

Quality of Life in Patients Pre- and Post-Breast Reduction Surgery in a South African Population: a single-centred patient-based study

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Short title: Quality of Life in Patients Pre- and Post-Breast Reduction Surgery

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ABSTRACT

Introduction

Breast hypertrophy is the abnormal enlargement of breast tissue resulting in extremely large breasts and is a regular condition among women worldwide. It can affect different aspects of their life including their psychosocial, sexual, emotional, and physical well-being. This study aimed to assess the quality of life in individuals with breast hypertrophy both before and after undergoing breast reduction surgery.

Methods

Two sets of questionnaires (pre-operative and post-operative) were formulated and distributed to 18 patients [median age of 31, (age range: 18 to 48 year)] undergoing breast reduction surgery. Patients were also provided with an informed consent form.

Results

Pre-operatively, most patients expressed different levels of dissatisfaction with themselves across all categories. However, post-operatively, significant levels ($p < 0.05$, $p < 0.001$) of satisfaction were demonstrated by patients as 100% of them reported a reduction in back pain and heaviness of breasts, and 100% reported improvement in their self-confidence. Also, 94% and 65% reported improvement in their social interaction and sexual life, respectively.

While 83% and 61% of patients reported satisfaction in carrying their grocery shopping bags and their engagement in regular exercise programs, respectively.

Conclusion

The study illustrates that breast reduction surgery had a positive effect on the Quality of life (QoL) of patients as a significant proportion of them reported improvement and satisfaction across all categories following the procedure.

Keywords: QoL, Breast reduction, Breast hypertrophy, Well-being improvement.

INTRODUCTION

Breast hypertrophy, also known as macromastia, is the abnormal enlargement of breast tissue, leading to excessively large breasts. It is a relatively common condition among women worldwide [1]. Although there are no clinical assessments of symptomatic macromastia due to the broad range of body forms, the average woman with breast hypertrophy may have between 900 and 2200 g of additional breast tissue [2]. Women with breast hypertrophy or enlarged breasts do experience persistent neck, shoulder, and back pains, rashes under and between their breasts, and other related pain from their bra straps, which can cause grooving and put them in danger of getting ulnar paraesthesia as a result of the pressure on their brachial plexus [2-7].

According to [8], chronic back discomforts are reported by 60–70% of people with breast hypertrophy. A study in KwaZulu-Natal reported a prevalence of 19.8% of lower back pain among women [9]. In addition, women with breast hypertrophy also suffer from severe psychological and social impacts such as self-consciousness, low self-esteem, discomfort during everyday activities, etc., thereby affecting their quality of life (QoL) [2,6,10]. This was highlighted in a study conducted by Crittenden et al. [11], which reported poor QoL among women with breast hypertrophy when compared with the general population.

QoL is an isolated person's perception of their position in life concerning their objectives, hopes, expectations, and challenges in terms of the social and cultural environment in which they live [12]. Although conservative treatments such as physical therapy, NSAIDs, weight loss, and special bras have been used as initial treatments for alleviating symptoms of breast hypertrophy, less than 1% of women experience long-term relief from these without surgery [2]. Breast reduction surgeries have proven effective in completely alleviating these symptoms and greatly improving the physical, social, and mental health and overall QoL in patients [5,7,13-14]. This was also confirmed in the study of Crittenden et al. [11], where women with breast hypertrophy (initially experiencing a poor QoL) had improved QoL after undergoing breast reduction surgery.

Breast reduction surgery is a common procedure performed to treat breast hypertrophy symptoms [5,7,12,14-16]. Although breast hypertrophy is mostly common in SA, breast reduction surgery only account for 10% of all plastic surgical procedures in South Africa [17,18]. Despite the awareness by the Breast Health Foundation (BHF) and the South African Society of Plastic Surgeons (SASPS), views regarding breast reduction are complicated and diverse in South Africa due to cultural and religious beliefs [13,18]. In addition, some medical funders (medical

aid companies) sometimes consider breast reduction to be a cosmetic treatment rather than a functional one or not with any benefits. Nevertheless, studies have also shown that people who undergo breast reduction surgery benefit greatly from increased physical and mental health and an overall higher QoL [11,13,19-20].

Hence, the present study set out to investigate the QoL of patients in South Africa who have undergone breast reduction surgery. This would be achieved by assessing their pre- and post-breast reduction surgery statuses regarding related symptoms and QoL. This, in turn, will provide knowledge and insight into the benefits of breast reduction surgery in the South African context.

METHODS

Study Design

This was a prospective questionnaire-based study of 20 adult female patients who presented to the Breast Clinic for breast reduction surgery at a Quaternary Hospital, in Durban, South Africa. However, a final total of 18 adult female patients were investigated as 2 participants did not meet the inclusion criteria, as they did not complete the post-operative breast reduction questionnaire. Inclusion and exclusion criteria are stated below”.

Inclusion criteria: Patients who underwent breast reduction surgery and those who participated in the pre-and post-operative questionnaires.

Exclusion criteria: Patients who did not answer one of the questionnaires, either the pre- or post-operative questionnaire.

Demographics

Patients’ demographics are listed in Table 1. The median age of patients was 31 (range 18-48 years). The median weight of patients is 76 kg (range 61-103 kg). Out of the total participants, 6% (1) patients were of Indian descent, while the majority, 94% (17), were of African descent. Regarding employment status, 61% (11) of patients were unemployed, while 39% (7) were employed (Table 1). A day before surgery, doctors measured the patient's sternal notch to nipple and nipple to inframammary fold length in both breasts. The median length of the sternal notch to nipple length on the right breast was 38 cm (range 28-46 cm) and a median length of 38 cm (range 29-47 cm) on the left breast. The median length of the nipple to inframammary fold on the right breast was 19 cm (range 11-25 cm) and 18 cm (range 12-29 cm) on the left breast.

Table 1: Characteristics of female patient demographics

Median age (years)	31
Median weight (kg)	76
Race n (%)	African – 17 (94%) Indian – 1 (6%)
Employment Status	Employed – 7 (39%) Unemployed – 11(61%)
Sternal notch to nipple median length (cm)	Left – 38 Right – 38
Nipple to inframammary fold median length (cm)	Left – 18 Right – 19

Ethical Approval

Study approval was obtained from the Biomedical Research Ethics Committee (BREC/00004832/2022).

Data Collection Tool

Two questionnaires were created: one to evaluate the QoL of patients coping with breast hypertrophy before surgery, and another to assess their QoL three months after undergoing breast reduction surgery. Both surveys examined a range of variables that could affect people's QoL, including body image, physical health, and psychosocial health. The questionnaires were adapted from the BREAST-Q questionnaire and the SF-36 QoL Inventory [11,19,21]. The pre-operative questionnaire was divided into five categories, including physical symptoms; body image; physical well-being and activities; psycho-social well-being; and sexual wellness. In the physical symptoms category, patients were given a scale (Fig. 1) to score the pain they experienced as a result of breast hypertrophy. This was just a physical illustration of the pain. The scale has numbers ranging from 0 to 10. The lowest score meant that the person felt no pain, while the highest number suggested that the person was in extreme pain. The post-operative questionnaire was also formulated using the same categories as the pre-operative questionnaire. Participants were offered a consent form to voluntarily sign before participating in the study, and their involvement was entirely based on their own choice without any coercion. Patients' information was kept confidential.

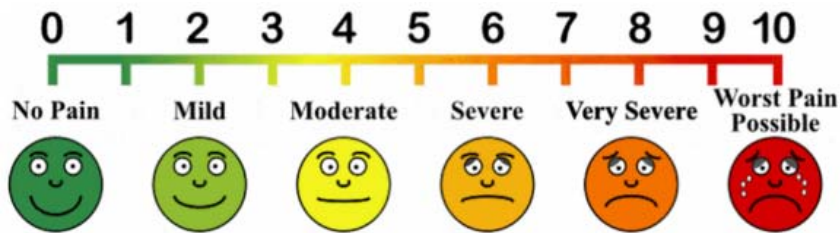


Fig. 1. Visual analog scale that was designed for patients to evaluate the extent of pain they experienced due to breast hypertrophy

Validity and Reliability of Questionnaires

The questionnaires were constructed following consultation with a Biostatistician and thereafter submitted to the supervisors for face and content validation. A pilot study was done with 5 patients from a hospital different from the research site to assess reliability. This was to ensure that when the questionnaires are used for the main study, they will provide patients with easy understanding with no misplaced words or ideas or stress on the participants and that the questionnaires are reliable enough to get relevant feedback as per each question in the questionnaires.

Method of Data Collection

Upon presentation to the Breast Clinic, patients were requested to complete a pre-operative questionnaire. This was done a day before their scheduled surgical procedure. Patients were also requested to complete a post-operative questionnaire telephonically three months after their procedure. Due to non-completion of the post-operative questionnaire by two patients, the final sample size for the study was 18 participants. The study only included patients who met the inclusion criteria.

Patients had an average stay of four days. They stayed the day before, the day of, and the day after surgery. They were discharged on the fourth day after being checked for complications. An inverted T-pedicle surgical method was used in all patients to reduce their breasts. No patient required theatre after surgery due to surgery complications; however, two patients experienced minor complications with their wounds not healing and were

treated at the clinic. On the right breast a median amount of 1051 g (range 222-2879 g) was removed, and a median amount of 998 g (range 190-2579 g) was removed from the left breast.

Statistical Analysis

The statistical data analysis was conducted in the R Statistical computing software of the R Core Team, 2020, version 3.6.3. The results were presented in the form of descriptive and inferential statistics. The data was mostly categorical, which were described as counts and percentage frequencies. Simple and multiple bar charts were used to visually display the categorical variables. To determine the association between categorical variables, the Chi-Square test was used, and when the distribution of the cross-tabulations contained an expected value of less than five, a Fisher’s exact test was applied. In the case of a significant difference between the Chi-Square or Fisher exact test, a row-wise paired z-test was used as a post hoc analysis following the omnibus tests (Chi-Square or Fisher exact test). All the inferential statistical analysis tests were conducted at 5% significance levels.

RESULTS

Physical Symptoms

Patients were given a visual analog scale to use when rating the pain they felt from having breast hypertrophy (Fig. 1). Before surgery, a total of 10 patients (56%) rated back pain at 10 (worst pain possible) in terms of it affecting them in their lives, and 2 patients (11%) reported a rating of 1 (No pain) (Fig. 2). Post-operatively, 100% of patients reported relief from their back pain. A total of 44% of patients reported a score of 10 (worst pain possible) pre-operatively, and 6% gave a score of 3 (mild) in terms of how the heaviness of their breasts affects them (Fig. 3). Post-operatively, 100% of patients said that the pain brought on by heavy breasts had improved.

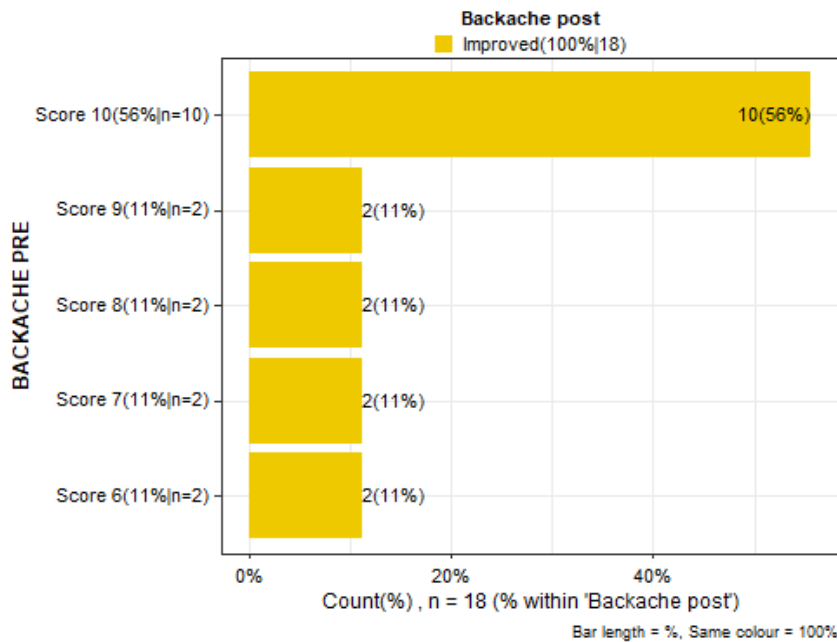


Fig. 2. Patients’ responses regarding the level of back pain before surgery and any observed improvements after surgery (n=18)

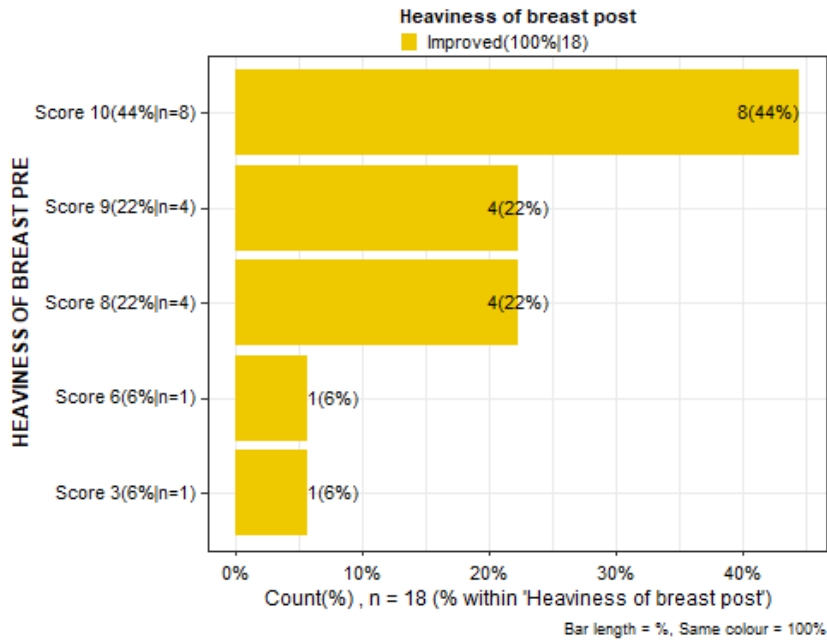


Fig. 3. Patients’ responses regarding the level of pain experienced in terms of the heaviness of breasts before surgery and any observed improvements after surgery (n=18)

In terms of the influence of breast hypertrophy on their sexual lives, 35% of patients gave it a rating of 10 (worst pain possible), while 18% gave it a rating of 1 (no pain) (Fig. 4). After surgery, 65% reported an improvement, 6% experienced no change, and a further 6% noted a decline in their sexual lives. Additionally, 24% of patients reported no sexual activity during the three months post-surgery. After surgery, 50% and 56% of patients reported a decrease in their left and right nipple sensitivity, respectively. Whereas 6% and 11% of patients, reported an increase in the sensation of their left and right nipples, respectively. Additionally, 39% and 33% of patients reported a lack of sensation in their left and right nipples, respectively. Only 6% of the patients reported occasional sensations in their left nipple (Fig. 5).

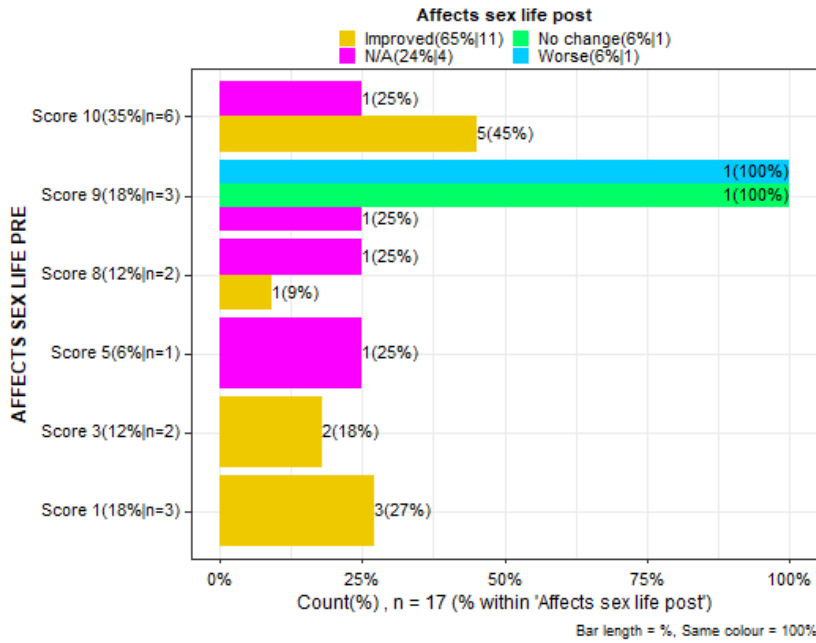


Fig. 4. Patients' responses related to pain in breast hypertrophy versus sex life pre- and post-operatively

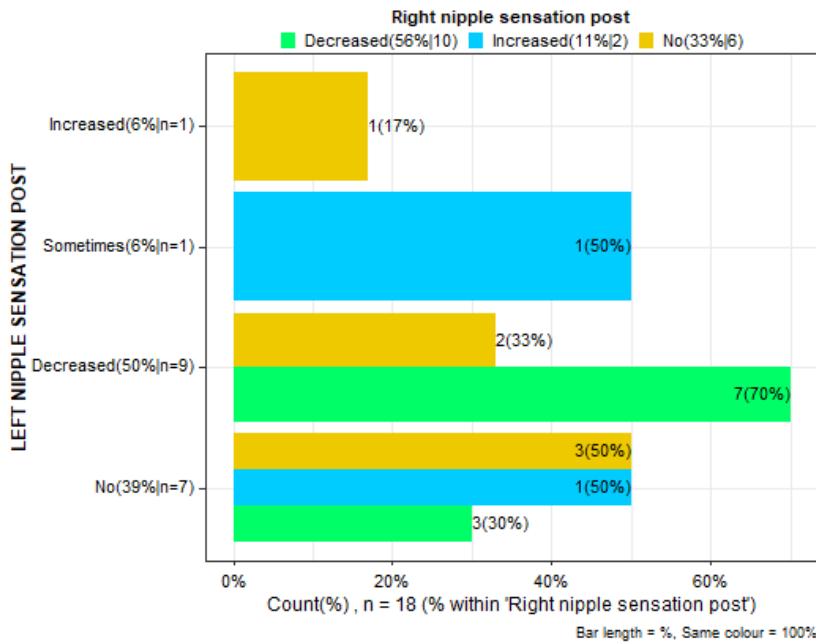


Fig. 5. Patients' post-operative responses in terms of nipple sensitivity

Body Image

A total of 89% of patients reported being dissatisfied, and 6% reported being satisfied with their bodies when asked how they felt about their bodies when they were naked and facing the mirror pre-operatively. After the surgery, the results revealed that 94% of them were now happy with their bodies with none reporting

dissatisfaction. The results were considered to be statistically significant, with a p-value less than 0.001 (Table 2). Before the surgery, all patients showed upper-torso dissatisfaction, and 100% of patients expressed upper-torso satisfaction following surgery. This was also statistically significant, with a p-value of less than 0.001 (Table 2). Before the surgery, 50% of patients reported being dissatisfied with their weight, while 11% reported being satisfied. After the surgery, 6% of patients reported to be dissatisfied with their weight, whereas 61% were satisfied. With a p-value of less than 0.05, it shows that the results between weight and satisfaction levels before and after the procedure were statistically significant (Table 2).

Table 2: The levels of satisfaction in patients regarding their body image and physical activities before and after surgery

Questions	Pre (N=18)	Post (N=18)	p-value
The way I look in the mirror with no clothes on.			* p<0.001
Dissatisfied	16 (88%)	0 (0%)	<0.001
Neither	1 (6%)	1 (6%)	1.000
Satisfied	1 (6%)	17 (94%)	<0.001
Upper torso (chest or breasts, shoulders, arms)			# p<0.001
Dissatisfied	18 (100%)	0 (0%)	<0.001
Satisfied	0 (0%)	18 (100%)	<0.001
Weight			# p<0.05
Dissatisfied	9 (50%)	1 (6%)	0.022
Neither	7 (39%)	6 (33%)	1.000
Satisfied	2 (11%)	11 (61%)	0.013
I am not involved in a regular exercise program.			# p<0.001
Dissatisfied	10 (56%)	1 (6%)	0.008
Neither	7 (39%)	6 (33%)	1.000
Satisfied	1 (5%)	11 (61%)	0.003
Carrying grocery shopping bags			* p<0.001
Dissatisfied	9 (50%)	0 (0%)	0.003
Neither	6 (33%)	3 (17%)	1.000
Satisfied	3 (17%)	15 (83%)	<0.001

*Fishers Test

#Chisq Test

Physical Activities (Well-being)

Before surgery, 56% of patients indicated to be dissatisfied, and 6% indicated to be satisfied with their involvement in regular exercise programs. After surgery, 6% of patients indicated to be dissatisfied, whereas 61% indicated to be satisfied. Results were statistically significant, with a p-value of less than 0.001 (Table 2). Before surgery, 50% said they were dissatisfied, and 17% said they were satisfied with carrying their grocery shopping bags. After the surgery, no patients reported being dissatisfied with having to carry shopping bags, and 83% reported being satisfied. Results were statistically significant, with a p-value of less than 0.001 (Table 2).

Psycho-Social Well-being

Pre-operatively, 89% were dissatisfied with the influence of breast size in social interactions, while 11% were satisfied. However, post-operatively, 94% reported that they were satisfied, and 6% indicated to be dissatisfied. These findings indicate that patients' post-operative satisfaction levels have increased. A p-value of <0.001 shows that these results are statistically significant (Table 3). Before surgery, 83% were dissatisfied with their confidence

in a social environment, whereas 11% were satisfied. Following surgery, 100% of patients reported being satisfied with their social confidence. Results are statistically significant because of a p-value less than 0.001 (Table 3).

Table 3: The level of satisfaction in patients regarding their psycho-social well-being pre- and post-operatively

Questions	Pre (N=18)	Post (N=18)	p-value
Influence of Breast Size on Social Interactions			* p<0.001
Dissatisfied	16 (89%)	0 (0%)	<0.001
Neither	0 (0%)	1 (6%)	1.000
Satisfied	2 (11%)	17 (94%)	<0.001
Confidence in a social environment			* p<0.001
Dissatisfied	15 (83%)	0 (0%)	<0.001
Neither	1 (6%)	0 (0%)	1.000
Satisfied	2 (11%)	18 (100%)	<0.001

* Fishers Test

Sexual Well-being

Figures 6 and 7 represent the patients' responses to sexual attractiveness and engagement. (Note: only 17 patients responded to the aspect of the questionnaire, as one patient chose not to respond to any question concerning her sexual activities or engagements)

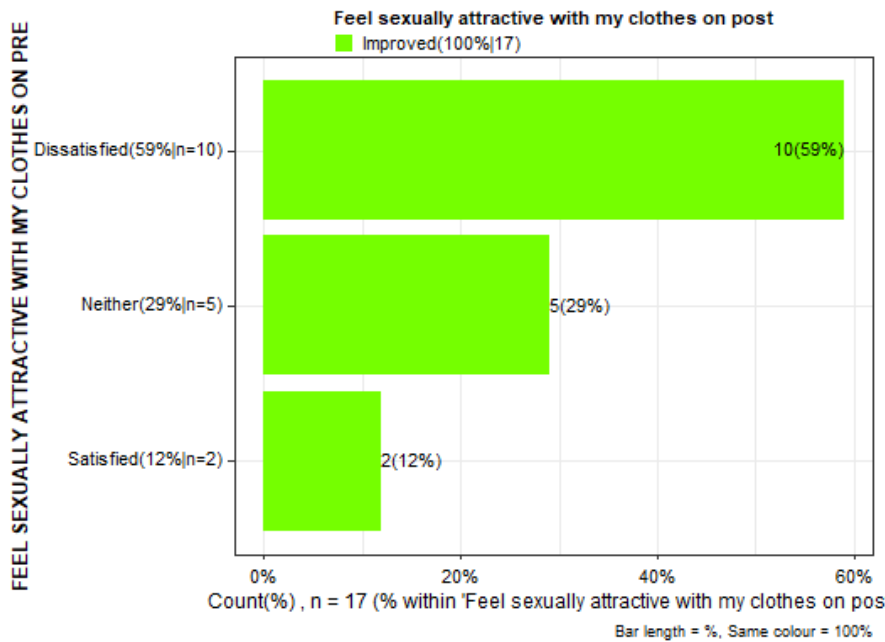


Fig. 6. Satisfaction level in patients regarding sex life pre- and post-operatively

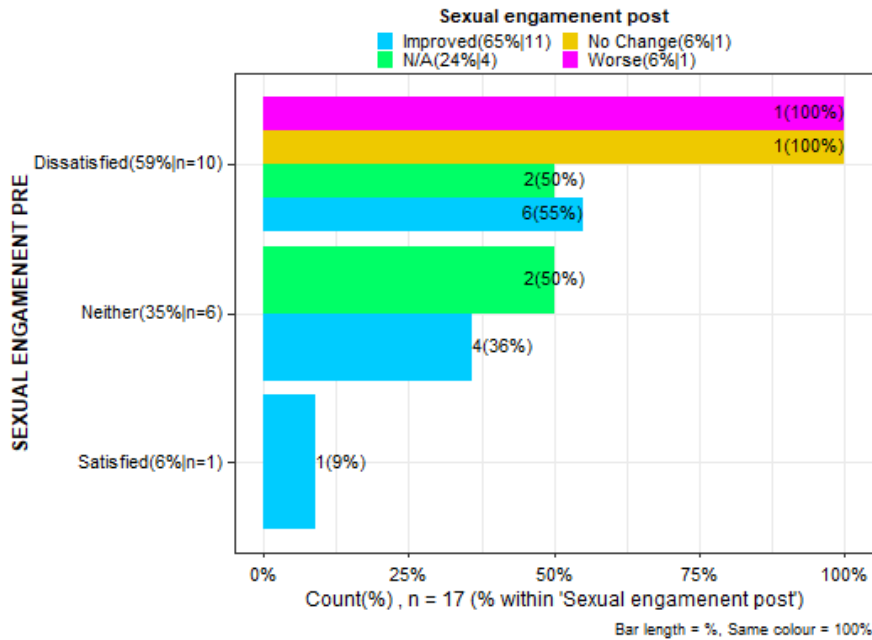


Fig.7. Satisfaction level in patients regarding sexual engagement

Patients pre-operatively reported satisfaction rates of 12% and dissatisfaction rates of 59% with their level of sexual attractiveness when wearing clothing. All patients (100%) reported improvement after the surgery. Patients felt more attractive when dressed after their surgery (Fig. 6). Before the surgery, 59% of patients reported being dissatisfied with their sexual engagement with their partners, and 6% reported being satisfied. After the surgery, 65% of patients indicated that their sexual lives with their partners had improved, and 6% said their sexual engagement had gotten worse after the surgery. However, 24% of patients stated that they hadn't engaged sexually with anyone after the surgery (Fig. 7).

DISCUSSION

Breast hypertrophy is an uncommon disorder that causes excessive breast tissue growth, leading to the development of very big breasts [4]. It can greatly impact an individual's QoL. The study examined various factors that can be affected by breast hypertrophy, thereby influencing the QoL in individuals with this condition. According to the literature on regularly sized breasts, the length from the sternal notch to the nipple ranges between 13.5cm - 29.1 cm [22,23]. The nipple to inframammary fold length ranges between 3.6 cm - 9.4 cm [18,19]. The average lengths of the sternal notch to nipple (37cm) and nipple to inframammary fold (18cm) for this study were very high, indicating that patients had breast hypertrophy prior to breast reduction surgery. This has been reported to be common in SA [24]. Patients also reported experiencing pain in their back and neck, as well as poor posture. The back pain experienced by patients in the present study may be the reason for the high prevalence of back pain reported among women in SA [9]. In addition, these pains had a profound impact on their lives, which was also reported by [3-5,7-8,11]. However, these aspects of their lives improved post-surgery.

In terms of body image and how comfortable and content they are with their bodies, patients before the surgery were dissatisfied with their bodies and how they appeared with their large breasts. Patients experienced issues regarding body proportion due to breast hypertrophy, resulting in their upper body appearing larger than their

lower body. This imbalance created challenges when shopping for clothes, particularly dresses, as the garments fitted well in the upper body but were excessively loose in the lower body. Patients' posture was influenced by breast hypertrophy. Patients developed a curved, leaning posture. Patients who underwent breast reduction surgery encountered one or more of the following issues: prominent and noticeable scarring, unevenly shaped breasts or nipples, challenges with wound healing, diminished nipple sensation, and permanent inability to breastfeed. The sensitivity of the nipples was affected by the surgical procedure, with changes observed in either one or both nipples. The change in nipple sensitivity was observed after the breast surgery because, during the surgery, several nerves were destroyed, which resulted in changes to nipple sensitivity. A study by Schlenz et al. [25] proved that the change in nipple sensation was due to damage to nerves. Some women do gradually regain lost amounts of sensitivity over time, as nerves are known to repair very slowly.

This study reveals that patients expressed a high level of dissatisfaction with their body image when looking in the mirror before undergoing breast reduction surgery (Table 2). Interestingly, a study conducted by Crittenden [26] in 2020 supported these findings by reporting that patients were unhappy with their body image before surgery; however, there was an improvement in patients' body image satisfaction after the surgery.

Results from this study show that patients were unsatisfied with the limitations regarding their engagement in exercise programs (Table 2). These results corroborate the study by Coltman [27] in 2019, who also reported that before undergoing breast reduction surgery, patients often faced limitations in actively engaging in exercise programs to maintain their overall health and fitness. Interestingly, some individuals may not even be fully aware of their abdominal concerns, such as a larger abdomen, due to the overshadowing effect of their large breasts. However, following surgery, when the breasts are reduced in size, these abdominal issues become more noticeable. Fortunately, as patients recover from surgery and gradually return to a regular exercise routine, they have the opportunity to enhance both the shape and health of their bodies, including addressing concerns related to their abdominal region [27]. Results show that changes experienced by patients after the surgery are positive, thus emphasizing the effectiveness of the breast reduction surgery in patients with breast hypertrophy.

When examining the psycho-social and sexual well-being of individuals with breast hypertrophy, it becomes evident that these aspects of their lives are adversely impacted. Individuals dealing with this condition often experience discomfort in social situations and tend to withdraw from others, leading to a sense of isolation. After analysing patient satisfaction in the post-operative responses within this study, it was evident that breast reduction surgery positively impacted the psycho-social of patients (Table 3). This aligns with the findings of Davis et al. [20] and Crittenden [26]. The present study also reported improvements in the sexual well-being of patients after surgery (Fig 6 & 7). This implies that not only does breast reduction surgery alleviate physical symptoms of breast hypertrophy, but it also helps with improving the QoL as it positively affects the psycho-social and sexual well-being of patients.

Contrary to the cultural beliefs and stigmatization towards breast reduction surgery in the study population [17], this study has been able to show the positive impact of breast reduction surgery as it improves the QoL and alleviates symptoms presented by patients before the surgery. Results from the present study prove that breast reduction surgery is beneficial to patients with breast hypertrophy.

Limitations and suggestions for future studies

The primary limitation of this study was the small sample size. Still, based on the sample size analyzed, patients reported improvement in several elements of their lives that were investigated in this study.

For future research, extending the follow-up duration to assess the long-term sustainability of post-surgery satisfaction would be beneficial, as this study followed up with patients three months post-surgery.

CONCLUSION

This study investigated the QoL in patients with breast hypertrophy who have undergone breast reduction surgery using questionnaires pre- and post-operatively. Pre-operatively, patients complained about pains, especially in the back and neck, and experienced low QoL. However, these pains were alleviated, and the QoL improved after undergoing reduction breast surgery. This study hopes that its findings will contribute significantly to the awareness of breast reduction surgery among women and medical funders in South Africa to be of more functional importance than aesthetic.

STATEMENTS AND DECLARATIONS

Statement of Ethics

Institutional ethical clearance for this study was obtained from the Biomedical Research Ethics Committee (BREC/00004832/2022) and relevant authorities.

Consent to Participate

All patients signed an informed consent form before participating in the study.

Conflict of Interest Statement

The authors do not have any conflict of interest to declare.

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Author Contributions

N Khwela: Project development, data collection, data analysis, manuscript writing, and editing.

L Lazarus: Project development, data analysis, manuscript editing.

A Madaree: Project development, data analysis, manuscript editing.

N Mohan: Project development, data analysis, manuscript editing.

All authors provided intellectual input, contributed to the study conception and design, manuscript revisions, and approved the final manuscript.

Data Availability Statement

The data supporting the findings of this study are not publicly available because they contain information that may jeopardize the privacy of the study participants, but they are available from the corresponding author (Prof L Lazarus) upon reasonable request.

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