

Breast cancer screening challenges in women with breast augmentation: Evidence from a comprehensive health checkup program

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Abstract: Breast augmentation may compromise the accuracy of breast cancer screening and mammography in particular. The aim of this study was to assess its impact on screening practices and the need for diagnostic follow-up. Data from 1,596 women undergoing comprehensive health checkups in 2024 were retrospectively analyzed. Among 912 women screened for breast cancer, 853 underwent both a mammography and ultrasound, while 54 underwent ultrasound only. Additional evaluation was required in 41/853 (4.8%) of the combined screening group compared to 1/54 (1.9%) of the ultrasound-only group. Breast augmentation was identified in 13/912 (1.43%) using extended detection, and 13/912 (1.43%) in the dedicated field. These findings highlight the limitations of mammography in augmented breasts. Breast augmentation influences screening choices and may hinder cancer detection. Alternative modalities, such as diffusion-weighted whole-body imaging with background body signal suppression (DWIBS) MRI or low-compression 3D mammography, should be considered to improve detection accuracy and patient outcomes.

Keywords: comprehensive health checkup, breast augmentation, mammography, breast ultrasound

1. Introduction

Breast augmentation is commonly performed to achieve an aesthetically ideal breast shape, enhance self-confidence, and alleviate psychological distress (1). The three primary methods are silicone implant insertion, fat grafting, and hyaluronic acid injection. Silicone implants provide reliable volume enhancement, fat grafting offers a natural appearance using autologous fat (2), and hyaluronic acid injections are simple but temporary due to absorption (3). The method selected depends on individual preferences, including desired size and tolerance of foreign material.

This study evaluated the impact of breast augmentation on breast cancer screening practices and the frequency of additional diagnostic evaluations among individuals undergoing comprehensive health checkups (4,5).

2. Findings

Anonymized data from female examinees who underwent comprehensive health checkups at this facility between January and December 2024 were retrospectively analyzed. Documents related to information disclosure are posted on the hospital's website, and the study

protocol was approved by the institutional ethics committee (No. NCGM-G-003291-00). All procedures were performed in accordance with the Declaration of Helsinki. Breast cancer screening included mammography and breast ultrasound in accordance with national recommendations. Mammography and breast ultrasound findings, overall assessments (A/B/C/D2/E**), and cancer diagnosis entries (presence of "Cancer" in the dedicated column) were extracted. Breast augmentation status was flagged using (a) the dedicated "Augmentation" field and (b) extended detection from mammography and ultrasound notes explicitly mentioning augmentation, implants, or fat injection.

For descriptive statistics, the mean \pm SD and median [IQR] were calculated for age, and counts with percentages were calculated for categorical variables. For sparse outcomes and zero cells in 2×2 tables, Fisher's exact test and report odds ratios (ORs) with 95% confidence intervals (Haldane–Anscombe correction when appropriate) were used.

The overall assessments were categorized as follows: A: No abnormalities; B: Slight abnormality; C: Follow-up is required; D2: Further examination is required; and E: Under treatment. Internal consistency checks confirmed that there were no records of

Assessment A simultaneously flagged as cancer or D2, and there were no instances of both examinations being normal (mammography and ultrasound) that were flagged as D2 (Supplementary Table S1, <https://www.globalhealthmedicine.com/site/supplementaldata.html?ID=116>).

The mean age was 53.9 years (SD 12.1), with a median of 53 years (IQR [45–62]). A "normal" mammography was noted in 714/912 women (78.3%), and a "normal" ultrasound was noted in 496/912 (54.4%). Overall assessments were A in 458/912 women (50.2%), B in 407/912 (44.6%), C in 1/912 (0.11%), D2 in 42/912 (4.61%), and E in 2/912 (0.22%). Cancer diagnosis entries accounted for 5/912 women (0.55%) (Table 1). In terms of screening modalities, 853 women underwent both mammography and ultrasound, while 54 underwent ultrasound only. Additional evaluation (Assessment D2)

was required in 41/853 (4.8%) of the combined group compared to 1/54 (1.9%) of the ultrasound-only group (Figure 1). The difference was not statistically significant (Fisher's exact test, $p = 0.507$). Augmentation was identified in 13/912 women (1.43%) according to both the dedicated field and extended detection from imaging notes. Of these 13 individuals, 10 were in the ultrasound-only group, while 3 underwent both modalities because no contraindications to mammography were documented.

3. Implications

These findings highlight the limitations of mammography in augmented breasts and raise concerns about whether ultrasound alone provides sufficient sensitivity for cancer detection. Silicone implants may hinder mammography due to capsular contracture or implant rupture, while fat grafting and hyaluronic acid injections can cause lumps, fat necrosis, or vascular occlusion, hampering interpretation (6-9). Alternative modalities such as diffusion-weighted whole-body imaging with background body signal suppression (DWIBS) MRI, which avoids breast compression, and low-compression 3D mammography may improve patient comfort and detection accuracy (10,11). Additionally, concerns about radiation exposure, particularly among foreign patients, underscore the need for non-X-ray-based screening options. Tailored screening strategies, including pain-free and radiation-free modalities, may be required to ensure effective follow-up and early diagnosis in this growing population.

This study is limited by its single-center retrospective design and small number of women with breast augmentation. Further research should clarify whether mammography can be safely recommended for patients

Table 1. Baseline characteristics

Characteristic	Overall (n = 912)
Age (years)	53.9 ± 12.1; median 53 [45–62]
Augmentation (dedicated), n (%)	13 (1.43%)
Augmentation (extended), n (%)	13 (1.43%)
Mammography: No abnormalities, n (%)	714 (78.3%)
Mammography: Abnormal, n (%)	139 (15.2%)
Ultrasound: No abnormalities, n (%)	496 (54.4%)
Ultrasound: Abnormal, n (%)	411 (45.1%)
Assessment A, n (%)	458 (50.2%)
Assessment B, n (%)	407 (44.6%)
Assessment C, n (%)	1 (0.11%)
Assessment D2, n (%)	42 (4.61%)
Assessment E, n (%)	2 (0.22%)
Cancer diagnosis, n (%)	5 (0.55%)

A: No abnormalities; B: Slight abnormality; C: Follow-up is required; D2: Further examination is required; E: Under treatment.

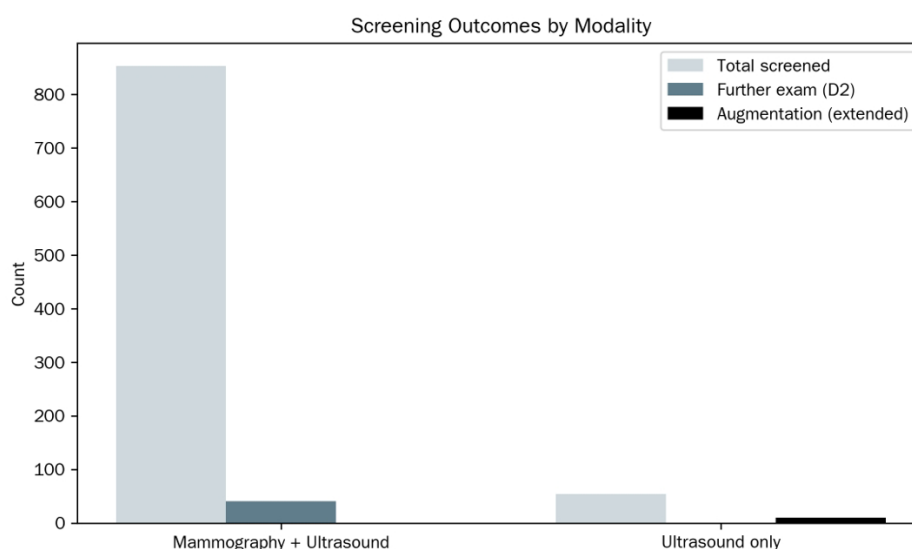


Figure 1. Screening outcomes by modality. Bars indicate the total count of women screened (light gray), those undergoing further examination D2 (dark gray), and those who underwent augmentation (black) for each modality. Counts: Combined 853 total / 41 D2 / 3 augmented; Ultrasound-only 54 total / 1 D2 / 10 augmented.

with fat grafting or hyaluronic acid injections, excluding those with silicone implants.

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