Knowledge on Breast Prostheses and Body Satisfaction After Mastectomy Among Social Service Users in Singapore: A Quantitative Pilot Study

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Abstract

Objective: Mastectomy has a negative impact on women's feelings of femininity and self-confidence. Previous research shows that external breast prostheses (EBP) can enhance body image. However, the knowledge of EBP of breast cancer survivors is scarce in Singapore. This study aimed to investigate their knowledge of EBP in relation to their body image and social appearance anxiety.

Methods: Breast cancer survivors from a local social service agency were asked to complete the EBP Knowledge Questionnaire, Body Image Scale (BIS), and Social Anxiety Appearance Scale (SAAS). EBP Knowledge Questionnaire was designed by our group, with a score 0-1 suggests low knowledge, 2-4 medium, and 5-6 good. A higher BIS score indicates more symptoms of a negative body image, and a higher SAAS score indicates greater social appearance anxiety. One-way ANOVA was used to compare means.

Results: 55 breast cancer survivors (57.20 ± 10.06 years of age) were enrolled into this study. 51% had low to medium level of EBP knowledge. Subjects with low-medium EBP knowledge level recorded poorer SAAS and BIS scores than those with a high knowledge level (SAAS: 33.25 ± 13.75 and 31.69 ± 11.87 vs 29.19 ± 10.09, $p = 0.222$; BIS: 12.92 ± 9.43 and 9.50 ± 8.33 vs 8.00 ± 7.19, $p = 0.558$).

Conclusion/ implications: In this pilot study, lack of knowledge about EBP may lead to mental distress. A future large-scale study is warranted to determine if providing comprehensive information and educational support to breast cancer survivors is beneficial in enhancing their body image and reducing social appearance anxiety.

Introduction

Breast prostheses play a pivotal role in the lives of women who have undergone mastectomy, offering restoration of body image and bolstering self-confidence. They serve as a viable alternative to breast reconstruction with up to 90% of mastectomy patient opting to use breast prostheses (Glaus & Carlson, 2009; Fitch et al., 2012). Proper fitting and use of these prosthetic breasts have been shown to significantly enhance satisfaction and quality of life for breast cancer survivors (Weaver, 2007). Beyond aesthetic purpose, breast prostheses provide functional advantages such as wound protections, mitigation of scoliosis resulting from bodily imbalances and enhancement of self-esteem, thereby improving their overall quality of life (Qiu et al., 2021).

Many women choose to use breast prostheses to alleviate feeling of discomfort, incompleteness, and self-consciousness stemming from post-mastectomy asymmetry (Jetha et al., 2017). Substantial arguments underscore the profound impact of breast prostheses on physical appearance and symmetry, self-perception, external perception, femininity, confidence, balance, and body posture. As a result, they contribute to a positive body image and improved posture (Gallagher et al., 2009).

Past research has highlighted barriers such as cost concerns and a lack of awareness regarding the benefits of breast prostheses (Qiu et al., 2020). The findings on the study can also be further supported by past studies that have been conducted, which revealed that women who wear breast prostheses find it difficult to bear the high cost, and that there is a common misconception that using breast prostheses comes with additional costs for maintenance and care that they may be unable to afford (Jetha et al., 2017; Fitch et al., 2012). Gallagher et al. (2009) found that the lack of information on external breast prostheses (EBP) increases post-mastectomy patient dissatisfaction towards using it. This underscores the importance of educating patients about the functional and psychological advantages of these protheses to alleviate post-mastectomy distress.

In Singapore, a notable research gap exists in comprehending the impacts of breast cancer among Singaporean women, particularly regarding the use of breast prostheses and their relationship to social appearance anxiety and body image. This gap emphasizes the need for further research to tailor interventions that will meet the unique needs of breast cancer survivors in Singapore, thereby improving their overall well-being and ensuring more personalized care.

This study aims to examine breast cancer survivors' knowledge and awareness of EBP and investigate how this knowledge relates to their perceptions of body image and social appearance anxiety post-mastectomy. By gaining deeper insights into the psychosocial well-being and quality of life of these survivors, the study seeks to provide valuable insights for enhancing their recovery and adjustment following breast cancer treatment.

Hypothesis

The present study hypothesized that breast cancer survivors with greater knowledge of breast prostheses would exhibit lower negative body image and reduced levels of appearance-related social anxiety compared to those with less knowledge of breast prostheses. Additionally, the decision concerning not wearing breast prostheses was partially influenced by financial, religious, familial or socioeconomic factors.

Methods

Study Design & Participant Groups

This study received approval from the local ethics committee. Breast cancer survivors registered with a community-based social service organization providing support to them were invited to participate. Inclusion criteria were: (a) registered with local social service organization (b) diagnosed with breast cancer, (c) have undergone mastectomy (either wide excision, oncoplastic surgery, or breast cancer surgery with breast reconstruction), (d) ability to speak, read and write in English or Malay, and aged 21 years and above. Exclusion criteria were: (a) psychiatric illness or impaired cognitive function, (b) substance abuse within the previous year, (c) anxiety disorder and other mood disorder as identified from their medical records, and (d) other major illness.

All participants provided written informed consent before participation. Each participant completed three sets of questionnaires: the EBP knowledge questionnaire, the Body Image Scale, and the Social Anxiety Appearance scale. These questionnaires were administered by a study investigator in a face-to-face setting at either the study centre or the participants' homes. Participants were guided through the questionnaire and provided their responses.

Measures

EBP knowledge questionnaires

This questionnaire consisted of three sections. The first section assessed participants' knowledge on breast prostheses with items such as "I know at least 1 place to purchase external breast prostheses" or "I know that external breast prostheses are made up of different shapes and sizes" (refer to the appendix for the full version). Items were rated as 'Yes' or 'No'. Participants' knowledge on breast prostheses was categorized into different levels; 0-1 suggests low knowledge, 2-4 medium knowledge and 5-6 high knowledge. The second section addressed their willingness to wear breast prostheses with items rated as 'Yes' or 'No'. The third section examined barriers to wearing breast prostheses, with a total of eight common barriers rated as 'Yes' or 'No'.

Body Image Scale

Body Image Scale (BIS) is a 10-item measure that assesses the changes in body image among breast cancer participants, regardless of their disease diagnoses (Hopwood et al., 2001). Items are rated on a 4-point Likert scale (1=Not at all, 2= A little, 3= Quite a bit, 4= Very much).

Higher BIS scores (0-30) indicate more symptoms of a negative body image. The Cronbach's alpha value of this scale is 0.93 (Hopwood et al., 2001).

Social Anxiety Appearance scale

Social Anxiety Appearance Scale (SAAS) is a 16-item measure developed to assess breast cancer participants' anxiety of being negatively evaluated by others because of their appearance (Hart et al., 2008). Items are rated on a 5-point Likert scale (1= Not at all, 2= A little, 3= Quite a bit, 4= Very much, 5= Extremely). The questionnaire includes items such as "I am concerned people would not like me because of the way I look" or "I am afraid that people find me unattractive" (refer to the appendix for the full version). Item 1 has been reverse-coded. Higher SAAS scores (16-80) indicate greater social anxiety appearance. The SAAS demonstrated a single-factor structure with strong test-retest reliability and internal consistency. Studies have indicated that the SAAS is a psychometrically valid measure of social anxiety related to appearances (Hart et al., 2008).

Data Analysis

Demographic data were obtained from participants which includes age, marital status and the year of diagnosis. A one-way ANOVA was used to compare SAAS and BIS scores among three knowledge levels. Data analysis was conducted using the SPSS software Version 26 (IBM Inc., Chicago, IL, US), with statistical significance defined as p-value of <0.05.

Results

A total of 55 participants were recruited into the study. The demographic profile of the participants is presented in Table 1, indicating a mean age of 57.2 ± standard deviation (SD) 10.06.

Table 1. Patient demographic and characteristics

Characteristics	**N (%) or Mean (± standard deviation)**
Female sex	55
Age, years	57.20 ± 10.06
Marital status	
Single	3 (5.5%)
Married	35 (63.6%)
Separated	1 (1.8%)
Divorced	13 (23.6%)
Widowed	3 (5.5%)
Year of diagnosis	
2005 - 2016	25 (45.5%)
2017 - 2023	30 (54.5%)

Highest qualification	
Primary	14 (25.5%)
Secondary	25 (45.5%)
Post-secondary	1 (1.8%)
Tertiary	15 (27.3%)
Employment status	
Full-time	11 (20.0%)
Part-time	8 (14.5%)
Ad hoc	2 (3.6%)
Self-employed	1 (1.8%)
Unemployed	33 (60.0%)
Household income	
$0 - $1,000	29 (52.7%)
$1,000 - $2,000	8 (14.5%)
$2,000 - $3,000	7 (12.7%)
Above $3,000	11 (20.0%)

Post mastectomy intervention among participants

Among the participants, 18 (33%) have undergone breast reconstruction surgery, while 12 (22%) are currently wearing breast prostheses. Additionally, 5 participants (9%) reported that they used to wear breast prostheses but have since stopped. However, 20 participants (36%) indicated that they have never worn breast prostheses or undergone breast reconstruction surgery.

Table 2. Post-Mastectomy Interventions among Participants

Item	N (%) or Mean (± standard deviation)
I have had a breast reconstruction surgery Years since operation	18 (33%) 5.26 ± 4.25
I have been wearing breast prostheses Years of wearing	12 (22%) 8.60 ± 6.07
I used to wear external breast prostheses Years of not wearing	5 (9%) 3.20 ± 2.51
I have never worn external breast prostheses or undergone a breast reconstruction surgery	20 (36%)

Among the participants, 76% have heard of breast prostheses, and 75% are aware that they come in various shapes and sizes. 58% have been introduced to external breast prostheses, while 60% understand the distinction between breast prostheses and breast implants. However, only 59% are aware of where to find information about them, while only 45% know where to purchase them. This shows us a moderate level of familiarity and understanding while at the same time highlighting areas where we can furnish additional information and resources.

Table 3: Knowledge on breast prosthesis

Item	Content	Yes, n (%)
1	I have heard of breast prostheses	42 (76%)
2	I know at least 1 place to purchase external breast prostheses	25 (45%)
3	I have been introduced to external breast prostheses	32 (58%)
4	I know that external breast prostheses is different from breast implants	33 (60%)
5	I know that external breast prostheses is made up of different shapes and sizes	41 (75%)
6	I know where to find information on external breast prostheses	32 (59%)

Participants in the control group of ‘not currently wearing breast prostheses’, 18% have expressed interest to their healthcare providers or social workers about wearing breast prostheses and envision themselves using them within the next six months. An additional 8% have considered wearing prostheses but remain undecided. However, a majority, 55%, are certain that they would not choose to wear an external breast prosthesis. This shows us that a significant portion of the group is unwilling to use breast prostheses, despite some level of interest or consideration among a smaller subset.

Table 4. Willingness to Wear Breast Prostheses (Control Group) - Participants Not Currently Using Breast Prostheses

Item	Content	Yes, n (%)
1	I have expressed interest to my healthcare providers or social workers that I wish to wear external breast prostheses	7 (18%)
2	I see myself wearing external breast prostheses within the next 6 months	7 (18%)
3	I thought about wearing external breast prostheses, but have not decided whether I would	3 (8%)
4	I would not wear an external breast prosthesis	21 (55%)

The barriers to wearing breast prostheses varies among the respondents. The most frequently cited barrier, mentioned by 37% of respondents, is the belief that they do not need a prosthesis. Other barriers include concerns about low comfortability and potential complications (14%), a lack of awareness about prostheses (11%), and costs (9%). Age and personal preferences, such as aesthetics or practicality, also influence decisions, each affecting 9% and 8% of the

respondents, respectively. Additionally, 6% of individuals mentioned religious concerns and 6% mentioned that they have undergone breast reconstruction surgery as reasons for not opting for breast prostheses. This distribution highlights a range of personal, practical, and financial factors that influence the decision to use breast prostheses.

Table 5. Barriers to wearing breast prostheses

Barrier	n (%)
I think I do not need it	24 (37%)
Low comfortability and potential complications	9 (14%)
I do not know about it	7 (11%)
Costs	6 (9%)
Age	6 (9%)
Personal preference e.g., aesthetic, impractical to wear	5 (8%)
Religious concerns	4 (6%)
Breast reconstruction surgery was done	4 (6%)

Correlation between SAAS, BIS and Knowledge of breast prosthesis among the participants

There is a significant positive relationship which exists between social appearance anxiety and body image perception, which suggests that higher levels of social appearance anxiety are closely associated with greater body image concerns.

Table 6 displays the correlations between the SAAS and BIS, and knowledge scores. The analysis reveals a strong positive correlation between SAAS and BIS (Spearman's Rho = 0.699, $p < 0.001$), indicating that higher social anxiety related to appearance is associated with a greater concern about body image. In contrast, there are no significant correlations between knowledge scores and either SAAS (Spearman's Rho = -0.173, $p = 0.207$) or BIS (Spearman's Rho = -0.194, $p = 0.156$), suggesting that knowledge scores do not significantly relate to levels of social anxiety or body image concerns.

Table 6. Correlations between SAAS, BIS, and knowledge scores

Spearman's Rho	SAAS	BIS	Knowledge
SAAS	1.000	**0.699 (p<0.001)**	-0.173 (p=0.207)
BIS	**0.699 (p<0.001)**	1.000	-0.194 (p=0.156)
Knowledge	-0.173 (p=0.207)	-0.194 (p=0.156)	1.000

Table 7 displays the SAAS and BIS scores categorized by willingness to wear breast prostheses. The data show that participants willing to wear breast prostheses have an average SAAS score of 36.29 ± 11.59, compared to 30.94 ± 12.20 for those not willing, with a p-value of 0.296, indicating no significant difference between the two groups. Similarly, the BIS scores for those willing to wear prostheses average 13.00 ± 5.23, while those not willing average 9.06 ± 8.54, with a p-value of 0.251, also showing no significant difference. These results suggest that the intention to wear breast prostheses does not significantly affect levels of social anxiety or body image concerns.

Table 7. SAAS and BIS scores stratified by willingness to wear breast prostheses

	Willing n=7	Not willing n=32	p-value
SAAS	36.29 ± 11.59	30.94 ± 12.20	0.296
BIS	13.00 ± 5.23	9.06 ± 8.54	0.251

Table 8 examines how different levels of knowledge impact scores for SAAS and BIS. For SAAS, individuals with low knowledge have an average score of 33.25 ± 13.75, those with medium knowledge score 31.69 ± 11.87, and those with high knowledge score 29.19 ± 10.09, with a p-value of 0.222. For BIS, the average scores are 12.92 ± 9.43 for low knowledge, 9.50 ± 8.33 for medium knowledge, and 8.00 ± 7.19 for high knowledge, with a p-value of 0.558.

Although it was observed that knowledge level does not significantly affect social appearance anxiety or body image concerns, notably, those with low-to-medium EBP knowledge exhibited higher scores on measures of social appearance anxiety (SAAS) and body image (BIS) compared to participants with high EBP knowledge. These findings suggest that greater knowledge about external breast prostheses may be associated with more positive body image and lower social appearance anxiety among the study participants.

Table 8. Impact of knowledge level on SAAS and BIS

	Knowledge levels			
	Low (0-1)	Medium (2-4)	High (5-6)	p-value (One-Way ANOVA)
SAAS	33.25 ± 13.75	31.69 ± 11.87	29.19 ± 10.09	0.222
BIS	12.92 ± 9.43	9.50 ± 8.33	8.00 ± 7.19	0.558

Discussion

After conducting research in our local social service organization, it became evident that those with low levels of knowledge about EBP had higher scores on both the SAAS and the BIS. Furthermore, the primary factor influencing the low uptake of breast prostheses was financial considerations rather than cultural or religious concerns. This finding underscores the need for educational initiatives to improve knowledge about EBP and address financial barriers to enhance the quality of life for affected individuals.

The results showed that only a handful of participants were hesitant to use as a result of their religious beliefs that prohibit physical alterations to the body. Most participants reported that they were not willing to wear breast prostheses, as they do not perceive it as a need.

Previous studies have stated that religious beliefs would significantly influence the utilization of breast prostheses. For example, Benidir et al. (2023) found that religion profoundly influences Muslim cancer patients following their diagnoses, helping them accept their illness as God's will. It has highlighted the profound impact of religion on patients' decisions following diagnosis. Similarly, Ahmadi et al. (2019) reported that Malaysian cancer patients rely on religion as a coping method, accepting their cancer diagnosis as a part of God's plan. Benidir et al. (2023), also observed that Muslim cancer patients often use religious beliefs to find meaning in their sufferings, regularly praying for comfort and expressing gratitude to God. These studies reveal how religion facilitates illnesses acceptance and provides emotional support and resilience for these patients. However, our study demonstrated that patients' decisions regarding breast prostheses were not influenced by religious beliefs.

In the current study, it was found that those with higher knowledge level on EBP have lower BIS and SAAS scores respectively. This aligns with Heggy et al. (2021) who reported that post-mastectomy women with inadequate knowledge on EBP had low self-esteem and were dissatisfied with their breast prostheses. After implementing instructional guidelines, improvements were seen in their self-esteem and their knowledge of EBP. Another study found that breast cancer post-mastectomy patients faced a common challenge, which was inadequate information about breast prostheses including where to find fitting service and the availability of breast prostheses (Fitch et al., 2012). Wiedemann and Schnepp (2017) found similar results, revealing that inadequate awareness of EBP fitting service in German centers led to dissatisfaction during consultations. Those who knew more about the different type of prostheses, models and materials found EBP comfortable and well-fitted. The current study found that most participants stated they do not need EBP, aligning with Wiedemann and Schnepp (2017) research, as some participants view it as less important compared to other life priorities.

Our study found that individuals with lower knowledge levels about EBP had higher BIS and SAAS scores, indicating that limited knowledge on EBP negatively affects mental health.

These individuals exhibit more pronounced negative body image symptoms. With insufficient knowledge of EBP, they may feel uncertain about enhancing their physical appearance after breast reconstruction or restoration, which can consequently affect their body image.

Similarly, the higher SAAS scores indicate greater social appearance anxiety, implying these participants feel more self-conscious and anxious about their appearance in social settings.

Since mastectomy can negatively impact feelings of femininity and self-confidence, knowledge of EBP plays a significant role in mitigating these effects. Higher knowledge levels are associated with better body image and lower social anxiety, contributing to a greater sense of self-confidence and femininity among survivors. Educated individuals may be better equipped to navigate and challenge the stigma associated with mastectomy and prostheses use. By understanding and advocating for themselves, they can reduce internalized stigma, positively impacting their body image and social anxiety levels. Higher knowledge of EBP often correlates with proactive health behaviours including regular follow-ups, seeking professional advice, and staying informed about advancements in prosthetic technology, contributing to a better body image and reduced anxiety. Greater knowledge of EBP can also lead to more realistic expectations about its appearance and functionality, helping align their expectations with reality and reduce dissatisfaction with their body image and anxiety in social settings.

To date, there appears to be a notable gap in research exploring the perspectives of Malay Muslim women regarding the use of breast prostheses, particularly focusing on why they may choose not to utilize them. Most papers focused on knowledge on EBP and not much in relation to body image. Despite growing awareness of the safety and benefits beyond aesthetics such as psychological well-being and quality of life, there remains an absence of studies investigating why Malay women may choose not to utilize breast prostheses.

Our study aligns with existing literature exploring the beneficial roles of external breast prostheses in enhancing body image, suggesting that they can significantly improve body satisfaction and self-esteem (Qiu et al., 2021; Weaver, 2007; Gallagher et al., 2007). Further investigation reveals that poor knowledge of external breast prostheses is associated with higher scores on body image and social appearance scales among the Malay Muslim population in Singapore. This finding highlights the significant impact of educational gaps on individuals' self-perception and social confidence. Additionally, financial concerns and misconceptions about breast prostheses are identified as major barriers to their uptake, contrary to the initial assumption that religious views were the primary cause. This shifts the emphasis to the value of tailored educational initiatives to promote awareness and provide exposure to prosthetic solutions that can substantially improve the quality of life for affected individuals.

Limitations

This study focuses on a group of Singaporean Malay Muslim women from low-income backgrounds who regularly participate in social service programs. Despite the narrow demographic, the findings offer valuable insights into the specific socioeconomic challenges and culture norms influencing breast prosthesis uptake. Understanding these factors provides a refined understanding on barriers to utilizing breast prostheses, contributing to a more comprehensive view of the associated challenges.

However, the study does not consider the unique environmental conditions in Singapore, such as high humidity, which could significantly impact the comfort and willingness of users to wear breast prostheses. Further research is needed to explore how environmental factors intersect with user experiences to influence the wearing of breast prostheses. This may encompass investigating the practical limitations that users encounter in humid environments, potentially leading to future improvements in prosthetic designs tailored to address these concerns.

Moreover, the cross-sectional design of the study poses additional limitations, as it only presents a short-term prediction on the perspectives on breast prostheses. To investigate the dynamic influences of environmental factors and social beliefs, longitudinal studies could be more suitable and valuable.

Despite the study's limitations, our study findings offer valuable insights into the socioeconomic and cultural barriers affecting breast prostheses uptake among Singaporean Malay Muslim women. These insights contribute significantly to comprehend the specific challenges holding them back from using breast prostheses.

Through examining Malay women's understanding of breast prostheses and their level of body satisfaction following a mastectomy, our study provides fresh viewpoints on the socio-cultural factors affecting post-mastectomy care among social service users in Singapore. These findings add valuable empirical knowledge in literature, enabling healthcare providers to develop more targeted and effective services for the Singaporean context.

Disclosure Statement
The authors declare that there are no known conflicts of interest associated with this publication.

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Appendix

Demographic Information

Highest Qualification

1. Primary
2. Secondary
3. Tertiary

Working Status

1. Part-time
2. Full-time
3. Ad-hoc
4. Self-employed
5. Unemployed

Total household income

1. $0 - $1000
2. $1000 - $2000
3. $2000 - $3000
4. Above $3000

Post-Mastectomy Intervention

1. Wearing breast prostheses
2. Wore external breast prostheses
3. Breast reconstruction surgery
4. Never worn external breast prostheses or undergone breast reconstruction surgery

External Breast Prostheses (EBP) Knowledge Questionnaire

Knowledge

1-Yes 2-No 3-Unsure

1. I have heard of breast prostheses
2. I know at least 1 place to purchase external breast prostheses
3. I have been introduced to external breast prostheses
4. I know that external breast prostheses are different from breast implants
5. I know that external breast prostheses are made up of different shapes and sizes
6. I know where to find information on external breast prostheses

Other factors/ barriers

I have not considered wearing external breast prostheses because of (tick all that apply)

1. cost
2. religious concerns
3. objections raised by family and friends
4. my age
5. I do not know about it
6. do not need it
7. others: _____

Body Image Scale Questionnaire

1-Not at all 2-A little 3-Quite a bit 4-Very Much

1. Have you been feeling self-conscious about your appearance?
2. Have you felt less physically attractive as a result of your disease or treatment?
3. Have you been dissatisfied with your appearance when dressed?
4. Have you been feeling less feminine/masculine as a result of your disease or treatment?
5. Did you find it difficult to look at yourself naked?
6. Have you been feeling less sexually attractive as a result of your disease or treatment?
7. Did you avoid people because of the way you felt about your appearance?
8. Have you been feeling the treatment has left your body less whole?
9. Have you felt dissatisfied with your body?
10. Have you been dissatisfied with the appearance of your scar?

Social Anxiety Appearance Scale Questionnaire

1- Not at all 2-A little 3-Quite a bit 4-Very Much 5- Extremely

1. I feel comfortable with the way I appear to others (Reverse-coded)
2. I feel nervous when having my picture taken
3. I get tense when it is obvious people are looking at me
4. I am concerned people would not like me because of the way I look
5. I worry that others talk about flaws in my appearance when I am not around
6. I am concerned people will find me unappealing because of my appearance
7. I am afraid that people find me unattractive
8. I worry that my appearance will make life more difficult for me
9. I am concerned that I have missed out on opportunities because of my appearance
10. I get nervous when talking to people because of the way I look
11. I feel anxious when other people say something about my appearance
12. I am frequently afraid I would not meet others' standards of how I should look
13. I worry people will judge the way I look negatively
14. I am uncomfortable when I think others are noticing flaws in my appearance.
15. I worry that a romantic partner will/would leave me because of my appearance
16. I am concerned that people think I am not good looking

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