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Breast imaging characteristics in Thai transgender women: mammography and ultrasound outcomes in a pilot study

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Abstract

Background: Breast cancer screening in transgender women, particularly those undergoing hormone therapy, remains understudied. Limited screening guidelines exist for transgender individuals, creating a need for tailored recommendations. This study addresses breast cancer screening outcomes in Thai transgender women using mammography and ultrasound.

Objectives: To assess breast imaging characteristics and screening outcomes in transgender women in Thailand and identify factors associated with breast density.

Design: A descriptive correlation study with a cross-sectional design.

Methods: Sixty-six transgender women over 40 years of age, who had been on hormone replacement therapy for at least 5 years, were recruited from three clinics. Participants underwent mammography and breast ultrasound, with imaging analyzed using the Breast Imaging-Reporting and Data System (BI-RADS) system. Data were analyzed with descriptive statistics and Spearman's correlation.

Results: The average age of participants was 49.2 years, with an average of 16.3 years of hormone use. Of the participants, 80.3% had undergone breast augmentation. Most participants (86.4%) were classified as BI-RADS 2 and dense breast tissue. Screening findings were mostly negative or benign (94%), with the remaining 6% demonstrating probably benign findings. No signs of malignancy were detected. There was no significant correlation between age, BMI, hormone use duration, BI-RADS, and breast density.

Conclusion: Breast cancer screening among transgender women in Thailand showed high rates of dense breast tissue and low abnormality detection. Moreover, most of them have previously undergone breast augmentation. Therefore, screening guidelines should use both mammography and ultrasound for early detection.

Keywords: breast cancer screening, breast ultrasound, hormone therapy, mammography, transgender women

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Introduction

Thailand is considered one of the countries with high freedom and acceptance of gender diversity.[1] According to the most recent data from the Ministry of Public Health, in 2020, there were an estimated 310,450 transgender women (TGW) in Thailand. In addition, the Trans-female Association of Thailand reported that at least 2000 women who have transitioned from male to female have already registered as members.[2] It has been found that up to 90% of this group use hormones, which is higher than in the United States and Canada. Most do not receive medical supervision and start using them on their own at an average age of 20, which is younger than in the United States.[3]

Cross-sex hormone therapy plays a significant role in enabling TGW to achieve physical

characteristics aligned with their gender identity and helps to alleviate psychological issues.[4] After 3–6 months of starting hormone therapy, TGW will begin to develop breast bud under the areola, and breast development will continue over the next 2–3 years. The radiological and pathological characteristics are indistinguishable from those of cisgender women.[5,6] However, studies have found that 60% of TGW desire breast augmentation surgery to achieve their desired size, further complicating the assessment of breast tissue through imaging.[7,8]

Currently, evidence shows that TGW on hormone treatment have a higher risk for breast cancer compared to males.[9,10] However, studies on this topic are limited, and existing data primarily come from retrospective studies. There are breast cancer screening guidelines recommended by various institutions such as The University of California, San Francisco (UCSF), Fenway, Endocrine Society, and The American College of Radiology (ACR), suggesting that screening should begin after 5 or more years of hormone use and between the ages of 40–50, or adjusted according to genetic risk factors.[11] Despite an understanding of the importance of screening with 70% of TGW and 60% of transgender men reporting awareness of the significance of breast cancer screening, only a small percentage of transgender individuals have actually undergone screening.[3]

Globally, breast cancer screening guidelines for transgender and gender-diverse (GD) individuals are regularly updated as more people undergo gender-affirming care. These guidelines vary by institution, depending on the patient's unique needs and their history of gender-affirming hormone therapy or surgery. Key criteria such as age, type of gender-affirming care, and screening methods are addressed in the referenced guidelines.[12,13] However, the current guidelines for breast cancer screening in transgender and GD individuals are primarily based on limited data and expert opinions. Collecting robust evidence for this population remains challenging due to several factors, including healthcare access barriers, younger average age compared to typical screening populations, loss to follow-up, and limited clinician experience with transgender care.[14]

To date, there are no specific breast cancer screening guidelines tailored for TGW in Thailand or Asia more broadly. There are several established guidelines, including those from UCSF and ACR, which offer valuable recommendations for imaging practices such as mammography and ultrasound. However, these guidelines have focused on TGW in Europe and America and do not account for the unique needs of Asian TGW. Given Thailand's unique cultural context and the high prevalence of hormone use, a Thai-specific approach is warranted. This study aims to address this gap by examining breast imaging characteristics among TGW who meet the criteria for breast cancer screening. In addition, we seek to identify factors associated with breast density, to inform guidelines tailored to the Thai transgender population and promote early detection.

Methods

Design and setting

This study used a descriptive correlation design with a cross-sectional approach to examine breast cancer screening outcomes among TGW in Thailand. Research indicates that transgender individuals over 40 years old and on hormone therapy for more than 5 years are at higher risk for breast cancer and should undergo mammography.[13] Ultrasound is generally not recommended as a routine tool but is included in Thailand's national guidelines for at-risk individuals. For this study, we included both mammography and ultrasound to ensure comprehensive screening. This approach was taken to address specific scenarios, such as cases with dense breast tissue, where mammography alone might fail to detect certain positive findings. Including both modalities allows us to provide a more complete evaluation of screening outcomes in this population.

The study was conducted at three primary institutes in Bangkok and Pattaya including King Chulalongkorn Memorial Hospital, Tangerine Clinic, and Swing Clinic between October 2022 and October 2023. These institutes were chosen for their expertise in gender-affirming healthcare and their reputation as high-volume centers for transgender care, ensuring a representative sample from this population. The reporting of this study conforms to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement (Supplemental Material 1).[15]

Sample

Given the early initiation of hormone therapy among transgender individuals in Thailand, the inclusion criteria in this study focused on TGW aged 40 years and older with a minimum of 5 years of hormone replacement therapy, aligning with ACR guidelines.[13] Exclusion criteria included a personal history of breast cancer or treatment for a breast mass. Participants were recruited via a convenience sampling method through direct outreach during regular clinic visits.

Data collection

Once the eligible participants agreed to participate, the researchers explained the study objectives and research procedures and conducted interviews to gather their perspectives on ultrasound and mammogram screenings. The procedures for each screening, along with their advantages and disadvantages, were clearly explained. Participants were informed that the screenings were provided free of charge. Data collection commenced after verbal and written consent was obtained.

1. *Interviews and Questionnaires*: Demographic and medical history information was collected through brief structured interviews lasting 5–10 min. Collected data included age, weight, height, infectious disease history, family history of breast or ovarian cancer, hormone therapy history, history of breast augmentation, gender reassignment surgery, and prior breast cancer screenings.
2. *Breast Ultrasound/Mammogram Examination*: All participants underwent breast ultrasound using Logiq E9 ultrasound systems with ML6-15 transducers (GE Healthcare, Chicago, IL, US). Each participant also received a mammogram in standard mediolateral oblique and craniocaudal views. For those with breast implants, an additional Eklund displacement view was performed. Radiologists interpreted the results according to the 5th edition of the Breast Imaging Reporting and Data System (BI-RADS®).[16] Each session took less than 15–30 min. After the examination, participants received their results via phone within 1 week.

Data analysis

The Statistic Package for the Social Sciences for Windows (SPSS/FW) program version 18 was used to analyze the data. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were calculated to summarize participant demographics and medical history. Given the non-normal distribution of data, Spearman Rank Order Correlation was used to evaluate associations between demographic factors and ultrasound/mammogram findings, with an alpha level of 0.05 for two-tailed tests.

Results

Characteristics of the participants and medical history information

Out of 70 initially screened, 4 were excluded due to ineligibility. Ultimately, 66 TGW were included in the study.

Table 1 provides information about the demographics and medical history information of the participants. The details are presented below.

Age. The study included 66 TGW with a mean age of 49.24 ± 6.21 years (age range = 40–69 years). The majority (56.1%) were between 40 and 49 years old, 40.9% were aged 50–59, and 3% were 60 years or older.

Anthropometric measures. The mean body weight of participants was 66.42 ± 10.65 kg. Most participants (40.9%) weighed between 61 and 70 kg. Height of participants had a mean of 168.33 cm (SD = 6.07); most participants (54.5%) were between 161–170 cm. BMI distribution showed that half of the participants (50%) had a normal BMI (18.50–22.9 kg/m²), with a mean BMI of 23.45 kg/m² (SD = 3.65).

Medical and family history. A majority (87.9%) of participants reported no history of communicable diseases. A family history of breast cancer was reported in 10.6% of participants, while 22.7% reported a family history of other cancers. None had a family history of ovarian cancer.

Hormone therapy use. The duration of hormone use averaged 16.30 years (SD = 8.62). Most participants (40.9%) reported using hormones for more than 15 years, while 30% had used them for 5–10 years. Regarding hormone types, 63.6% used oral contraceptive pills (OCP), and 36.4% used estradiol.

Table 1. Number, percentage, mean, and standard deviation of the participant characteristics ($N = 66$).

Variables	N	%
Age (years)		
40–49	37	56.1
50–59	27	40.9
⩾60	2	3
(Mean = 49.24 ± 6.21 years, Range 40–69 years)		
Body weight (kg)		
⩽50	1.5	1.5
51–60	25.8	25.8
61–70	40.9	40.9
71–80	22.7	22.7
⩾80	9.1	9.1
(Mean = 66.42 ± 10.65 kg, Range 50–102 kg)		
Height (cm)		
151–160	6	9.1
161–170	36	54.5
171–180	23	34.8
⩾181	1	1.5
(Mean = 168.33 ± 6.07 cm, Range 155–181 cm)		
BMI (kg/m^2)		
<18.50	2	3.0
18.50–22.9 (normal)	33	50.0
23.00–24.99 (overweight)	14	21.2
25.00–29.99 (obesity class I)	11	16.7
⩾30.00 (obesity class II)	6	9.1
(Mean = 23.45 ± 3.65 kg/m^2, Range 17.31–36.14 kg/m^2)		
Communication disease		
No	58	87.9
Yes	8	12.1
Breast cancer in first- and second-degree relatives		
No	59	89.4
Yes	7	10.6
Family history of ovarian cancer		
No	66	100.0
Family history of other cancers		
No	51	77.3
Yes	15	22.7
Hormonal use (year)		
⩽5	5	7.6
5.01–10	20	30.0
10.01–15	14	21.2
⩾15.01	27	40.9
(Mean = 16.30 ± 8.62 years, range 5–40 years)		
Hormone grouping		
Estradiol	24	36.4
OCP	42	63.6
History of breast augmentation		
No	13	19.7
Yes	53	80.3
Number of breast augmentation surgery ($N = 53$)		
1	44	83.0
2	6	11.3
3	3	5.7
Type of silicone ($N = 53$)		
Gell fill, smooth surface	27	50.9
Gell fill, texture surface	18	34.0
Saline fill	2	3.8
Unknown	6	11.3
Silicone in body ($N = 53$)		
No	1	1.9
Yes	52	98.1
Used to SRS		
No	31	47.0
Yes	35	53.0
Use to screen breast cancer		
No	51	77.3
Yes	15	22.7
Abnormally symptoms in breast		
No	62	93.9
Yes	4	6.1

OCP, oral contraceptive pills; SRS, sex reassignment surgery.

History of breast augmentation. Breast augmentation surgery had been performed in 80.3% of participants, with 83% having undergone one surgery. The most common implant type was gel-filled with a smooth surface (50.9%), followed by gel-filled with a textured surface (34%). Nearly all participants with implants (98.1%) had silicone implants elsewhere in the body.

Gender-affirming surgery and breast cancer screening. A little over half of the participants (53%) had undergone sex reassignment surgery. While 77.3% had never previously screened for breast cancer, 22.7% had undergone screening at least once. In addition, only 6.1% of participants reported having abnormal breast symptoms.

Breast imaging characteristics

Table 2 provides information about the breast imaging characteristics of the participants. The details are presented below.

BI-RADS classification. Most participants (86.4%) were classified as BI-RADS 2, indicating benign findings. A small percentage fell under BI-RADS 1 (7.6%) with normal findings, and BI-RADS 3 (6.1%) indicating probably benign findings. No participants were categorized under BI-RADS 4, 5, or 6.

Breast composition. The majority (78.8%) were classified as having heterogeneously dense breast tissue, followed by 12.1% with scattered areas of fibro-glandular density. A smaller proportion was categorized as having extremely dense (7.6%) or almost entirely fatty (1.5%) breast tissue.

Positive findings. 71.2% of participants had negative findings with no abnormalities detected. Regarding positive findings, 12.1% had cysts, 7.6% had calcifications, 4.5% had macro-calcifications, and 3% had masses. All calcifications and masses were classified as benign or probably benign, and none were deemed suspicious, warranting biopsy.

Axillary lymph node findings. All participants (100%) had normal axillary lymph node findings, with no abnormalities detected in the lymph nodes.

Breast implants. Among the 53 participants with breast implants, implant placement was almost evenly distributed between subpectoral (50.9%) and prepectoral (49.1%) techniques. In terms of implant condition, 54.7% had implants with a normal contour, while 15.1% showed folding and 18.9% had capsular calcification.

In addition, this study identified four individuals with abnormal breast symptoms: one with nipple discharge, two with palpable masses, and one with breast pain. Following mammography and ultrasound, only one person was found to have an abnormality, specifically the individual with a palpable mass. Calcifications were observed on the mammogram, along with a hypoechoic mass on the ultrasound, both classified as BI-RADS 3, indicating a probably benign condition; therefore, a biopsy was not performed (see Figure 1).

Correlation analysis

Table 3 shows the statistical correlations between various factors and breast density. Specifically, There is a negative correlation between age and breast density ($r = -0.144$). However, this correlation is not significant ($p > 0.05$). There is also a negative non-significant correlation between BMI and breast density ($r = -0.154$, $p > 0.05$). Regarding hormone use, breast density has a non-significant correlation with hormonal use ($r = 0.237$, $p > 0.05$). Finally, the correlation between BI-RADS and breast density is negative ($r = -0.093$), but it is also not statistically significant ($p > 0.05$).

Discussion

This study offers valuable insights into breast cancer risks and imaging characteristics among Thai TGW, addressing a significant gap in the existing literature that has largely focused on Western transgender populations. Currently, only 44 cases of breast cancer in TGW have been reported, primarily through cohort studies, case reports, and case series.[17] Notably, one case reported by Gooren, Bowers[18] involved a Thai transgender woman. The findings from this study are particularly significant for Thai TGW, as they may inform culturally specific health guidelines, ultimately improving health outcomes in this population.

In this study, the participants had an average age of 49 years, which is higher than the previous study conducted in Ghent, Belgium

Table 2. Number and percentage of the mammography/ultrasound breast (*N* = 66).

Variables	*N*	%
BI-RADS		
1 (negative)	5	7.6
2 (benign)	57	86.4
3 (probably benign)	4	6.1
4 (suspicious for malignancy)	0	0
5 (highly suggestive of malignancy)	0	0
6 (known biopsy-proven malignancy)	0	0
Breast density		
Almost entirely fatty	1	1.5
Scattered areas of fibroglandular density	8	12.1
Heterogeneously dense	52	78.8
Extremely dense	5	7.6
Positive finding		
None	47	71.2
Cyst	8	12.1
Macrocalcification	3	4.5
Calcification	5	7.6
Mass	2	3.0
Other	1	1.5
Axillary lymph node		
Normal	66	100.0
Abnormal	0	0
Implant technique (*N* = 53)		
Subpectoral	27	50.9
Prepectoral	26	49.1
Implant condition (*N* = 53)		
Normal contour	29	54.7
Folding	8	15.1
Capsular calcification	10	18.9
Intracapsular rupture	5	9.4
Extracapsular rupture	1	1.9
Peri-implant fluid (*N* = 53)		
No	53	100
Yes	0	0

BI-RADS, Breast Imaging-Reporting and Data System.

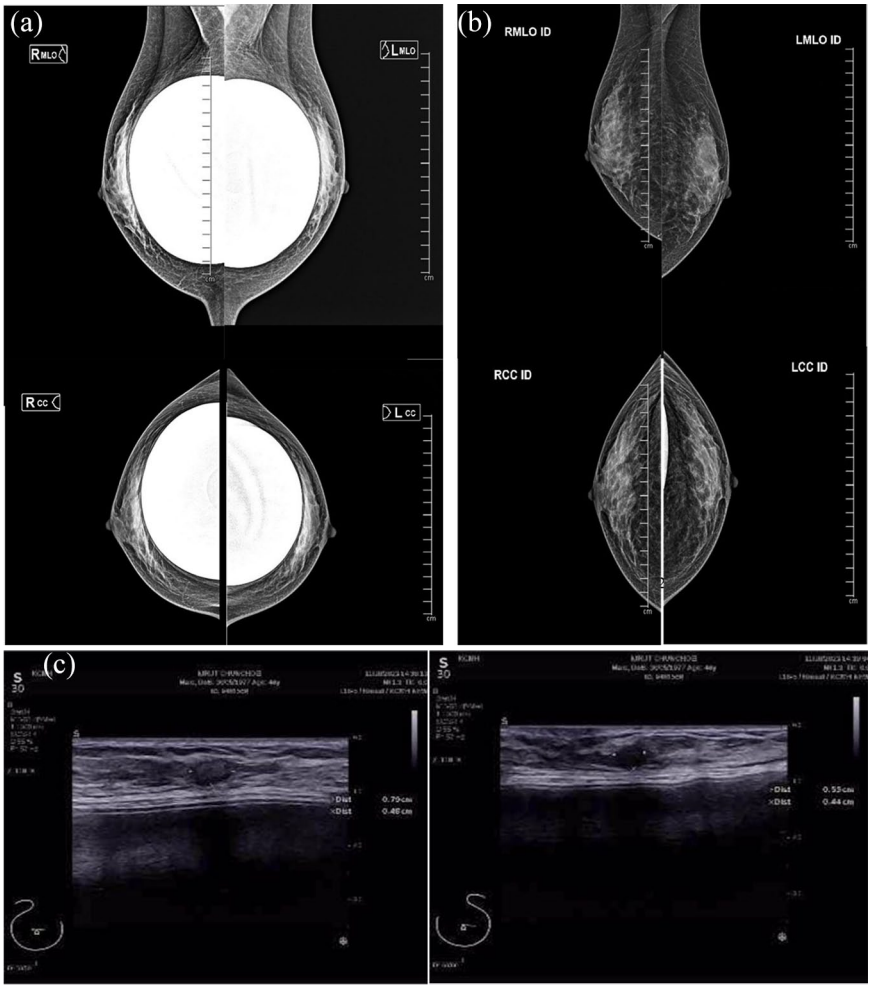

Figure 1. A case of 47-year-old TGW on estradiol therapy for 15 years, presenting with a palpable right breast lump. Screening mammogram shows heterogeneously dense fibrogranular tissue: (a) Mediolateral oblique and craniocaudal view demonstrates bilateral subpectoral prosthesis. (b) Implant displacement view on the diagnostic mammogram demonstrates a few calcifications at the right nipple are observed, benign. (c) Additional ultrasound shows a few circumscribed hypoechoic nodules without vascularity in both breasts.

Table 3. Correlation between participant characteristics, hormonal use, and mammography/ultrasound breast ($N = 66$).

	1. Age	2. BMI	3. Hormonal use	4. BI-RADS	5. Breast density
1.	1.000				
2.	0.253*	1.000			
3.	0.068	−0.106	1.000		
4.	0.019	−0.102	0.112	1.000	
5.	−0.144	−0.154	0.237	−0.093	1.000

*Correlation is significant at the 0.05 level (two-tailed).
BI-RADS, Breast Imaging-Reporting and Data System.

(43.06 ± 10.42).[19] The BMI of transgender individuals in Thailand is slightly lower than that of those in Ghent (23.45 ± 3.65 vs 25.30 ± 5.37), but both groups fall into the overweight category according to BMI standards based on ethnicity.[20,21] This is noteworthy as higher BMI has been linked to increased breast cancer risk in postmenopausal women.[22] Although the relationship between BMI and cancer risk may differ in TGW due to unique hormone profiles, our findings suggest that this metabolic factor should not be overlooked and warrants further investigation in future studies. In addition, the participants in this study reported a family history of breast cancer in first- or second-degree relatives, which is comparable to previous studies (10.6% vs 12%).[19] Family history is a well-established risk factor for breast cancer among men and women.[23,24] This suggests that TGW with a family history of breast cancer might face compounded risk factors, particularly when combined with long-term hormone use. Although there are currently sexual health clinics in Thailand, they are typically accessed only when individuals reach working age or attain legal adulthood.

One of the most significant aspects of this study is the hormone use among Thai TGW. Specifically, the participants have been using hormones for an average of 16 years, predominantly in the form of OCP rather than estrogen therapy typically administered under medical supervision. This unsupervised hormone use is a consequence of the easy accessibility of OCPs through pharmacies without a prescription. Many TGW in Thailand rely on peer-based guidance and social media rather than seeking professional medical advice. This trend is also observed in other developing countries like Malaysia.[25] This lack of medical oversight can lead to inconsistent dosing, potential overuse, and a lack of monitoring for adverse effects, which could elevate breast cancer risk. Therefore, the campaign to encourage these individuals to receive hormones correctly should focus on social media platforms recommended by TGW, including advising the parents of those who have not yet reached legal adulthood to take them for hormone treatment as well. A notable finding in our study was a high percentage of participants (80.3%) who were still dissatisfied with their breast size after undergoing hormone therapy and opted for breast augmentation, which is slightly higher than previous studies that reported rates of 60% and 70%.[11] This finding further reflects cultural norms in Thailand, where breast augmentation is one of the top cosmetic surgeries for cisgender individuals and is widely advertised.[26] Also, it was found that the TGW who underwent breast augmentation in Thailand were more aware of the type of breast implants they had compared to those in Ghent, Belgium (89% vs 77%).[19]

Another important finding of this study is that there was a high prevalence of dense breast tissue, with 86.4% of participants exhibiting extremely dense or heterogeneously dense breast tissue. This aligns with previous studies on breast density in TGW, although most of those studies were retrospective, case reports, or reviews.[11,27–30] There is only one study that reported mammography results in 50 TGW conducted by Weyers, Villeirs.[19] They found that 60% of the individuals had dense and very dense breast tissue, defined as having glandular tissue comprising more than 25%.[19] This study found a higher trend in breast density may be attributed to the different categorizations used for breast density. In the 5th edition, percentage density was eliminated and replaced with an emphasis on how breast density affects the ability to detect underlying cancer (the degree of masking).[27,16]

Moreover, breast density has a non-significant correlation with hormonal use ($r = 0.237$, $p > 0.05$) suggesting that hormonal therapy does not consistently affect breast density. Although previous studies have indicated that hormonal use can influence breast density,[31] the current findings suggest that this effect may not apply to the TGW in this study. In addition, the lack of significant correlations between breast density and age, BMI, or BI-RADS suggests that within this study, none of the variables influence breast density. A possible explanation is that breast density is complex and may be affected by a combination of many factors.

Mammogram is a recommended breast imaging modality for breast cancer screening among TGW.[14] However, this study found that most TGW in Thailand have dense breasts and breast implants. According to data from studies in cisgender women, high breast density and breast implants make it more challenging to detect abnormalities.[32] Special techniques or additional tools, such as ultrasound and MRI, are required to enhance the accuracy of breast cancer screening.[33–35] Therefore, the researchers believe that screening should be performed

using mammogram and ultrasound, following the guidelines issued by the institution in Thailand—the Center of Excellence in Transgender Health (CETH).

Last but not least, among all the positive findings, none raised suspicions of malignancy; therefore, no participants were required to undergo a biopsy. Instead, they were advised to return for a follow-up examination in 6 months. The 6-month follow-up period allows for early detection of any significant developments without subjecting patients to the risks and anxiety associated with biopsies.[36]

Limitation

A key limitation of this study is the relatively small sample size, which may have limited the detection of cases with suspected malignancy. Moreover, this study lacks data on the long-term implications of breast imaging findings, as follow-up was limited to a single, short-term interval. Future research would benefit from larger sample sizes and extended follow-up periods to better assess the potential for malignancy and the progression of benign findings over time.

Moreover, the absence of standardized breast imaging interpretation protocols specific to transgender individuals poses a challenge in both clinical practice and research. Current breast imaging guidelines are primarily based on cisgender populations, which may limit the applicability of findings to transgender patients. Future studies should consider establishing and validating standardized protocols for this population to improve the consistency of results and enable more meaningful comparisons with existing literature.

Conclusion

This study highlights the importance of establishing breast cancer screening guidelines specifically tailored for TGW in Thailand. This study is consistent with previous research, showing high rates of dense breast tissue and low abnormality detection, with most participants having undergone breast augmentation. Therefore, screening should involve multiple modalities, including mammogram and ultrasound, to aid in detection. Consequently, the guidelines of the CETH in Thailand recommend performing both mammogram and ultrasound. The study provides valuable insights into the unique characteristics of TGW undergoing hormone therapy, including the age at which screening should begin and their hormone usage patterns. This study also suggests the need for further research with larger sample sizes and long-term follow-up to better understand the implications of breast imaging. Ultimately, the study emphasizes the significance of creating standardized protocols for breast cancer screening in transgender individuals to improve healthcare outcomes and provide clearer guidance for clinicians.

Declarations

Ethics approval and consent to participate

The study protocol was approved by the Institutional Review Board of the Faculty of Medicine, Chulalongkorn University (IRB Number 585/63). Informed consent was obtained from all participants after explaining the study objectives, risks, benefits, and their rights to withdraw or decline participation without any impact on their treatment. All personal and health information provided was kept confidential and de-identified, and the data were used solely for educational purposes.

Consent for publication

Not applicable.

Author contributions

Poonpissamai Suwajo: Conceptualization; Funding acquisition; Methodology; Supervision; Writing – original draft; Writing – review & editing.

Pavinee Annopporchai: Data curation; Formal analysis; Investigation; Methodology; Validation; Visualization; Writing – original draft; Writing – review & editing.

Jenjeera Prueksadee: Data curation; Investigation; Methodology.

Patcharin Krongtham: Data curation; Software; Validation; Writing – original draft.

Sopark Manasnayakorn: Conceptualization; Supervision.

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Supplemental material
Supplemental material for this article is available online.

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