

# Quality of Life in Breast Cancer Patients in Saudi Arabia: A Systematic Review

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**Introduction:** Breast cancer is the most prevalent malignancy worldwide which carries a high mortality rate. Quality of life (QoL) is adversely affected by the disease process; thus, this systematic review aimed to Summarize the QoL among women with breast cancer in Saudi Arabia, and descriptively analyze the risk factors that are associated with low QoL.

**Methods:** Following the PRISMA guidelines for systematic review, a literature search for all cross-sectional studies conducted in Saudi Arabia was performed in five databases including PubMed, DOAJ, Scopus, Google Scholar, and Mendeley, then, the studies which met the eligibility criteria were extracted and assessed for quality using AXIS tool.

**Results:** Following a full-text evaluation, there were a total of 8 included articles. Based on the EORTC QLQ-C30 questionnaire, the Global Health Status (GHS) score of patients with breast cancer ranged from 31.2 +20 to 73.16 ± 20.26. Elements that impact Health Related Quality of Life (HRQoL) are the age of breast cancer diagnosis, marital status, and number of children. Women who are childless, widowed, or divorced have a lower quality of life (QoL), and those who were diagnosed beyond the age of 50 have worse emotional functioning. Emotional well-being is lowered by the coexisting medical issues especially if living alone. Chemotherapy and monoclonal antibodies can make the patients stressed and more tired. Rehabilitation groups surprisingly can increase insomnia, while immunotherapy and radiation therapy may decrease physical function, particularly in older patients.

**Conclusion:** This systematic review has identified several factors that affect the quality of life of breast cancer patients in Saudi Arabia, including physical, mental, functional, and social well-being, as well as various sociodemographic factors. Understanding these factors and implementing a QoL assessment tool in clinical practice can aid in the development of supportive measurements for those patients and their families, helping them to manage their life challenges more effectively.

**Keywords:** breast cancer, quality of life, QoL, Saudi Arabia, Cancer

## Introduction

Cancer is a term associated with despondency, dysfunction and mortality, where individuals with diverse ages, genders and socioeconomic backgrounds may be affected. In addition, it comes in various forms depending on the specific cell type that is influenced, and it is classified accordingly.<sup>1</sup> Breast cancer predominantly originates from the epithelial cells of ducts or lobules in the breast tissue.<sup>2</sup> In 2020, 7.8 million women worldwide were diagnosed with breast cancer, accounting for approximately 12% of all new cancer cases, and it was responsible for 6.9% of all malignancy-related fatalities in females.<sup>3</sup> Locally, a detailed systematic review and meta-analysis, including fourteen studies conducted between 2010–2018 in Saudi Arabia, concluded that breast cancer was the predominant type of cancer with a prevalence of 53%.<sup>4</sup> In 2023, the Saudi Health Council released the cancer incidence report that had breast cancer as the most common type of cancer among women in Saudi Arabia in 2020, with an incidence rate of 31.4%.<sup>5</sup> Recognizing risk factors associated with breast cancer is essential to detect and screen the disease in early stages.<sup>6</sup> Risk factors can be

classified into two broad categories, firstly, modifiable factors that can be avoided or controlled including obesity, sedentary lifestyle and hormone replacement therapy, and secondly, non-modifiable variables such as age, gender, genetic mutation including BRCA1 or BRCA2, early menarche, late menopause, nulliparity, and late pregnancy.<sup>6</sup> Lactation, physical activity, and aspirin or non-steroidal anti-inflammatory drugs are considered protective factors.<sup>6</sup> Further coordinated and widespread use of mammography screening and the creation of breast cancer registries can all help to increase early-stage breast cancer diagnosis and decrease the global future burden of breast cancer.<sup>3</sup> A prior study on the Quality of Life (QoL) in breast cancer patients revealed that pain and discomfort had the worst consequences on QoL, and these effects related to household income and the use of conventional therapy.<sup>7</sup> Patients who were older than 65 years experienced considerably lower median utility ratings than younger patients. Additionally, the median score for individuals with comorbidity was significantly less than those without.<sup>8</sup> In another study,<sup>9</sup> age, surgical technique, social support, and family history of breast cancer were shown to be strongly correlated with depression. Researchers found that there was a strong correlation between anxiety and the number of children.<sup>9</sup> Furthermore, a study<sup>10</sup> found employment status, having underaged children, and receiving radiotherapy were significantly associated with negative changes in QoL. Additionally, employed women had a lower risk of negative changes in global QoL and health/functioning compared to retired women.<sup>10</sup> Similarly, women without underaged children had a reduced risk of negative changes in family QoL.<sup>10</sup> Conversely, women who did not receive radiotherapy as adjuvant treatment faced a greater risk of decreased overall QoL, socioeconomic, and family QoL compared to those who did receive radiotherapy.<sup>10</sup> Moreover, a previous study<sup>11</sup> showed that the presence of comorbidity was linked to significantly lower Quality of Well-Being (QWB) levels. Also, the study findings suggested that breast cancer survivors face a long-term reduction in QoL comparable to that of other health conditions, persisting for years after treatment.<sup>11</sup> Despite multiple studies addressing QoL among breast cancer patients in Saudi Arabia, there is no previous systematic review assessing it. Therefore, this study aimed to present systematic analyses of the existing evidence of the QoL of breast cancer patients in Saudi Arabia with a focus on various variables affecting physical, emotional, social, and functional aspects. We believe our study will evaluate and summarize the evidence regarding factors associated with low QoL to screen it early and improve disease journey.

## Methods

### Study Registration

This systematic review followed the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) guideline and was prospectively registered in PROSPERO (ID: CRD42024525252).

### Literature Search Strategy

For this review, a thorough search conducted by the team was done on several databases, including Google Scholar, PubMed, Scopus, Mendeley, and Directory of Open Access (DOAJ), to find and extract relevant articles. Retrieved articles were analyzed according to our inclusion and exclusion criteria for the possibility of incorporation in this study. The research strategy was designed by one of the authors and approved by the rest of the team. An amalgamation of Medical Subject Headings (MeSH), such as (Breast carcinoma OR Breast neoplasm OR Breast malignancy OR breast tumor OR breast cancer) AND (Patients OR survivors) AND (Quality of life OR QOL OR life satisfaction OR Health-related quality of life OR HRQoL) were used to inclusively identify all studies pertaining to Quality of Life in breast cancer patients in Saudi Arabia.

### Study Selection of Articles and Data Extraction

All records resulting from the primary search were imported to Rayyan in MA, USA, to resolve duplications. Articles were initially screened by a dual independent reviewing team with the inclusion and exclusion criteria defined before the start of the process. Firstly, the titles and abstracts were initially screened, followed by full-text screening. In the event of any disagreement, the research group leader handled this issue by providing a third opinion to reach a consensus. Eventually, eight studies were deemed fit for inclusion in this study.

## Eligibility Criteria

Included articles fulfilled our inclusion criteria, which are as follows: studies published in the English language, studies conducted in the Kingdom of Saudi Arabia (KSA) and studies involving only female patients over the age of 18. Studies excluded from this review were those published in languages other than English, with improper methods (such as reporting a meta-analysis/systematic review, economic analysis, animal study, cadaver study, narrative review, or editorial), involving patients under the age of 18, focusing on patients with malignancies other than breast cancer alone and involving patients with psychiatric or mental diseases.

## Outcome Measure

Our main outcome in this study was the quality of life of breast cancer patients which was evaluated through four questionnaires: The European Organization for Research and Treatment-QOL questionnaire and breast cancer supplementary module (EORTC QLQ-C30 and QLQ-BR23), Quality of Life Instrument - Breast Cancer Patient (QOL-BC), and Medical Outcome Study Health Survey 36-Item Short Form (SF-36). Firstly, in EORTC QLQ-C30 and QLQ BR-23, each questionnaire included multi-item sections as well as single items. Our secondary outcome examined the demographic and clinical factors influencing QoL. These factors included age, marital status, education, employment, parenting, living conditions, and disease stage, highlighting their impact on patients' QoL.

## Data Extraction

The extracted data from the retained studies included study characteristics such as author, year of publication, setting, study design, sample size, type of questionnaire used. Patient characteristics extracted included age, outcome measures as provided by the questionnaire, and the conclusion provided in each paper.

## Risk of Bias

As our study scope was cross-sectional design, we used the AXIS tool to evaluate the risk of bias. Four independent group members utilized this tool to assess the quality of our included papers. After all the studies were evaluated a fifth member would review the work and aid in the case of any disagreements.

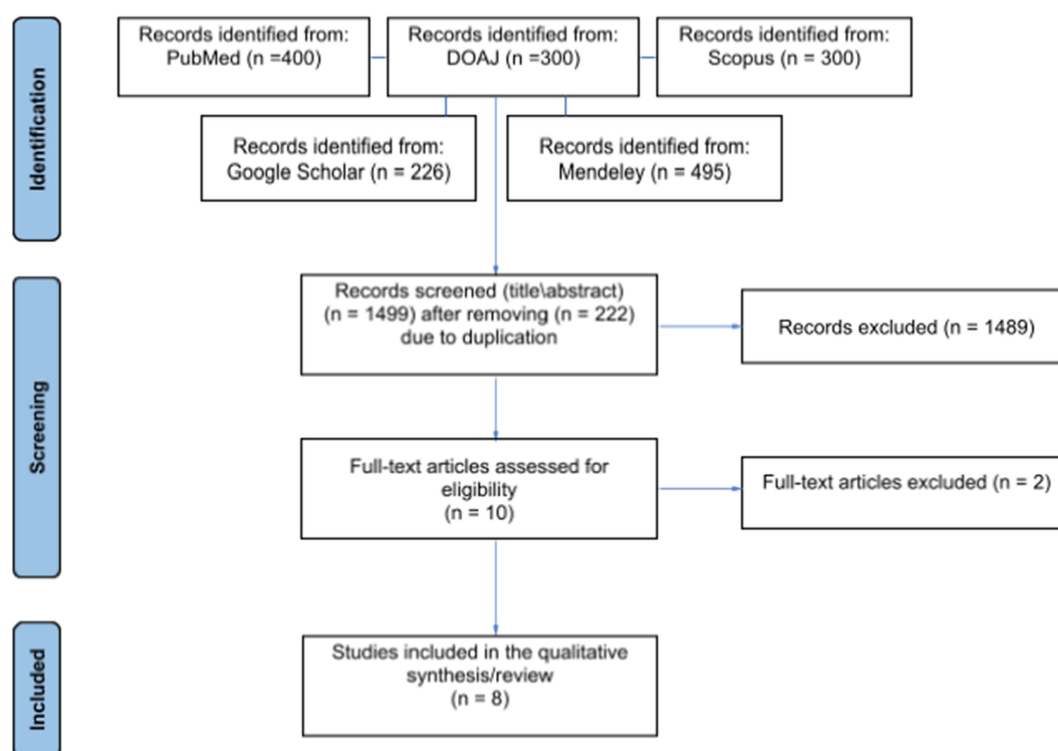
## Descriptive Analysis

A descriptive analysis with the intent of a quantitative analysis if the data was eligible will be conducted on the outcomes of interest which compromise: (1) Physical well-being, (2) Emotional well-being, (3) Social well-being, (4) Functional well-being in addition to cultural and contextual factors. To elucidate, physical well-being was considered in terms of assessment of pain, fatigue, physical functioning, and symptom severity. Likewise, emotional well-being was defined with regards to measures of anxiety, depression, stress, and overall emotional health. Social well-being was defined through evaluation of social support, relationships, and communication with family, friends, and healthcare providers. Functional well-being was evaluated through an assessment of activities of daily living, work productivity, and overall functional status. Lastly, cultural and contextual factors studied were consideration of cultural beliefs, social norms, and healthcare system factors that may influence quality of life outcomes in the Saudi Arabian context.

## Results

### Study Selection

1,721 records were initially identified from a variety of databases, including PubMed, DOAJ, Scopus, Google Scholar, and Mendeley. 222 were omitted due to duplication, and 1,499 records remained for screening based on titles and abstracts. Out of these, 10 articles were retrieved for further assessment of eligibility after excluding 1,489 records. Following the full-text comprehensive review, only 2 articles did not meet the inclusion criteria, ending up with 8 studies being included in the final qualitative review [Figure 1](#).



**Figure 1** Flow diagram of the studies selection based on PRISMA.

**Notes:** PRISMA figure adapted from Liberati A, Altman D, Tetzlaff J, et al. The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: explanation and elaboration. *Journal of clinical epidemiology*. 2009;62(10). Creative Commons.<sup>12</sup>

## Study Characteristics

All the included studies were conducted between 2014 and 2021. Moreover, all studies were conducted in single regions of Saudi Arabia, except for one study that was nationwide.<sup>13</sup> The regions that were included in studies: three conducted in Riyadh,<sup>1,14,15</sup> and one study in each of the following regions: Makkah,<sup>16</sup> Jeddah,<sup>17</sup> and Tabuk.<sup>18</sup> Out of the eight studies, only one did not report its region.<sup>19</sup> The combined sample size of all included studies in the systematic review was 1262 participants. The individual study sample size ranged from 88 to 284 participants. One study targeted breast cancer survivors,<sup>13</sup> while all the other studies targeted breast cancer patients.<sup>1,14–19</sup> For more detailed information on the characteristics of the included studies, refer to [Table 1](#).

The majority of the included studies utilized the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire (EORTC QLQ-C30 & BR23) to assess the quality of life of patients with breast

**Table 1** Characteristics of Included Studies

| Study                                | Year of publication | Study Design    | Sample Size | Setting                                                                                          | Mean Age     | Region     |
|--------------------------------------|---------------------|-----------------|-------------|--------------------------------------------------------------------------------------------------|--------------|------------|
| <b>Almutairi 2016<sup>1</sup></b>    | 2014–2015           | Cross-sectional | 145         | Multi-centered within Riyadh                                                                     | NR           | Riyadh     |
| <b>Nageeti 2019<sup>16</sup></b>     | 2016                | Cross-sectional | 88          | King Abdullah Medical City                                                                       | NR           | Makkah     |
| <b>Albabbain 2018<sup>14</sup></b>   | 2016                | Cross-sectional | 95          | The Oncology Unit at a tertiary hospital in Saud Arabia.                                         | NR           | Riyadh     |
| <b>Abu-Helalah 2022<sup>13</sup></b> | 2015–2017           | Cross-sectional | 246         | Two large tertiary Ministry of Health Hospitals and two National Guard Health Affairs hospitals. | 49.5±10.9    | Nationwide |
| <b>Imran 2019<sup>17</sup></b>       | NR                  | Cross-sectional | 284         | King Abdulaziz University Hospital (KAUH)                                                        | 51.74 ±11.59 | Jeddah     |

(Continued)

**Table 1** (Continued).

| Study                                | Year of publication | Study Design    | Sample Size | Setting                                                                        | Mean Age   | Region |
|--------------------------------------|---------------------|-----------------|-------------|--------------------------------------------------------------------------------|------------|--------|
| <b>Tamam 2021</b> <sup>19</sup>      | 2020–2021           | Cross-sectional | 163         | Multiple outpatient physiotherapy clinics in Saudi Arabia                      | 42.6 ± 8.3 | NR     |
| <b>Al-Zahrani 2019</b> <sup>18</sup> | 2016–2017           | Cross-sectional | 96          | King Salman Armed Forces Hospital in Tabuk, Saudi Arabia                       | NR         | Tabuk  |
| <b>Ahmed 2017</b> <sup>15</sup>      | 2016                | Cross-sectional | 145         | King Abdulaziz Medical City, Riyadh, Ministry of National Guard Health Affairs | 50.3±13.5  | Riyadh |

**Abbreviation:** NR, Not Reported.

cancer.<sup>1,13,14,16,17,19</sup> However, one study by Alzahrani et al used the Quality of Life instrument, Breast Cancer Patient (QOL-BC),<sup>18</sup> as well as another study, which was conducted by Ahmed et al used the Medical Outcome Study Health Survey 23-item (SF-36)<sup>15</sup> **Table 2**.

## Data Synthesis

According to the data's heterogeneity, we concluded that a quantitative approach was not feasible. Studies included in this review used similar questionnaires; however, the heterogeneity of the recorded patient's data included a detailed

**Table 2** Questionnaires Used and Studies' Conclusion

| Study                                 | Questionnaire                                                                                                                                                                            | Conclusion                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Almutairi 2016</b> <sup>1</sup>    | The European Organization for Research and Treatment of Cancer Quality of Life Cancer Specific Arabic Version (EORTC QLQ-C30, v.3.0) and breast cancer module QLQ-BR23 (EORTC-QOL-BR-23) | The study found that breast cancer survivors in Saudi Arabia had a low overall quality of life. Emotional scales scored highest among functional scales, while insomnia, appetite loss, and dyspnea were notable distressing symptoms. Future perspective was the highest scoring item on QLQ-BR23, and breast symptoms and treatment side-effects were significant on the symptom scale. Sociodemographic and clinical factors like age, education, employment status, age at diagnosis, and disease stage were significantly related to the quality of life in these patients. |
| <b>Nageeti 2019</b> <sup>16</sup>     | European Organization for Research and Treatment of Cancer QOL-C30 (EORTC-QOL-C30) and breast cancer module QLQ-BR23 (EORTC-QOL-BR-23)                                                   | The breast cancer patients showed an acceptable overall global health score. However, they scored low on the important functional and symptoms domains.                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Albaptain 2018</b> <sup>14</sup>   | European Organization for Research and Treatment of Cancer QOL-C30 (EORTC-QOL-C30) and breast cancer module QLQ-BR23 (EORTC-QOL-BR-23)                                                   | CAM therapy was commonly used among women in our study sample which was correlated with higher overall global QoL.                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Abu-Helalah 2022</b> <sup>13</sup> | European Organization for Research and Treatment of Cancer QOL-C30 (EORTC-QOL-C30) and breast cancer module QLQ-BR23 (EORTC-QOL-BR-23)                                                   | The results of this study provide valuable data for breast cancer care providers in order to assess the outcomes of their management from patients' perspectives. Detected specific impairments in health-related quality of life or psychological wellbeing could help in the future management of breast cancer patients and hopefully stimulate further research in this field.                                                                                                                                                                                               |

(Continued)

**Table 2** (Continued).

| Study                                | Questionnaire                                                                                                                          | Conclusion                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Imran 2019</b> <sup>17</sup>      | European Organization for Research and Treatment of Cancer QOL-C30 (EORTC-QOL-C30) and breast cancer module QLQ-BR23 (EORTC-QOL-BR-23) | The breast cancer patients who visited our institute had a better quality of life regarding overall global health status as well as functional and symptoms scales. Patients scored highest in social functioning and lowest in physical functioning. Insomnia and fatigue were the most disturbing symptoms. Similarly, patients scored better in functional scale (QLQ-BR-23), body image and future perspective. Hair loss and systemic therapy side effects were the most disturbing symptoms. Patients of younger age groups showed better QoL. Some issues, for instance, fatigue, insomnia, hair loss, etc., warrant good supportive therapy to reduce the concerns of patients and to give them psychological support. Future studies can be performed keeping in view specific problems in detail. |
| <b>Tamam 2021</b> <sup>19</sup>      | European Organization for Research and Treatment of Quality of Life Cancer 30 (EORTC QLQ-C30)                                          | Both quality of life and quality of sleep significantly decreased in Saudi women suffering from different stages of breast cancer-related lymphedema, and those suffering from stage III lymphedema exhibited the worst mean values of quality of life and quality of sleep. Future research should be designed to replicate and expand the findings of this study in addition to assessing the risk factors that affect the quality of life and quality of sleep among Saudi women suffering from breast cancer-related lymphedema.                                                                                                                                                                                                                                                                        |
| <b>Al Zahrani 2019</b> <sup>18</sup> | Quality of Life Instrument - Breast Cancer Patient (QOL-BC) instrument developed by Ferrel and Grant.                                  | The study revealed increased scores for the physical, spiritual, psychological and social well-being subscales. Age, marital status and cancer stage had a remarkable influence on the physical well-being subscale, whereas work status significantly influenced the psychological well-being subscale. In contrast, certain demographic characteristics of the patients, namely, marital status, chemotherapy and radiation, could act as predictive indicators of the social well-being (ie, marital status) and spiritual well-being (ie, chemotherapy and radiation) subscales.                                                                                                                                                                                                                        |
| <b>Ahmed 2017</b> <sup>15</sup>      | Medical Outcome Study Health Survey 36-Item Short Form (SF-36).                                                                        | Saudi breast cancer patients, regular exercise was a significant positive predictor of increased general health. In several SF-36 domains, Saudi breast cancer patients with multiple tumors, metastasis, or fever tend to experience significantly poor QoL. For such breast cancer patients, the effectiveness of interventional programs, such as regular exercise, should be assessed to maintain and improve QoL. Thus, it is important to provide routine assessment of QoL in breast cancer patients.                                                                                                                                                                                                                                                                                                |

indication of age, staging, and social status. Some papers vividly recorded tumor staging and patient age groups, while others only briefly mentioned such parameters. Moreover, some studies looked at specific measures, such as the usage of CAM. Such differences made it hard to find a common numerical ground for analysis. After the final decision to not

conduct a quantitative analysis, the team members proceeded to evaluate and summarize the studies carefully. With an emphasis on the selected outcomes and results and with full precision, data selection was made.

## Quality of Included Studies

In order to evaluate the quality of all included studies the AXIS tool was used and applied to all studies. The Scores of all included studies were above 13 out of 20, indicating that all included studies had a high quality, and therefore a proportionally low risk of bias. As the aim of this review is to assess the quality of life in breast cancer patients, all included studies have satisfied the aim.

## Demographics

In reference to education, A total of approximately 553 participants had a high school education or below, whereas nearly 193 had a university education or above. In terms of employment status, 243 participants were employed, and 549 were unemployed, with housewives and retirees labeled as unemployed. Regarding marital status, about 241 participants were single considering divorced and widowed, and nearly 519 were married. For residence, 67 participants lived in urban areas (specifically Riyadh), while 28 resided in rural areas, and the rest were not reported. Nationality data indicated that 77 participants were Saudi, and 18 were non-Saudi. It is important to note that one study did not report any demographic data, and several other studies lacked information.<sup>17</sup> These gaps are denoted as “Not Reported” (NR) in Table 3.

## Global Health Status/QoL2

Our systematic review included eight studies, six of which used the QLQ-C30 questionnaire to measure global health status.<sup>1,13,14,16,17,19</sup> The overall health status scores obtained in these investigations varied greatly. Almutairi et al<sup>1</sup> observed a global health status score of  $31.2 \pm 20$ . This implied that the patients in this study had a negative general health status which indicates low quality of life. In contrast, Albabtain et al<sup>14</sup> found a global health status score of  $73.16 \pm 20.26$ . This was an extremely favorable score, indicating that these individuals had an optimistic view of their health and quality of life. Table 4.

In order to evaluate the quality of life of breast cancer patients, Alzahrani et al<sup>18</sup> and Ahmed et al<sup>15</sup> employed different instruments. The Breast Cancer Patient Quality of Life (QOL-BC) scale was used by Alzahrani et al,<sup>18</sup> while the Medical Outcome Study Health Survey (SF-36) including 23 items was used by Ahmed et al.<sup>15</sup> A number of quality of life factors, including spiritual well-being, were investigated by the QOL-BC scale. Out of the patients with breast cancer that Alzahrani et al<sup>18</sup> investigated, the spiritual well-being score was  $7.19 \pm 0.66$ . On the other hand, the survey used by

**Table 3** Demographics of Included Studies

| Study                          | Education            |                     | Employment Status * |            | Marital Status** |         | Residence  |           | Nationality |           |
|--------------------------------|----------------------|---------------------|---------------------|------------|------------------|---------|------------|-----------|-------------|-----------|
|                                | High School Or below | University or Above | Employed            | Unemployed | Single           | Married | Urban      | Rural     | Saudi       | Non-Saudi |
| Almutairi 2016 <sup>1</sup>    | 96                   | 49                  | 79                  | 66         | 74               | 71      | NR         | NR        | NR          | NR        |
| Nageeti 2019 <sup>16</sup>     | NR                   | NR                  | 37                  | 51         | 27               | 61      | NR         | NR        | NR          | NR        |
| Albabtain 2018 <sup>14</sup>   | 68                   | 27                  | 15                  | 80         | 23               | 72      | Riyadh: 67 | Other: 28 | 77          | 18        |
| Abu-Helalah 2022 <sup>13</sup> | 66.66%               | 33.34%              | 27.5%               | 72.5%      | 23.33%           | 76.67%  | NR         | NR        | NR          | NR        |
| Imran 2019 <sup>17</sup>       | NR                   | NR                  | NR                  | NR         | NR               | NR      | NR         | NR        | NR          | NR        |
| Tamam 2021 <sup>19</sup>       | 135                  | 28                  | 51                  | 112        | 27               | 136     | NR         | NR        | NR          | NR        |
| Al-Zahrani 2019 <sup>18</sup>  | 87                   | 9                   | 24                  | 72         | 62               | 34      | NR         | NR        | NR          | NR        |
| Ahmed 2017 <sup>15</sup>       | 98                   | 47                  | 37                  | 108        | 37               | 108     | NR         | NR        | NR          | NR        |

**Notes:** \* Housewives and retirees were considered unemployed. \*\*divorced and widowed were considered as single.

**Abbreviation:** NR. Not reported.

**Table 4** Quality of Life Functional Scale

| Study                          | Global Health Status /QoL2                                             | Functional Scale                                                                           |                                                                                                             |                                                                                              |                                                                                             |                                                                                            |
|--------------------------------|------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|
|                                |                                                                        | Physical Functioning (PF2)                                                                 | Role Functioning (R[2)                                                                                      | Emotional Functioning (EF)                                                                   | Cognitive Functioning (CF)                                                                  | Social Functioning                                                                         |
| Almutairi 2016 <sup>1</sup>    | 31.2 ±20.5                                                             | 62.9 ± 24.6                                                                                | 67.6± 29.2                                                                                                  | 83.3 ± 22.7                                                                                  | 68.3 ± 27.3                                                                                 | 65 ± 35.7                                                                                  |
| Nageeti 2019 <sup>16</sup>     | 64.0 ±27.7                                                             | 68.63 ± 22.21                                                                              | 71.2 ± 31                                                                                                   | 59.5 ± 32                                                                                    | 67.42 ± 26.49                                                                               | 57 ± 35.8                                                                                  |
| Albabbain 2018 <sup>14</sup>   | CAM Users 73.16 ± 20.26<br>Non-CAM Users 64.82± 32.79                  | CAM Users 68.05 ± 21.72<br>Non-CAM Users: 63.33 ± 28.02                                    | CAM Users 78.14 ± 29.28<br>Non-CAM Users 62.96 ± 42.23                                                      | CAM Users 70.78 ± 29.54<br>Non-CAM Users: 67.14 ± 32.39                                      | CAM Users: 79.22 ± 24.05<br>Non-CAM Users: 83.33 ± 25.56                                    | CAM Users: 83.33 ± 26.35<br>Non-CAM Users: 72.22 ± 33.82                                   |
| Abu-Helalah 2022 <sup>13</sup> | 72.71 ±23.54                                                           | 62.14 ±26.03                                                                               | 78.69 ±29.60                                                                                                | 75.39 ±26.81                                                                                 | 74.61 ±25.53                                                                                | 80.06 ± 29.18                                                                              |
| Imran 2019 <sup>17</sup>       | 67.45 ±20.51                                                           | 63.61±26.85                                                                                | 64.02±34.20                                                                                                 | 67.89±31.10                                                                                  | 72.82±26.47                                                                                 | 79.63±27.15                                                                                |
| Tamam 2021 <sup>19</sup>       | -Stage I, 38.7± 7.4<br>-Stage II, 36.1 ± 6.8<br>-Stage III, 32.4 ± 5.6 | -Stage I (n=27): 64.2 ± 9.4<br>-Stage II(n=84): 61.4 ± 9.1<br>-Stage III(n=52): 57.3 ± 8.5 | -Stage I (n=27): 66.3 ± 10.2<br>-Stage II(n=84): 63.5 ± 9.8<br>-Stage III(n=52): 59.6 ± 8.7                 | -Stage I (n=27): 71.6 ± 11.4<br>-Stage II(n=84): 69.6 ± 10.5<br>-Stage III(n=52): 65.2 ± 9.4 | -Stage I (n=27): 68.5 ± 10.8<br>-Stage II(n=84): 65.2 ± 9.4<br>-Stage III(n=52): 61.6 ± 8.3 | -Stage I (n=27): 65.4 ± 9.8<br>-Stage II(n=84): 62.3 ± 8.7<br>-Stage III(n=52): 58.5 ± 7.9 |
| Al Zahrani 2019 <sup>18</sup>  | 7.91 ±1.54                                                             | 7.65±071                                                                                   | N/A                                                                                                         | 7.09±0.30                                                                                    | N/A                                                                                         | 7.02±0.41                                                                                  |
| Ahmed 2017 <sup>15</sup>       | NR                                                                     | 54.5±28.8                                                                                  | Role limitations due to physical health, 29.3±38.3<br>Role limitations due to emotional problems, 33.6±42.1 | 61.4±20.0                                                                                    | N/A                                                                                         | 58.4±28.2                                                                                  |

**Abbreviation:** NR. Not reported.

Ahmed et al<sup>15</sup> showed that, on average, the breast cancer patients had a general health score of  $50.7 \pm 19.2$ , a pain score of  $49.0 \pm 26.6$ , and a vitality score of  $43.9 \pm 20.8$ .

## QLQ-C30-Functional Scale

In the Negeeti et al's research, the functional measures indicated that role functioning scored the highest (mean 71.2, SD = 31), whereas social and emotional functioning scored the lowest (mean 57, SD = 35.8) and (59.5, SD = 32), respectively.<sup>16</sup> However, according to Almutairi et al's research,<sup>1</sup> emotional functioning was rated the highest among functional scores (83.25 [95% CI 79.53–86.98]). A study by Abu-Helalah et al<sup>13</sup> found that physical functioning had the lowest mean score of  $62.14 \pm 26.03$ , while social functioning had the highest mean score of  $80.06 \pm 29.18$ , which is consistent with Imran et al's results.<sup>17</sup> Additionally, the research that was done by Tamam et al<sup>19</sup> found that emotional function was the most significant while physical function was the lowest. Table 4.

## QLQ-C30-Symptoms Scale

The most undesirable symptoms were fatigue and insomnia (mean 48.86, SD = 29.4) and (mean = 48, SD = 35) based on Nageeti et al.<sup>16</sup> This was compatible with Imran et al's study, which described insomnia ( $42.73 \pm 40.00$ ) and fatigue ( $42.50 \pm 26.86$ ) as the most unfavorable symptoms.<sup>17</sup> Furthermore, Abu-Helalah et al<sup>13</sup> reported the lowest scores for fatigue and pain (mean = 28.29, SD = 25.67) (mean = 27.52, SD = 28), respectively. In research by Tamam et al,<sup>19</sup> insomnia was the most worrisome symptom in all three phases of lymphoedema in Saudi women with breast cancer-related symptoms ( $74.7 \pm 10.2$ ), ( $72.7 \pm 9.8$ ), and ( $69.4 \pm 9.7$ ). Moreover, according to Almutairi et al,<sup>1</sup> a loss of appetite ( $80.9 \pm 26.9$ ) was the second most upsetting symptom after insomnia ( $84.1 \pm 25.5$ ). Table 5.

## QLQ-BR23-Functional Scale

The greatest mean score was associated with body image, ranging from  $80.63 \pm 23.40$ <sup>14</sup> to  $60.22 \pm 36.19$ .<sup>16</sup> Additionally, the score for sexual enjoyment revealed a broad range from  $77.94 \pm 27.04$ <sup>17</sup> to  $21.33 \pm 28.81$ .<sup>14</sup> Similarly, the sexual function, ranging from  $75.81 \pm 26.85$ <sup>16</sup> to  $37.55 \pm 29.65$ .<sup>17</sup> The future perspective demonstrated a variation from  $76.3 \pm 35.3$ <sup>1</sup> to  $42.04 \pm 39.63$ .<sup>16</sup> Table 6.

In the comparison of six studies assessing the quality of life in breast cancer patients using QLQ-C30, physical functioning was consistently reported as the most compromised domain in the functional scale across five studies.<sup>1,13,14,16,17,19</sup> Additionally, one of these studies specifically compared CAM users, revealing poorer physical functioning among this subgroup compared to non-user who experienced a greater impairment in social functioning.<sup>14</sup> Notably, another study highlighted that social functioning was the domain with the lowest score.<sup>16</sup> Among the six studies reviewed, insomnia emerged as the most distressing symptom across five of them, reflecting its widespread prevalence and debilitating effects on patients with breast cancer.<sup>1,14,16,17,19</sup> Additionally, fatigue was consistently highlighted as a significant concern in three studies.<sup>13,16,17</sup> Pain was identified as a prominent symptom in one study.<sup>14</sup> Furthermore, loss of appetite had the highest mean score in one study.<sup>19</sup>

In reference to QLQ-BR23, two studies exhibited the future perspective domain as the worst rated.<sup>13,16</sup> Other studies showed different results, with Body Image,<sup>14</sup> Sexual Enjoyment,<sup>1</sup> and Sexual Functioning<sup>17</sup> being the worst domains on the functional scale. On the symptom scale, multiple studies found that hair loss was the most upsetting symptom.<sup>13,14,16,17</sup> Meanwhile, breast symptoms and arm symptoms (CAM users) both got the highest scores on two separate papers,<sup>1,14</sup> respectively.

The study conducted by Ahmed et al found that those suffering from metastatic disease had considerably inferior outcomes across several dimensions.<sup>15</sup> These patients had worse ratings on the SF-36 quality of life test, with decreases of 22.9 points for physical function, 15.0 points for vitality, 19.4 points for overall health, and 16.9 points for pain. Interestingly, they revealed that regular exercise considerably improved overall health, with an 8.2-point improvement on the SF-36 general health subscale. This shows that physical activity might be a valuable strategy for improving overall well-being in this patient population.

**Table 5** Quality of Life Symptom Scale

| Study                                | Symptom Scale                                                           |                                                                         |                                                                         |                                                                          |                                                                          |                                                                           |                                                                         |                                                                         |                                                                                            |
|--------------------------------------|-------------------------------------------------------------------------|-------------------------------------------------------------------------|-------------------------------------------------------------------------|--------------------------------------------------------------------------|--------------------------------------------------------------------------|---------------------------------------------------------------------------|-------------------------------------------------------------------------|-------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|
|                                      | Fatigue                                                                 | Nausea & Vomiting                                                       | Pain                                                                    | Dyspnea                                                                  | Insomnia                                                                 | Appetite loss                                                             | Constipation                                                            | Diarrhea                                                                | Financial Difficulties                                                                     |
| <b>Almutairi 2016<sup>1</sup></b>    | 42.50±26.86                                                             | 68.9 ± 76.2                                                             | 76.2 ± 24                                                               | 80 ± 27.3                                                                | 84.1 ± 25.5                                                              | 80.9± 26.9                                                                | 59.3± 31                                                                | 41.2 ± 32.4                                                             | 52 ± 39.3                                                                                  |
| <b>Nageeti 2019<sup>16</sup></b>     | 48.86, ± 29.39                                                          | 28.21 ± 33.55                                                           | 43.37 ± 31.61                                                           | 31.81 ±32.71                                                             | 48.10 ± 35.32                                                            | 35.22 ± 37.26                                                             | 40.53 ± 37.63                                                           | 13.63 ± 24.04                                                           | 25.37 ± 33.52                                                                              |
| <b>Albabbain 2018<sup>14</sup></b>   | CAM Users 33.62 ± 29.13<br>Non-CAM Users 41.97 ± 30.39                  | CAM Users 19.70 ± 30.55<br>Non-CAM Users 12.04 ± 26.07                  | CAM Users 33.99 ± 31.46<br>Non-CAM Users 50.92 ± 28.85                  | CAM Users 25.11 ± 30.19<br>Non-CAM Users 24.07 ± 29.83                   | CAM Users 48.06 ± 41.01<br>Non-CAM Users 40.74 ± 46.52                   | CAM Users 31.60 ± 34.59<br>Non-CAM Users 29.63 ± 41.05                    | CAM Users 29.01 ± 39.13<br>Non-CAM Users 14.81 ± 28.52                  | CAM Users 12.99 ± 28.69<br>Non-CAM Users 18.52 ± 38.30                  | CAM Users 13.42 ± 29.25<br>Non-CAM Users 20.37 ± 34.56                                     |
| <b>Abu-Helalah 2022<sup>13</sup></b> | 76.2± 22.9                                                              | 10.86 ± 22.61                                                           | 27.52 ± 28.00                                                           | 19.44 ± 27.77                                                            | 25.99 ± 34.35                                                            | 14.51 ± 25.89                                                             | 14.98± 28.50                                                            | 7.41± 18.97                                                             | 7.55 ± 20.72                                                                               |
| <b>Imran 2019<sup>17</sup></b>       | 63.61±26.85                                                             | 23.47 ±29.53                                                            | 38.96, ±28.39                                                           | 28.87±32.49                                                              | 42.73±40.00                                                              | 30.25±34.04                                                               | 29.69±37.04                                                             | 15.25±26.17                                                             | 17.13±29.31                                                                                |
| <b>Tamam 2021<sup>19</sup></b>       | -Stage I, 70.6 ± 9.7<br>-Stage II, 67.8 ± 9.4<br>-Stage III, 63.7 ± 8.7 | -Stage I, 68.4 ± 9.5<br>-Stage II, 65.7 ± 9.1<br>-Stage III, 62.5 ± 8.8 | -Stage I, 71.5 ± 9.8<br>-Stage II, 68.8 ± 9.4<br>-Stage III, 64.3 ± 8.4 | -Stage I, 73.2 ± 10.4<br>-Stage II, 70.6 ± 9.8<br>-Stage III, 67.1 ± 9.6 | -Stage I, 74.7 ± 10.2<br>-Stage II, 72.7 ± 9.8<br>-Stage III, 69.4 ± 9.7 | -Stage I, 74.5 ± 10.6<br>-Stage II, 72.2 ± 10.1<br>-Stage III, 68.2 ± 9.5 | -Stage I, 53.7 ± 8.6<br>-Stage II, 50.6 ± 8.5<br>-Stage III, 48.1 ± 7.5 | -Stage I, 45.3 ± 7.5<br>-Stage II, 42.5 ± 7.2<br>-Stage III, 40.1 ± 6.2 | -Stage I (n=27): 51.6 ± 7.7<br>-Stage II(n=84): 50.2 ± 7.4<br>-Stage III(n=52): 48.5 ± 6.8 |
| <b>Al Zahrani 2019<sup>18</sup></b>  | 7.71±1.62                                                               | N/A                                                                     | 7.65±1.65                                                               | N/A                                                                      | 7.85±1.68                                                                | 7.68±1.72                                                                 | N/A                                                                     | N/A                                                                     | 7.12±1.63                                                                                  |
| <b>Ahmed 2017<sup>15</sup></b>       | N/A                                                                     | N/A                                                                     | 49.0±26.6                                                               | N/A                                                                      | N/A                                                                      | N/A                                                                       | N/A                                                                     | N/A                                                                     | N/A                                                                                        |

**Abbreviation:** NR. Not reported.

**Table 6** Quality of Life Functional Scale (QLQ-BR23)

| Study                                | Functional Scale                                      |                                                        |                                                        |                                                        |
|--------------------------------------|-------------------------------------------------------|--------------------------------------------------------|--------------------------------------------------------|--------------------------------------------------------|
|                                      | Body Image                                            | Sexual Function                                        | Sexual Enjoyment                                       | Future Perspective                                     |
| <b>Almutairi 2016<sup>1</sup></b>    | 64.7 ±35.7                                            | 52.3±23.7                                              | 22.5±27.7                                              | 76.3 ±35.3                                             |
| <b>Nageeti 2019<sup>16</sup></b>     | 60.22 ±36.19                                          | 75.81 ±26.85                                           | 70.66 ±29.07                                           | 42.04 ±39.63                                           |
| <b>Albabbain 2018<sup>14</sup></b>   | CAM Users 0.63 ± 23.40<br>Non-CAM Users 66.67 ± 34.78 | CAM Users 19.26 ± 25.23<br>Non-CAM Users 25.93 ± 31.43 | CAM Users 21.33 ± 28.81<br>Non-CAM Users 24.08 ± 33.94 | CAM Users 64.07 ± 38.53<br>Non-CAM Users 55.55 ± 41.23 |
| <b>Abu-Helalah 2022<sup>13</sup></b> | 64.09 ±30.87                                          | 70.92 ±30.09                                           | 69.91 ±34.88                                           | 51.41 ±38.81                                           |
| <b>Imran 2019<sup>17</sup></b>       | 79.16±22.83                                           | 37.55±29.65                                            | 77.94±27.04                                            | 67.84±37.05                                            |

Additionally, the research carried out by Alzahrani et al revealed that the physical well-being aspect attained the highest score at  $7.65 \pm 0.71$ , followed closely by spiritual well-being at  $7.19 \pm 0.66$ , psychological well-being at  $7.09 \pm 0.30$ , and social concerns at  $7.02 \pm 0.41$ .<sup>18</sup>

## QLQ-BR23-Symptoms Scale

Among the eight reviewed studies, five utilized QLQ-BR23(1, 12–15). On the symptoms scale, breast symptoms had the highest mean score, ranging from  $65.1 \pm 26.1$ <sup>1</sup> to  $22.73 \pm 21.62$ .<sup>17</sup> Moreover, the hair loss score ranged from  $64.4 \pm 33$ <sup>1</sup> to  $34.85 \pm 41.89$ .<sup>14</sup> Along with arm symptoms, which varied between  $62.9 \pm 24.1$ <sup>1</sup> and  $36.42 \pm 29.97$ .<sup>14</sup> The systemic therapy side-effects score demonstrated a variation from  $64.4 \pm 27$ <sup>1</sup> to  $25.98 \pm 19.67$ .<sup>14</sup> Table 7.

## Marital Status and Parenthood

Marital status appeared to be a crucial predictor for global QoL.<sup>1,13</sup> One of these studies found that financial difficulty was significantly associated with marital status,<sup>1</sup> with research showing that divorced and widowed women reported lower physical function and lower social well-being scores than single and married women.<sup>18</sup> Furthermore, having children was linked to greater global quality of life scores compared to women without children.<sup>16</sup>

## Age

The age at diagnosis is a statistically significant predictor of overall quality of life for patients with breast cancer.<sup>1,13,16</sup> Individuals diagnosed after the age of fifty exhibited lower mean emotional functioning scores.<sup>16</sup> This suggests that

**Table 7** Quality of Life Symptoms Scale (QLQ-BR23)

| Study                                | Symptoms scale                                         |                                                        |                                                        |                                                        |
|--------------------------------------|--------------------------------------------------------|--------------------------------------------------------|--------------------------------------------------------|--------------------------------------------------------|
|                                      | Systemic Therapy Side-effects                          | Breast Symptoms                                        | Arm Symptoms                                           | Upset by Hair Loss                                     |
| <b>Almutairi 2016<sup>1</sup></b>    | 64.4±27.6                                              | 65.1±26.1                                              | 62.9±24.1                                              | 64.4 ±33                                               |
| <b>Nageeti 2019<sup>16</sup></b>     | 39.12 ±26.63                                           | 44.60 ±32.82                                           | 40.15 ±30.53                                           | 61.57 ±41.36                                           |
| <b>Albabbain 2018<sup>14</sup></b>   | CAM Users 25.98 ± 19.67<br>Non-CAM Users 26.14 ± 27.41 | CAM Users 22.73 ± 21.62<br>Non-CAM Users 23.15 ± 23.33 | CAM Users 37.36 ± 28.39<br>Non-CAM Users 36.42 ± 29.97 | CAM Users 34.85 ± 41.89<br>Non-CAM Users 51.86 ± 44.45 |
| <b>Abu-Helalah 2022<sup>13</sup></b> | 38.59 ±27.23                                           | 33.62 ±24.45                                           | 40.39 ±27.12                                           | 54.52 ±40.96                                           |
| <b>Imran 2019<sup>17</sup></b>       | 42.08±22.28                                            | 28.34±26.86                                            | 38.18±29.61                                            | 45.89±39.66                                            |

patients diagnosed later in life typically have worse emotional functioning and more emotional distress scores than those diagnosed earlier in life, which is consistent with findings from other studies.<sup>1,18</sup> In addition, older patient's physical function was worse than that of younger ones.<sup>15</sup> Conversely, other research discovered that those under 50 years of age had superior global health, physical functioning, and role functioning.<sup>17</sup> Furthermore, one study found that the age of menopause significantly impacted cognitive and role performance among breast cancer patients.<sup>1</sup>

## Living Status and History of Health Problem

Living alone was related to decreased emotional functioning score compared to living with family. Co-existing medical conditions were also associated with lower emotional well-being scores.<sup>16</sup> Moreover, severe disease status, including multiple tumors and metastases, contributed to poor physical, social, and overall health.<sup>15</sup>

## Treatment and Rehabilitation Sessions

In terms of therapies, individuals using monoclonal antibodies reported increased fatigue and a less favorable body image, whereas those on chemotherapy reported feeling more stressed out about their hair loss. Unexpectedly, those attending rehabilitation and support groups experienced increased insomnia.<sup>16</sup> Moreover, women receiving radiation and immunotherapy had greater spiritual well-being.<sup>18</sup> Immunotherapy, on the other hand, has been linked to reduced physical function, particularly in elderly individuals.<sup>15</sup>

## CAM Usage

Interestingly, the usage of complementary and alternative medicine (CAM) was linked to disparities in quality of life categories. Specifically, CAM users reported higher overall health, physical, role, and social function, as well as less constipation than non-CAM users.<sup>14</sup>

## Educational Level and Employment

Educational level and work status were also identified as relevant predictors, with emotional functioning influenced by employment status.<sup>1</sup> Higher levels of work and education were linked to improved psychological well-being.<sup>18</sup> Furthermore, research found that individuals with breast cancer who had only completed high school had worse physical function.<sup>15</sup>

## Affected Side

The position of the damaged side of the body is highly connected with the physical and role functioning of the patient. It is plausible that this is because nearly two thirds of research participants had right-side breast cancer, which might easily affect physical functioning due to the associated arm symptoms, given that most people are right-handed.<sup>1</sup>

## Stage

Compared to patients in earlier stages of the disease, those in late stages of breast cancer often have worse global health and functional scores. Distress over hair loss, symptoms in the arms and breasts, and a negative body image were all significantly predicted by pathological staging.<sup>1</sup> Patients in early stages (I/II) reported greater physical well-being compared to those in more advanced phases.<sup>18</sup> Meanwhile, patients in the late stages (III/IV) reported increased body pain.<sup>15</sup> However, other research revealed that the type of surgery and staging did not substantially impact quality of life.<sup>17</sup>

## Discussion

This systematic review aimed to present qualitative analysis of the existing evidence of the QoL of breast cancer patients in Saudi Arabia. We included eight studies with 1,262 breast cancer patients, carried out in different parts of Saudi Arabia between 2014 and 2021. The main instrument used across studies to measure quality of life was the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire (EORTC QLQ-C30 & BR23). Breast cancer survivors suffer from a decline in quality of life that lasts for years after treatment.<sup>20</sup> According to our data, the global health status scores varied significantly, as one research may score very low while another one scored

high. Social and emotional functioning frequently had the lowest scores on functional scales, but role functioning varied greatly. The most common symptoms that were recorded, according to the symptom scales were fatigue and insomnia, and far less commonly “constipation”. Hair loss and arm symptoms were identified as the most bothersome symptoms on the QLQ-C30 and QLQ-BR23 symptoms scale respectively. Demographic characteristics such as age, marital status, and education level had a major impact on the QoL outcomes as higher scores were associated with marriage and employment, whereas lower scores were associated with older age and less education. The QoL was also affected by the types of treatments used; for example, fatigue and hair loss were associated with monoclonal antibodies and chemotherapy. Interestingly, complementary and alternative medicine (CAM) were linked to better overall health and decreased constipation. These findings highlight the complex interplay of clinical, demographic, and psychosocial factors that influence the quality of life in breast cancer patients.

The global health status of breast cancer patients, as assessed by the QLQ-C30 questionnaire, showed variability across studies we reviewed, reflecting a wide range of perceptions regarding health and quality of life. One study reported a global health status score of  $31.2 \pm 20$ , indicating a clear negative outlook among their patient cohort. Such negative results could be attributed to the small sample size in that study, suggesting that results may not be applicable across larger populations.<sup>1</sup> On the other hand, another study found a higher score of  $73.16 \pm 20.26$ . It suggested a quite optimistic view of health and quality of life among the participants.<sup>14</sup> That also can be attributed to several factors, which include differences in sample sizes, patient demographics, and the specific contexts of the studies. Larger sample sizes often provide more representative and conclusive data, whereas smaller studies may capture more extreme, singular or special cases or specific groups within the population. Furthermore, Ngo NTN et al highlighted a broader range of global health status scores across multiple studies, ranging from  $56.32 \pm 25.42$  to  $72.48 \pm 15.68$ . The range provided by the study suggested a more consistent perception of health and quality of life among breast cancer.<sup>21</sup> The scores falling within this range indicate that while perceptions vary, many breast cancer patients could maintain a positive view of their health despite the challenges posed by their condition.

Studies pertaining to the functional scale scores of breast cancer patients highlight significant variability, which could indicate that multiple factors, like the ones mentioned above, play a role in impacting functional health in breast cancer patients. Role functioning scored very high in a study (mean 71.2, SD = 31), while social and emotional functioning scored the lowest (mean 57, SD = 35.8; 59.5, SD = 32).<sup>16</sup> Such numbers imply that patients optimize the functional aspects of their lives while neglecting their mental health and their social lives. It could pertain to the burden of the disease with regards to the surrounding environment or society and not being able to perform functionally well alongside the illness.<sup>16</sup> However, emotional functioning was highest among functional scores (83.25 [95% CI 79.53–86.98]). A notable discrepancy like this suggests that some members of the population diagnosed with breast cancer can have good emotional support provided by the people around them or through the healthcare profession.<sup>18</sup> Physical functioning was reported to be the lowest, with a mean score of  $62.14 \pm 26.03$ , and the highest for social functioning ( $80.06 \pm 29.18$ ), consistent with findings from another study.<sup>13,17</sup> Evident variability provided by these studies might be implicated by sample sizes, patient demographics, and the objectives of the studies. Moreover, among functional scales, social functioning scored the highest (mean 77.5 [95% CI 73.65–81.38]), whereas emotional functioning scored the lowest (63.4 [95% CI 59.12–67.71]).<sup>22</sup> These scores indicate that while some patients may have significant physical limitations, their social functions remain relatively unaffected, possibly due to a compensating support network or good community engagement. Evident variability provided by these studies might be implicated by sample sizes, patient demographics, and the objectives of the studies.

Fatigue and insomnia are debilitating side effects that constantly affect breast cancer patients. Studies that we reviewed highlighted these two side symptoms of this illness, which determined the significance of their influence on the patients. A mean score of 48.86 (SD = 29.4) for fatigue and 48 (SD = 35) for insomnia aligned closely with a study that reported similar levels of distress (insomnia:  $42.73 \pm 40.00$ ; fatigue:  $42.50 \pm 26.86$ ). These scores indicate that a solid portion of the population experiences these debilitating symptoms as part of the illness or the treatment regimen. Possibly affecting their day-to-day lives and well-being.<sup>16,17</sup> However, low scores numbered (28.29, SD = 25.67) in fatigue and (27.52, SD = 28) in pain suggested that the population included in that study either did not correctly report their symptoms or just did not experience these debilitating side effects of breast cancer.<sup>13</sup> Insomnia, on the other hand, was

identified as the most troublesome symptom in patients with breast cancer suffering from lymphedema as a side effect of treatment. This implies that the illness itself does not cause such enervative results, in fact, lymphedema that happened due to the surgical treatment can lead to insomnia which has been classified as the most common symptom that arises in this entity of patients.<sup>19</sup> Contrasting the prior study mentioned. Moreover, a study observed that the loss of appetite (80.9, SD = 26.9) ranks as the second most distressing symptom after insomnia (84.1, SD = 25.5), further emphasizing the multifaceted impact of these symptoms on patients' daily lives.<sup>1</sup> The consistency of these findings across studies indicates that fatigue and insomnia are prevalent factors influencing the overall quality of life in breast cancer patients.

QLQ-BR23 was used in several studies, and it has provided useful insight into the obstacles faced by breast cancer patients. Starting with breast cancer-related symptoms, which included pain, swelling, or discomfort, it was shown that it received the highest mean score across several studies we utilized. This proposes that breast-related issues are common among the patients, significantly affecting them. Hair loss, on the other hand, was another common side effect of breast cancer treatment and showed significant variability in scores across studies, ranging from  $64.4 \pm 33$  to  $34.85 \pm 41.89$ . Variability in such matters could reflect the nature of the disease, the treatment regimen, or their overall health. It may impact other parts of their lives, which include their self-image and mental wellbeing. Moreover, arm symptoms (swelling due to lymphoedema), which may result from surgery, ranged between  $62.9 \pm 24.1$  and  $36.42 \pm 29.97$ . These symptoms will affect their functional lives, possibly disturbing their day-to-day tasks, worsening their already established condition, and, in the future, complicating the recovery and rehabilitation process. Additionally, systemic therapy side effects, including a range of symptoms like nausea, fatigue, and cognitive issues, showed variation from  $64.4 \pm 27$  to  $25.98 \pm 19.67$ . These scores reflect the broader impact of treatment on patients' overall health and quality of life.

As it is already known, breast cancer influences different aspects of a patient's life, ranging from their body image to their sexual dysfunction. QLQ-BR23 explores these segments and further assesses the patient's well-being. Body images play a crucial role that potentially impacts the patient's well-being, with a high mean score of ( $80.63 \pm 23.40$  to  $60.22 \pm 36.19$ ) being reported in the study. Breast cancer treatments, such as radiation, chemotherapy, and surgery, directly influence the body image, alter the perception of self-image, and further worsen state of health. Moreover, further variations were noticed in the sexual function and sexual enjoyment domains. The results showed that the range of scores for sexual satisfaction was  $77.94 \pm 27.04$  to  $21.33 \pm 28.81$ , and for sexual function it was  $75.81 \pm 26.85$  to  $37.55 \pm 29.65$ . This suggested that intimacy can be affected by the disease itself or the treatment of the illness. Variations in the numbers could suggest that a huge portion of the population with distinct cancer stages and treatment modalities were included and have affected the outcomes. Moreover, sexual dysfunction can be aggravated by conditions that arise from breast cancer or its treatments. Conditions can include exhaustion, hormone fluctuations, and stress, which negatively affect a patient's relationships and general quality of life. Heterogeneity in numbers was also observed, which ranged from  $76.3 \pm 35.3$  to  $42.04 \pm 39.63$ .

In Saudi Arabia, for the last 20 years, breast cancer has been labeled as the most common cancer accounting for 19.8% of all female cancers according to an article that was published in 2005. This incidence rate has increased up to 31.4% as per the cancer incidence report 2020 released in 2023 by the Saudi Health Council.<sup>5,20</sup> This documented increase in the number of cases, whether attributed to the advances in the screening programs or due to better defined policies, the issue would remain the same, hence addressing the main complications directly would increase the quality of care. Since 2016, the Kingdom of Saudi Arabia has released its **"2030 Vision"**, and one of the main components of this vision is the Quality of Life program. The goal of this program is to make Saudi Arabia a more vibrant and livable country for all.<sup>23</sup> This ambitious goal is the standard that dares to challenge the difficult aspects of cancer and its complications, and as such it is within the responsibilities of the health organizations in the kingdom to include this aspect of the disease within its care. To ensure a more representative sample of the general population and to gain a deeper understanding of the quality of life (QoL) among breast cancer patients, it is recommended to conduct studies encompassing a wider variety of demographics, including all regions of the Kingdom. Moreover, longitudinal studies are necessary to monitor quality of life (QoL) over time, as this approach will provide valuable insights about how QoL changes throughout different stages of breast cancer and at various phases of treatment. We recommend incorporating the QoL assessments as a standard part of breast cancer management, this will ultimately guide to more effective and tailored interventions that will support patients' well-being.

Our paper “Quality of Life of Breast Cancer Patients in Saudi Arabia” acknowledges several strengths and limitations. To our knowledge, no previous systematic review was conducted to solely evaluate the QoL of breast cancer patients in Saudi Arabia. Another notable strength lies in our thorough approach to the literature review, which followed the established PRISMA guidelines and adhered to rigorous methodology. Additionally, a wide range of QoL components were included in our study, which provides valuable insights into the problems faced by breast cancer patients. However, we note some limitations as we cannot generalize our study results beyond the Saudi Arabia setting. As breast cancer is known to be a disease with wide presentations, the limited reporting of the QoL according to each intervention and stage of the disease have imposed a restricted view on the QoL in different presentations. Another limitation was our search strategy having no restrictions beside that it was limited to studies published in the English language. Also, the heterogeneity in the included studies made it challenging to compare them with one another; therefore, a meta-analysis could not be applied in this systematic review. At the level of the included studies, the validity and reliability of the Arabic translation of the QLQ-C30 and QLQ-BR23 has been established.<sup>1,13,14,16,17,19,24</sup> However, one study employed two bilingual translators but did not report any procedures for validating or checking the reliability of the translation.<sup>18</sup> Another study provided no information regarding the translation process, or its validity and reliability.<sup>15</sup> Despite these limitations, our research adds significantly to the literature by highlighting the available evidence regarding factors associated with low QoL and through a clinical continuous monitoring for these factors the disease journey would be improved for most patients.

## Conclusions

In conclusion, our systematic review provides valuable insights into the multidimensional quality of life (QoL) among breast cancer patients. Global health status scores varied widely, reflecting disparities in health perceptions among patients. Physical functioning consistently emerged as the most compromised domain on the QLQ-C30 functional scale, with insomnia, fatigue, and pain being the most frequently reported symptoms. On the QLQ-BR23 scale, body image and sexual function showed notable variability, while breast symptoms were universally identified as a particularly distressing symptom. Sociodemographic parameters such as age, marital status, education, employment, living conditions, and parenting roles were found to noticeably influence overall QoL. These findings emphasize the complex interplay of clinical and social determinants in shaping patient experiences. Tailored interventions, including supportive care, personalized therapies, and rehabilitation programs, could enhance QoL outcomes by addressing these factors. Moreover, a QoL evaluation instrument applied in a therapeutic context may inform strategies to provide holistic support for patients and their families, enabling them to navigate the challenges of the disease more effectively. As breast cancer continues to be a significant health issue worldwide, future research should explore longitudinal changes in QoL and the impact of targeted interventions to optimize the well-being of diverse patient subgroups.

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