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REDUCTION MAMMOPLASTY IN THE TREATMENT OF NECK, BACK AND SHOULDER PAIN

B. B. Chinondira, MBChB, MMED (PRAS), **A. A Adan**, MBChB, MMED, FPRS (PRAS) and **F. W Nango'le**, MBChB, MMED, PhD, Prof, Department of Plastic, Reconstructive and Aesthetic Surgery, University of Nairobi, P.O.Box 30197-00100, Nairobi, Kenya

Corresponding Author: Benedict.B. Chinondira, Department of Plastic, Reconstructive and Aesthetic Surgery, University of Nairobi, P.O.Box 30197-00100, Nairobi, Kenya Email: chinondirab@gmail.com

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ABSTRACT

Background: Breast hypertrophy is commonly associated with chronic neck, back, and shoulder pain. Reduction mammoplasty is recognized for alleviating these symptoms, yet regional data from Kenya is scarce.

Objectives: To evaluate the impact of reduction mammoplasty on pain relief.

Design: A prospective longitudinal cohort study.

Study Setting: This study was conducted in six surgical centers in Nairobi.

Study Subjects: Sixty-nine patients undergoing reduction mammoplasty were assessed using a pain analogue scale preoperatively and at 2, 4, 6, and 12 weeks post-operatively. Data were analyzed with SPSS version 25, employing paired T-tests and repeated measures ANOVA, with $p \leq 0.05$ considered statistically significant.

Results: Participants aged 14–54 years were included, with juvenile gigantomastia being most prevalent (51%). Pain scores significantly decreased from a mean of 5.68 preoperatively to 0 at 12 weeks post-operatively ($p < 0.001$). No significant correlation was found between the amount of tissue resected and the degree of pain relief ($p = 0.379$).

Conclusion: Reduction mammoplasty provides substantial musculoskeletal pain relief in women with breast hypertrophy. These findings reinforce the procedure's therapeutic value and support broader insurance coverage for patients experiencing symptomatic macromastia.

Keywords: Reduction mammoplasty, Macromastia, Breast hypertrophy, Pain relief, Postoperative outcomes

INTRODUCTION

Breast hypertrophy, or macromastia, refers to an abnormal enlargement of breast tissue disproportionate to body size, often leading to significant physical and psychological distress (1). Patients with macromastia commonly experience chronic neck, shoulder, and back pain, along with inframammary skin issues, postural deformities, and neuropathies (2,3). The condition can also impose social limitations, negatively impacting emotional well-being, self-esteem, and overall quality of life (4). Conservative therapies have generally been ineffective in managing these symptoms, with reduction mammoplasty emerging as the definitive

treatment offering symptomatic relief and functional improvement (5).

Multiple studies have demonstrated that reduction mammoplasty leads to substantial reductions in neck and back pain, as well as improvements in posture, physical activity, and psychological well-being (6,7). While the volume of resected tissue has been a contentious issue regarding insurance coverage, evidence suggests that even modest resections significantly alleviate symptoms, challenging policies that link coverage solely to excised tissue weight (8).

Despite this growing body of global evidence, there remains a paucity of local data from Kenya evaluating the relationship between breast hypertrophy, pain

symptoms, and outcomes following reduction mammoplasty. This study aimed to evaluate the effectiveness of reduction mammoplasty in relieving musculoskeletal symptoms among patients with macromastia.

MATERIALS AND METHODS

Study Design and Setting: This was a 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 study was conducted in the surgical departments of the following collaborating institutions: Kenyatta National Hospital, Nairobi Hospital, Platinum Surgery Centre, AJ Plastics, Da Vinci Hospital, and Coptic Mission Hospital. The above sites were chosen as they are board certified to perform reduction mammoplasty in Kenya. These centers offer a wide variety of surgical services and interventions in plastic, aesthetic and reconstructive surgeries.

Selection criteria: The study included all patients who underwent reduction mammoplasty after presenting with neck, back and shoulder pain provided they gave informed consent.

Sample size and sampling technique: The required sample size was determined using the Fischer formula, resulting in a total of 52 participants. These individuals were subsequently recruited through a convenience sampling method.

Data collection: Data collection was conducted using structured questionnaires, which included a validated pain analogue scale commonly used in clinical pain assessment. The questionnaires also captured participants' age, weight, and the volume of breast tissue resected as recorded in the operative notes, and were administered preoperatively and at 2, 4, 6, and 12 weeks post-operatively.

Data Analysis: Data were analyzed using SPSS version 25, with categorical variables summarized through frequency tables and histograms. Differences in pain scores before and after surgery were assessed using paired t-tests and repeated measures mixed ANOVA, while Spearman's correlation was employed to evaluate the relationship between pain relief and variables such as age, patient weight, and resected tissue volume. A p-value of <0.05 was considered statistically significant, and results were presented in both tables and figures.

Ethical approval and Informed consent: Ethical approval for the study was obtained from the

KNH-UON Ethics and Research Committee, along with permissions from the administrations of all participating facilities. Data collection began after these approvals, with patient information securely stored and access restricted unless authorized by the KNH-UON. Informed consent was obtained using bilingual forms (Swahili and English), and the study adhered to the Helsinki Declaration and ICH-GCP guidelines to safeguard participant rights and data integrity.

RESULTS

Patient Demographics

The participants underwent pre-operative assessments, reduction mammoplasty then post-operative follow-up at weeks 2, 4, 6 and 12 respectively.

The mean age at the time of consultation was 31 years $\pm$ 8 years. The youngest was 14 years while the eldest was 54 years. The mean age at the time of initial disease presentation was 31 years $\pm$ 1.5 years (21 – 49 years). For gestational gigantomastia, mean age was 13 years $\pm$ 0.9 (10 – 16 years). For juvenile and idiopathic gigantomastia mean age was 23 years (21-32 years). They had the condition for about 6, 11 and 5 years for gestational, juvenile and idiopathic gigantomastia respectively. Majority of the gigantomastia cases were juvenile (51%), then gestational (42%) and idiopathic (7%). Figure 1 shows the age distribution of the participants while figure 2 shows the proportion of the different diagnosis of macromastia among the patients.

Figure 1: Age distribution in years among the participants

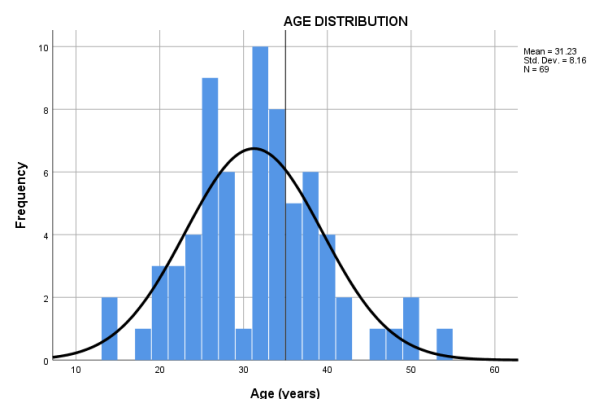
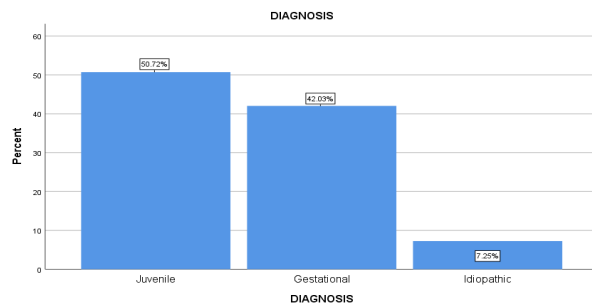


Figure 2: Bar graph showing the proportion of different diagnosis of macromastia among the patients.



intensity, where 0 indicates 'no pain' and 10 indicates 'worst possible pain'. Evaluations were conducted during the pre-operative phase and subsequently at 2-, 4-, 6-, and 12-weeks post operation. The average pain scores and descriptive statistics for these five time points are presented in Table 1. There was a general decline in the pain scores across the assessment period as depicted in figure 3.

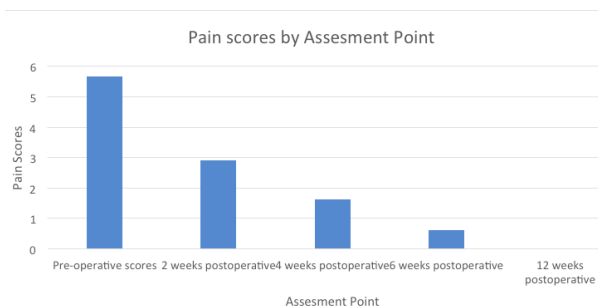
Pain Assessment

The pain analogue scale was used to measure pain

Table 1: Pain Assessment at pre-op, and at 2-, 4-, 6-, and 12-weeks post-operation

Assessment points	Pain scores Mean (SD)	Mode	Median	Min	Max
Pre-operative scores	5.68(1.007)	6.0	6.0	4	9
2 weeks post-operative	2.899 (0.807)	3.0	3.0	1	5
4 weeks post-operative	1.61(0.5482)	2.0	2.0	0	3
6 weeks post-operative	0.61(0.521)	1.0	1.0	0	3
12 weeks post-operative	0(0)	0	0	0	0

Figure 3: Bar graph following up pain scores



Comparisons between the pain scores at each time points

A repeated measures ANOVA was conducted to compare the effect of time on pain scores at pre-operation, and at weeks 2, 4, 6, and 12 post operation.

When analyzed, all patients reported a significant improvement in average Pain Analogue scores at all time points relative to average preoperative scores (Table 2). The results of the ANOVA showed a significant effect of time on pain scores, $p < 0.001$. Specifically, the mean difference in pain scores from pre-operation to week 2 was 2.783 (95% CI [2.560, 3.006]), from pre-operation to week 4 was 4.072 (95% CI [3.765, 4.380]), from pre-operation to week 6 was 5.072 (95% CI [4.759, 5.386]), and from pre-operation to week 12 was 5.681 (95% CI [5.329, 6.033]). Post-hoc comparisons using the Bonferroni correction revealed that pain scores significantly decreased from pre-operation to each subsequent time point, with the largest reduction observed at week 12.

Table 2: Pairwise comparisons across the assessment

<i>periods</i>				
(I) Time	(J) Time	Mean Difference (I-J)	Std. Error	Sig.b
Preop	Week 2	2.783*	.077	< 0.001
	Week 4	4.072*	.106	< 0.001
	Week 6	5.072*	.108	< 0.001
	Week 12	5.681*	.121	< 0.001
Week 2	Preop	-2.783*	.077	< 0.001
	Week 4	1.290*	.078	< 0.001
	Week 6	2.290*	.078	< 0.001
	Week 12	2.899*	.097	< 0.001
Week 4	Preop	-4.072*	.106	< 0.001
	Week 2	-1.290*	.078	< 0.001
	Week 6	1.000*	.021	< 0.001
	Week 12	1.609*	.066	< 0.001
Week 6	Preop	-5.072*	.108	< 0.001
	Week 2	-2.290*	.078	< 0.001
	Week 4	-1.000*	.021	< 0.001
	Week 12	.609*	.063	< 0.001
Week 12	Preop	-5.681*	.121	< 0.001
	Week 2	-2.899*	.097	< 0.001
	Week 4	-1.609*	.066	< 0.001
	Week 6	-.609*	.063	< 0.001

Correlation between resected breast tissue weight and pain relief

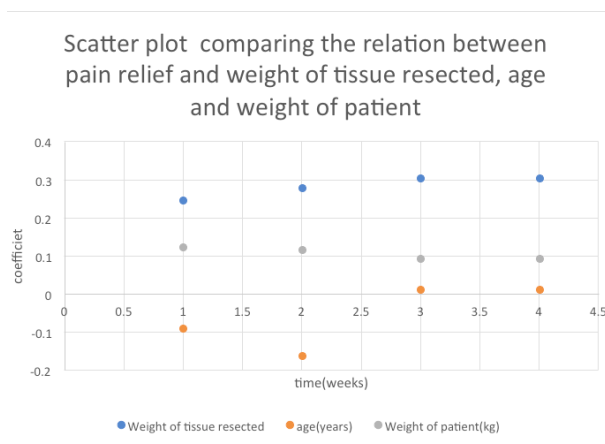
Correlation analyses were conducted to examine the strength of relationship between the weight of resected breast tissue, age, weight, and pain relief

(Preop pain – postop pain) at the different time periods. The correlation coefficients and the p-values are in the table 3. These results indicate that there was no significant correlation between resected weight and pain relief at each of the 4 post-op assessment periods (Figure 4).

Table 3: Spearman linear relation between pain 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.
Pain relief at week 2	-0.09	0.280	-0.132	0.280	0.008	0.945
Pain relief at week 4	0.068	0.614	-0.062	0.614	-0.099	0.419
Pain relief at week 6	0.085	0.605	-0.063	0.605	-0.072	0.555
Pain relief at week 12	0.108	0.379	-0.131	0.285	-0.100	0.411

Figure 4: Scatter plot comparing the relation between pain relief and weight of tissue resected, age and weight of patient



DISCUSSION

Macromastia is a distressing condition that adversely affects patients' quality of life, often presenting with persistent musculoskeletal discomfort such as pain in the neck, shoulders, and back. Although international research has underscored the benefits of reduction mammoplasty in mitigating these symptoms, there has been a lack of local studies examining the direct link between macromastia and pain, as well as the effectiveness of surgical intervention. This study demonstrates that reduction mammoplasty plays a crucial role in alleviating these clinical manifestations, irrespective of the volume of tissue removed. The results support the therapeutic value of the procedure and strengthen the case for its inclusion in health insurance coverage policies.

Patients with macromastia often present with headache, neck pain, back pain, shoulder pain, and bra strap groove pain. A study by Gonzalez 1993 showed that the above symptoms were present in 60-92% of the patients, with 97% of patients having at least three of these pain symptoms (9). In the current study we found that 75.4% of the patients initially presented with a combination of neck, shoulder, and back pain, while the remaining 24.6% presented with both neck and shoulder pain. These symptoms improved significantly after reduction mammoplasty.

Two previous studies by Marcia Freire *et al.* (2007) and Chao *et al.* (2002) also highlighted the association between breast hypertrophy and neck and lower back pain. These studies assessed the pain levels of 100 macromastia patients before and six months after undergoing reduction mammoplasty. The mean intensity of pain in these patients decreased from 5.7 to 1.3 for back pain, and for neck pain decreased from 5.2 to 0.9. (2,3).

In our study, the degree of pain reduction, as measured by the visual analogue score, decreased from 5.68 preoperatively to 1.61, four weeks post-operatively. There was no significant correlation between the weight of resected breast tissue and pain relief at each of the four post-operative assessment periods. This suggested that even resections of less than 1000g in total for both breasts provided significant relief of neck and back pain. These findings are consistent with Strong & Hall-Findlay's observations, who noted positive outcomes in patients undergoing minor volume reductions. (10). Similarly, Yao *et al* 2021 found that resected weight does not correlate with symptom relief in women with macromastia (11).

Our findings suggest that pain relief following reduction mammoplasty is not necessarily dependent on the volume of resected tissue, which may have implications for current practices that link coverage to tissue weight. In contrast, some studies have correlated pain relief with amount of breast tissue resected citing that a larger resection volume may correspond to a greater improvement in the symptoms (10).

Quantifying breast size preoperatively would have provided valuable context for understanding the relationship between breast size, resected tissue weight, and pain relief. The absence of these measurements represents a limitation of our study, which future studies should aim to address.

CONCLUSION

Reduction mammoplasty is a surgical procedure indicated for the management of symptomatic macromastia and gigantomastia, involving the excision of excess breast parenchyma, adipose tissue, and skin. Findings from our study confirm its clinical efficacy in mitigating symptoms such as neck, back, and shoulder pain. Importantly, patients reported substantial symptomatic improvement even when total resection volumes were below 1000 grams. These findings indicate that symptom improvement after reduction mammoplasty may be influenced by factors beyond tissue weight alone, underscoring the procedure's therapeutic value.

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