RESEARCH PAPER

Ultrasonography Grey Scale Characteristics and Contralateral Breast Mammographic Findings in Breast Cancer Patients

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ABSTRACT

Background: Breast imaging plays a crucial role in the diagnosis and comprehensive assessment of breast cancer. Grey scale ultrasonography and mammography provide complementary information regarding breast tissue characteristics, while evaluation of the contralateral breast is essential to detect occult abnormalities. Understanding the association between imaging findings and demographic or reproductive factors may enhance diagnostic interpretation and patient management.

Methods: This analytic observational study employed a cross-sectional design and was conducted at the Department of Radiology, Universitas Hasanuddin Hospital, Makassar, Indonesia, starting from October 2024 until the required sample size was achieved. A total of 60 breast cancer patients who underwent grey scale breast ultrasonography and contralateral breast mammography were included. Demographic, reproductive, and clinical data were collected from medical records. Imaging findings were classified according to tissue type.

Results: Type C breast tissue was the most predominant pattern observed on both ultrasonography and mammography. No significant associations were found between age, age at menarche, body mass index, parity, menopausal status, or contraceptive use and imaging tissue types ($p>0.05$). Breastfeeding history showed a significant association with both ultrasonographic tissue type ($p=0.021$) and mammographic tissue type ($p=0.011$). Several variables demonstrated trends toward association with imaging patterns, although these did not reach statistical significance.

Conclusion: Grey scale ultrasonography and contralateral breast mammography reveal heterogeneous breast tissue characteristics in breast cancer patients. Breastfeeding history appears to significantly influence breast tissue patterns, emphasizing the importance of incorporating reproductive history into imaging interpretation and comprehensive breast cancer assessment.

Keywords: Breast cancer; Ultrasonography; Mammography; Breast tissue type; Breastfeeding history

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1. INTRODUCTION

Breast cancer is the most commonly diagnosed malignancy among women and remains a leading cause of cancer-related mortality globally.[1] The increasing incidence of breast cancer, particularly in developing and middle-income countries, poses a significant public health challenge. Early diagnosis and accurate assessment are critical determinants of patient prognosis, therapeutic planning, and long-term survival.[2] Consequently, imaging modalities play a fundamental role in the detection, characterization, and monitoring of breast cancer. Among available imaging techniques, mammography and

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ultrasonography are the most widely used modalities in routine clinical practice. Mammography has long been established as the cornerstone of breast cancer screening due to its proven effectiveness in reducing breast cancer related mortality. However, its sensitivity may be reduced in women with dense breast tissue, younger patients, or those with hormonally active breasts, necessitating complementary imaging approaches.[3]

Ultrasonography has emerged as an important adjunct to mammography, particularly in the evaluation of palpable masses and mammographically occult lesions. Grey scale ultrasonography provides detailed information on lesion morphology, internal echotexture, margins, orientation, and posterior acoustic features.[4] These parameters are essential for differentiating benign from malignant lesions and play a crucial role in the Breast Imaging Reporting and Data System (BI-RADS) classification. Several grey scale ultrasonographic characteristics have been strongly associated with malignancy, including irregular shape, non-circumscribed margins, heterogeneous echogenicity, posterior acoustic shadowing, and a taller-than-wide orientation.[5] These features reflect underlying pathological changes such as tumor infiltration, desmoplastic reaction, and altered tissue composition. A systematic evaluation of these characteristics enhances diagnostic confidence and reduces unnecessary invasive procedures.[6]

Despite advances in ultrasonography, mammography remains indispensable, particularly for the detection of microcalcifications and architectural distortions that may not be visualized on ultrasound.[7] In patients with a confirmed diagnosis of unilateral breast cancer, careful assessment of the contralateral breast is clinically important due to the risk of synchronous or metachronous contralateral breast malignancies.[8] Early identification of contralateral lesions can significantly influence treatment strategies and surveillance planning. Contralateral breast mammography is routinely recommended in breast cancer patients to detect occult lesions that may otherwise remain clinically silent. Previous studies have reported varying incidences of contralateral breast abnormalities, ranging from benign findings to invasive malignancies.[9] These findings underscore the importance of comprehensive bilateral breast evaluation, even in the absence of symptoms or palpable abnormalities.[10]

The integration of ultrasonography and mammography offers complementary diagnostic advantages. Ultrasonography excels in lesion characterization and evaluation of dense breast tissue, whereas mammography provides a global overview of breast architecture and excels in detecting calcifications.[11] The combined interpretation of these modalities has been shown to improve diagnostic accuracy and reduce false-negative rates.[12] Although numerous studies have investigated ultrasonographic features of breast cancer and mammographic findings independently, limited research has focused on correlating grey scale ultrasonographic characteristics of the primary breast lesion with mammographic findings in the contralateral breast. Understanding this relationship may provide additional insights into disease behavior, bilateral breast involvement, and imaging patterns in breast cancer patients.[13]

A comprehensive imaging-based evaluation is particularly relevant in clinical decision-making, including surgical planning, selection of adjuvant therapy, and long-term follow-up strategies. Identifying contralateral breast abnormalities at the time of diagnosis may alter management approaches, such as the extent of surgery or the intensity of surveillance.[14] Therefore, an integrated assessment of ultrasonographic and mammographic findings is essential for personalized patient care. Accordingly, this study aims to analyze grey scale ultrasonographic characteristics of breast cancer lesions and to evaluate mammographic findings in the contralateral breast among breast cancer patients. By examining these imaging features collectively, this study seeks to enhance the understanding of complementary imaging roles and to contribute to improved diagnostic assessment and comprehensive management of breast cancer patients.

2. MATERIALS AND METHODS

This study employed an analytic observational design with a cross-sectional approach to evaluate grey scale ultrasonographic characteristics and contralateral breast mammographic findings in patients diagnosed with breast cancer. The cross-sectional design was selected to assess imaging characteristics and mammographic findings at a single point in time, allowing for the analysis of associations between ultrasonographic features and contralateral breast mammography results. The study was conducted at the Department of Radiology, Universitas Hasanuddin Hospital (RS Unhas), Makassar, Indonesia. Data collection was initiated in October 2024 and continued until the required sample size was achieved. Study data were obtained retrospectively from the hospital medical records, specifically from patients who underwent radiological examinations at the Radiology Installation of RS Unhas during the study period.

The target population consisted of all breast cancer patients who sought medical care at RS Unhas Makassar. The accessible population included breast cancer patients who underwent grey scale breast ultrasonography and contralateral breast mammography at the Department of Radiology, RS Unhas. Patients with complete imaging data from both modalities were eligible for inclusion in the study. Research data were recorded using standardized

data collection forms and subsequently organized into tabular formats. Data processing involved editing, coding, and electronic data cleaning to ensure data accuracy and completeness. Validated data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 27.0 (IBM Corp., Armonk, NY, USA). Descriptive analyses were performed to summarize patient characteristics and imaging findings, which were presented as frequency distributions and cross-tabulations in accordance with the study objectives.

For comparative analyses involving two categorical variables, statistical testing was conducted based on data distribution. If the data were normally distributed, an independent t-test was applied. In cases where the data were not normally distributed, the Mann-Whitney U test was used. A p-value of <0.05 was considered statistically significant for all analyses. This study was conducted in accordance with ethical principles for medical research involving human subjects. Ethical approval was obtained from the Health Research Ethics Committee of the Faculty of Medicine, Universitas Hasanuddin. The study utilized primary data derived from grey scale ultrasonography and contralateral breast mammography examinations of breast cancer patients. No contractual or financial relationships existed between the researchers and any external parties that could influence the conduct or outcomes of this study.

3. RESULT

Table 1 presents the general characteristics of the study sample comprising 60 respondents. The majority of participants were younger than 50 years (51.7%), while the remaining 48.3% were aged 50 years or older, indicating a relatively balanced age distribution. The most common age at menarche was 12 years (33.3%), followed by 13 years (28.3%) and 11 years (21.7%). Menarche occurring at ages 14-15 years was less frequent, accounting for a cumulative proportion of 16.7%. Regarding nutritional status, most respondents had a normal body mass index (BMI) (53.3%), followed by those classified as overweight (45%), whereas obesity was observed in only a small proportion of participants (1.7%). In terms of parity, the majority of respondents were multiparous (60%), followed by grand multiparous women (30%). Only a small proportion were primiparous (6.7%) or nulliparous (1.7%). Most respondents had a history of breastfeeding (98.3%).

With respect to contraceptive use, the majority of participants reported using hormonal contraceptives (86.7%), while the remainder were equally divided between non-hormonal contraceptive users (6.7%) and those who did not use any contraceptive method (6.7%). The duration of contraceptive use among most respondents was less than 5 years (60%), whereas 36.7% reported use for more than 5 years, and only 3.3% reported no contraceptive use. Based on ultrasonographic findings, the most frequently observed breast tissue type was type C (60%), followed by type A (28.3%) and type B (11.7%). For mammographic findings, type B was the most predominant (36.7%), followed by type D (30%), type C (26.7%), and type A (6.7%). Regarding genetic mutations, BRCA1 mutations were identified in 10% of respondents, while the remaining 90% showed no BRCA1 mutation. BRCA2 mutations were observed in only 3.3% of respondents, with the majority (96.7%) showing no evidence of mutation.

Table 1. General data on the characteristics of the research sample

Characteristic And Variable		n (%)
Age	< 50	31 (51.7)
	≥ 50	29 (48.3)
Menarche	11	13 (21.7)
	12	20 (33.3)
	13	17 (28.3)
	14	7 (11.7)
	15	3 (5.0)
IMT	Normal	32 (53.3)
	Overweight	27 (45.0)
	Obesity	1 (1.7)
Parity	Nullipara	1 (1.7)
	Primipara	5 (8.3)
	Multipara	36 (60.0)
	Grandemultipara	18 (30.0)
Breastfeeding	Yes	59 (98.3)
	No	1 (1.7)
Contraception	Contraception Hormonal	52 (86.7)

Characteristic And Variable		n (%)
	Non contraception hormonal	4 (6.7)
	hormonal	4 (6.7)
Old Contraception	< 5 yo	36 (60.0)
	> 5 yo	22 (36.7)
	No	2 (3.3)
Menopause	Yes	23 (38.3)
	No	37 (61.7)
USG	Type A	17 (28.3)
	Type B	7 (11.7)
	Type C	36 (60.0)
Mammography	Type A	17 (28.3)
	Type B	22 (36.7)
	Type C	16 (26.7)
	Type D	5 (8.3)

Table 2 demonstrates the association between respondent characteristics and ultrasonographic tissue types. No statistically significant relationship was observed between respondents' age (<50 years or ≥50 years) and ultrasonographic tissue type, as indicated by a p-value greater than 0.05. This finding suggests that the distribution of ultrasonography (USG) tissue types was not significantly influenced by age category. An increasing proportion of Type C ultrasonographic findings was observed with older age at menarche, with the highest proportion noted among women with menarche at 15 years of age (66.7% Type C). However, statistical analysis revealed no significant association between age at menarche and USG tissue type (p = 0.210), indicating that the observed pattern did not reach statistical significance.

With respect to breastfeeding history, most women who reported breastfeeding exhibited Type C ultrasonographic findings (61%). In contrast, the only respondent who did not breastfeed was classified as Type B (100%). Statistical analysis demonstrated a significant association between breastfeeding history and USG tissue type (p = 0.021), suggesting that breastfeeding may be related to breast tissue characteristics as observed on ultrasonography. Among users of hormonal contraception, the majority showed Type C ultrasonographic findings (61.5%). Similarly, respondents using non-hormonal contraception predominantly exhibited Type C findings (75%); however, the number of participants in this subgroup was small. Statistical testing did not reveal a significant association between type of contraceptive use and USG tissue type (p = 0.072), although a trend toward a potential relationship was observed.

Regarding nutritional status, both normal and overweight body mass index (BMI) categories were predominantly characterized by Type C ultrasonographic findings. Statistical analysis showed no significant association between BMI status and USG tissue type (p = 0.389). In terms of parity, grand multiparous women demonstrated a higher proportion of Type C ultrasonographic findings (66.7%), whereas primiparous women exhibited more varied tissue types. Nevertheless, the association between parity and USG tissue type did not reach statistical significance (p = 0.080), although a trend suggesting an increased likelihood of Type C tissue with higher parity was noted. Both premenopausal and postmenopausal women were predominantly classified as having Type C ultrasonographic tissue. Statistical analysis confirmed that menopausal status was not significantly associated with USG tissue type (p = 0.444).

Table 2. Comparison of general characteristics of research samples with USG

Characteristic And Variable			USG			Total	P value
			Type A	Type B	Type C		
Age	< 50 yo	n	11	2	18	31	0.260
		%	35.5%	6.5%	58.1%	100.0%	
	> 50 yo	n	6	5	18	29	
		%	20.7%	17.2%	62.1%	100.0%	
Menarche	11	n	4	2	7	13	0.210
		%	30.8%	15.4%	53.8%	100.0%	
	12	n	4	2	14	20	
		%	20.0%	10.0%	70.0%	100.0%	
	13	n	6	0	11	17	
		%	35.3%	0.0%	64.7%	100.0%	
	14	n	2	3	2	7	

Characteristic And Variable			USG			Total	P value
			Type A	Type B	Type C		
		%	28.6%	42.9%	28.6%	100.0%	
	15	n	1	0	2	3	
		%	33.3%	0.0%	66.7%	100.0%	
Breastfeeding	Yes	n	17	6	36	59	0.021
		%	28.8%	10.2%	61.0%	100.0%	
	no	n	0	1	0	1	
		%	0.0%	100.0%	0.0%	100.0%	
Contraception	Contraception hormonal	n	16	4	32	52	0.072
		%	30.8%	7.7%	61.5%	100.0%	
	Contraception non hormonal	n	0	1	3	4	
		%	0.0%	25.0%	75.0%	100.0%	
	No	n	1	2	1	4	
		%	25.0%	50.0%	25.0%	100.0%	
IMT	Normal	n	7	5	20	32	0.389
		%	21.9%	15.6%	62.5%	100.0%	
	Overweight	n	9	2	16	27	
		%	33.3%	7.4%	59.3%	100.0%	
	Obesitas	n	1	0	0	1	
		%	100.0%	0.0%	0.0%	100.0%	
Parity	Nullipara	n	0	1	0	1	0.080
		%	0.0%	100.0%	0.0%	100.0%	
	Primipara	n	3	0	2	5	
		%	60.0%	0.0%	40.0%	100.0%	
	Multipara	n	9	5	22	36	
		%	25.0%	13.9%	61.1%	100.0%	
	Grandemultipara	n	5	1	12	18	
		%	27.8%	5.6%	66.7%	100.0%	
Menopause	Yes	n	5	4	14	23	0.444
		%	21.7%	17.4%	60.9%	100.0%	
	No	n	12	3	22	37	
		%	32.4%	8.1%	59.5%	100.0%	
Normal		n	17	7	36	60	
		%	28.3%	11.7%	60.0%	100.0%	

Based on **Table 3.** presents the associations between respondent characteristics and mammographic tissue types. No statistically significant relationship was observed between age category (<50 years or ≥50 years) and mammographic tissue type, as indicated by a p-value greater than 0.05. This finding suggests that respondent age did not have a statistically significant influence on mammographic outcomes. Regarding age at menarche, the majority of respondents who experienced menarche between 11 and 13 years tended to be classified as Type C on mammography. However, statistical analysis demonstrated no significant association between age at menarche and mammographic tissue type ($p = 0.200$), although a tendency toward structural tissue variation among women with earlier menarche was observed. In women with a history of breastfeeding, mammographic findings were predominantly Type B (37.3%) and Type A (28.8%). In contrast, the only respondent who did not breastfeed was classified as Type D (100%). Statistical analysis revealed a significant association between breastfeeding history and mammographic tissue type ($p = 0.011$), indicating that breastfeeding may influence breast tissue structure as detected by mammography. Among respondents using hormonal contraception, mammographic tissue types were predominantly Types B and C. Similarly, users of non-hormonal contraception showed a relatively balanced distribution between Types B and C. Although the association between contraceptive type and mammographic tissue type did not reach statistical significance ($p = 0.051$), the results suggest a possible trend toward a relationship between contraceptive use and mammographic tissue characteristics.

Across all body mass index (BMI) categories, mammographic tissue Types B and C were consistently dominant. Statistical analysis indicated no significant association between nutritional status and mammographic findings ($p = 0.827$). With respect to parity, grand multiparous and multiparous women were predominantly classified as Types A and C, whereas primiparous women

were more frequently classified as Type B. However, this association did not reach statistical significance (p = 0.066), although a potential influence of higher parity on mammographic tissue type was suggested. Postmenopausal women were more frequently classified as having mammographic Types B and C, whereas premenopausal women demonstrated a more even distribution of tissue types. Statistical analysis showed no significant association between menopausal status and mammographic tissue type (p = 0.064), although the findings indicate a near-significant trend suggesting that menopause may influence mammographic tissue composition.

Table 3. Comparison of general characteristics of research samples with respect to mammography examination

Characteristic And Variable			**Mammography**				Total	P Value
			Type A	Type B	Type C	Type D		
Age	< 50 yo	n	10	10	8	3	31	0.839
		%	32.3%	32.3%	25.8%	9.7%	100.0%	
	> 50 yo	n	7	12	8	2	29	
		%	24.1%	41.4%	27.6%	6.9%	100.0%	
Menarche	11	n	2	3	7	1	13	0.200
		%	15.4%	23.1%	53.8%	7.7%	100.0%	
	12	n	4	9	6	1	20	
		%	20.0%	45.0%	30.0%	5.0%	100.0%	
	13	n	8	6	2	1	17	
		%	47.1%	35.3%	11.8%	5.9%	100.0%	
	14	n	3	3	0	1	7	
		%	42.9%	42.9%	0.0%	14.3%	100.0%	
	15	n	0	1	1	1	3	
		%	0.0%	33.3%	33.3%	33.3%	100.0%	
Breastfeeding	Yes	n	17	22	16	4	59	0.011
		%	28.8%	37.3%	27.1%	6.8%	100.0%	
	No	n	0	0	0	1	1	
		%	0.0%	0.0%	0.0%	100.0%	100.0%	
Contraception	Contraception hormonal	n	16	19	14	3	52	0.051
		%	30.8%	36.5%	26.9%	5.8%	100.0%	
	Contraception non hormonal	n	0	2	2	0	4	
		%	0.0%	50.0%	50.0%	0.0%	100.0%	
	No	n	1	1	0	2	4	
		%	25.0%	25.0%	0.0%	50.0%	100.0%	
IMT	Normal	n	9	11	9	3	32	0.827
		%	28.1%	34.4%	28.1%	9.4%	100.0%	
	Overweight	n	7	11	7	2	27	
		%	25.9%	40.7%	25.9%	7.4%	100.0%	
	Obesitas	n	1	0	0	0	1	
		%	100.0%	0.0%	0.0%	0.0%	100.0%	
Parity	Nullipara	n	0	0	0	1	1	0.066
		%	0.0%	0.0%	0.0%	100.0%	100.0%	
	Primipara	n	0	4	1	0	5	
		%	0.0%	80.0%	20.0%	0.0%	100.0%	
	Multipara	n	11	12	10	3	36	
		%	30.6%	33.3%	27.8%	8.3%	100.0%	
	Grandemultipara	n	6	6	5	1	18	
		%	33.3%	33.3%	27.8%	5.6%	100.0%	
Menopause	Yes	n	2	11	8	2	23	0.064
		%	8.7%	47.8%	34.8%	8.7%	100.0%	
	No	n	15	11	8	3	37	
		%	40.5%	29.7%	21.6%	8.1%	100.0%	
Total		n	17	22	16	5	60	

Characteristic And Variable		Mammography				Total	P Value
		Type A	Type B	Type C	Type D		
	%	28.3%	36.7%	26.7%	8.3%	100.0%	

* Chi Square Test, used to compare the proportion of characteristics and research variables between each Mammography category.

4. DISCUSSION

This study provides a comprehensive evaluation of grey scale ultrasonographic characteristics and contralateral breast mammographic findings in breast cancer patients by integrating demographic, reproductive, and clinical factors. The results demonstrate that Type C breast tissue predominated across both ultrasonographic and mammographic assessments, reflecting the heterogeneous and fibroglandular composition commonly observed in breast cancer patients.[15] These findings reinforce the importance of multimodality imaging in understanding breast tissue characteristics and their potential clinical implications. Age distribution in this study was relatively balanced between women younger and older than 50 years. The absence of a significant association between age category and ultrasonographic or mammographic tissue type aligns with previous studies reporting that breast tissue composition in cancer patients may not strictly follow age-related involution patterns observed in the general population.[16] Tumor-related stromal reactions and fibroglandular remodeling may obscure typical age-dependent imaging changes.[17]

Age at menarche showed no statistically significant association with either ultrasonographic or mammographic tissue types, although a tendency toward Type C tissue was observed among women with earlier menarche. Early menarche is a well-established risk factor for breast cancer due to prolonged estrogen exposure, yet its influence on imaging-based tissue classification remains inconsistent. Several studies have reported similar findings, suggesting that hormonal exposure affects cancer risk more strongly than post-diagnostic breast tissue morphology.[18] However, other reports indicate denser breast patterns in women with early menarche, highlighting ongoing controversy.[19] Breastfeeding history demonstrated a significant association with both ultrasonographic and mammographic tissue types in this study. Women with a history of breastfeeding predominantly exhibited Type C ultrasonographic patterns and Type A or B mammographic patterns, whereas the non-breastfeeding participant demonstrated a denser mammographic pattern. These findings are consistent with prior research indicating that lactation induces long-term remodeling of breast tissue, leading to reduced density and altered fibroglandular architecture.[20] Breastfeeding has also been associated with a protective effect against breast cancer and less aggressive imaging features.[21]

The observed association between breastfeeding and imaging characteristics supports the hypothesis that lactational involution results in structural changes detectable on both ultrasound and mammography.[22] Studies using mammographic density as a surrogate marker have consistently reported lower density among women with prolonged breastfeeding duration.[23] However, some investigations have failed to demonstrate a clear relationship, potentially due to variations in breastfeeding duration, parity, and timing relative to imaging.[24] Hormonal contraceptive use was not significantly associated with ultrasonographic or mammographic tissue types in this study, although a trend toward Type C ultrasonographic patterns and Type B/C mammographic patterns was observed among hormonal contraceptive users. These findings are consistent with previous studies suggesting that exogenous hormones may transiently influence breast density but do not necessarily result in persistent structural changes detectable by imaging.[25] In contrast, other studies have reported increased breast density among long-term hormonal contraceptive users, particularly in younger women. Differences in formulation, duration of use, and individual hormonal sensitivity may explain these discrepancies.[26]

Body mass index (BMI) showed no significant association with either ultrasonographic or mammographic tissue types, with Type C and Type B patterns predominating across BMI categories. This finding is consistent with reports indicating that while higher BMI is associated with increased fatty tissue on mammography, tumor-induced fibroglandular changes may mask the typical inverse relationship between BMI and breast density in cancer patients.[27] Conversely, some population-based studies have demonstrated a strong association between lower BMI and higher mammographic density, emphasizing differences between screening populations and cancer cohorts.[28] Parity demonstrated a non-significant but notable trend, with higher parity associated with a greater proportion of Type C ultrasonographic and Type A/C mammographic patterns. This observation aligns with studies suggesting that repeated pregnancies contribute to breast tissue differentiation and long-term architectural remodeling.[29] Although parity is generally considered protective against breast cancer, its relationship with imaging characteristics remains complex and may be influenced by age at first birth and breastfeeding history.[30]

Menopausal status was not significantly associated with imaging tissue types in this study, although

postmenopausal women tended to show Type B and C mammographic patterns. This finding contrasts with studies reporting a marked reduction in breast density following menopause due to estrogen withdrawal.[31] However, in breast cancer patients, tumor-associated stromal reactions and fibrosis may attenuate menopausal involution effects, resulting in persistent fibroglandular patterns.[32] This study highlights the multifactorial nature of breast tissue characteristics as assessed by ultrasonography and mammography in breast cancer patients. The significant association observed with breastfeeding history underscores the long-term impact of reproductive factors on breast tissue architecture, while other variables demonstrated trends without statistical significance.[33] These findings emphasize the need for individualized imaging interpretation and further longitudinal studies to elucidate the dynamic interactions between hormonal, reproductive, and biological factors influencing breast tissue morphology. Such insights may enhance risk stratification, diagnostic accuracy, and personalized management strategies in breast cancer care.[34]

5. CONCLUSION

This study demonstrates that grey scale ultrasonographic characteristics and contralateral breast mammographic findings in breast cancer patients are influenced by multiple demographic and reproductive factors. Type C breast tissue was the most predominant pattern observed on both ultrasonography and mammography. Among the variables analyzed, breastfeeding history showed a statistically significant association with both ultrasonographic and mammographic tissue types, highlighting its potential long-term impact on breast tissue architecture. Other factors, including age, age at menarche, body mass index, parity, menopausal status, and contraceptive use, did not show significant associations, although several exhibited trends toward influencing imaging patterns. These findings underscore the importance of comprehensive, multimodality imaging assessment and consideration of reproductive history in the interpretation of breast imaging in breast cancer patients.

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CONFLICT OF INTEREST

This research has no conflict of interest from anywhere

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