DOI: 10.58490/ctump.2025i9TA.4001

SURVEY RESULTS ON ULTRASOUND CHARACTERISTICS AND RELATED FACTORS OF BREAST TUMORS IN WOMEN UNDERGOING BREAST ULTRASOUND AT CAN THO UNIVERSITY OF MEDICINE AND PHARMACY HOSPITAL IN 2024 - 2025

Thach Khoi Nguyen [1], Du Huynh The Vinh [1], Vo Le Anh Thu [1] , Pham Nhu Tra My [1], Nguyen Thi Ngoc Yen [1], Nguyen Thi Giao Ha [1,2*]

1. Can Tho University of Medicine and Pharmacy

2. Can Tho University of Medicine and Pharmacy Hospital

**Corresponding author: ntgha@ctump.edu.vn*

Received: 14/5/2025

Reviewed: 30/5/2025

Accepted: 25/6/2025

ABSTRACT

Background: *Breast tumors are common conditions in women and can occur at any age. Benign breast tumors account for approximately 80%, while malignant tumors make up about 20%. Breast cancer is among the leading causes of cancer-related mortality in women worldwide, including in Vietnam. It is prevalent in both developed and developing countries. The diagnosis of breast tumors is typically based on clinical examination combined with imaging techniques such as mammography, breast ultrasound, and histopathological findings. Consequently, the rate of early detection of breast tumors has significantly increased, leading to higher treatment success rates. Ultrasound is a widely used and commonly indicated modality for breast examination. It offers several advantages, including the ability to differentiate between solid and cystic lesions, provide imaging features suggestive of benign or malignant nature, facilitate breast biopsy, and offer a low-cost, non-invasive, and painless approach.* ***Objectives:*** *To determine the prevalence and ultrasound characteristics of breast tumors and identify related factors in women.* ***Materials and methods:*** *A cross-sectional descriptive study was conducted on 218 female patients who underwent breast ultrasound imaging at Can Tho University of Medicine and Pharmacy Hospital.* ***Results:*** *The clinical and ultrasonographic characteristics of breast lesions primarily indicate benign features. Most cases presented with breast pain (26.1%), with lesions predominantly located in the left breast (34.9%). The majority were solitary lesions (59.2%) with an oval shape (91.7%), well-defined margins (99.5%), hypoechoic echogenicity compared to fat (56%), and a cystic structure (59.2%). No posterior acoustic shadowing was observed (100%), and the lesions showed no signs of invasion (99.5%) or vascular proliferation (98.6%), with no axillary lymph node metastasis (96.3%). BI-RADS category 3 was the most prevalent (45.5%), particularly in the 30–60 age group (statistically significant, p=0.003). However, there were no significant differences based on marital or reproductive status (p>0.05).* ***Conclusion:*** *In the distribution of BI-RADS classifications by age group, BI-RADS 3 accounted for 45.5% in the 30-60 age group, while the proportions in those under 30 years old were 32.6% and 10.6%, respectively. This difference was statistically significant (p=0.005). The study indicates a correlation between age group and the prevalence of breast tumors in women.*

Keywords: *Breast tumor, ultrasound imaging of breast tumors, factors associated with breast tumors.*

I. INTRODUCTION

Breast tumors are common conditions in women and can occur at any age. Benign breast tumors account for approximately 80%, while malignant tumors make up about 20%.

Breast cancer is among the leading causes of cancer-related mortality in women worldwide, including in Vietnam [1]. According to GLOBOCAN 2020, breast cancer ranks first globally and is the most common cancer in females. An estimated 21,555 new breast cancer cases were diagnosed in 2020 (accounting for 25.8% of all cancers in women). Breast cancer is prevalent in both developed and developing countries. The diagnosis of breast tumors typically relies on clinical examination combined with imaging techniques such as mammography, breast ultrasound, and histopathological findings [2], which are widely applied internationally. Consequently, the rate of early detection of breast tumors has significantly increased, leading to higher treatment success rates. Ultrasound is a widely used and commonly indicated modality for breast examination. It offers several advantages, including the ability to differentiate between solid and cystic lesions, provide imaging features suggestive of benign or malignant nature, facilitate breast biopsy, and offer a low-cost, non-invasive, and painless approach. Therefore, we conducted this study at Can Tho University of Medicine and Pharmacy Hospital with two specific objectives: (1) To determine the prevalence and ultrasound characteristics of breast tumors. (2) To identify factors associated with breast tumors in women.

II. MATERIALS AND METHODS

2.1. Materials

Female patients who visited and underwent breast ultrasound imaging at Can Tho University of Medicine and Pharmacy Hospital from May 2024 to May 2025.

- **Inclusion criteria:** Female patients who agreed to participate and underwent breast ultrasound imaging at the hospital.

- **Exclusion criteria:** Non-cooperative patients, the patient is currently breastfeeding or is taking medications that may affect the mammary glands, such as gastrointestinal drugs or hormonal agents, etc.

2.2. Methods

- **Study design:** A cross-sectional descriptive study.

- **Sample size:** The sample size was estimated using the formula for proportion estimation:

$$n = Z^2_{(1-\alpha/2)} \frac{p(1-p)}{d^2}$$

+ In which:

n: Sample size.

Z: Z-score at a 95% confidence level (Z=1.96).

p: Prevalence of breast cancer among breast pathologies, set at p=0.34 based on a study by Ngo Thi Hong [3].

d: Margin of error (7%, d=0.07).

+ Using this formula, the calculated minimum sample size was $n \geq 176$. In practice, we enrolled 218 cases.

- **Study contents**

+ **General characteristics of research subjects:** Age, marital status, reproductive history.

+ **Clinical data:** Reason for medical consultation.

+ **Ultrasound findings:** Morphological features of breast lesions and BI-RADS classification.

+ **Associated factors:** Relationships between age and BI-RADS category, marital status and BI-RADS category, and parity and BI-RADS category.

III. RESULT

We conducted the study and collected 218 samples. After processing and analyzing the data, the following results were obtained.

3.1. Clinical and Subclinical Characteristics of the Study Population

3.1.1. Reasons for Medical Consultation

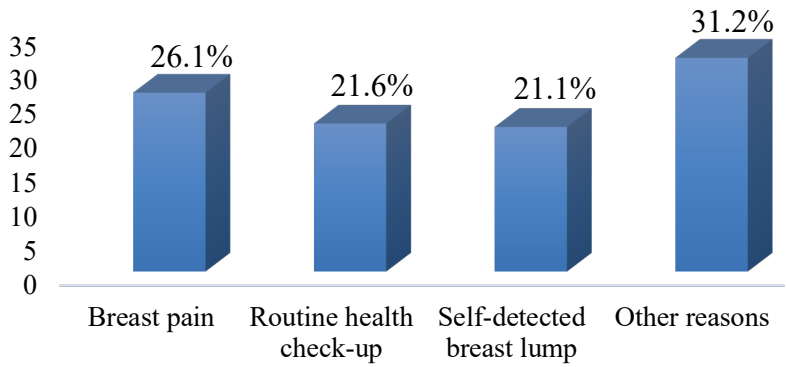

Figure 1. Reasons for Medical Consultation

Among the reasons for patient visits, other reasons had the highest prevalence at 31.2%, followed by breast pain at 26.1%, and the lowest was self-detection of a breast lump at 21.1%.

3.1.2. Ultrasound Features of Breast Lesions

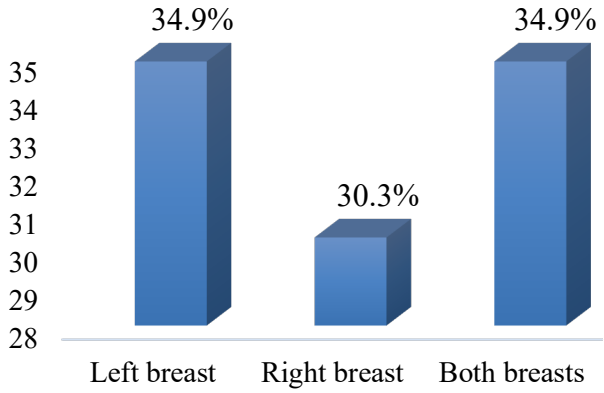

Figure 2. Location

The location of lesions in the left breast and both breasts had the highest rate, accounting for 34.9%. The rate for the right breast was lower, at 30.3%.

Table 1. Ultrasound Features of Breast Lesions

Ultrasound characteristics		Frequency (n)	Proportion (%)
Number of lesions	A lesion	129	59.2
	Two or more lesions	89	40.8
Lesion shape	Round	6	2.8
	Oval	200	91.7
	Multilobulated	12	5.5
Echogenicity compared to fat	High	6	2.8
	Homogeneous	0	0
	Reduced	122	56
	Mixed echogenicity	90	41.2
Structure	Cystic form	129	59.2
	Typical	84	38.5
	Atypical	5	2.3
Margin	Well-defined	217	99.5
	Ill-defined	1	0.5
Posterior silhouette	Present	0	0
	Absent	218	100
Invasion	Absent	217	99.5
	Surrounding tissue	1	0.5
Angiogenesis	Present	3	1.4
	Absent	215	98.6
Axillary lymph node	Present	8	3.7
	Absent	210	96.3

The most common lesion shape was oval, accounting for 91.7%. The most frequent echogenicity compared to fat is hypoechoic at 56%. Well-defined margins were the most prevalent at 99.5%, with only 0.5% having indistinct margins. The absence of posterior shadowing was observed in 100% of cases. The highest non-invasive rate was 99.5%, the non-vascularization rate was 98.6%, and the absence of axillary lymph nodes was 96.3%.

3.2. Distribution of BI-RADS Categories by Related Factors

3.2.1. Distribution of BI-RADS Categories by Patient Age

Table 2. Distribution of BI-RADS Categories by Age Group

Age group	BI-RADS classification						p*
	1 Frequency (%)	2 Frequency (%)	3 Frequency (%)	4 Frequency (%)	5 Frequency (%)	6 Frequency (%)	
<30 age	0	9(4)	23(10.6)	1(0.5)	0	0	0.003
30-60 age	11(5)	71(32.6)	71(32.6)	10(4.5)	3(1.4)	2(0.9)	
>60 age	5(2.3)	6(2.8)	5(2.3)	0	0	1(0.5)	
Total	16(7.3)	86(39.4)	99(45.5)	11(5)	3(1.4)	3(1.4)	

Among the BI-RADS classifications by age group, BI-RADS 3 accounted for 45.5% in the 30-60 age group, 32.6% in those under 30 years old, and 10.6% in other age groups. The difference was statistically significant with $p = 0.003 < 0.05$.

3.2.2. Distribution of BI-RADS Categories by Marital Status

Table 3. Distribution of BI-RADS Categories by Marital Status

Marital status	BI-RADS classification						p*
	1 Frequency (%)	2 Frequency (%)	3 Frequency (%)	4 Frequency (%)	5 Frequency (%)	6 Frequency (%)	
Single	0	10(4.5)	23(10.6)	2(0.9)	0	1(0.5)	0.104
Married	16(7.3)	76(34.9)	76(34.9)	9(4.1)	3(1.4)	2(0.9)	
Divorced/ Widowed	0	0	0	0	0	0	
Total	16(7.3)	86(39.4)	99(45.5)	11(5)	3(1.4)	3(1.4)	

Among the BI-RADS classifications by marital status, BI-RADS 3 accounted for 45.5% in the married group and 34.9% and 10.6% in the unmarried group, respectively. However, this difference was not statistically significant with $p > 0.05$.

3.2.3. Distribution of BI-RADS Categories by Reproductive Status

Table 4. Distribution of BI-RADS Categories by Reproductive Status

Reproductive status	BI-RADS classification						p*
	1 Frequency (%)	2 Frequency (%)	3 Frequency (%)	4 Frequency (%)	5 Frequency (%)	6 Frequency (%)	
Nulliparous	1(0.5)	15(6.9)	28(12.8)	2(0.9)	0	1(0.5)	0.427
Uniparous	4(1.8)	18(8.3)	29(13.4)	3(1.3)	1(0.5)	0	
Biparous	9(4.1)	40(18.3)	32(14.7)	6(2.8)	2(0,9)	2(0.9)	
> Biparous	2(0.9)	13(5.9)	10(4.6)	0	0	0	
Total	16(7.3)	86(39.4)	99(45.5)	11(5)	3(1.4)	3(1.4)	

Among the BI-RADS classifications by reproductive status, 45.5% of patients were classified as BI-RADS 3. The proportions in women with two children, one child, and no children were 14.7%, 13.4%, and 12.8%, respectively. However, this difference was not statistically significant with $p > 0.05$.

IV. DISCUSSION

4.1. General characteristics of research subjects

Our study, conducted on 218 female patients with suspected malignant breast tumors, found that the highest prevalence was among those aged 30-60, accounting for 6.8%. Within this group, BI-RADS 4 comprised 4.5%, while BI-RADS 5 and BI-RADS 6 had equal proportions of 1.4% and 0.9%, respectively. The lowest prevalence was observed in patients under 30 years old, with 0.5% in BI-RADS 4 and no recorded cases in BI-RADS 5 or BI-RADS 6. The remaining cases are equally distributed at a relatively high rate between BI-RADS 3 and BI-RADS 2, accounting for 32.6%. The proportion gradually decreases in the age group of 60 and above, with only 0.5% classified as BI-RADS 4 or higher. Similarly, in the <30 age group, the proportion of BI-RADS 4 or higher is also 0.5%. This indicates that the likelihood of tumor malignancy in the <30 and >60 age groups is not significant. Our findings contrast with those of Nguyen Thi Mai Lan, who reported that breast cancer incidence starts increasing significantly from the age of 40, peaks between 40-

69 years, and then declines toward 80 [4]. This difference may be due to variations in study period, sample size, and research location.

Our study also contrasts with the findings of Nguyen Thi Dung *et al.*, where the highest incidence was in patients over 50 years old (65%), while those under 50 had a lower proportion [5]. Likewise, Nguyen Thi Mai Anh reported the highest breast cancer incidence in the 50-60 age group [7]. These variations may stem from differences in study populations, data collection methods, and diagnostic criteria. The variability in breast cancer incidence by age highlights the need for region-specific screening strategies to optimize early detection efforts.

Regarding reasons for seeking medical attention, incidental detection during routine health check-ups and the diagnosis of other conditions were major factors, accounting for 21.6% and 31.2%, respectively (totaling 52.8%). This result aligns with Ho Hoang Thao Quyen's study, which reported a rate of 47.8% [6]. However, it differs significantly from Tran Hoang's research, where the most common reason was detecting a palpable lump, accounting for 91.7% [2]. Similarly, Nguyen Thi Mai Anh found that 69.4% of breast cancer patients sought medical care due to discovering a lump [7]. In our study, the second most common reason was breast pain (26.1%), while self-detected lumps had the lowest rate (21.1%). These differences emphasize the varying degrees of awareness and healthcare-seeking behaviors among different populations.

In terms of ultrasound findings, most cases involved unilateral lesions, with 30.3% occurring in the right breast and 34.9% in the left. These findings are consistent with those of Huynh Thi Thanh Giang, who reported right breast involvement in 47.6% of cases and left breast involvement in 50.5% [8]. Similarly, Nguyen Thi Mai Anh found rates of 53% for the right breast, 44.9% for the left, and 2% for bilateral lesions [7]. However, our study recorded a relatively high rate of bilateral lesions (35%), which differs from Huynh Thi Thanh Giang's study, where only 1.9% had bilateral involvement [8], and Nguyen Thi Mai Anh's, which reported 2% [7].

Regarding lesion morphology on ultrasound, oval-shaped lesions were the most common (91.7%), followed by lobulated shapes (5.5%) and round shapes (2.8%). This differs from Nguyen Thi Mai Anh's findings, where oval shapes accounted for 0%, round shapes for 14.3%, and irregular shapes for 55.7%. The predominance of oval lesions in our study suggests a higher proportion of benign or low-risk lesions.

Our study also found that most breast lesions had a hypoechoic mixed structure (56%), while homogeneous structures were absent. This aligns with Nguyen Thi Mai Anh's study, where 73.5% of lesions were hypoechoic and no cases of hyperechoic or isoechoic structures were recorded [7]. Hypoechoic structures are often associated with malignancies, but their presence alone is not diagnostic. Therefore, additional imaging and histopathological assessments are necessary to confirm the nature of these lesions.

Regarding lesion margins, our study found that 99.5% of cases had well-defined margins, while only 0.5% had indistinct margins. This contrasts with Tran Hoang's study, where well-defined margins were observed in only 27.1% of cases, while indistinct margins were significantly higher at 72.9% [2]. The presence of well-defined margins in our study suggests a greater prevalence of benign or early-stage lesions, whereas studies reporting a higher proportion of indistinct margins may indicate more aggressive tumor characteristics.

Our study also found that 59.2% of patients had a single lesion, while 40.8% had multiple lesions. The difference between these proportions was not substantial. However, our findings differ from Nguyen Thi Mai Anh's research, where single tumors accounted

for 98% of cases, while multiple tumors were observed in only 2%, indicating a significant disparity [7]. Multiple lesions can be indicative of multifocal or multicentric breast cancer, which may require a more aggressive treatment approach. The relatively high proportion of multiple lesions in our study may reflect differences in disease presentation.

In terms of lesion composition on ultrasound, cystic lesions were the most common (59.2%), followed by typical solid lesions (38.5%), and the least common were atypical lesions (2.3%). The high prevalence of cystic lesions suggests that many patients in our study may have had benign conditions, such as fibrocystic changes, rather than malignant tumors. However, the presence of atypical lesions highlights the need for biopsy and further diagnostic workup in certain cases.

Additional imaging characteristics observed in our study included posterior acoustic shadowing (0%), surrounding tissue invasion (0.5%), vascular proliferation (1.4%), and axillary lymphadenopathy (3.7%). These features were generally rare or nearly absent. Our findings contrast with Tran Hoang's study, which reported a significantly higher rate of surrounding tissue invasion (20.9%). This discrepancy may stem from differences in sample selection criteria [2]. The low rate of invasive features in our study suggests that a significant proportion of patients presented at an earlier stage of disease, emphasizing the potential benefits of early screening and detection programs.

4.2. Factors Related to BI-RADS Classification

Distribution of BI-RADS Categories by Patient Age: The proportion of patients aged 30-60 years, under 30 years, and over 60 years was 32.6%, 10.6%, and 2.3%, respectively. This difference was statistically significant with $p = 0.003$. Thus, the highest incidence was observed in the 30-60 age group, decreasing in patients over 60 years old with BI-RADS 3 classification.

Distribution of BI-RADS Categories by Marital Status: The proportion of patients who were married and unmarried was 34.9% and 10.6%, respectively; however, this difference was not statistically significant with $p > 0.05$. Therefore, the BI-RADS 3 classification rate did not differ between married and unmarried groups.

Distribution of BI-RADS Categories by Reproductive Status: The proportion of patients with two children, one child, and no children was 14.7%, 13.3%, and 12.8%, respectively; however, this difference was not statistically significant with $p > 0.05$. Thus, the BI-RADS 3 classification rate did not differ between women with children and those without children.

V. CONCLUSION

The study results indicate that the clinical and ultrasound characteristics of breast lesions are predominantly benign. The majority of patients sought medical attention due to breast pain (26.1%), with lesions more commonly located in the left breast (34.9%). These lesions were mostly solitary (59.2%), oval-shaped (91.7%), well-defined (99.5%), hypoechoic compared to fat tissue (56%), cystic in structure (59.2%), without posterior acoustic shadowing (100%), non-invasive (99.5%), non-hypervascular (98.6%), and without axillary lymph node metastasis (96.3%). BI-RADS category 3 had the highest prevalence (45.5%), particularly in the 30-60 age group (statistically significant, $p = 0.003$), but showed no significant differences based on marital or reproductive status ($p > 0.05$). These findings highlight the role of age in risk assessment and reflect the typical ultrasound

characteristics of benign lesions, emphasizing the need for regular follow-up, especially for BI-RADS 3 cases, to detect any abnormal changes early.

REFERENCES

1. Wang J. Is Ultrasound an Accurate Alternative for Mammography in Breast Cancer Screening in an Asian Population? A Meta-Analysis. *Diagnostics (Basel)*. 2020. 10(11). doi: 10.3390/diagnostics10110985.
2. Tran Hoang. Characteristics of Ultrasound, Mammography, and Cytology in Breast Cancer Patients at the Oncology Center, Thai Nguyen Central Hospital. *Thai Nguyen University Journal of Science and Technology.* 2021. 228, 283-291. doi:10.34238/tnu-jst.7902.
3. Ngo, T. H., Nguyen, V. L., & Nguyen, P. D. Investigation of the Incidence and Characteristics of Breast Diseases in Surgical Specimens from Patients Undergoing Breast Surgery at Can Tho University of Medicine and Pharmacy Hospital, 2016-2020. *Can Tho Journal of Medicine and Pharmacy.* 2022. 53, 147-153. doi:10.58490/ctump.2022i53.165.
4. Nguyen Thi Mai Lan. Study on the Incidence of Breast Cancer in Women in Hanoi, 2014-2016. *Hanoi Medical University.* 2020. 10-23.
5. Nguyen Thi Dung. The Value of Mammography and Breast Ultrasound According to BI-RADS Classification in Breast Cancer Diagnosis at Thai Nguyen Central Hospital. *Vietnam Medical Journal.* 2024. 546(3), 232-236. doi: 10.51298/vmj.v546i3.12743.
6. Ho Hoang Thao Quyen. The Value of Mammography and Ultrasound in Breast Cancer Screening for Women Aged 40 and Over. *Vietnam Journal of Radiology and Nuclear Medicine.* 2022. 26, 26-31. doi:10.55046/vjrnm.26.447.2016.
7. Nguyen Thi Mai Anh. Ultrasound Imaging Characteristics of Breast Cancer at Bach Mai Hospital. *Vietnam Journal of Radiology and Nuclear Medicine.* 2020. 38, 48-51. doi:10.55046/vjrnm.38.166.2020.
8. Huynh Thi Thanh Giang *et al*. Study on Characteristics of Early-Stage Breast Cancer Patients Undergoing Endocrine Therapy at Military Hospital 175. *Vietnam Medical Journal.* 2023. 526, 132-135. doi: 10.51298/vmj.v526i1B.5427.