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ORIGINAL ARTICLE

Satisfaction and Quality of Life in Women with Breast Cancer After Breast Reconstructive Surgery in a Tertiary Referral Centre

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ABSTRAK

Rekonstruksi payudara selepas mastektomi memainkan peranan utama dalam mengembalikan bentuk fizikal dan kesihatan psikologi wanita yang mengalami barah payudara. Walaupun kajian antarabangsa sudah mengenalpasti peranannya dalam kualiti hidup (QoL) dan kepuasan seseorang, maklumat dalam Malaysia masih terhad. Kajian ini menilai QoL dan tahap kepuasan selepas menjalani pembedahan rekonstruksi payudara dalam kalangan wanita Malaysia yang menjalani rekonstruksi payudara menggunakan penilaian yang diiktiraf. Kajian ini menggunakan reka bentuk dua fasa iaitu fasa validasi soal-selidik dan analisis keratan rentas. Kajian EORTC QLQ-BRECON23 telah diterjemahkan ke Bahasa Malaysia dan disahkan dari segi konsistensi dalaman. Seterusnya, seramai 35 orang wanita yang telah menjalani rekonstruksi payudara dalam satu atau dua peringkat, menggunakan otot sendiri, implan atau gabungan keduanya, di sebuah pusat rujukan tertiari telah menyertai kajian ini. Hasil yang dilaporkan oleh pesakit dinilai menggunakan soal selidik EORTC QLQ-C30 dan QLQ-BRECON23 dalam versi Bahasa Ingggeris atau Bahasa Malaysia. Analisa deskriptif dan bukan parametrik telah dijalankan. Peserta melaporkan secara QoL keseluruhan yang tinggi (min skor kesihatan menyeluruh 79.5), dengan fungsi emosi mencatat skor tertinggi dalam domain QLQ-C30 (85.0). Fungsi seksual mendapat skor tertinggi dalam kajian BRECON23 (min 70.4). Tiada perbezaan ketara dalam QoL dan kepuasan didapati dalam jenis-jenis rekontruksi yang berlainan. Walau bagaimanapun, skor QoL dan fungsi seksual yang lebih tinggi dilaporkan dalam kalangan pesakit yang menjalani rekonstruksi dalam satu peringkat serta mereka yang mengekalkan atau menjalani rekonstruksi kompleks puting-areola. Rekonstruksi payudara didapati menghasilkan keadaan pasca pembedahan yang positif dari segi kepuasan dan QoL, terutamanya dari segi emosi dan kesihatan seksual. Peringkat rekonstruksi dan pengekalan kompleks puting dan areola mungkin menyumbang kepada hasil yang lebih baik. Penglibatan dalam mencapai keputusan rawatan, rujukan awal pesakit dan maklumat yang dapat diterima oleh pesakit-pesakit bersesuaian dengan adat resam mereka adalah penting. Kajian yang melibatkan lebih banyak pusat rawatan adalah diperlukan untuk mengesahkan dapatan dalam kajian ini.

***Kata kunci**: Barah payudara; BRECON23; EORTC QLQ-C30; kualiti hidup; mastektomi; rekonstruksi*

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ABSTRACT

Breast reconstruction following mastectomy plays a vital role in restoring physical form and psychological well-being in women with breast malignancy. While international studies highlight its impact on quality of life (QoL) and satisfaction, Malaysian data are limited. This study evaluated postoperative QoL and satisfaction among Malaysian women who underwent breast reconstruction using validated tools. It consisted of a two-phase design: a questionnaire validation phase and a cross-sectional analysis. The EORTC QLQ-BRECON23 was translated into Bahasa Malaysia and validated for internal consistency. Subsequently, 35 women who underwent immediate or delayed autologous, alloplastic or a combination of breast reconstruction at a tertiary center were recruited. Patient-reported outcomes were assessed using the EORTC QLQ-C30 and QLQ-BRECON23 questionnaires in English or Bahasa Malaysia. Descriptive and non-parametric analyses were performed. Participants reported a high overall QoL (mean global health score 79.5), with emotional functioning scoring highest among QLQ-C30 domains (85.0). Sexual functioning was the most highly rated BRECON23 domain (mean 70.4). No significant differences in Global QoL and satisfaction were observed across reconstruction types. However, higher QoL and sexual functioning scores were reported among patients who underwent immediate reconstruction and those with nipple–areolar complex preservation or reconstruction. Breast reconstruction appears to offer positive postoperative outcomes in terms of satisfaction and QoL, particularly in emotional and sexual well-being. Timing of reconstruction and nipple areolar complex (NAC) preservation may contribute to better outcomes. Shared decision-making, early referral and culturally appropriate education are essential. Larger multicenter studies are needed to confirm these insights.

Keywords: Breast cancer; BRECON23; EORTC QLQ-C30; mastectomy; quality of life; reconstruction

INTRODUCTION

Breast cancer remains a traumatic diagnosis for women. The loss of a body part as a result of mastectomy is a life-changing event that affects the physiological and psychosocial well-being of women and its sequelae can be profoundly challenging (Edib et al. 2016; Ishak et al. 2018). Cancer and its treatment often lead to physical and psychological challenges that affect women's well-being and intimate relationships (Alinejad Mofrad et al. 2021; Yusoff et al. 2022). These challenges can be particularly profound for younger women throughout the course of the illness (Bentsen et al. 2024).

Reconstructive breast surgery is performed with the goal of restoring the shape, volume, appearance and symmetry of the breast that has been removed due to medical conditions such as breast cancer. Advancements in these techniques have contributed to better outcomes in patient satisfaction, boosted self-confidence, body image and have enhanced the overall quality of life (QoL) for many women post-surgery (Falgari 2024). It may also help to maintain a balance in intimate relationship satisfaction between the patient and their partner (Cimaroli et al. 2020).

According to the Malaysia National Cancer Registry Report 2017-2021, breast cancer remains the most commonly reported cancer, accounting for 38.9% of all female cancers, an increase from 34.1% in the 2012-2016 period. Indisputably, a significant proportion of patients continue to present at advanced stages (Stage III and IV), with the rate increasing from 47.9% to 50.5% over the same timeframe (Haron et al. 2023). In such cases, mastectomy is often required as part of the definitive surgical management, as later stage of the disease often precludes breast-conserving surgery. Therefore, reconstructive surgery may allow results that help to restore the body image and QoL of our patients (Nguyen et al. 2024; Wong et al. 2019).

Although breast reconstruction is widely recognised for its benefits, not all patients have the same level of awareness or access to this option. In Malaysia, social and cultural factors

(Abdullah & Mohamed 2021), including financial challenges, levels of health literacy, personal beliefs and the availability of skilled surgical teams, play a significant role in determining whether women are informed about or choose to undergo reconstructive surgery (Nguyen et al. 2024). This is exacerbated by the non-uniform healthcare delivery between urban and rural geographies, which continues to cause delays and missed referrals for reconstructive consultation. A local study found that women who were aware of breast reconstruction prior to their operation were more likely to undergo reconstructive surgery compared to those without prior awareness; highlighting the importance of early patient education in facilitating informed and value-driven decisions (Ishak et al. 2018).

Shared decision-making (SDM) plays a vital role in ensuring that breast reconstruction choices reflect not just clinical suitability, but also each patient's values, expectations and psychological well-being. By incorporating SDM, clinicians can offer more individualised care that supports informed value-based decisions (Nies et al. 2017). While breast reconstruction techniques have advanced significantly, there is still limited use of validated tools to assess QoL and satisfaction in our local context. However, in order to optimise patient care, treating physicians will also require sufficient knowledge on the available options and expertise. This will help to overcome uncertainties and fear about reconstruction within themselves, in order to provide appropriate advice to patients. The objective of this study was to assess the satisfaction levels and QoL among women who had undergone breast reconstructive surgery following mastectomy for breast malignancy in our centre.

MATERIALS AND METHODS

This study consisted of two main components: a questionnaire validation phase and a cross-sectional study. Initially, a questionnaire validation study was conducted to translate and validate the European Organisation for Research and Treatment of Cancer (EORTC) QLQ-BRECON23 questionnaire into Bahasa Malaysia. The QLQ-BRECON23 is an internationally recognised tool designed to assess QoL and satisfaction among women who have undergone breast reconstruction. It was used in conjunction with the EORTC QLQ-C30 core questionnaire, which had already been validated in Bahasa Malaysia for assessing general cancer-related QoL (Yusoff et al. 2010). The translation was performed after obtaining formal permission from the EORTC group. The translation process followed the guidelines proposed by Tsang et al. (2017), aiming to preserve the original meaning of the questionnaire while ensuring cultural and linguistic appropriateness for the local population proficient in Bahasa Malaysia.

Following the validation phase, a cross-sectional study was carried out to evaluate the QoL and satisfaction among women who had undergone successful breast reconstructive surgery. Due to the limited number of eligible patients, data was collected from women who had undergone breast reconstructive surgery between 2010 and February 2025. This extended timeframe allowed inclusion of both patients with long-term follow-up and those who had undergone more recent procedures, thereby improving the feasibility of recruitment. Respondents completed either the original English or the newly translated Bahasa Malaysia version of the QLQ-BRECON23, based on their language preference, along with the validated EORTC QLQ-C30 questionnaire in the corresponding language. The study was conducted at Hospital Canselor Tuanku Muhriz (HCTM), Universiti Kebangsaan Malaysia (UKM). Participants were recruited from the Breast and Endocrine Surgical Unit at HCTM.

Inclusion and Exclusion Criteria

This study included women with breast cancer who had undergone mastectomy followed by successful breast reconstructive surgery. Eligible participants were those who had received either immediate or delayed breast reconstruction using autologous, alloplastic or combination

techniques. Patients who underwent revision surgery for postoperative complications were also included, provided there was no complete flap failure. Revisional procedures were defined as any subsequent surgery performed on the initially reconstructed breast to enhance aesthetic outcome or address complications, after the patient had been discharged post-primary reconstruction (Johnson et al. 2023). Participants were required to be literate in either English or Bahasa Malaysia to ensure accurate completion of the questionnaire. Patients were excluded if they had developed a failed reconstruction, local recurrence or distant metastasis following their reconstructive surgery, as these conditions could significantly impact their QoL.

Study Outcomes

The primary outcome of this study was to evaluate the overall satisfaction and QoL among women who had undergone breast reconstructive surgery following mastectomy for breast malignancy. These outcomes were measured using the validated EORTC QLQ-C30 (Version 3) and the BRECON23 module, administered in both English and Bahasa Malaysia. Scoring and interpretation followed the official EORTC QLQ-C30 Scoring Manual and the EORTC QLQ-BRECON23 Scoring Guidelines. The questionnaire assessed multiple domains including physical functioning, emotional well-being, social support, body image and overall satisfaction with the surgical outcome, enabling a comprehensive evaluation of the postoperative experience from the patient's perspective.

The secondary outcomes examined how different surgical techniques and patient-specific factors influenced satisfaction and QoL. The study compared outcomes between women who underwent autologous, alloplastic or combination techniques, aiming to determine whether the type of reconstruction had an impact on overall well-being. It also assessed satisfaction and QoL among patients who had immediate or delayed breast reconstruction, offering insights into how the timing of surgery relative to mastectomy affected patient-reported outcomes and satisfaction with the reconstructive process.

The study described demographic and clinical characteristics such as age, ethnicity, marital status, tumour stage and hormone receptor status in order to characterise the patient population. This was relevant especially in the Malaysian context as critical demographic and cultural determinants such as ethnicity and marital status might influence the health perceptions and expectations. Other descriptive variables, including parity and history of breastfeeding, were also included to present a more comprehensive profile of the participants. Group comparisons performed for selected clinical and perioperative factors, such as nipple-areolar complex (NAC) preservation or reconstruction, to evaluate potential association with patient-reported outcomes.

Translation of Questionnaires

As the original version of the EORTC QLQ-BRECON23 questionnaire is in English, it was necessary to translate it into Bahasa Malaysia to accommodate respondents who were not proficient in English. Forward translation, from English to Bahasa Malaysia, was carried out by two independent translators who were fluent in both languages. One of the translators was a medical professional with expertise in the subject matter, while the other was a naıve translator with no medical background and no prior knowledge of the questionnaire's conceptual framework. A reconciled forward-translated version was then produced. Backward translation, from Bahasa Malaysia back to English, was similarly performed by two independent bilingual translators-one with clinical and research experience and the other a native translator without prior exposure to the original content. A meeting involving all four translators was held on 17th May 2024 to discuss and resolve any discrepancies between the original and translated versions. The final Bahasa Malaysia version of the QLQ-BRECON23 was then finalised and approved through consensus.

Preliminary Pilot Test and Reliability Testing

A preliminary pilot test was conducted involving 30 participants to evaluate the clarity, relevance and comprehensibility of the translated Bahasa Malaysia version of the EORTC QLQ-BRECON23 questionnaire. The target respondents were breast cancer patients who were literate in Bahasa Malaysia and had undergone breast reconstruction surgery. This sample size was selected based on recommendations by Bonett (2002) and Tsang et al. (2017), which suggested that a minimum of 30 participants was appropriate for preliminary questionnaire testing. The feedback obtained was used to identify any issues related to wording, interpretation or layout before proceeding with the main study (Bonett 2002; Tsang et al. 2017).

To assess the reliability of the translated questionnaire, internal consistency was measured using Cronbach's alpha, analysed via the Statistical Package for the Social Sciences (IBM Corp., Armonk, NY, USA) . Cronbach's alpha reflected the extent to which items within a scale consistently measured the same underlying concept (Costello & Osborne 2005; Kennedy 2022).

Study Conduct

Patient recruitment was carried out at the Breast and Endocrine Surgical Unit of HCTM, UKM. Eligible patients attending outpatient follow-up clinics were identified and screened according to the inclusion and exclusion criteria. Those who fulfilled the criteria and agreed to participate were given a patient information sheet and consent form, with sufficient time to review and ask questions before signing the consent.

A total of 63 eligible patients were identified during the recruitment period. Of these, 28 were considered dropouts and were not included in the final analysis. These included patients who had passed away (n = 7), those who were given the questionnaire but did not respond or decline to participate (n = 6), and individuals who were non-contactable or had defaulted follow-up appointments (n = 15). The final study sample consisted of 35 patients who met the inclusion criteria and completed both questionnaires.

Participants were then invited to complete the questionnaire in their preferred language, either the original English version or the translated Bahasa Malaysia version, together with the EORTC QLQ-C30. The questionnaires were self-administered in a quiet and private clinic setting. All filled questionnaires were reviewed for completeness at the time of collection and were securely stored. It was important to note that the 30 participants involved in the earlier pilot study for translation and internal consistency testing (Cronbach's alpha) were not included in the main study sample described here. A visual summary of the overall study process, including questionnaire translation, pilot testing, participant recruitment and analysis was presented in Figure 1.

Sample Size and Statistical Analysis

The sample size was determined using the World Health Organisation (WHO) manual Sample Size Determination in Health Studies by Lwanga and Lemeshow (1991), which provided sample size estimation tables commonly used for cross-sectional studies aiming to estimate a population proportion with a specified level of confidence and precision. Based on an estimated population proportion of 20.6% (Ishak et al. 2018) at a 95% confidence level and a margin of error of 0.187, the required sample size corresponded to approximately 32 participants. The margin of error was derived from the difference in general domain satisfaction scores between women who underwent breast reconstruction (mean = 0.300) and those who did not and did not desire reconstruction (mean = 0.487), as reported in a previous study (Siqueira et al. 2020). After accounting for a 20% potential dropout rate, the final target sample size was adjusted to 38 participants. Descriptive statistics were reported using mean (standard deviation, SD) for the overall sample. For group comparisons, median (interquartile range, IQR) values were used due

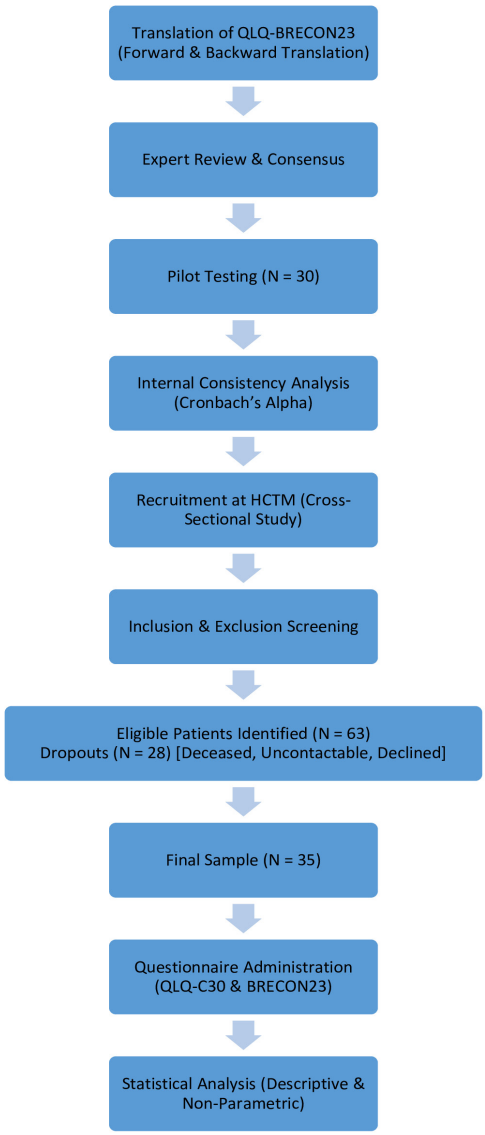

FIGURE 1: Methodology flowchart of study process

to the small subgroup sizes and non-normal distribution of data, consistent with the use of non-parametric statistical tests, SPSS (IBM Corp., Armonk, Ny, USA) (Arifin et al. 2016).

RESULTS

Translation and Reliability of the EORTC QLQ-BRECON23 Questionnaire

The original and translated Bahasa Malaysia versions of the EORTC QLQ-BRECON23 questionnaire were presented in the tables and figures. To assess the reliability of the translated version, a pilot study involving 30 patients was conducted. The overall Cronbach's alpha value obtained was 0.815, which reflected good internal consistency. According to Tsang et al. (2017), a Cronbach's alpha value of at least 0.7 was considered acceptable for demonstrating adequate reliability in questionnaire-based research. A summary of the internal consistency results was shown in Table 1. Appendix 2 included the validated original English version of the EORTC QLQ-C30, along with the validated Bahasa Malaysia translation used in this study.

Participant Demographics

A total of 35 women who underwent breast reconstruction following mastectomy were included in this study. The mean age was 50.2 years (SD 9.06). The majority were Malay ethnicity (71.4%) and most were married (82.9%). Regarding the type of reconstructive surgery, 18 patients (51.4%) underwent transverse rectus abdominis myocutaneous (TRAM) flap reconstruction, eight (22.9%) had a latissimus dorsi (LD) flap, seven (20.0%) received LD flap with implant and two

TABLE 1: Summary of reliability results

Questionnaire	Language Version	No. of Items	Sample Size (n)	Cronbach's Alpha	Interpretation
EORTC QLQ-BRECON23	Bahasa Malaysia	23	30	0.815	Good internal consistency

TABLE 2: Demography and perioperative data of the study population

Variable	Frequency (%)	Mean (SD)	Median (IQR 25th, 75th percentile)
Number of patients	35		
Age (years)		50.43 (SD 9.06)	
Race			
Malay	25 (71.4)		
Chinese	7 (20.0)		
Indian	2 (5.7)		
Others	1 (2.9)		
Marital status			
Married	29 (82.9)		
Single	5 (14.3)		
Widow	1 (2.9)		
Parity			1 (IQR 0, 3)
History of breastfeeding			
Yes	22 (62.9)		
No	13 (37.1)		
ECOG			
ECOG 0	26 (74.3)		
ECOG 1	8 (22.9)		
ECOG 2	1 (2.9)		
Duration of surgery (minutes)		389 (SD 134.00)	
Type of reconstruction			
LD Flap	8 (22.9)		
TRAM Flap	18 (51.4)		
Implant	2 (5.7)		
LD Flap + Implant	7 (20.0)		
Timing of reconstruction			
Immediate	32 (91.4)		
Delayed	3 (8.6)		
NAC preservation / reconstructive surgery			
Yes	9 (25.7)		
No	26 (74.3)		
Complication			
Yes	15 (42.9)		
No	20 (57.1)		
Types of complication (n = 15)			
Superficial surgical site infection	6 (40.0)		
Wound breakdown	3 (20.0)		
Suture granuloma	2 (13.3)		
Incisional hernia	2 (13.3)		
Chronic abdominal pain	1 (6.7)		
Migrated implant	1 (6.7)		
Clavien-Dindo classification (n=15)			
Clavien-Dindo III	13 (86.7)		
Clavien-Dindo II	2 (13.3)		
Largest tumour diameter (mm)			45 (IQR 26, 85)
Weight of breast (g)			520 (IQR 392, 1100)

Continued...

...continuing

Variable	Frequency (%)	Mean (SD)	Median (IQR 25th, 75th percentile)
Stage			
Stage I	14 (40.0)		
Stage II	9 (25.7)		
Stage III	12 (34.3)		
IHC subtype			
ER+			
Yes	21 (60.0)		
No	14 (40.0)		
PR+			
Yes	17 (48.6)		
No	18 (51.4)		
Her2+			
Yes	10 (28.6)		
No	25 (71.4)		
Triple negative	3 (8.6)		
Laterality			
Left	23 (65.7)		
Right	12 (34.3)		
Location			
Central	16 (45.7)		
Upper outer	10 (28.6)		
Upper inner	5 (14.3)		
Lower outer	3 (8.6)		
Lower inner	1 (2.9)		
Axillary surgery			
ALND	30 (85.7)		
SLND	3 (8.6)		
No axillary surgery	2 (5.7)		
Neoadjuvant chemotherapy therapy (+/- Herceptin)			
Yes	17 (48.6)		
No	18 (51.4)		
Adjuvant endocrine	20 (57.1)		
Yes	15 (42.9)		
No			
Adjuvant radiotherapy			
Yes	12 (34.3)		
No	23 (65.7)		
Adjuvant chemotherapy			
Yes	8 (22.9)		
No	27 (77.1)		
Adjuvant targeted therapy			
Yes	7 (20.0)		
No	28 (80.0)		

Note: Data was reported as frequency (%), mean (SD) and median (IQR), where appropriate.
SD: Standard deviation; IQR: Interquartile range; ECOG: Eastern Cooperative Oncology Group performance status; LD flap: Latissimus dorsi flap; TRAM flap: Transverse rectus abdominis myocutaneous flap; IHC: Immunohistochemistry; ER+: Oestrogen receptor positive; PR+: Progesterone receptor positive: HER2+: Human epidermal growth factor receptor 2 positive; SLND: Sentinel lymph node dissection: ALND: Axillary lymph node dissection; NAC: Nipple-areolar complex

(5.7%) had implants only. Of the total, 32 patients underwent immediate reconstruction, while three had delayed reconstruction. Table 2 summarised the full demographic and clinical characteristics of the study population.

EORTC QLQ-C30 and QLQ-BRECON23 Score

The EORTC QLQ-C30 assessment revealed a mean Global Health Status/QoL score of 79.5 (SD 18.6), reflecting a generally high level of overall well-being among participants (n = 35). Among the functional domains, emotional functioning recorded the highest mean score of 85.0 (SD 15.6). Table 3 summarised the Functional and Global Health Scores derived from the EORTC QLQ-C30 across all domains. In terms of symptoms, fatigue was most frequently reported, with a mean score of 30.2 (SD 22.2). These results were detailed in Table 4.

The EORTC QLQ-BRECON23 was used to explore breast reconstruction-specific QoL and patient satisfaction. Among the functional and satisfaction domains, sexual functioning showed the highest mean score of 70.4 (SD 29.5), suggesting a generally favourable perception in this area. Table 5 provided an overview of the Satisfaction and Functional Scores from the EORTC QLQ-BRECON23 across all domains. Symptom-related score was generally low reflecting minimal postoperative concern, as shown in Table 6.

TABLE 3: Functional and QoL scores from the EORTC QLQ-C30

Scale	Mean score (SD)
Global Health Status / QoL	79.5 (18.6)
Emotional Functioning	85.0 (15.6)
Cognitive Functioning	81.0 (19.0)
Physical Functioning	80.2 (19.2)
Social Functioning	78.6 (24.1)
Role Functioning	77.1 (30.0)

Note: Scores ranged from 0 to 100. Higher scores indicated better functioning or higher QoL for these domains. Scores calculated according to EORTC QLQ-C30 Scoring Manual
QoL: Quality of life

TABLE 4: Symptom scores from the EORTC QLQ-C30

Scale	Mean score (SD)
Fatigue	30.2 (22.2)
Insomnia	28.6 (30.4)
Pain	23.8 (25.0)

Note: Scores ranged from 0 to 100. Higher scores indicated greater symptom burden or difficulty in the respective domain. Scores calculated according to EORTC QLQ-C30 Scoring Manual.

Group Comparison Based on the EORTC QLQ Scores

Comparative analysis revealed no statistically significant differences in Global QoL, satisfaction with surgery or sexual functioning among the different reconstruction types-LD flap, TRAM flap, implant and LD with implant. Although implant-

TABLE 5: Functional score from the EORTC QLQ-BRECON23

Function Scale	Mean score (SD)
Sexual functioning	70.4 (29.5)
Satisfaction with the reconstruction	66.0 (26.0)
Satisfaction with breast cosmesis	62.3 (27.9)
Satisfaction with preserved / reconstructed nipple[a]	58.3 (42.7)
Satisfaction with donor scars[a]	52.5 (30.1)
Satisfaction with nipple cosmesis[a]	42.4 (33.6)

Note: Function scores ranged from 0 to 100. Higher scores indicated better functioning or higher quality of life in the respective domains. Scores were calculated according to the EORTC QLQ-BRECON23 scoring manual.
[a]Items were applied conditionally to applicable patients. Missing values were handled according to the EORTC QLQ-C30 scoring manual for missing data

TABLE 6: Symptoms score from the EORTC QLQ-BRECON23 (n = 35)

Symptoms scale	Mean score (SD)
Donor site symptoms[a]	39.7 (32.8)
Treatment side effects	28.6 (29.9)
Loss of nipple[a]	25.6 (35.7)

Note: Symptoms scores ranged from 0 to 100. Higher scores indicated greater symptom burden in the respective domain. Scores were calculated according to the EORTC QLQ-BRECON23 scoring manual.
[a]Items were applied conditionally to applicable patients. Missing values were handled according to the EORTC QLQ-C30 scoring manual for missing data.

based reconstructions showed numerically higher median scores in several domains, these differences were not statistically significant (Table 7).

Patients who underwent immediate reconstruction reported higher Global QoL scores (median 83.3) compared to those who had delayed reconstruction (median 58.3), a difference that was statistically significant. Satisfaction with surgery and sexual functioning did not significantly differ between these two groups (Table 8).

Notably, patients who had NAC preservation or reconstruction demonstrated significantly higher scores in both Global QoL (median

TABLE 7: Comparison of quality of life and satisfaction scores by reconstruction type

Questionnaire Domain	TRAM Flap (n = 18)	LD Flap alone (n = 8)	LD Flap with Implant (n =7)	Implant alone (n = 2)	p-value
QLQ-C30 Global QoL	83.8 (66.7, 100.0)	83.3 (52.1, 38.9)	83.3 (66.7, 100.0)	87.5	0.903
QLQ-BRECON23 Satisfaction with the reconstruction	72.2 (52.8, 88.9)	66.7 (38.9, 91.7)	66.7 (44.4, 77.8)	77.8	0.873
Sexual well-being	70.8 (39.6, 85.4)	79.2 (35.4, 100.0)	91.7 (50.0, 100.0)	95.8	0.253

Note: Differences in patient-reported outcomes across the four reconstruction types (LD flap, TRAM flap, Implant and LD + Implant) were analysed using the Kruskal-Wallis H test. Scores were presented as median (interquartile range [25th, 75th percentile]), with higher values indicating better quality of life or satisfaction.
$p < 0.05$ is statistically significant

TABLE 8: Comparison of quality of life and satisfaction scores by timing of reconstruction (Immediate vs delayed reconstruction)

Questionnaire Domain	Immediate Reconstruction (n = 32)	Delayed Reconstruction (n = 3)	p-value
QLQ-C30 Global QoL	83.3 (66.7, 100.0)	58.3	0.034
QLQ-BRECON23 Satisfaction with reconstruction	66.7 (55.6, 86.1)	77.8	0.653
Sexual well-being	75.0 (43.8, 100.0)	75.0	0.698

Note: Comparison between immediate and delayed reconstruction groups was performed using the Mann-Whitney U test. Scores were presented as median (interquartile range [25th, 75th percentile]), with higher values indicating better quality of life or satisfaction
$p < 0.05$ is statistically significant

100.0 vs. 79.2) and sexual functioning (median 100.0 vs. 75.0) compared to those without NAC procedures. Satisfaction with reconstruction, however, was not significantly different (Table 9).

DISCUSSION

This study assessed the postoperative satisfaction and QoL among women with breast malignancy who underwent various types of breast reconstructive surgery, using the validated EORTC QLQ-C30 and QLQ-BRECON23 questionnaires. Overall, the results suggest a favourable perception of well-being and functional outcome, with specific domains such as emotional functioning, sexual well-being and satisfaction with reconstruction showing encouraging trends.

Although this was a single-centre study, whereby the majority were married Malay women, the findings may still reflect local cultural norms and patterns of engagement with the healthcare system, particularly given that Malays constitute the ethnic majority in Malaysia. Prior studies have shown that ethnic background and marital support influence perceptions of body image and acceptance of reconstruction (Ishak et al. 2018; Yusoff et al. 2022). These factors should be taken into account during preoperative counselling and the provision of tailored support.

Participants reported high global QoL, with emotional functioning scoring the highest. This may reflect strong coping mechanisms or available psychological support (Roy et al. 2024). Sexual functioning was the highest-rated domain in the BRECON23 scale (mean 70.4), highlighting that many women experienced a preserved or restored sense of sexual identity after reconstruction. This supports prior findings that breast reconstruction contributes positively to intimacy and body confidence (Cimaroli et al. 2020). Although overall satisfaction following reconstruction was generally high, patients expressed lower satisfaction regarding nipple aesthetics and donor site scarring, with mean scores of 42.4 and 52.5 respectively, suggesting that dissatisfaction with certain aspects of appearance remained despite successful surgery. This observation aligns with findings by Abu-Nab & Grunfeld (2007), who reported that donor site scars often remained a significant source of dissatisfaction among breast reconstruction patients. These findings highlight the importance of managing preoperative expectations, as some patients may hope for results that closely resemble their original anatomy, which may not always be achievable. Providing thorough counselling on the possible aesthetic outcomes can help to align expectations with realistic results and ultimately enhance patient satisfaction (Tedesco & Loerzel

TABLE 9: Comparison of quality of life and satisfaction scores based on NAC preservation or reconstruction

Questionnaire Domain	With preservation / reconstruction (n = 9)	Without preservation / reconstruction (n = 26)	p-value
QLQ-C30 Global QoL	100.0 (83.3, 100.0)	79.2 (64.6, 91.7)	0.012
QLQ-BRECON23 Satisfaction with reconstruction	55.5 (27.8, 77.8)	66.7 (63.9, 88.9)	0.116
Sexual well-being	100.0 (75.0, 100.0)	75.0 (41.7, 91.7)	0.029

Note: Comparison between immediate and delayed reconstruction groups was performed using the Mann-Whitney U test. Scores were presented as median (interquartile range [25th, 75th percentile]), with higher values indicating better quality of life or satisfaction
$p < 0.05$ is statistically significant

2020).

Interestingly, no statistically significant differences were observed in QoL or satisfaction scores between different types of reconstruction (LD flap, TRAM flap, prosthesis, LD + prosthesis). These findings echo the results of Siqueira et al. (2020), who noted comparable patient-reported outcomes regardless of reconstructive technique. This suggests that the success of breast reconstruction, from the patient's perspective, may be more influenced by the quality of care, communication and SDM processes rather than the specific surgical method alone. Ascertaining the optimal group of patients who should undergo reconstruction remains complex, and decisions should not rely solely on clinical suitability. Rather, the inclusion of SDM ensures that patient values, expectations, and psychological well-being are central to reconstructive choices (Nies et al. 2017).

Significantly higher Global QoL scores were noted among patients who underwent immediate reconstruction compared to those with delayed procedures. This aligns with previous evidence suggesting that immediate reconstruction may reduce psychological distress associated with mastectomy and provide earlier restoration of body image (Johnson et al. 2023). However, the small sample size in the delayed group (n = 3) warrants cautious interpretation of these results.

Patients who had NAC preservation or reconstruction reported significantly better outcomes in both Global QoL and sexual functioning. These findings reinforce the role of NAC preservation or reconstruction in enhancing body image and intimacy, further supporting literature advocating for nipple-sparing techniques when oncologically safe (Nguyen et al. 2024).

Most complications were classified as Clavien-Dindo grade III, reflecting a relatively high requirement for intervention. Despite some ongoing symptoms, most patients reported high satisfaction and QoL, likely due to effective complication management.

Strengths and Limitations

This study offers important local evidence on postoperative QoL and satisfaction among women who underwent breast reconstruction following mastectomy. A major strength is the use of internationally validated instruments, namely the EORTC QLQ-C30 and QLQ-BRECON23, which were formally translated and culturally adapted into Bahasa Malaysia. Providing the questionnaires in both Bahasa Malaysia and English allowed for inclusive data collection across diverse linguistic backgrounds. The study was conducted in a university hospital setting that serves both public and private patients, supported by subspecialists and academic infrastructure. This environment enabled access to a wide range of reconstructive procedures and ensured consistent clinical follow-up. The inclusion of patients with various reconstruction types, timings and revision histories, combined with the use of appropriate non-parametric statistical methods, strengthens the relevance and reliability of the findings.

Several limitations should be considered. As a single-centre study, the findings may not fully represent other healthcare settings, particularly those within the Ministry of Health system where subspecialty services and resource availability may differ. The relatively small sample size limited the statistical power for subgroup analyses, especially in delayed reconstruction groups. Additionally, the cross-sectional design restricted the ability to assess changes in QoL over time. Recall bias may have occurred, particularly among participants who underwent surgery several years prior. Selection bias is also a potential limitation, as individuals who continued with follow-up and agreed to participate may have had more favourable outcomes than those who declined or were lost to follow-up. Survivorship bias is another consideration, as patients with recurrence or metastatic disease were excluded. This exclusion may have skewed the results in a more favourable direction, as it intentionally removed cases where disease progression could have negatively influenced QoL or satisfaction

scores. Additionally, the study experienced a notable number of dropouts, including patients who were deceased, uncontactable or unwilling to participate. This may have introduced attrition-related selection bias, as the final sample may not fully represent the broader cohort of women eligible for breast reconstruction.

CONCLUSION

This study provides valuable insights into the postoperative experiences of women with breast malignancy who underwent reconstructive surgery at a single Malaysian tertiary healthcare centre. Through the use of validated patient-reported outcome measures, the findings highlight overall high satisfaction and QoL following reconstruction, particularly in emotional well-being and sexual functioning domains. Although no significant differences were observed across reconstruction types, the data suggest that the timing of reconstruction and the preservation or reconstruction of the NAC may meaningfully influence patients' perceived outcomes. Importantly, the study reflects the sociocultural and healthcare context of the local population, emphasising the role of SDM and individualised care in supporting women through breast cancer treatment and recovery. While the small sample size limits the generalisability of the findings, the use of a standardised methodology and culturally adapted tools strengthens the study's internal validity.

Overall, these results support the continued integration of reconstructive options into breast cancer care pathways, tailored to patient preferences and values. Future research involving larger, multicentre cohorts is encouraged to validate and expand upon these findings, with a particular focus on long-term psychosocial adaptation and accessibility across diverse patient groups.

Data availability statement: Supplementary materials, including the study questionnaire are available in the Open Science Framework at: https://osf.io/4c8vt/files/dzytc.

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