 76.4)
Almutair (2016) [22]	Saudi Arabia	68.3 (63.9, 72.7)	65.0 (59.2, 70.8)	67.6 (62.8, 72.4)	62.9 (58.9, 66.9)	83.3 (79.6, 87.0)
El Fakir (2016) [28]	Morocco	83.2 (82.0, 84.4)	86.2 (85.0, 87.4)	74.1 (72.6, 75.6)	78.1 (77.0, 79.2)	62.5 (61.0, 64.0)
Najafi, (2016) [35]	Iran	74.4 (70.7, 78.2)	55.7 (51.5, 60.0)	71.2 (66.8, 75.5)	68.5 (65.4, 71.7)	42.9 (38.8, 47.0)
Rohani (2015) [37]	Iran	83.3 (80.5, 86.1)	74.8 (71.0, 78.6)	81.9 (78.9, 84.9)	77.4 (74.9, 79.9)	65.3 (61.6, 69.0)
Jafari (2013) [30]	Iran	54.4 (48.5, 60.4)	47.6 (41.4, 53.7)	63.9 (57.8, 70.0)	63.1 (58.2, 68.0)	43.4 (38.2, 48.6)
Jassim (2013) [31]	Bahrain	73.4 (69.6, 77.2)	77.5 (73.7, 81.4)	68.8 (64.3, 73.4)	74.9 (72.2, 77.7)	63.4 (59.2, 67.7)
Khalili (2013) [32]	Iran	62.9 (55.6, 70.2)	75.3 (68.0, 82.5)	69.3 (63.9, 74.8)	72.5 (68.2, 76.9)	49.6 (42.5, 56.8)
Abu-Saad Huijer (2012) [14]	Lebanon	84.5 (79.8, 89.1)	60.3 (54.4, 66.2)	73.4 (67.1, 79.7)	79.1 (74.7, 83.5)	65.9 (60.0, 71.8)
Saleha (2010) [40]	Pakistan	60.7 (56.8, 64.6)	77.3 (73.0, 81.7)	61.0 (55.2, 66.8)	56.4 (52.6, 60.2)	46.2 (41.0, 51.3)
Sharif (2010) [43]	Iran	71.8 (65.3, 78.2)	82.0 (76.4, 87.5)	86.1 (80.3, 91.9)	81.5 (77.0, 85.9)	62.9 (55.3, 70.5)
Alawadi. (2009) [18]	Kuwaiti	59.4 (56.9, 61.9)	61.3 (58.9, 63.7)	55.1 (52.9, 57.3)	52.7 (50.7, 54.7)	60.2 (57.8, 62.6)
Montazeri (2008) [33]	Iran	74.2 (71.3, 77.1)	82.5 (79.3, 85.7)	66.0 (62.3, 69.7)	66.8 (63.7, 69.9)	61.3 (57.6, 65.0)
Safae (2008) [39]	Iran	72.3 (67.3, 77.2)	69.6 (63.7, 75.5)	65.3 (59.0, 71.5)	57.3 (53.0, 61.6)	56.3 (50.7, 61.8)
Random pool ES (95% CI)		74.3 (70.4, 78.2)	72.5 (66.2, 78.9)	71.3 (67.4, 75.2)	70.8 (66.2, 75.3)	61.0 (57.3, 64.7)

disrupted the QoL in studies carried out in Spain and Germany (31.7) [52, 53]. The least frequent symptom was diarrhea (16.7), which was consistent with Engel's study in Germany (6.6%) [53]. Inconsistent with studies carried out by Sun in Japan and Villar in Spain, the lowest common

symptom was nausea and vomiting (4.5, 3.1) [51, 52], which could have been owing to differences in the stage of the disease in patients of the above two studies. Based on the FACT-B tool used in four studies, the mean QoL score was 93.2. There was no meta-analysis study on this tool, but

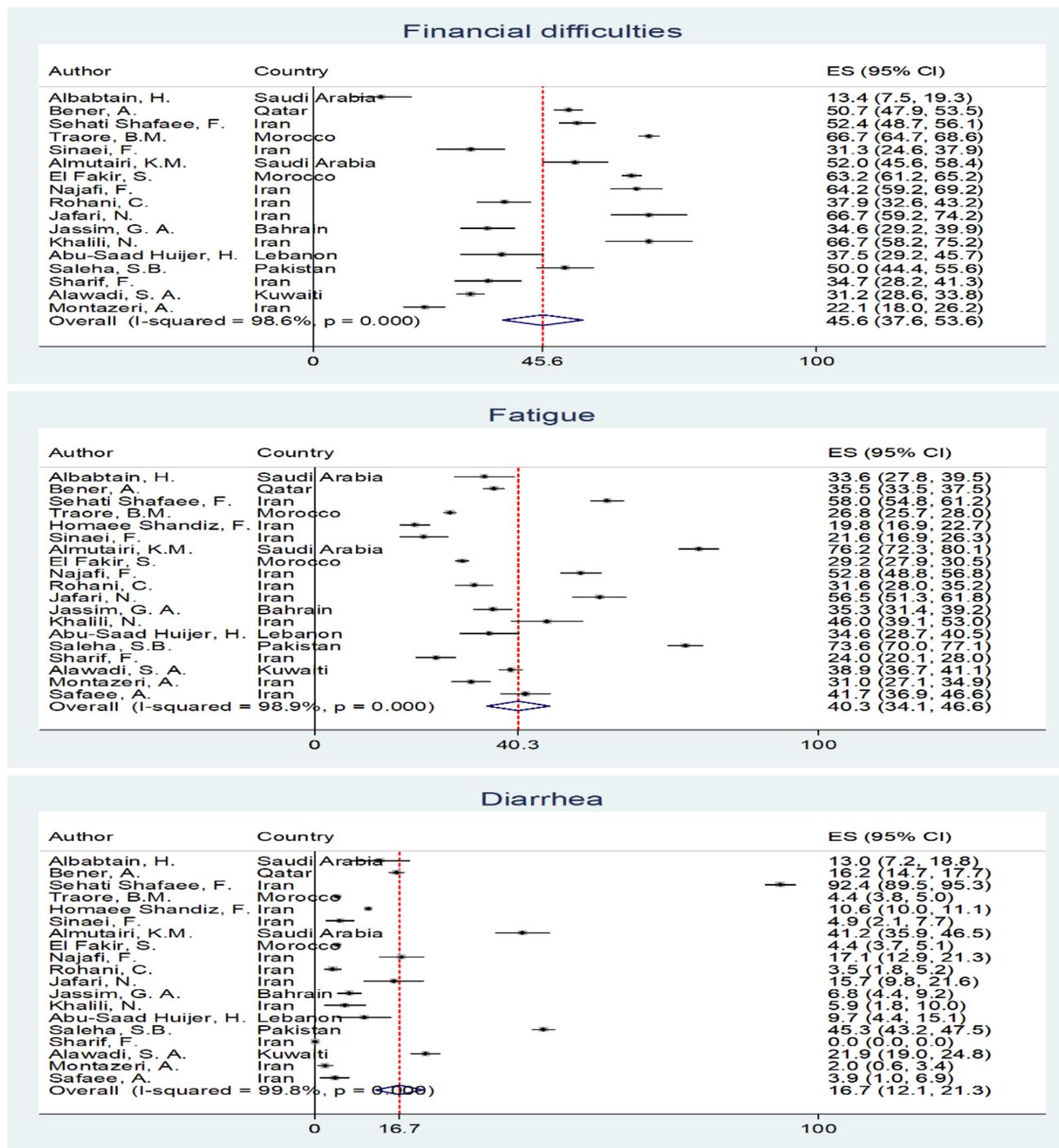


Fig. 3 Forest plot of the highest and lowest functional problem scales based on the random effect model in breast cancer patients in the EMRO

individual studies in China showed mean scores of 94.99 and 94.81, which is consistent with the current study [51, 56]. However, the mean QoL score in a study conducted in Canada was 105, which indicates a higher QoL [57] and could be owing to the difference in the infrastructure for faster diagnosis and supportive systems during the treatment of breast cancer in developed countries [58, 59].

In six studies carried out on 1,053 people, QoL was categorized as poor, moderate, or good. The results demonstrated that only 21.2% of patients with breast cancer had a good QoL, and the rest had poor and moderate QoL, consistent with the systematic review conducted in Asia where most participants had poor QoL (59), which can be generally attributed to lifestyles in the Eastern Mediterranean region

Table 4 Meta-analysis of QoL in breast cancer patients in the EMRO by assessment tools

First author (year; country)	QoL based on mean score		QoL classification		
	Mean (SD)	95% CI for ES	Poor (%)	Moderate (%)	Good (%)
FACT-B					
Akel [17]	108.7 (18.8)	105.7, 111.7			
Al-Naggar [23]	78.0 (7.8)	76.8, 79.2			
Zamanian [47]	105.0 (22.8)	102.0, 108.0			
Ali [20]	81.1 (22.3)	76.9, 85.3			
Overall random pooled ES	93.2	75.7, 110.7			
SF-36					
Ahmed [15]	380.8 (224.0)	609.4, 641.0			
Zargani [48]	625.2 (73.9)	344.3, 417.3	8 (9.5)	39 (46.5)	37 (44.0)
Overall random pooled ES	503.6	264.1, 743.1			
BCIS					
Daher [26]			62 (25.2)	134 (54.0)	51 (20.8)
Denewer [27]			70 (35.0)	104 (52.0)	26 (13.0)
Overall random pooled ES					
EQ-5D					
Al-Jabi [21]	0.72 (0.21)	0.69, 0.75			
Abu Farha [13]	0.67 (0.21)	0.64, 0.70			
Overall random pooled ES	0.70	0.65, 0.74			
FACT-G					
Al-Natour [24]	79.9 (18.01)				
LQI					
Shakeri, J [42]	70.2 (14.4)				
NMCBRI-Q					
Musarezaie [34]	75.9 (15.3)	72.7, 79.1	54 (16.4)	193 (58.5)	83 (25.1)
QOL-BC					
Safa [38]			0 (0.0)	80 (87.0)	12 (13.0)
WHOQOL-26					
Ahrafizadeh [16]			29 (28.6)	55 (55.5)	16 (15.9)
Overall random pooled ES for categorical score (95% CI)			18.9% (6.6, 31.3)	59.1% (47.7, 70.4)	21.2 (14.4, 28.0)

and Asia [60] and the same surgical treatments in different populations [61]. Yanez et al. also demonstrated in their systematic review that most patients with breast cancer in Latin America had a poor QoL [49]. The most important limitations of the present study included the fact that the studies were descriptive and cross-sectional, and their specific methodological limitations could have impacted our results; in most studies, the precise stage of the disease was not determined, which could have been an important factor affecting the QoL of patients; only English studies were included; the studies were selected from only 12 countries, and English studies carried out in other countries were not included owing to their poor quality; and some studies lacked necessary information, which was obtained by contacting the authors. The most important strengths of this study include the fact that to the best of the researchers' knowledge, it is the first meta-analysis in this area; it was conducted using

the systematic review and meta-analysis approach; and QoL levels were separately examined based on the types of tools.

Conclusions

The present meta-analysis investigated the QoL of patients with breast cancer in the Eastern Mediterranean region. The results demonstrated that, owing to the high prevalence and growing incidence of breast cancer in the region, less than one-third of patients have a good QoL. The results of the present study indicate that more attention should be paid to QoL, along with proper access to treatment and control of subsequent symptoms. The implementation of integrated and multidimensional educational programs to provide patients with the necessary

Fig. 4 Meta-regression between publication year of study and QoL in breast cancer patients based on the EORTC QLQ-C30

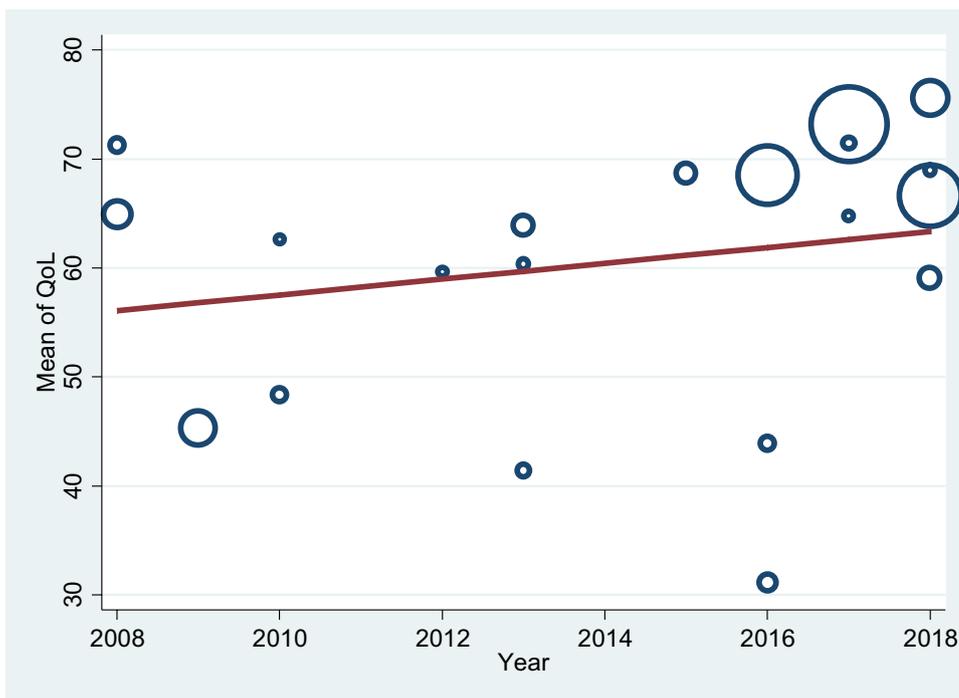
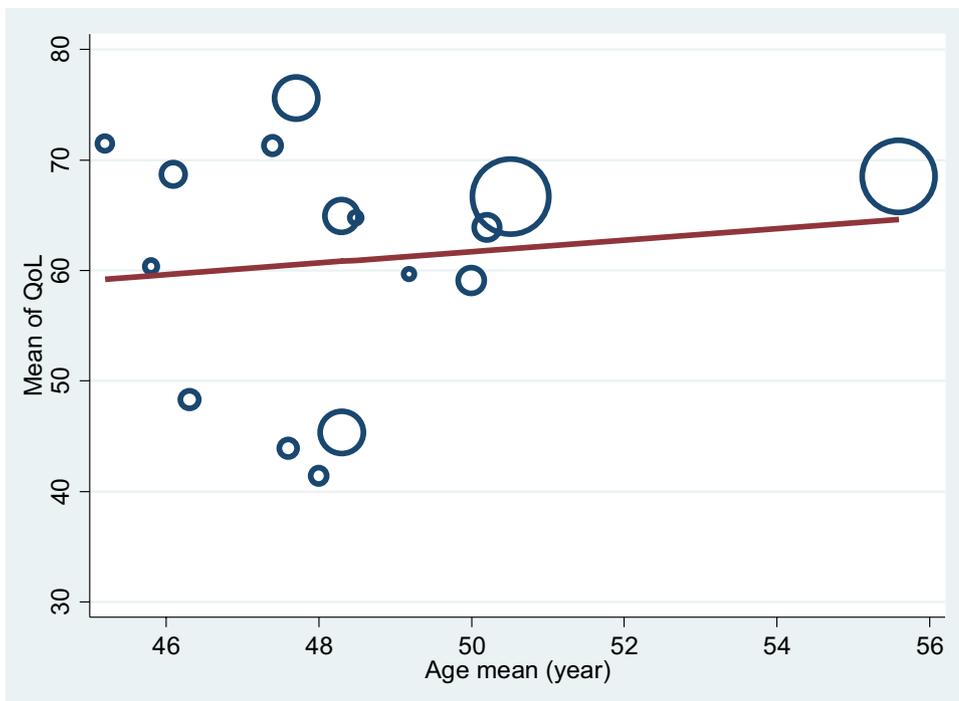


Fig. 5 Meta-regression between mean age of participants and QoL in breast cancer patients based on the EORTC QLQ-C30



information and resources and thus improve their QoL is recommended. It is also necessary to pay attention to the role of families in improving the QoL of these patients.

Data availability The datasets analyzed during the current study are available from the corresponding author on reasonable request.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflicts of interest.

Ethical approval This article does not contain any studies with human participants or animals performed by any of the authors. Hence, it does not need any human consent.

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