

RESEARCH ARTICLE

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Patients' Satisfaction After Breast Reconstruction Surgery Using Autologous versus Implants: A Meta-Analysis

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Abstract

Introduction: Breast cancer is a common disease that affects women globally and causes physical and emotional challenges. Breast reconstructive surgery aims to restore the shape of the breast after a mastectomy. Two common approaches used today are tissue-based or autologous and implant-based reconstruction. Autologous breast reconstruction has the advantage of being more affordable, but the resulting shape is less attractive. At the same time, the implant technique produces a more pleasing shape at a more expensive cost. **Objective:** To compare the level of patients' satisfaction after breast reconstruction using the implant technique with the autologous technique using the Breast-Q questionnaire. **Methods:** This research was a meta-analytic study to compare patients' satisfaction levels with breast reconstruction using the autologous technique compared with the implant technique. We searched several research articles from PubMed, EMBASE, and the Cochrane Library from 2014 to 2023. Then, we conducted an analysis using Revman 5.4. The results of the study were presented in a forest plot diagram. **Results:** From the search results, there were 3980 studies. Then, exclusion and inclusion were carried out, and the results obtained were 16 research articles. Of the 16 studies, analysis was then carried out, and the results obtained were satisfaction in breast patients with a sample size of 7284. The standard result of the mean difference was 0.55 (95% CI 0.41-0.68) $p < 0.00001$. Satisfaction with the reconstruction results with a sample size of 2935. The standard result of the mean difference was 0.48 (95% CI 0.28-0.69) $p < 0.00001$. Patients' sexual satisfaction with a sample size of 7149. The standard result of the mean difference was 0.27 (95% CI 0.17-0.37) $p < 0.00001$. Patients' satisfaction with nipple shapes with a sample of 426. The standard result of the mean difference was 0.22 (95% CI -0.00-0.44) $p = 0.06$. Patients' satisfaction with plastic surgeons with a sample size of 272. The standard result of the mean difference was 0.52 (95% CI 0.25-0.80) $p = 0.0002$. **Conclusion:** The autologous breast reconstruction technique is better than the implant-based reconstruction technique in terms of patient satisfaction with the breast, reconstruction outcome, sexual satisfaction, nipple shapes, and plastic surgeons based on the Breast-Q questionnaire. The findings of this comprehensive study indicate that breast cancer survivors who choose autologous reconstruction have higher levels of satisfaction across multiple domains than those who decide implant-based reconstruction.

Keywords: Breast reconstruction- autologous- implant-based, patients' satisfaction- questionnaire

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Introduction

Breast cancer is a common and debilitating disease that affects millions of women worldwide.¹ It causes significant physical, emotional, and psychological challenges for those who are diagnosed. Patients with breast cancer frequently need breast reconstruction surgery [1, 2]. Breast reconstruction is an important part of the overall treatment and recovery process of breast cancer because it aims to restore the form, shape, and symmetry of the breast following a mastectomy [1,

3, 4]. Breast reconstruction techniques have evolved significantly over the years, providing a variety of options for restoring the appearance of the breasts and improving patient outcomes. In breast reconstruction, two approaches are commonly used: autologous tissue-based reconstruction and implant-based reconstruction.³ Autologous tissue-based reconstruction involves the use of the patient's tissues to reconstruct the breast, such as those from the abdomen, buttocks, or back.⁴ Implant-based reconstruction, on the other hand, uses silicone or saline implants to restore breast volume [5]. The loss of one or

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both breasts due to mastectomy can lead to emotional distress, diminished self-confidence, and body image concerns [1, 6]. Yet, breast reconstruction surgery aims to alleviate these psychological burdens by restoring the appearance, symmetry, and aesthetics of the breasts [1, 7, 6]. This systematic review and meta-analysis reviewed the existing evidence to show how breast reconstruction, whether autologous or implant-based, provides better patient satisfaction.

Materials and Methods

Study Selection

We conducted a literature search by citing articles from the PubMed, EMBASE, and Cochrane Library databases for case-control studies. The search strategy utilized keywords such as breast cancer, breast reconstruction, autologous reconstruction, implant reconstruction, BREAST-Q, and combinations thereof. The search scope was developed using the wildcard symbol '*', and the search was continued with combinations of words or phrases using Boolean operators ('AND,' 'OR,' 'NOT'). The titles from the search results were examined and included in the study.

Inclusion and Exclusion Criteria

All studies that analyze patient satisfaction in breast cancer patients who underwent a mastectomy followed by breast reconstruction using the autologous method compared to the implant method were included. Satisfaction levels were assessed using the BREAST-Q questionnaire. The BREAST-Q questionnaire itself is a tool for measuring the quality of life specifically designed for patients who have undergone breast reconstruction procedures or other breast surgeries. This tool is used to gauge patients' experiences and satisfaction after the surgery or procedure. We excluded duplicate publications, meta-analyses, systematic reviews, and case report studies.

Data Extraction

Data is extracted from all studies, including the primary author, year of publication, sample size, sample age, location, number of autologous reconstruction samples, number of implant reconstruction samples, and BREAST-Q satisfaction values. All data is extracted and entered into a table for further data analysis (Table 1).

Evaluation of the quality of selected studies

In this study, the Newcastle-Ottawa Scale checklist was used to assess the quality of studies (Table 2). The NOS (Newcastle-Ottawa Scale) ranges from zero to nine stars, from low stars to high stars, indicating high research quality.

Statistical analysis

From each paper, the following information was extracted: Types of study (cross-sectional or cohort), The number of patients/respondents in each group, and Breast-Q data. The mean differences and 95% confidence intervals (CIs) were calculated using the random effects of meta-analysis on the pooled data. RevMan 5.4 was

used to analyze and evaluate the previously collected and extracted data for statistical analysis.

Results

From the research data, a total of 3980 studies were obtained from various sources of journals such as PubMed, EMBASE, and the Cochrane Library databases. Then, we filtered out duplicate studies, resulting in 129 duplicate research data. Out of the 3851 journals, they were subjected to the inclusion and exclusion criteria that had been established, leading to 69 journals for screening. Within these, 23 studies did not assess satisfaction using BREAST-Q. There were 17 journals without full-text access. Additionally, there were 8 case report studies and five studies without published data tables. Ultimately, 16 journals were eligible for inclusion in the research and subsequent meta-analysis (Figure 1).

A higher overall breast satisfaction (Figure 2) in the autologous group compared with the implant group (the mean difference of 0.55; 95% CI; 0.41 to 0.68; $Z=7.95$; $p<0.005$) was observed, with considerable heterogeneity ($I^2=77%$ $p<0.05$). Patients' satisfaction with the outcome was higher in the autologous group (Figure 3) rather than the implant group (the mean difference was 0.48; 95% CI; 0.23 to 0.69; $Z=4.67$; $p<0.005$), with considerable heterogeneity ($I^2=73%$ $p<0.05$). Patients' sexual satisfaction was higher in the autologous group (Figure 4) rather than the implant group (the mean difference was 0.27; 95% CI; 0.17 to 0.37; $Z=5.41$; $p<0.005$), with moderate heterogeneity ($I^2=57%$ $p<0.05$). Patients' satisfaction with the result of nipple shapes was higher in the autologous (Figure 5) group rather than the implant group (the mean difference was 0.22; 95% CI; 0.00 to 0.44; $Z=1.92$; $p<0.005$), with low heterogeneity ($I^2=17%$ $p=0.06$). Patients' satisfaction with the plastic surgeon was higher in the autologous group (Figure 6) rather than the implant group (the mean difference was 0.52; 95% CI; 0.25 to 0.80; $Z=3.74$; $p<0.005$), with low heterogeneity ($I^2=23%$ $p<0.05$).

The funnel plot data of Patients' Satisfaction with Breast Reconstruction indicates there is no significant research bias, which means that both positive and negative research outcomes have been published (Figure 7).

Discussion

Breast-Q is a valid and widely used patient-reported outcome measure that is developed specifically to assess the outcomes and patient satisfaction associated with breast surgery, including breast reconstruction [8]. It is a comprehensive questionnaire that collects information concerning patients' experiences and perceptions of breast appearance, psychosocial well-being, sexual well-being, and physical well-being. The Breast-Q questionnaire is made up of several scales. Each of these focuses on a different domain, such as satisfaction with breasts, satisfaction with outcomes, satisfaction with psychosocial well-being, and satisfaction with sexual well-being [8, 9]. This study, based on 16 kinds of literature, showed that autologous breast reconstruction methods provided overall

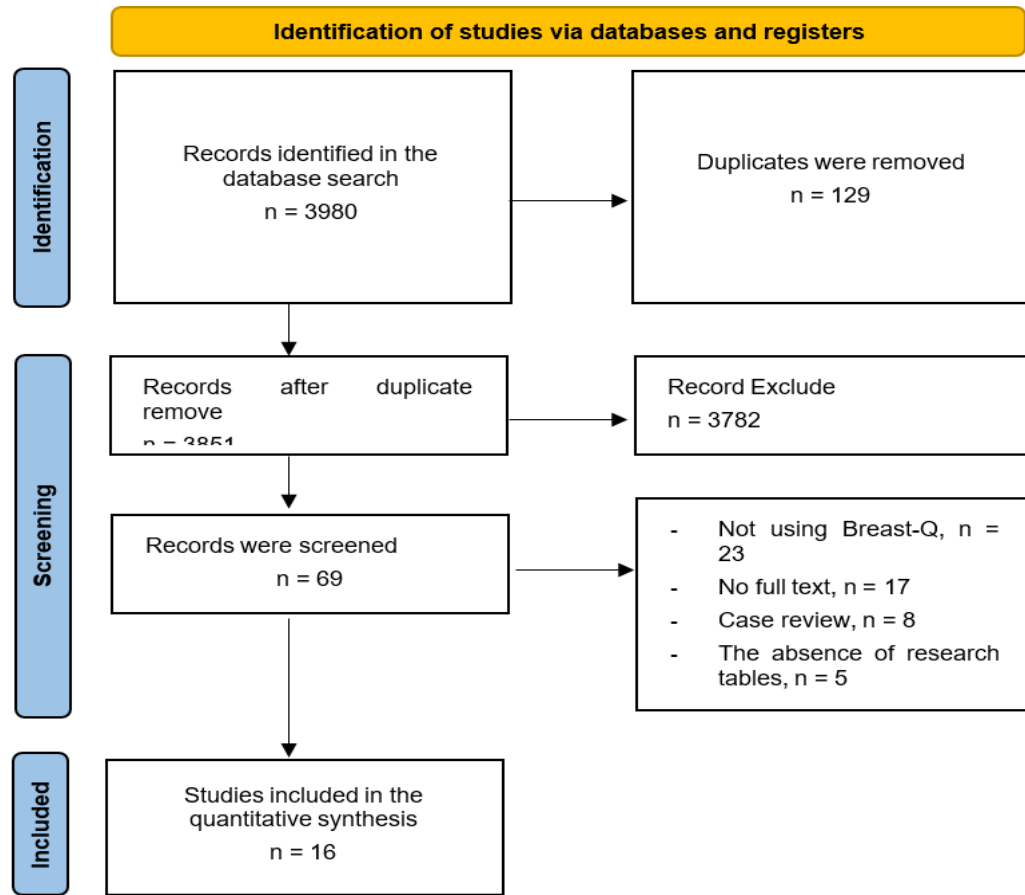


Figure 1. The PRISMA Flow Diagram

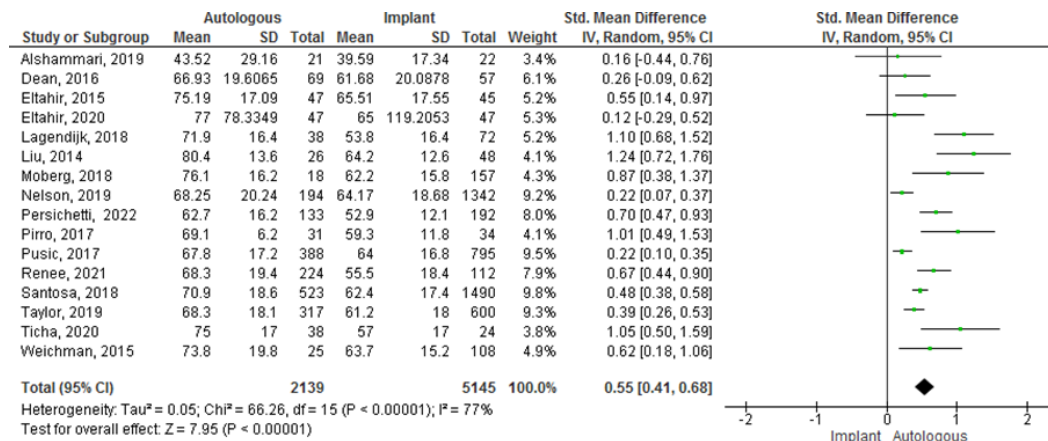


Figure 2. The Forest Plot of Patients' Satisfaction with the Breast Reconstruction

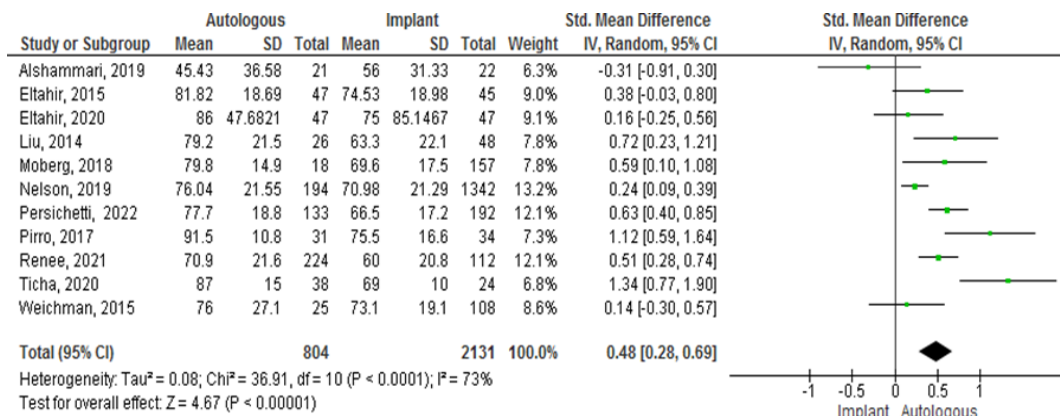


Figure 3. The Forest Plot of Patients' Satisfaction with the Outcome

Table 1. Characteristics of Included Studies

| Author | Year published | Country | Follow-up (months) | Study Design | Age of Implant-based patients (years) | Number of Implant-based procedures | Age of autologous patients (years) | Number of autologous procedures | Outcomes | Ref |
|------------------------|----------------|------------------------------|------------------------|----------------------|---------------------------------------|------------------------------------|------------------------------------|---------------------------------|---|------|
| Alshammari et al. [13] | 2019 | Saudi Arabia | 6 to 36 | Cross-sectional | 40.95 ± 10.4 | 22 | 46.19 ± 9.1 | 21 | Complications, Breast-Q satisfaction with outcomes, Breast-Q satisfaction with breast | [7] |
| Dean and Tamara, [4] | 2016 | Australia | 4 to 12 | Cohort prospective | Not mentioned | 57 | Not mentioned | 69 | Complications, Breast-Q satisfaction with outcomes, Breast-Q satisfaction with breast | [8] |
| Eltahir et al.[11] | 2020 | Netherlands | 4 to 52 | Cross-sectional | 49 | 47 | 42 | 47 | Breast-Q satisfaction with outcomes, Breast-Q satisfaction with outcomes, Breast-Q satisfaction with breast, Strasser score | [9] |
| Eltahir et al. [15] | 2014 | Netherlands | Not mentioned | Cross-sectional | 42 | 45 | 49 | 47 | Breast-Q satisfaction with breast, Breast-Q satisfaction with the outcome, total complications | [10] |
| Legendijk et al. [16] | 2018 | Netherlands | Not mentioned | Cross-sectional | Not mentioned | 73 | Not mentioned | 38 | Breast-Q satisfaction with breast | [11] |
| Liu et al.[17] | 2014 | the United States | Not mentioned | Cross-sectional | 52.2 ± 7.0 | 48 | 48.0 ± 9.8 | 26 | Breast-Q satisfaction with the outcome, Breast-Q satisfaction with breast | [12] |
| Ingviold et al. [18] | 2018 | Norway | Not mentioned | Cohort retrospective | Not mentioned | 157 | Not mentioned | 18 | Breast-Q satisfaction with the outcome, Breast-Q satisfaction with breast, total complication | [13] |
| Nelson et al.[19] | 2019 | the United States | 3 to 12, then annually | Cohort prospective | 49.92 | 2932 | 49.53 | 336 | Breast-Q satisfaction with the outcome, Breast-Q satisfaction with breast | [14] |
| Persichetti et al.[20] | 2022 | Italy | Not mentioned | Cohort retrospective | 51.9 | 192 | 51.3 | 133 | Breast-Q satisfaction with the outcome, Breast-Q satisfaction with breast | [15] |
| Pirto et al.[21] | 2017 | Czech Republic | Not mentioned | Cross-sectional | Not mentioned | 34 | Not mentioned | 31 | Breast-Q satisfaction with the outcome, Breast-Q satisfaction with breast | [16] |
| Pusic et al. [22] | 2017 | the United States | 12 | Cohort prospective | 48.9 | 1139 | 52.3 | 493 | Breast-Q satisfaction with the outcome, Breast-Q satisfaction with breast, PROMIS score | [17] |
| Miseric et al. [23] | 2021 | Netherlands | Not mentioned | Cross-sectional | 56.4 | 112 | 55 | 224 | Breast-Q satisfaction with the outcome, Breast-Q satisfaction with breast | [18] |
| Sanrosa et al.[24] | 2018 | the United States and Canada | 12 to 48 | Cohort prospective | 48.1 | 1490 | 51.6 | 523 | Breast-Q satisfaction with the outcome, Breast-Q satisfaction with breast, total complication | [19] |
| Taylor et al. [25] | 2019 | the United States and Canada | 24 | Cohort prospective | 45.9 (bilateral) 52.5 (unilateral) | 600 | 49.8 (bilateral) 52.7 (unilateral) | 317 | Breast-Q satisfaction with the outcome, Breast-Q satisfaction with breast, total complication | [20] |
| Techa et al.[26] | 2020 | Czech Republic | 60 | Cross-sectional | 46.7 | 24 | 50 | 38 | Breast-Q satisfaction with the outcome, Breast-Q satisfaction with breast, total complication | [21] |
| Weichman et al.[10] | 2015 | Germany | Not mentioned | Cross-sectional | 47.6 | 223 | 47.3 | 50 | Breast-Q satisfaction with the outcome, Breast-Q satisfaction with breast | [22] |

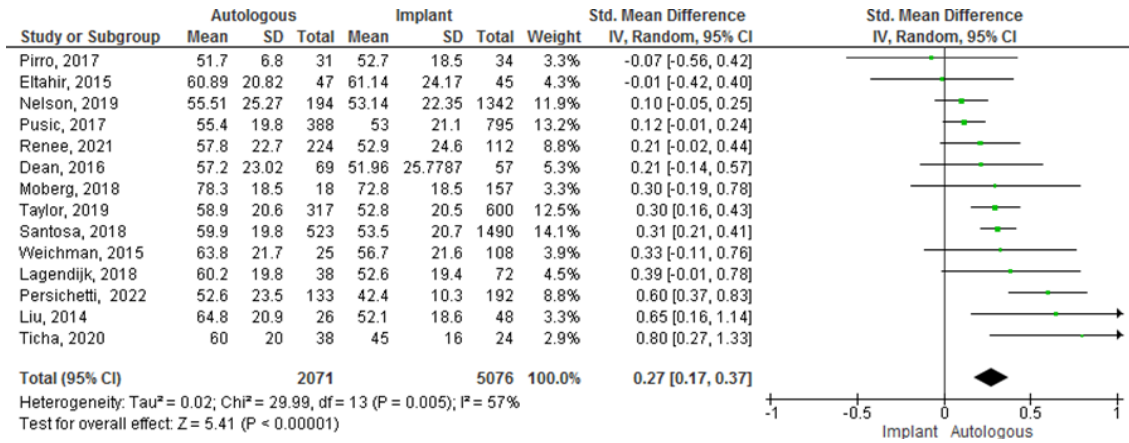


Figure 4. The Forest Plot of Patients' Satisfaction with Sexual Well-being.

Table 2. Quality assessment of included articles according to the Newcastle–Ottawa Scale checklist

| Author (References) | | Selection | | | | Comparability | | Exposure | | |
|-------------------------|------|-----------|---|---|---|---------------|---|----------|---|---|
| | | 1 | 2 | 3 | 4 | A | B | 1 | 2 | 3 |
| Alshammari et al. [13] | 2019 | ☺ | ☺ | | ☺ | ☺ | ☺ | ☺ | | ☺ |
| Dean and Tamara. [14] | 2016 | ☺ | ☺ | ☺ | | ☺ | ☺ | ☺ | ☺ | |
| Eltahir et al. [11] | 2020 | ☺ | ☺ | ☺ | | ☺ | ☺ | ☺ | ☺ | |
| Eltahir et al. [15] | 2014 | ☺ | ☺ | ☺ | ☺ | ☺ | ☺ | ☺ | | ☺ |
| Legendijk et al. [16] | 2018 | ☺ | ☺ | | ☺ | ☺ | ☺ | ☺ | ☺ | |
| Liu et al. [17] | 2014 | ☺ | ☺ | ☺ | ☺ | ☺ | | ☺ | ☺ | |
| Ingvild et al. [18] | 2018 | ☺ | ☺ | ☺ | | ☺ | ☺ | ☺ | | ☺ |
| Nelson et al. [19] | 2019 | ☺ | ☺ | | ☺ | ☺ | ☺ | ☺ | ☺ | |
| Persichetti et al. [20] | 2022 | ☺ | ☺ | ☺ | ☺ | ☺ | ☺ | ☺ | ☺ | |
| Pirro et al. [21] | 2017 | ☺ | ☺ | ☺ | ☺ | ☺ | | ☺ | | ☺ |
| Pusic et al. [22] | 2017 | ☺ | ☺ | ☺ | | ☺ | ☺ | ☺ | ☺ | ☺ |
| Miseré et al. [23] | 2021 | ☺ | ☺ | ☺ | | ☺ | ☺ | ☺ | ☺ | |
| Santosa et al. [24] | 2018 | ☺ | ☺ | ☺ | | ☺ | ☺ | ☺ | ☺ | ☺ |
| Taylor et al. [25] | 2019 | ☺ | ☺ | | ☺ | ☺ | | ☺ | ☺ | ☺ |
| Ticha et al. [26] | 2020 | ☺ | ☺ | ☺ | ☺ | ☺ | | ☺ | ☺ | |
| Weichman et al. [10] | 2015 | ☺ | ☺ | ☺ | | ☺ | ☺ | ☺ | ☺ | |

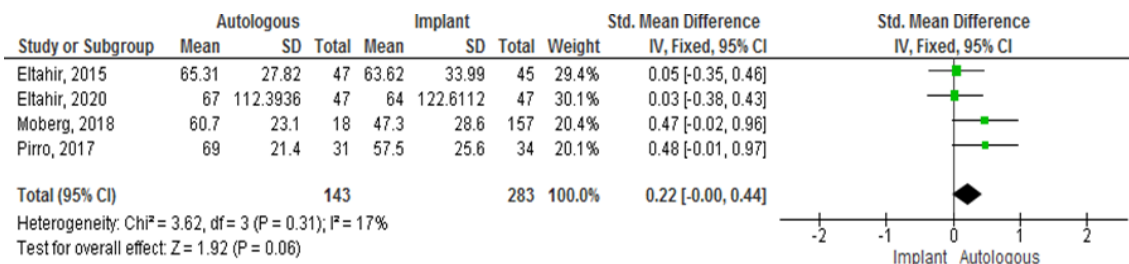


Figure 5. The Forest Plot of Patients' Satisfaction with Nipple Shapes

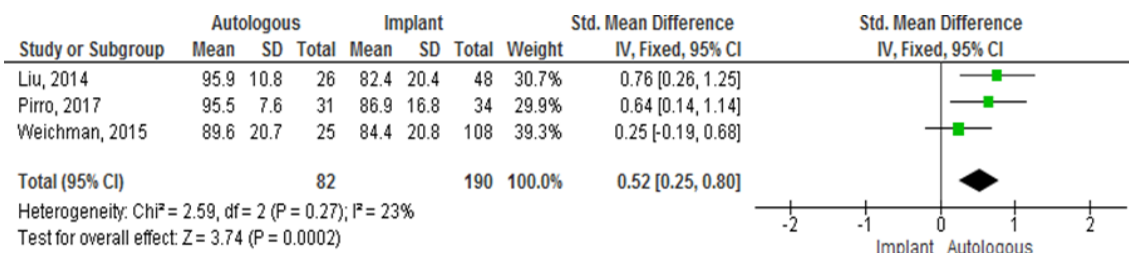


Figure 6. The Forest Plot of Patients' Satisfaction with Plastic Surgeons

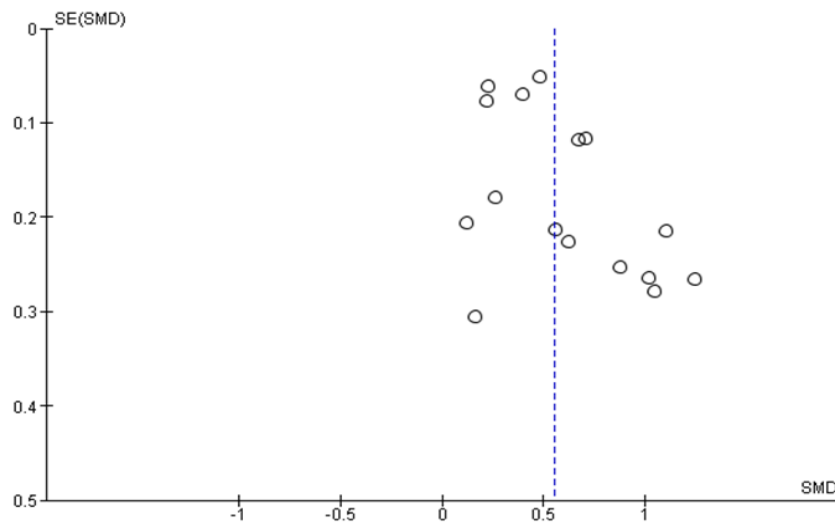


Figure 7. Funnel Plot of Patients' Satisfaction with the Breast Reconstruction

better breast satisfaction than implant-based surgery. The most recent meta-analysis study was conducted by Stefura et al. [9] in 2022. The study investigated patients' satisfaction after breast reconstruction surgery (comparing autologous and implant-based surgery) and showed a similar result, that is, autologous-based surgery was preferred over implant-based surgery (the mean difference was -8.51; 95% CI: -10.70 to -6.33; $Z=7.63$; $p<0.001$) with considerable heterogeneity ($I^2=76\%$) for breast outcome. The study above examined 14 RCTs comparing patients' satisfaction after breast reconstruction surgery using Breast-Q (the same instrument was used in the current study). However, the author of the previous study also addressed the fact that considerable heterogeneity may disseminate the actual impact or benefit possessed by each technique. Surgical technique, perioperative approach, and financing were the probable causes of data heterogeneity. Other factors that the Breast-Q cannot evaluate can be the cause of data heterogeneity, although a significant heterogeneity regarding patients' satisfaction analysis was also observed in this study. The same previous study conducted by Stefura et al. [9] also evaluated patients' satisfaction with the outcome after breast reconstruction surgery, comparing the autologous group and implant-based group using the Breast-Q questionnaire. From 10 RCTs, it was found that based on the outcome, patients were more satisfied with the autologous group than the implant-based group (the mean difference was -6.56; 95% CI: -9.97 to -3.14; $Z=3.77$; $p<0.001$) with substantial heterogeneity ($I^2=65\%$) [10].

Based on 16 kinds of literature, it was discovered that in terms of sexual well-being, patients who underwent breast reconstruction surgery preferred autologous-based surgery over implant-based surgery. A previous study conducted by Eltahir, [11] also revealed a similar finding, favoring the autologous group (the mean difference was 3.75; 95% CI: 2.36 to 5.14; $Z=5.29$; $p<0.001$) with low heterogeneity ($I^2=0\%$) rather than alloplastic (implant-based) group in terms of sexual well-being after the surgery [9]. However, the author of the previous study also stated that the lack of breast-Q scoring for the unspecified sub-

techniques performed to conduct the breast surgery might cause the results to be highly homogenous. Among the included studies, only four evaluated patients' satisfaction with the nipple shapes. The observed mean difference in the aspect of patients' satisfaction regarding nipple shapes after breast reconstruction surgery showed that the autologous group was preferred over the implant-based one. Although there had not been a systematic review/meta-analysis study before, the results of evaluating the satisfaction of anatomically specific nipples, multiple RCTs had already documented similar phenomena. One study (that wasn't included in this meta-analysis due to lack of overall needed data) done by Kuykendall et al. [12] in 2018 showed a significant difference in satisfaction scores among women who came in for breast reconstruction surgery. In the study, patients preferred the autologous group to implant-based surgery (66.9% vs 54.6%) for the nipple shapes [9]. It is important to note that the study done by Kuykendall was previously done with a deep inferior epigastric perforator flap [8]. However, the available information on whether the different techniques used and surgeon capabilities affected nipple aesthetics was still unknown.

Only three studies analyzed in this meta-analysis evaluated patients' satisfaction with the plastic surgeon. It was discovered that patients' satisfaction with the plastic surgeon belonged to the autologous group. While the three studies showed a tendency toward the autologous group individually, previous research conducted by Kuykendall et al. [12] in 2018 discovered the opposite. It should be noted that two of the three studies included in this study performed a microsurgical approach rather than an epigastric flap done by Kuykendall [9]. The lack of sub-technique level and outcome analysis may limit the current knowledge. It can provide a more representative finding, especially with the autologous breast reconstruction manner, to offer better patient satisfaction.

In conclusion, autologous breast reconstruction outperforms implant-based reconstruction in terms of patient satisfaction, outcome satisfaction, sexual well-being, nipple satisfaction, and satisfaction with the plastic

surgeon based on the Breast-Q questionnaire. The findings of this comprehensive study show that breast cancer survivors who choose autologous reconstruction have higher levels of satisfaction across multiple domains than those who decide implant-based reconstruction. Autologous techniques should be considered the preferred option for breast reconstruction to maximize patient satisfaction and overall quality of life. More research and studies may be needed to investigate additional factors that contribute to these observed differences, as well as to assess the long-term outcomes and complications associated with various reconstruction methods.

Author Contribution Statement

Amru Sungkar, primary investigator, writing, analysis; Kristanto Yuli Yarso, corresponding author, proofreading, writing; Didit Fajar Nugroho, writing, method, analysis; Dian Ibnu, method, analysis; Chandra Analis Permatasari, proofreading

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