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Patient-Reported Outcomes after Subpectoral Breast Augmentation with Microtextured or Macrotextured Implants Using the BREAST-Q

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Abstract

Background Breast augmentation with implants is the most commonly performed cosmetic plastic surgery in Brazil and worldwide. The aim of this study was to assess patient satisfaction and quality of life following subpectoral breast augmentation with either microtextured or macrotextured implants, using the BREAST-Q.

Methods A prospective study was conducted with 40 women with hypomastia undergoing subpectoral breast augmentation. The patients were randomly allocated to two groups to receive either microtextured or macrotextured breast implants. All participants were assessed preoperatively (baseline) and after 2 and 4 months of surgery for quality of life and patient satisfaction with the surgical results, using the BREAST-Q augmentation module, a patient-reported outcome measure.

Results The patients had a mean age of 28.9 ± 6.45 years. The microtextured ($n = 20$) and macrotextured ($n = 20$) groups were homogeneous for sex, age, education level, marital status, and number of children ($p > 0.05$). Both groups showed significant improvement in satisfaction with breasts ($p < 0.001$), psychosocial well-being ($p < 0.001$), and sexual well-being ($p < 0.001$) at the 2- and 4-month follow-up visits compared with baseline. The observed improvements were associated with high effect size values of 5.09, 3.44, and 3.90, respectively. In contrast, significant decreases from baseline in physical well-being scores ($p = 0.001$) were found 2 and 4 weeks after surgery in both groups.

Conclusion Subpectoral breast augmentation with either microtextured or macrotextured breast implants improved satisfaction with breasts and quality of life in patients with hypomastia.

Keywords
- mammaplasty
- breast implants
- plastic surgery
- patient-reported outcome measures
- patient satisfaction

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Breast augmentation is the most commonly performed cosmetic surgery in Brazil and throughout the world.[1,2] Women who seek breast augmentation have a profound dissatisfaction with the size and shape of their breasts, low self-perception of physical attractiveness, and anxiety regarding sexuality.[3,4]

Currently, a wide variety of implants has been used in breast augmentation. Breast implant selection is based on the implant surface texture, from smooth to microtexture to macrotexture in all of its variations, dimensions, long-term results, complication rates, and surgeon preference.[5] Previous studies have shown differences in results and complication rates according to the type of breast implant used in breast augmentation.[5,6] Macrotextured implants are associated with low rates of malposition, rotation, capsular contracture, and rippling, as they facilitate implant adherence to the surrounding tissue, resulting in patient satisfaction. However, they increase the risk of double capsule and late seroma formation.[5]

A better understanding of the differences in outcomes and complication rates between macrotextured and microtextured implants may contribute to the selection of the most appropriate implants for use in breast augmentation, improving postoperative results and enhancing quality of life and satisfaction of patients with hypomastia treated with breast augmentation.[6]

It is important to assess the opinion of patients on the surgical results using instruments that provide a reliable quantification of subjective outcomes resulting from the cosmetic procedure.[7–11] The BREAST-Q assesses patient satisfaction with the surgical outcome through the "satisfaction with breasts," "satisfaction with overall outcome," and "satisfaction with care" domains, as well as quality of life, as measured through the "psychosocial well-being," "sexual well-being," and "physical well-being" domains. BREAST-Q domains may be evaluated together or independently.[7,12–15] The information provided by this instrument allows a reliable quantification and comparison of data obtained from different studies and populations, and the comparison of surgical techniques and implant technologies.[10] In this context, the evaluation of the impact of subpectoral breast augmentation on patient satisfaction and quality of life, using a validated, specific instrument is of fundamental importance to better understand subjective surgical outcomes and compare results with other studies performed in Brazil and worldwide.

Thus, the aim of this study was to assess patient satisfaction and quality of life following subpectoral breast augmentation with either microtextured or macrotextured implants, using the BREAST-Q.

Methods

This was a primary, analytical, interventional, clinical, longitudinal, prospective, single-center study. The study was based on a convenience sample. Forty women with hypomastia, who were candidates for breast augmentation with implants, were consecutively selected at a breast surgery outpatient clinic of a university hospital in Brazil. Data were collected from January 2016 to July 2017.

Eligibility criteria included women aged 18 to 45 years, with body mass index $< 25\ kg/m^2$, and small breasts with Sacchini index $< 9\ cm$.[16] Patients with breast asymmetry, breast ptosis, or who reported the use of daily medication for control of chronic disease, were pregnant, had undergone previous breast surgery, had given birth or had breastfed within the last 12 months prior to the study, and those patients unable to read the questionnaire due to visual impairment or illiteracy, lost to follow-up or who withdraw from the study before or after surgery were excluded.

The participants were randomly allocated to either the microtextured group ($n = 20$) to receive microtextured breast implants or to the macrotextured group ($n = 20$) to receive macrotextured breast implants. The allocation sequence was generated using a computer-generated randomization chart (htpp://www.randomization.com).

In the preoperative period, sociodemographic data were collected from all patients, photographic documentation was obtained, and implant volume was estimated based on the patient's desire and physical characteristics.[17]

The Brazilian-Portuguese version of the BREAST-Q augmentation module, culturally adapted and validated for use in Brazil,[13] was administered preoperatively (baseline) and after 2 and 4 months of surgery to all patients. Authorization for the use of the questionnaire was obtained from the copyright holders.

The BREAST-Q augmentation module, a patient-reported outcome measure, was used to assess patient satisfaction and quality of life after breast augmentation with implants through the domains: satisfaction with breasts, satisfaction with overall outcome, psychosocial well-being, sexual well-being, and physical well-being. The responses provided by the patients on each scale, ranging from 1 to 4 or 5, were transformed using the Q-Score program into a total score ranging from 0 to 100. The higher the score, the greater the degree of patient satisfaction or the better the quality of life.

All patients underwent subpectoral breast augmentation with access through the inframammary fold and received round silicone-gel breast implants with either microtextured or macrotextured surface (Lifesil Silicone Implant, Curitiba, PR, Brazil). Acellular dermal matrix was neither used to close the lateral portion of the subpectoral pocket nor to cover the implants.

The patients were prospectively followed up for 4 months and assessed for postoperative complications, including hematoma, seroma, infection, wound dehiscence, unsightly scar, symmastia, stretch marks, and implant malposition. Photographic documentation was obtained and the BREAST-Q was administered at the 2- and 4-month follow-up visits.

Statistical Analysis

Categorical variables were summarized as absolute and relative frequencies. Descriptive analysis was performed to determine means and standard deviation (SD) for continuous variables. Fisher's exact test was applied to search for

Table 1 Study sample characteristics

Patient characteristics	Total ($n = 40$)	Groups		*p*-Value
		Micro ($n = 20$)	Macro ($n = 20$)	
Mean age (SD) (y)	28.93 (6.45)	28.05 (6.64)	29.80 (6.30)	0.398[a]
Education level, *N* (%)				
Incomplete secondary level	2 (5.0)	0 (0.0)	2 (10.0)	0.488[b]
Complete secondary level	10 (25.0)	6 (30.0)	4 (20.0)	
Higher education	28 (70.0)	14 (70.0)	14 (70.0)	
Marital status, *N* (%)				
Single	23 (57.5)	12 (60.0)	11 (55.0)	0.473[b]
Married	10 (25.0)	6 (30.0)	4 (20.0)	
Divorced	7 (17.5)	2 (10.0)	5 (25.0)	
Number of children, *N* (%)				
None	22 (55.0)	12 (60.0)	10 (50.0)	0.348[b]
1	8 (20.0)	2 (10.0)	6 (30.0)	
2	9 (22.5)	5 (25.0)	4 (20.0)	
3	1 (2.5)	1 (5.0)	0 (0.0)	

Abbreviations: Macro, macrotextured group; Micro, microtextured group; *N*, population size; *n*, sample size; SD, standard deviation.
[a]Student's *t*-test.
[b]Fischer's exact test.

associations between two categorical variables. Comparisons of mean BREAST-Q scores over time were performed using analysis of variance with repeated measures followed by Bonferroni's test for multiple comparisons.

Two standard indicators of effect size (ES) (i.e., Kazis ES and standardized response mean [SRM]) were used to evaluate the magnitude of differences in changes in mean BREAST-Q scores. The Kazis ES was calculated by dividing the mean BREAST-Q score change (i.e., mean follow-up scores minus baseline scores) by the baseline SD. The SRM was computed by dividing the mean BREAST-Q score change by the SD of the change. In general, ES ≥ 0.80 indicates a large ES, ES from 0.80 to 0.20 is considered a medium ES, and ES < 0.2 indicates a small ES.[18]

Statistical analysis was performed using the Statistical Package for the Social Sciences (SPSS) 20.0 (SPSS Inc., Chicago, IL) and Stata 12 (StataCorp, College Station, TX). All statistical tests were performed at a significance level α of 0.05 ($p < 0.05$). Data were expressed as mean $\pm$ SD and ranges.

Results

Forty women with hypomastia, mean age of 28.9 ± 6.45 years, were selected and completed the study (no dropouts). The microtextured ($n = 20$) and macrotextured ($n = 20$) groups were homogeneous for sex, age, marital status, level of education, and number of children ($p > 0.05$), as shown in ►**Table 1**.

The mean implant volume was 272.5 ± 26.43 mL (median, 275; range, 175–325). No significant difference in mean implant volume was found between groups ($p = 0.895$), as shown in ►**Table 2**.

Examples of results obtained in this study with the use of microtextured and macrotextured breast implants are illustrated in ►**Figs. 1** and **2**, respectively.

There was no significant difference in postoperative complications between groups (►**Table 3**). Two cases (5%) of implant malposition required revision surgery.

The mean BREAST-Q domain scores for both groups at different time points, as well as time, group, and interaction effects are shown in ►**Table 4**.

No significant differences in mean BREAST-Q domain scores were found between groups (group effect) at the different time points. There were significant differences in mean BREAST-Q scores over time (time effect) in all domains, except for "satisfaction with overall outcome." Increases in "satisfaction with breasts," "psychosocial well-being," and

Table 2 Mean implant volume (mL) according to the study groups

Characteristics	Total ($n = 40$)	Groups		*p*-Value[a]
		Micro ($n = 20$)	Macro ($n = 20$)	
Mean implant volume (SD) (mL)	272.5 (26.43)	270.0 (30.99)	275.0 (21.46)	0.895

Abbreviations: Macro, macrotextured group; Micro, microtextured group; *n*, sample size; SD, standard deviation.
[a]Mann–Whitney test.

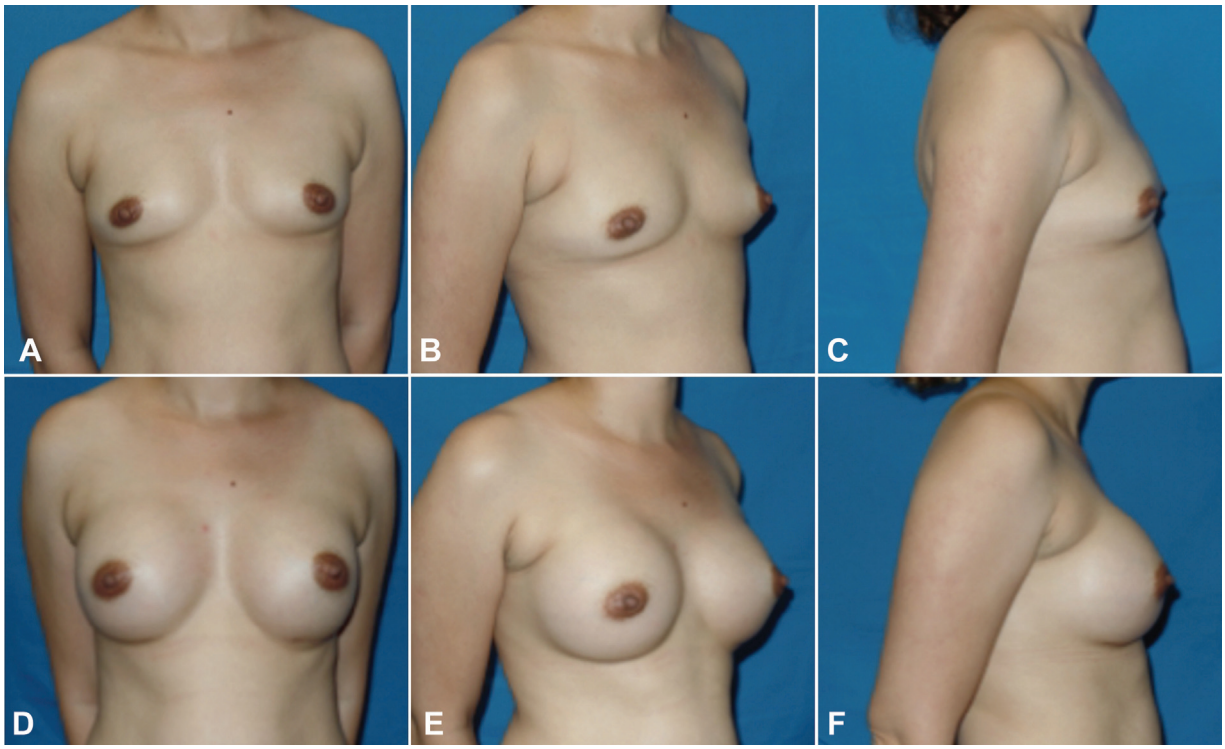

Fig. 1 Preoperative and 4-month postoperative clinical photographs of a 28-year-old female patient who received high-profile, microtextured implants, with implant volume of 275 mL. The pre- and postoperative photographs are shown in (**A**, **D**) anterior, (**B**, **E**) right oblique, and (**C**, **F**) right lateral views.

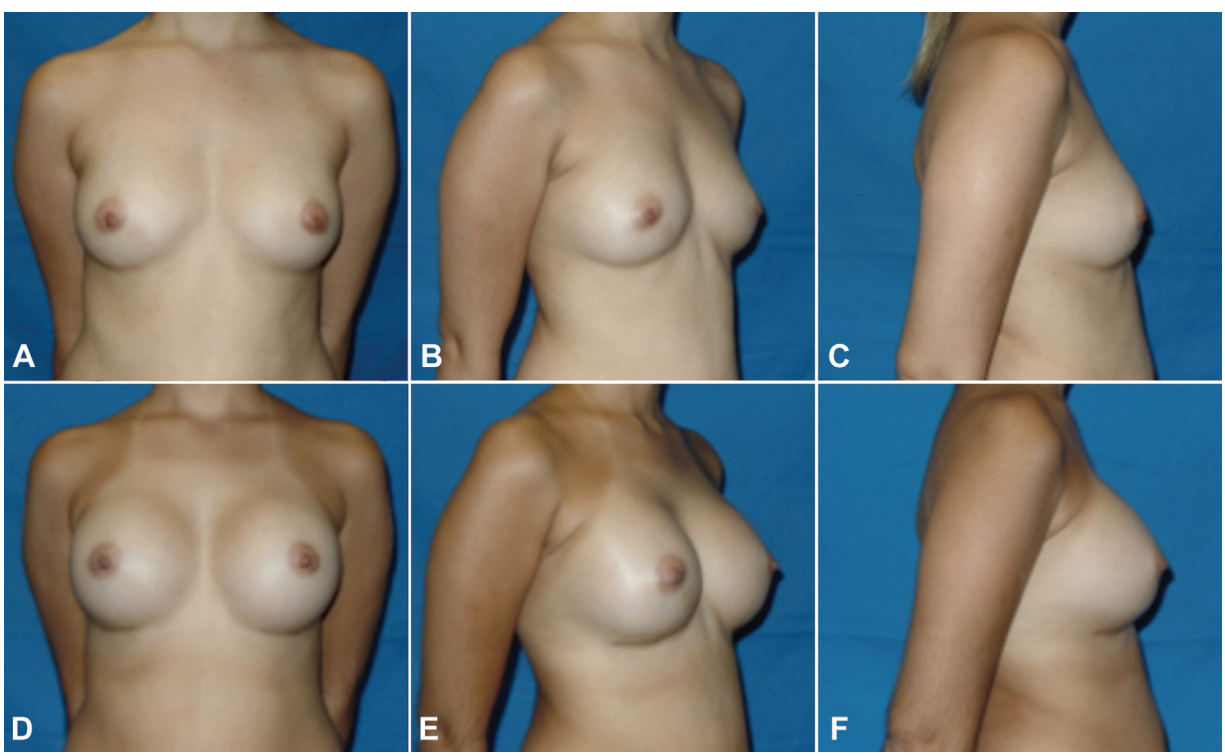

Fig. 2 Preoperative and 4-month postoperative clinical photographs of a 26-year-old female patient who received high-profile, macrotextured implants, with implant volume of 275 mL. The pre- and postoperative photographs are shown in (**A**, **D**) anterior, (**B**, **E**) right oblique, and (**C**, **F**) right lateral views.

Table 3 Postoperative complications

Postoperative complication	Total ($n = 40$)	Groups		*p*-Value[a]
		Microtextured ($n = 20$)	Macrotextured ($n = 20$)	
Seroma, *N* (%)	2 (5.0)	1 (5.0)	1 (5.0)	1.000
Implant malposition, *N* (%)	7 (17.5)	1 (5.0)	6 (30.0)	0.091
Unsightly scar, *N* (%)	2 (5.0)	2 (10.0)	0 (0)	0.487
Stretch marks, *N* (%)	1 (2.5)	0 (0)	1 (5.0)	1.000

Abbreviations: *N*, population size; *n*, sample size; SD, standard deviation.
[a]Fischer's exact test.

Table 4 Mean BREAST-Q domain scores for the both groups at the different time points

BREAST-Q scores mean ± SD/Groups ($n = 40$)	Time points			*p*-Value[a]		
	Baseline	2-month follow-up	4-month follow-up	Group effect	Time effect	Group-Time
Satisfaction with breasts	14.4 ± 14.1	85.6 ± 14.5	86.0 ± 14.8	0.086	< 0.001[b]	0.284
Microtextured	14.8 ± 14.6	87.4 ± 15.0	91.2 ± 12.4			
Macrotextured	14.1 ± 13.8	83.8 ± 14.2	80.8 ± 15.5			
Psychosocial well-being	25.7 ± 18.5	84.6 ± 20.5	89.5 ± 18.9	0.322	< 0.001[b]	0.709
Microtextured	23.6 ± 19.7	80.9 ± 23.1	89.1 ± 18.2			
Macrotextured	27.8 ± 17.6	88.3 ± 17.3	89.9 ± 20.0			
Physical well-being	91.7 ± 13.3	79.6 ± 14.6	84.8 ± 12.5	0.784	< 0.001[c]	0.654
Microtextured	89.9 ± 13.3	79.4 ± 14.6	85.4 ± 12.8			
Macrotextured	93.4 ± 13.4	79.7 ± 15.1	84.2 ± 12.5			
Sexual well-being	22.7 ± 16.3	83.1 ± 19.1	86.5 ± 19.8	0.976	< 0.001[b]	0.819
Microtextured	22.4 ± 19.3	82.2 ± 21.6	87.9 ± 18.0			
Macrotextured	23.1 ± 13.2	84.0 ± 16.8	85.1 ± 21.8			
Satisfaction with overall outcome	–	86.2 ± 17.0	87.9 ± 17.6	0.138	0.540	0.109
Microtextured	–	87.3 ± 17.5	93.7 ± 13.2			
Macrotextured	–	85.0 ± 16.9	82.1 ± 19.8			

Abbreviations: Group-Time, group-time interaction; Macrotextured, Macrotextured group; Microtextured, Microtextured group; *n*, sample size; SD, standard deviation.
[a]Two-way analysis of variance (ANOVA) with repeated measures.
[b]Baseline < 2-month follow-up = 4-month follow-up.
[c]Baseline > 2-month follow-up = 4-month follow-up.

"sexual well-being" were detected from baseline to the 2-month follow-up, remaining at similar levels at the 4-month follow-up. In contrast, a reduction in physical well-being was observed from baseline to the 2-month follow-up, remaining at similar levels at the 4-month follow-up. The comparison between the groups overtime (group-time interaction) showed no significant differences in mean BREAST-Q scores for all domains.

Overall, the "satisfaction with breasts," "psychosocial well-being," and "sexual well-being" domains showed very large ESs (range, 2.22–5.09) at the follow-up visits, in contrast to the "physical well-being" domain, which had predominantly medium ESs (range, 0.40–0.91), as seen in ►**Table 5**.

Discussion

The BREAST-Q is a patient-reported outcome measure that assesses patient satisfaction and quality of life after breast surgery. It is a validated instrument composed of four independent, specific modules for breast surgery, including breast reduction, augmentation, reconstruction, and mastectomy.[3,7,19] Thus, when used in studies with adequate designs, the BREAST-Q provides reliable data based on evidence that may be used for comparisons with other studies in the literature.[15]

The BREAST-Q augmentation module was applied to all patients preoperatively and postoperatively at the 2- and 4-month follow-up visits, allowing the evaluation of the impact

Table 5 Effect size of breast augmentation on the BREAST-Q domains

BREAST-Q domains ($n = 40$)	Effect size			
	2-month follow-up		4-month follow-up	
	Kazis	SRM	Kazis	SRM
Satisfaction with breasts	5.06	3.27	5.09	3.07
Psychosocial well-being	3.17	2.22	3.44	2.44
Physical well-being	0.91	0.66	0.51	0.40
Sexual well-being	3.70	2.44	3.90	2.41

Abbreviations: Kazis, Kazis effect size; *n*, sample size; SRM, standardized response mean.

of breast surgery on the patients' lives. Previous studies[20–22] only administered the instrument in the postoperative period, making it impossible to measure changes from baseline in patients' quality of life associated with the surgical procedure. All participating patients were followed up for 4 months after breast augmentation surgery. A 4-month postoperative follow-up period was chosen for this study as it corresponds to a period in which breast augmentation patients show good recovery, allowing a proper evaluation of the results, as indicated by Abla et al[23] and Neto et al.[24]

The response rate for the BREAST-Q was 100%, and therefore the results represent the actual opinion of all patients, regardless of their level of satisfaction with the surgical outcome. The lowest BREAST-Q scores were reported by patients who experienced postoperative complications, reflecting their negative perception of the surgical procedure and the need for improvements to increase patient satisfaction. Previous studies have reported lower response rates, usually due to patients lost to follow-up, which may lead to biased results.[8,9,19]

The volume of the breast implant was estimated based on patient's desire and physical characteristics.[17] The patients were randomly assigned to receive either microtexture or macrotexture implants, using a computer-generated sequence, thus minimizing potential bias in patient assignment to each study group.

Implant malposition, characterized by the upward migration of the implants, was the most common postoperative complication, occurring in 17.5% ($n = 7$) of patients. A nonsignificant trend toward a higher prevalence of upward migration of the implants was observed in the macrotextured group ($n = 6$; 30%) compared with the microtextured group ($n = 1$; 5%). The lack of a significant association of type of implant texture with implant malposition may be attributed to the small sample size per group, which may not be large enough to detect a given difference as significant. Low rates of malposition of 0.4[21] and 1.2%[20] have been reported in studies on subpectoral breast augmentation. According to Maxwell et al,[5] macrotextured implants are associated with low rates of malposition, as their texture promotes adhesion of the implant to the surrounding tissue. However, in this study, the use of macrotextured implants in the subpectoral position did not prevent the upward migration of implants, which may have occurred due to tension forces exerted by the pectoral muscle during muscle actions or due to an eventual technical failure, such as a subpectoral pocket greater than the size of the breast implant or no muscle disinsertion.

BREAST-Q scores revealed increases in satisfaction with breasts, psychosocial well-being, and sexual well-being from baseline to 2 and 4 months after breast augmentation. There was also a reduction in physical well-being from baseline to the postoperative period, regardless of the type of implant used. In a study with 639 patients who underwent subpectoral breast augmentation, Alderman et al[8] reported improvement in satisfaction with breasts, psychosocial well-being, and sexual well-being from baseline to the 6-week and 6-month follow-up and a decrease in physical well-being from baseline to the 6-week follow-up with some improvement at the 6-month follow-up visit, but without returning to baseline levels. Coriddi et al[19] also reported improved satisfaction with breasts, psychosocial well-being, and sexual well-being, as well as reduced physical well-being from baseline to the 6-week follow-up. Both studies[8,19] suggested that the reduction in physical well-being following breast augmentation may be associated with use of a subpectoral pocket, as it results in increased pain and discomfort during the postoperative period. In the present study, the subpectoral pocket was also used, which may support the previous findings for the early postoperative period. Further studies are necessary to clarify the impact of placing the implants in the subpectoral or prepectoral plane on the physical well-being of patients, which may be considered a limitation of this study.

The use of the BREAST-Q to quantify changes in satisfaction with breasts, psychosocial well-being, and sexual well-being associated with breast augmentation has also been reported in other studies.[3,25–27] The comparison of preoperative BREAST-Q scores obtained in the present study with those reported by previous studies[8,18,25,26] showed that, except for the physical well-being domain, the mean domain scores were much lower in this series, suggesting a greater patient dissatisfaction with the measured parameters at baseline. This may be related to differences in perceived body image between Brazilian and international populations, with hypomastia having a greater impact on the quality of life of Brazilian women, or it may be related to overreporting by patients trying to increase their chances to be selected for the surgical procedure provided by the public health system.

ES may be defined as the mean change found in a variable divided by the SD of that variable. ESs are used to analyze the before and after changes in a group situation using a standard unit of measurement to provide a clearer understanding of changes in the status of a variable in the study results.[18] ESs, calculated from scores obtained before and after surgery, are indicators of the ability of a scale, such as the BREAST-Q, to detect changes in the study parameters over time. Thus, ES was used as a measure of differences in patient satisfaction and quality of life resulting from subpectoral breast augmentation. Large ESs were found in "satisfaction with breasts," "psychosocial well-being," and "sexual well-being," indicating the magnitude and impact of the procedure in the BREAST-Q domains. These results are in agreement with the findings of other authors.[3,8,9] Medium to large ESs were found in "physical well-being," consistent with previous findings.[8]

Interpretation of the results may be limited by the small sample size, which made it difficult to perform more robust statistical analysis and may prevent generalization of the results. Further studies with a larger number of patients and involving multiple centers are necessary extend our results.

In conclusion, subpectoral breast augmentation with either microtextured or macrotextured implants improved the quality of life and satisfaction with breasts of women who underwent this procedure.

Author Contributions

Conceptualization: A.T.L., M.S.N., V.C.L.R, D.F.V., L.M.F. Data curation: A.T.L., M.S.N., V.C.L.R., D.F.V. Project administration: M.S.N., D.F.V., L.M.F. Visualization: A.T.L., M. S.N., V.C.L.R., D.F.V., L.M.F. Writing - original draft: A.T.L., M.S.N., V.C.L.R., D.F.V. Writing - review and editing: A.T.L., M.S.N., V.C.L.R., D.F.V., L.M.F. Approval of final manuscript: all authors.

Ethical Approval

All procedures involving human participants were approved by the Institutional Review Board (IRB No. 1344/2015) and performed in accordance with the ethical standards of the Resolution 466/12 of the Brazilian National Health Council (CNS) on research involving human beings and with the 1964 Helsinki Declaration and its later amendments. This article does not contain any studies with animals performed by any of the authors. All participants gave their informed consent in writing prior to inclusion in the study for use of clinical data for scientific purposes and publication.

Patient Consent

Informed consent was obtained from all individual participants included in the study.

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None.

Conflict of Interest

None declared.

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