Pan-African Journal of Plastic Reconstructive and Aesthetic Surgery Vol. 2 No. 3 September 2025
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Abstract

Background: **Breast hypertrophy is associated with physical discomforts such as chronic inflamammary pruritus. Reduction mammoplasty has been shown to alleviate these symptoms, but local data from Kenya remains limited.**

Objective: **To evaluate the impact of reduction mammoplasty on pruritus relief.**

Design: **A prospective longitudinal cohort study.**

Setting: **Six surgical centers in Nairobi, Kenya.**

Subjects/Participants: **Sixty-nine patients undergoing reduction mammoplasty were assessed using a pruritus analogue scale preoperatively and at 2, 4, 6, and 12 weeks postoperatively. Data were analyzed using SPSS version 25. Changes in pruritus severity were evaluated using paired T-tests and repeated measures ANOVA, with a significance level of $p \leq 0.05$.**

Results: **The participants ranged from 14 to 54 years, with juvenile gigantomastia being the most common cause (51%). There was a significant decrease in pruritus severity scores, from a preoperative mean of 2.81 to 0 at 12 weeks postoperatively ($p < 0.001$). A positive correlation was found between the amount of breast tissue resected and pruritus relief ($p = 0.011$).**

Conclusion: **Reduction mammoplasty significantly relieves inframammary pruritus in women with breast hypertrophy. These findings emphasize the therapeutic role of breast reduction surgery and support its recognition as a medically necessary procedure.**

Keywords: **Reduction mammoplasty, Breast hypertrophy, macromastia, pruritus relief, postoperative outcomes**

INTRODUCTION

Breast hypertrophy, or macromastia, is the excessive enlargement of breasts relative to body size (1). A more severe form, gigantomastia, involves excision of 1000–2000 grams of tissue per breast. Women with symptomatic macromastia typically present with physical discomfort such as chronic neck, shoulder, and back pain, inframammary rashes, and skin irritation (2,3). These symptoms often restrict physical activity, complicate clothing choices, and contribute to psychological distress, reduced self-esteem, and diminished quality of life (4). In contrast, women with asymptomatic macromastia have breast enlargement without accompanying symptoms and would likely seek aesthetic breast reduction rather than medically indicated surgery.

Conservative treatments for symptomatic macromastia have shown limited benefit (5), whereas reduction mammoplasty has consistently improved physical and psychological outcomes (6). In this context, reduction mammoplasty performed for symptomatic macromastia is considered a therapeutic or reconstructive intervention, distinct from purely aesthetic breast reductions.

A notable yet under examined symptom of symptomatic macromastia is inframammary pruritus—a persistent itch beneath the breasts that contributes to significant discomfort and skin complications (7). While studies suggest breast reduction may relieve pruritus, the extent of this benefit remains unclear (7,8). Despite overall symptom improvement post-surgery, pruritus has not been a primary focus. This study aims to assess

whether reduction mammoplasty significantly alleviates chronic inframammary pruritus in women with macromastia.

MATERIALS AND METHODS

Study Design and Setting: This was prospective longitudinal cohort study in which participants were followed up for a period of 12 weeks post-surgery to assess their symptom relief levels. The entire study spanned nine months, from February to October 2024. It was conducted in the surgical departments of six board-certified institutions in Kenya: Kenyatta National Hospital, Nairobi Hospital, Platinum Surgery Centre, AJ Plastics, Da Vinci Hospital, and Coptic Mission Hospital. These centers were selected for their certification and expertise in plastic, aesthetic, and reconstructive surgical procedures, including reduction mammoplasty.

Selection criteria, Sample size and sampling technique

This study included all patients who underwent reduction mammoplasty, presented with symptoms of inframammary pruritus, and provided informed consent to participate. Symptomatic macromastia was defined as breast enlargement relative to body size associated with these symptoms. Patients with breast enlargement but no symptoms (asymptomatic macromastia) were not recruited, as such individuals typically undergo aesthetic breast reduction rather than therapeutic surgery. Patients were excluded if they had pre-existing pruritic conditions such as psoriasis or eczema or a diagnosis of any form of breast malignancy.

The sample size was determined using the Fischer formula which yielded a sample size of 52 participants. A convenience sampling technique was employed to recruit participants who met the inclusion criteria.

Data collection

A custom-made questionnaire, incorporating the validated pruritus analogue scale, was the primary data collection tool. It also recorded resected tissue volume and operative complications. Administered preoperatively and at 2, 4, 6, and 12 weeks postoperatively, the tool tracked symptom changes over time and was piloted after ethical approval.

Data Analysis: Data were analyzed using SPSS version 25. Categorical variables were summarized with frequency tables and histograms. Paired t-tests and repeated measures mixed ANOVA assessed score differences, while Spearman correlation tested associations between resected tissue, age, weight, and pruritus relief. A p-value <0.05 indicated statistical significance. Results were summarized in tables and figures.

Ethical considerations

Ethical approval for the study was obtained from the Kenyatta National Hospital–University of Nairobi (KNH-UON) Ethics and Research Committee, as well as from the administrations of all participating facilities. Access to patients was granted through formal requests to the relevant departments, accompanied by the study proposal, appendices, and the ethics approval letter (approval number P717/10/2023).

Informed consent was obtained using bilingual forms (English and Swahili), with copies for both parties. The study was conducted in accordance with the principles of the Declaration of Helsinki and the ICH-GCP guidelines, ensuring participant rights, confidentiality, and data integrity were upheld throughout the research process.

RESULTS

Patient Demographics

The mean age at the time of consultation was 31.0 ± 8.0 years (range, 14–54 years). The mean age at initial presentation was 31.0 ± 1.5 years, with an age range of 21 to 49 years. Among patients with gestational gigantomastia, the mean age was 13.0 ± 0.9 years (range, 10–16 years), while for those with juvenile and idiopathic gigantomastia, the mean age was 23.0 years (range, 21–32 years). The average duration of the disease prior to surgical intervention was approximately 6 years for gestational gigantomastia, 11 years for juvenile gigantomastia, and 5 years for idiopathic gigantomastia. Juvenile gigantomastia was the most frequently observed subtype (51%), followed by gestational gigantomastia (42%) and idiopathic gigantomastia (7%).

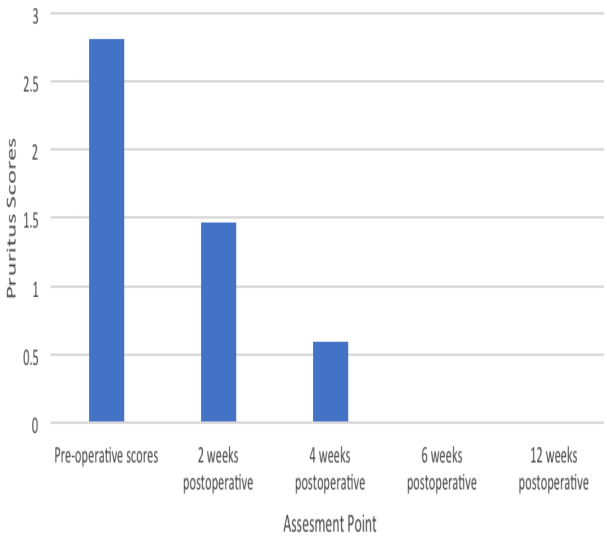
Pruritus Assessment

The pruritus analogue scale was used to measure pruritus intensity. Evaluations were conducted during the pre-operative phase and subsequently at 2-, 4-, 6-, and 12-weeks post operation. The average pruritus scores and descriptive statistics for these five time points are presented in Table 1 and figure 1.

Table 1: Descriptive statistics of pruritus score

Assessment points	Pruritus scores Mean (SD)	Mode	Median	Min	Max
Pre-operative scores	2.81(2.851)	0	4	0	8
2 weeks postoperative	1.464(1.481)	0	2	0	4
4 weeks postoperative	0.59(0.671)	0	0	0	2
6 weeks postoperative	0	0	0	0	0
12 weeks postoperative	0	0	0	0	0

Figure 1: Bar graph following up pruritus scores



Comparisons between the pruritus scores at each time point

Comparing the effect of time on pruritus scores at pre-operation, and at weeks 2, 4, 6, and 12 post-operation, all patients reported a significant improvement in average pruritus scores at all time points relative to average preoperative scores (Figure 2).

The results of the ANOVA showed a significant effect of time on pruritus scores F (1.086, 73.830) = 65.264, p < 0.001, $\eta^2 = 0.490$. This indicates that pruritus scores significantly decreased over time.

Specifically, the mean difference in pruritus scores from pre-operation to week 2 was 1.348 (95% CI [0.806, 1.890]), from pre-operation to week 4 was 2.217 (95% CI [1.423, 3.012]), from pre-operation to week 6 was 2.812 (95% CI [1.816, 3.807]), and from pre-operation to week 12 was 2.812 (95% CI [1.816, 3.807]) (Table 2).

Post-hoc comparisons using the Bonferroni correction revealed that pruritus scores significantly decreased from pre-operation to each subsequent time point, with the largest reduction observed at week 6 and 12.

Figure 2: Comparisons between the pruritus scores at each time point

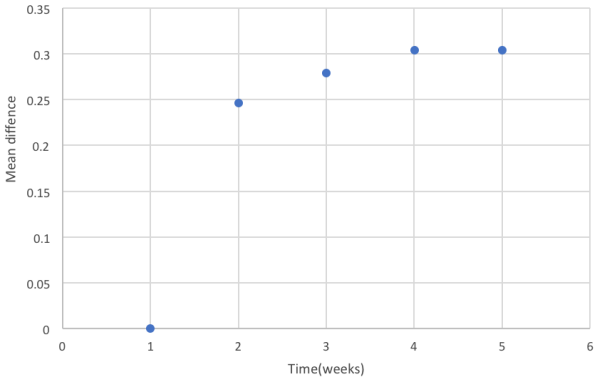


Table 2: comparisons of pruritus scores

(I) Time	(J) Time	Mean Difference (I-J)	Std. Error	Sig.b
Preop	Week 2	1.348*	.187	< 0.001
	Week 4	2.217*	.274	< 0.001
	Week 6	2.812*	.343	< 0.001
	Week 12	2.812*	.343	< 0.001

Week 2	Preop	-1.348*	.187	< 0.001
	Week 4	.870*	.107	< 0.001
	Week 6	1.464*	.178	< 0.001
	Week 12	1.464*	.178	< 0.001
Week 4	Preop	-2.217*	.274	< 0.001
	Week 2	-.870*	.107	< 0.001
	Week 6	.594*	.081	< 0.001
	Week 12	.594*	.081	< 0.001
Week 6	Preop	-2.812*	.343	< 0.001
	Week 2	-1.464*	.178	< 0.001
	Week 4	-.594*	.081	< 0.001
	Week 12	.000	.000	.
Week 12	Preop	-2.812*	.343	< 0.001
	Week 2	-1.464*	.178	< 0.001
	Week 4	-.594*	.081	< 0.001
	Week 6	.000	.000	.

Correlation between resected breast tissue weight and pruritus relief

There was a significant positive correlation between weight of breast tissue and pruritus relief at the four periods suggesting that the more the weight of the resected tissue, the more the pruritus relief (figure 3). Age had a negative correlation while weight of the patients had a positive correlation. However, the two were not significant. The p-values and coefficients are in the table 3.

Figure 3: Scatter plot of correlation coefficients showing the relationship between pruritus relief and resected breast tissue weight, patient age, and patient weight.

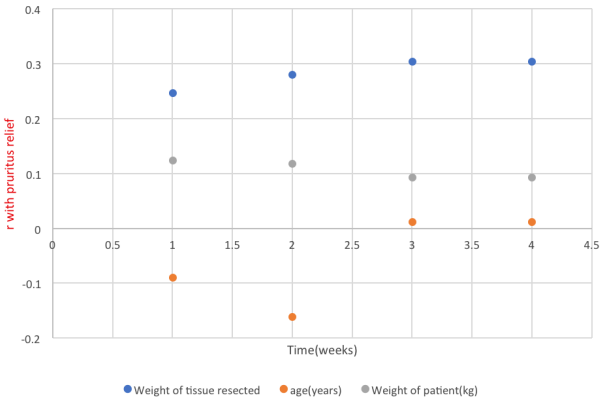


Table 3: Spearman linear relation between pruritus relief (at 4 post op time points) and age, weight of patient and weight of resected tissue

	Weight of resected tissue(g)		Age(years)		Weight of patient (kg)	
	Coefficient	Sig.	Coefficient	Sig.	Coefficient	Sig.
Pruritus relief at week 2	0.246**	0.042*	-0.090	0.460	0.124	0.311
Pruritus relief at week 4	0.279**	0.020*	-0.162	0.185	0.117	0.339
Pruritus relief at week 6	0.304**	0.011*	-0.173	0.156	0.092	0.452
Pruritus relief at week 12	0.304**	0.011*	-0.173	0.156	0.092	0.452

**-Correlation is significant at the 0.01 level (2-tailed)

*-Correlation is significant at the 0.05 level (2-tailed)

DISCUSSION

In addition to chronic musculoskeletal pain affecting the neck, shoulders, and back, inframammary pruritus and intertrigo represent a significant burden among individuals with macromastia. Although global studies have previously highlighted the therapeutic efficacy of reduction mammoplasty in alleviating these symptoms, there has been a notable lack of local research systematically evaluating the association between macromastia-related pruritus and the outcomes following surgical intervention. This study demonstrates that reduction mammoplasty not only provides significant symptomatic relief from inframammary pruritus but also establishes a positive association between the extent of tissue resection and the magnitude of symptom improvement.

Our findings reinforce the notion that reduction mammoplasty is not merely a cosmetic procedure but an effective therapeutic intervention. The substantial improvement in pruritus scores postoperatively, particularly at weeks 6 and 12, underscores the enduring benefits of the surgery in addressing the inflammatory and infectious sequelae commonly observed in macromastia. These results support the inclusion of reduction mammoplasty within insurance reimbursement schemes, shifting its perception from an elective aesthetic procedure to one with clear medical and quality-of-life benefits.

Macromastia predisposes individuals to persistent intertrigo in the inframammary folds, often leading to chronic pruritus. While medical treatments such as topical and systemic antibiotics or antifungals can offer temporary relief, patients with recalcitrant intertrigo often achieve the best and most sustained outcomes following surgical intervention (9). In alignment with previous work by Spector *et al*. (2008), who demonstrated reductions in intertriginous skin issues following reduction mammoplasty, our study observed a marked decline in pruritic symptoms (7). Notably, our findings further clarify that the extent of symptom relief is directly proportional to the volume of breast tissue resected—an association not clearly delineated in earlier studies.

Furthermore, the positive correlation between the weight of excised tissue and pruritus relief highlights a dose-response relationship, suggesting that patients with larger resections may anticipate greater symptomatic benefit. This relationship is clinically important, as it provides an objective predictor of postoperative symptom resolution and may assist in preoperative counseling and surgical planning. Our findings are further supported by the study by Bai *et al*. (2019), which also demonstrated significant pruritus alleviation and improved patient satisfaction following reduction mammoplasty (8).

The implications of these findings are substantial for clinical practice. First, they support advocating for reduction mammoplasty as a medically necessary procedure for patients presenting with chronic inframammary pruritus and intertrigo secondary to macromastia. Second, they suggest that careful surgical planning to optimize resection volume may enhance postoperative outcomes. Lastly, these findings provide additional evidence to guide policy changes that may ensure broader insurance coverage for reduction mammoplasty, thereby improving access to this essential intervention for affected individuals.

CONCLUSION

This study demonstrates that reduction mammoplasty provides significant therapeutic benefits beyond cosmetic improvement, notably in alleviating inframammary pruritus and intertrigo associated with macromastia. The observed positive correlation between the volume of breast tissue resected and the degree of symptom relief underscores the clinical importance of reduction mammoplasty in the management of patients with persistent macromastia-related skin complications. These findings advocate

for the recognition of reduction mammoplasty as a medically necessary procedure and support its inclusion in insurance coverage policies. Further prospective studies with larger sample sizes are warranted to strengthen these findings and optimize patient selection and surgical outcomes.

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