Effect of Educational Program on Women's Knowledge, Practices and Attitude regarding Mammography Screening and Fibro-Glandular Density

Noura Mohammed Attia Ahmed[1], Fatma Talal Fathy Ali[2], Howida Ragab Mohammed Ragab[3]
[1]Assistant Professor of Obstetrics and Gynecological Nursing, Faculty of Nursing, Zagazig University, Egypt.
[2] Lecturer of Obstetrics and Gynecological Nursing, Faculty of Nursing, Zagazig University, Egypt [3]Assistant Professor of Obstetrics and Gynecological Nursing, Faculty of Nursing, Zagazig University, Egypt.
Corresponding author: Fatmatalal25@gmail.com FTAly@nursing.zu.edu.eg

Abstract

Background: Breast cancer is a significant health concern for women worldwide, and mammography screening plays a crucial role in early detection and treatment**.** Thus, **the aim** of this study was to evaluate the Effect of educational program on women's knowledge, practices & attitude regarding mammography screening and fibro-glandular breast density. **Research Design**: A quasi-experimental research design with (pretest and posttest) was used to carry out this study. **Setting**: The study was conducted at women health (Mammogram Unit) on the ground floor, at Sidnawy sector, Zagazig university Hospitals. **Subjects**: The study included a convenient sample of **(50)** women who were accepted to participate in the study. **Tools of data collection:** Four tools were used: **Tool I**: A structured interview questionnaire. **Tool II:** Women's knowledge regarding Mammography screening and fibro-glandular breast density**. Tool III:** Women's practices observational checklist. **Tool IV:** Women's attitudes regarding Mammography screening and fibro-glandular breast density. **Results:** The study showed significant improvements in women's knowledge, practices and attitudes regarding mammography breast cancer screening and fibro glandular density, with a strong correlation between these factors, highly significant difference (P <0.0001). **Conclusions**: The present study achieved its goals and objectives and women's knowledge, practices and attitudes about breast cancer, mammography and fibro glandular density were positively enhanced. **Recommendations**: Breast cancer screening mammography and fibro glandular density awareness are essential for early detection and should be emphasized in nursing curricula and health education programs to reduce mortality and morbidity rates. Further research on women's intention and readiness to perform breast cancer screening mammography, as well as factors influencing its use, should involve maternity and gynecological nurses.

Keywords: ***Educational Program, Knowledge, Practices, Attitude, Mammography Screening & Fibro-Glandular Density.***

Introduction

Breast cancer (BC) is the most prevalent type of cancer worldwide and the second leading cause of mortality for women. Globally, 31% of female cancer cases are caused by breast cancer, which also causes roughly 2.5% (1 in 39) of all female cancer deaths. In the world in 2020, there will be 2,261,419 newly diagnosed cases. (**The American Cancer Society Breast Cancer Facts and Statistics, 2023, & American Society of Clinical Oncology, 2023**).

Breast cancer is the most prevalent type of cancer among Egyptian women and the primary cause of death from the disease. It accounts for almost 22,000 new cases annually and 33% of cancer cases in females. Egypt's breast cancer survival rate varies from 28% to 68% due to the majority of women seeking diagnoses late in the disease's progression, which leads to unfavorable results. **(Abdelaziz et al., 2021, &Alorabi et al., 2021).**

The exact causes of breast cancer are unknown; however, there are numerous risk

factors that increase the likelihood of developing the illness. These include the following: being a woman, reaching middle age, having a family history of type 2 diabetes, having dense breast tissue, using hormone therapy and contraception, and leading a lifestyle that includes alcoholism, obesity, and radiation exposure. **(Bray et al., 2024).**

Women's breast cancer manifests as a lump or thickening of the breast, changes in the breast's size, shape, or appearance, orange-peel skin, a newly inverted nipple, cracking, scaling, crusty pigmented areola, and redness of the skin **(Azuero et al., 2018)**.

Monthly self-examination of the breast, annual or semiannual clinical breast examination, ultrasonography, breast MRI, annual mammography, or a combination of these techniques is used to diagnose breast cancer in women. By reducing the death rate by roughly one-third, these techniques can aid in the early detection of the illness. **(Luleci et al., 2022).** Mammography for breast cancer screening is a useful tool and a great method for screening asymptomatic women in order to identify and treat breast cancer early on, which lowers the death rate. **(Yik et al., 2022)**.

Breast density is one risk factor for breast cancer detection since dense breast tissue can obscure underlying disease and reduce mammography's sensitivity. 10% of women are estimated to have extremely dense breast tissue, whereas 40% to 50% of women have dense breasts. **(Cruwys 2020, Mayo Clinic 2020).** Other screening methods include magnetic resonance imaging (MRI) and ultrasound.

A mammography will show the density of a woman's breasts. Fatty tissue, supportive breast tissue, milk glands, and milk ducts make up breast tissue. Fatty tissue is non-dense and appears dark on a mammography, whereas supportive tissue is dense and appears white. Breast density is more common in younger women, those with lower body mass indices, and those undergoing hormone replacement treatments (**Vourtsis & Berg 2019)**.

Lack of information about breast cancer and the significance of early diagnosis and management, as well as social, cultural, and financial factors, negative attitudes and misconceptions about breast cancer screening, fear of the disease, fear of possible radiation side effects, and false-positive results that require further testing can all have an impact on women's capacity to perform breast cancer screening mammography **(Alenezi et al., 2022)**. Additional concerns include inadequate procedures before, during, and after the breast cancer screening mammography, which can result in false positive results, and low self-efficacy, which is a major predictor of women's intention to conduct mammography **(Abdullah et al., 2022)**.

Maternity and gynecological nurses can also offer women undergoing breast cancer screening mammography with health education, as well as emotional and physical support, answers to questions, referrals to other services, and a bridge to all members of the treatment and diagnostic team. Additionally, they can support women, their families, or caregivers who are afraid of receiving a breast cancer diagnosis. **(Saad et al., 2022**).

Significance of the study

Maternity and gynecological nurses can collaborate with mammography specialists to enhance women's knowledge, attitudes, and practices regarding breast cancer screening mammography (prior to, during, and following mammography). This will help to prevent false positive results for breast cancer by putting in place educational programs. Few studies have been conducted on how educational programs affect women undergoing breast cancer screening mammography in terms of their knowledge, attitudes, and practices and implication regarding fibro glandular density **(Rakhshani et al. 2022).** So, this study will help women to be engaged in preparation for breast screening practice and recognize alternative screening in case of dense breast tissues. In addition to encouraging women to become familiar with their breasts, managing breast problems and promoting and informing women about appropriate screening programs.

Aim of the study

This study aimed to evaluate the Effect of educational program on women's knowledge, practices & attitude regarding mammography screening and fibro-glandular breast density.

Research hypothesis: women's Knowledge, practices and attitudes regarding mammography screening and fibro-glandular breast density are expected to be improved after implementation of educational program.

Operational Definitions:

******Educational Program:*** A program consisting of multiple educational sessions and culturally adapted materials designed to increase knowledge, improve attitudes, and promote mammography screening rates among women **(El- Adham & Shaban 2023)** and **(Noman et al., 2020).**

* ***Mammography Screening***: is the systematic use of mammographic imaging (a medical procedure) in asymptomatic women to identify breast abnormalities before they become clinically apparent **(Autier et al., 2024).**

* ***Fibro-Glandular Density*****:** is a key concept in breast imaging and cancer risk assessment; it is typically defined as the percentage of fibroglandular tissue (glandular and connective tissue) relative to the total breast area or volume, as seen on imaging modalities such as mammography, digital breast tomosynthesis, or breast CT **(Fedon et al., 2021).**

Subjects and Method

Study Design: A quasi-experimental research design was used to conduct this study (pre/posttest).

- Quasi-experimental research designs examine the cause-and-effect relationship between two variables (the independent and dependent variable). The independent variable (educational program) was the variable of influence, and the dependent variables (knowledge, practices, and attitude of the studied women regarding mammography screening and fibro-glandular density) were the variables that affected by the intervention.

Setting: The study took place at women health (Mammogram Unit) on the ground floor, at Sidnawy sector, Zagazig university Hospitals.

Subjects: The study included **a convenient sample** of (50) women who were accepted to participate in the study

Data Collection Tools

To achieve the study's objectives, four tools were employed:

Tool I: Structured Interview Questionnaire: Developed by the researchers after a thorough literature review, this questionnaire gathered data on the socio-economic characteristics of participants and comprised 24 items covering general characteristics (age, marital status, residence, education and occupation, weight, height and BMI) obstetrics and gynecological history (gravidity, parity, breastfeeding, presence of gynecological diseases, family history of breast cancer, and breast self-examination)Menstrual & contraceptive history (Menstrual Rhythm, Intake of hormonal contraception, Duration of intake, Hormonal replacement therapy)Present history of diagnostic screening (Number of previous mammography, Breast dense tissues, categories of fibro glandular density and alternative screening).

Tool II: Women's knowledge regarding Mammography screening and fibro-glandular breast density which consists of 3 parts:

Part (A): 5 items on knowledge about breast and breast cancer, including definition, risk factors, manifestations, Screening technique required and management). The total score ranged from 0 to 32.

Part (B): This section included 15 items on knowledge about breast cancer mammography screening, covering its definition, reliability, uses, importance, recommended starting age, optimal timing for screening, potential complications, recurrence,

preparation, precautions and factors affecting results. Scores ranged from 0 to 15.

Part (C): This includes 6 items on women's knowledge about fibro-glandular breast density definition, risk factors, categories, incidence, degree that require referral to another screening technique and other screening tests needed. Scores ranged from 0 to 17.

Knowledge was scored as follows: Correct and complete answers earned 1 point, and incorrect or unknown answers earned 0 points. Knowledge levels were categorized as:

- **High (≥75%)**
- **Moderate (50-75%)**
- **Low (<50%)**

Tool III: Women's practices regarding Mammography screening and fibro-glandular breast density:

An observational checklist of women practices regarding the breast cancer screening mammography: It was developed by the researchers after reviewing recent related literature **(Abda et al. 2017, Saei et al. 2018, & Dandash et al. 2017).** It included the following three parts:

Part (A): an observational checklist of women Practices before the Breast Cancer Screening Mammography

o Scheduled mammography during a period of reduced breast pain perception to prevent increased pain and false negative results.

o Be aware that a mammogram requires roughly half an hour.

o Told her companions that they are not allowed to enter the examination room for fear of exposure to radiation .

o Don't apply powder or deodorant under your arms on the day of the mammography test.

o Take the medications that your doctor suggested an hour prior to the exam to help you deal with any discomfort that might arise.

o Before beginning the examination, take off all clothing and remove any jewelry or decorations from the upper body.

o Put on a dress with a front opening.

o Notify the mammogram technologist if she has (cosmetic) breast implants .

Part (B): Women's Practices during the Breast Cancer Screening Mammography

o Take a position in front of the mammography scanner that is being utilized.

o Place the breast on the hard surface of the mammogram machine close to another surface to press together on the breast until its area is expanded and the tissues are sufficiently distributed .

o If the pain becomes intolerable, tell the radiologist knows.

o Extend your arms beyond the frame for the picture.

o Remaining motionless throughout the mammography process as movement produces inaccurate findings.

o Holding breath during mammography .

o After taking pictures of the first breast from every angle, carry out the same procedures with the other breast.

Part (C): Women's Practices after Breast Cancer Screening Mammography

o Putting on clothes .

o Establish a timetable for when you will get the test findings .

o Consult the specialized physician again.

Scoring System for Women's Practices:

- Actions completed were scored as (1).
- Actions not completed were scored as (0).

The total score for women's practices was categorized as follows:

- **Satisfactory practice: ≥ 75%**
- **Unsatisfactory practice: <75%**

Tool (IV): Women's attitudes regarding Mammography screening and fibro-glandular breast density:

It included 12 statements, with five reflecting negative attitudes and seven reflecting positive attitudes. Negative statements included

beliefs such as mammography is undesirable, fear of radiation, radiation is painful, radiation induces embracement and not necessary, feeling of discomfort when talking with me about breast density. Positive statements included views on the importance of information about mammography, understanding procedures, and planning for screening, preparation for procedure, optimal time in relation to age and presence or absence of menstruation, fibro-glandular breast density appearance in mammography screening is a landmark for cancer, aspect of missed diagnoses necessitating further imaging studies as MRIs and ultrasounds.

Responses were recorded as "yes" (1 point) or "no" (0 points), with scores inverted for negative statements. Attitudes were categorized as:

- **Positive (≥50%)**
- **Negative (<50%)**

Tools content validity and reliability: The comprehensiveness of the three tools was assessed by an expert panel of three professors from Zagazig University's nursing faculty and one medical specialist with obstetrics and gynecologic medicine competence. Additionally evaluated were the submissions' appropriateness and readability. The panel of experts assessed the tools' validity based on both their appearance and substance. Along with other little but necessary changes, a few sentences and a few elements were altered.

Cronbach's Alpha		N
Breast cancer knowledge	0.865	33
Mammography knowledge	0.877	15
Fibro glandular knowledge	0.739	17
○ **Total knowledge**	**0.761**	**65**
Practice before mammography	0.733	8
Practice during mammography	0.71	7
Practice after mammography	701	3
○ **Total practice**	**0.742**	**18**
Attitude mammography	0.7	7
Attitude fibro glandular	0.73	5
○ **Total Attitude**	**0.723**	**12**

Pilot Study: Ten percent of the sample, or **eight women**, participated in pilot research to evaluate the tools' use, practicality, and clarity. The tools were refined for use after the pilot study, and the pilot study participants were not included in the final study population.

Field work: The actual study field: The study data was collected from 1st January to 30th May 2025.

The study is composed of the following: Understanding the definition, incidence, etiology, risk factors, manifestation, diagnosis, complications, prevention, and management of breast cancer, as well as the anatomy and physiology of the breasts. It also covered information on mammography screening for breast cancer, including its definition, significance and how women should behave prior to, during, and following a mammogram.

The study **objectives** were to increase understanding of breast anatomy, breast cancer, and breast cancer screening mammography; to communicate in order to build rapport and a better understanding of the needs of the women; and to offer comfort, encouragement, and useful information to help them change their opinions about breast cancer screening mammography in order to treat fibro glandular density and detect breast cancer early.

Study was implemented through four phases: assessment, planning, implementation, and evaluation.

Phase I: Assessment Phase (Pre /post-test)

In this phase, **Tool (I)** was used once before implementing the educational program to gather data on the socioeconomic, medical, obstetric, and gynecological, menstrual, contraceptive and present histories of the women in the study.

Tools (II) parts (A), (B) and (C) were utilized once on the day of the mammography and following the implementation of the educational program to evaluate the participants' knowledge about breast anatomy,

breast cancer, breast cancer screening mammography and fibro-glandular density.

Tool (III) was used before and after the program implementation (on the day of the mammography). Researchers observed the women's performance during the screening mammography from the observation windows where the technicians or radiologists were stationed, to evaluate their practices before, during, and after the mammography**.**

Tools (IV) was administered once before the program implementation (on the day of the mammography) and following the implementation of the educational program to assess the attitudes and awareness of the women undergoing breast cancer screening mammography and fibro-glandular density.

Phase II: Planning Phase

The goal of educational program was to improve women's knowledge, practices and attitudes related to breast cancer, mammography screening and fibro-glandular density.

Based on the predetermined aims and objectives, the preliminary evaluation of women's knowledge, practices and attitudes, and pertinent literature, the researchers created the material for both theoretical and practical sessions. Drawing from existing literature and the assessment results, an educational booklet was developed with the aim of improving the knowledge, attitudes, and practices of the participants.

A variety of instructional strategies and resources were also produced, such as role plays, power point presentations, movies, posters, group discussions, and a genuine breast self-examination model. In order to further improve women's knowledge and habits about mammography, these resources were created to cover many elements of breast cancer screening, such as the usage of deodorants, powders, adornments, cosmetics, painkillers, jewelry, and front-opening apparel.

Phase III: Implementation Phase

The researchers conducted this phase in the study conditions that were previously indicated. There were fifty women in the study. These women were interviewed as part of evaluation phase to find out more about their beliefs, knowledge, and behaviors around fibro-glandular density and mammography screening.

Interview conducted in a private room inside woman health unit in the ground floor which prepared for changing cloths and applying instructions before mammography screening

The educational program was divided into five parts: practical sessions lasting for 90 minutes and, meanwhile, theoretical sessions lasting for 120 minutes. During morning shifts, three days weekly. Five groups were involved in the study; everyone consisted of ten cases per month to complete their educational sessions throughout a period of five months extending from the 1st of Jan to the end of May. An independent interview for every woman was conducted separately to take a chance for sufficient understanding and allowed them to ask questions and provided a period of discussion.

	Pre-test (before mammography)		Post test Immediately after mammography	No. cases
	Theoretical	Practical		
January	120 min. 8-10 am	90 min. 10-11.5 am	45 min. 12.15-1.00pm	10 cases
February	120 min. 8-10 am	90 min. 10-11.5 am	45 min. 12.15-1.00pm	10 cases
March	120 min. 8-10 am	90 min. 10-11.5 am	45 min. 12.15-1.00pm	10 cases
April	120 min. 8-10 am	90 min. 10-11.5 am	45 min. 12.15-1.00pm	10 cases
May	120 min. 8-10 am	90 min. 10-11.5 am	45 min. 12.15-1.00pm	10 cases

The implementation of the educational program followed this sequence:

1.**Initial Interview and Consent:** The researchers performed the initial interview with the women on the day they came for their physical check. They sent out invitations to the ladies to take part in the study, got their informed consent, and sent each one a booklet that was already written.

2.**Theoretical Sessions:**

- **First Theoretical Session:** presented information on breast anatomy and introduced the training program's goals and objectives.
- **Second Theoretical Session:** Centered on breast cancer and covered topics such as definition, prevalence, symptoms, treatment, and consequences.
- **Third Theoretical Session:** This session covered knowledge about breast cancer screening mammography and fibro-glandular density and its level, etiology, diagnosis, and further diagnostic screening.

3.**Practical Sessions:**

- **First Practical Session:** held on the day the ladies were scheduled for their mammograms as part of their breast cancer screening regimen, and it addressed the useful features of the screening procedure. Each participant received thorough instruction and hands-on experience related to fibro-glandular density and mammography screening thanks to this organized method.
- **Second Practical Session:** This session focused on practices before, during, and after the breast cancer screening mammography and fibro-glandular density.

The researchers used the above-mentioned teaching and learning strategies to improve women's understanding, perspectives, and behaviors about fibro-glandular density and mammography screening. Every session started with an overview of the goals for the upcoming one, followed by comments and a re-demonstration of the previous one. Following each session, participants had a chance to ask questions, receive information about the goals of the subsequent one, and participated in discussion time.

Phase IV: Evaluation Phase:

In order to ascertain how well the educational module contributed to the improvement of habits, attitudes, and knowledge about fibro-glandular density and mammography screening, its effectiveness was evaluated. By comparing pre- and post-test levels utilizing study tools, the evaluation assessed improvements in knowledge, attitudes, and practices.

Ethical Considerations and administration:

Ethical consideration: The ethical committee at Zagazig University's Faculty of Nursing granted approval. The **Zu.Nur.REC#:0222/4/11/2024** was the code of ethics. We obtained informed consent from every research participant. Participants received assurances that there would be no harm or discomfort from the study, as well as information regarding its goal and their ability to withdraw at any moment. Data collection was conducted with strict confidentiality and privacy protocols in place, and the data was utilized only for the objectives of the study.

Administrative design: To get authorization to conduct the study, an official letter detailing the goal of the study was received from Zagazig University's Faculty of Nursing and presented to the appropriate authorities at the designated settings.

Limitations of the study

Limitations of the current study were the fact that data was only collected via a questionnaire. This study's outcomes were contingent upon the precision and honesty with which the participants answered. All of these could result in bias in information. Furthermore, Appendices used were too long and take a long time spent with every case. Number of participants involved in the study needs to increase in future studies to avoid bias.

Statistical Analysis:

All data were collected, tabulated and statistically analyzed using (IBM SPSS Statistics for Windows, Version 23.0. Armonk, NY: IBM Corp.2015). The Shapiro Wilk test was used to detect the normality of data. Quantitative variables presented with mean and standard deviation, median, range. MCnemar test was used to compare between paired categorical variables. Marginal homogeneity test was used to compare between paired ordinal variables. Chi square tests or Fisher Exact tests were used to compare categorical variables when appropriate. All tests were two sided. P-value < 0.05 was considered statistically significant and p-value≥ 0.05 was considered

statistically non-significant (NS). Pilot study was done 15% (8 women) to estimate reliability of study tools.

Results

Table 1 shows the socio-demographic characteristics of the studied women. It was observed that 52.0% of the studied women were aged <50 years old with a mean age of 48.96±14.5. Regarding BMI, the studied women were obese, with a mean of 30.91±7.28. In addition, 60.0% of women were married, and 72.0% of them were from rural areas (rural dwellers). Also, 68.0% of women had a primary educational level, and the majority of them (88.0%) were housewives.

The past obstetric & gynecological, menstrual and breast screening history of the studied women was presented in **table 2.** It reveals that more than half of the women (52.0%) had a history of more than two pregnancies and deliveries, and nearly three-quarters (72.0%) had breastfed their children. Also, the vast majority of women (88.0%) reported prior gynecological diseases. Furthermore, 64.0% of the studied women had no family history of breast cancer, while nearly three-quarters of women (74.0%) did not undergo breast self-examination.

Concerning menstrual & contraceptive history, 76.0% of the studied women had regular menstrual cycles, and nearly half of them (48.0%) used hormonal contraceptive methods with a mean duration of 6.8±6.2. Additionally, 24.0% of the women were taking hormonal replacement therapy (HRT) with a mean duration of 24.5±13.6. As regards breast screening history, 64.0% of the studied women underwent mammography at least once. The results showed the presence of dense breast tissue in 68.0% of the women who underwent mammography. Additionally, ultrasound was used as an alternative screening method in nearly three-quarters (74.0%) of the studied women.

Table 3 represents marked improvements regarding breast cancer knowledge items post intervention among the studied women with a highly statistically significant difference (P < **0.0001**). It is clarified that the proportion of women correctly defining breast cancer increased from 22.0% pre intervention to 86.0% post intervention. Furthermore, knowledge related to common risk factors of breast cancer such as hormonal contraceptives, advanced age, and positive family history, improved from (40.0%, 38.0%, and 64.0%) pre intervention to the vast majority (90.0%, 88.0%, and 86.0%, respectively) post intervention. Additionally, awareness of major signs and symptoms of breast cancer, including breast lumps, nipple changes (inversion/retraction), and severe persistent pain (not related to the menstrual cycle); improved from (96.0%, 64.0%, and 86.0%) pre intervention to (100.0%, 100.0%, and 96.0%, respectively, post intervention.

Table 4 presents the distribution of the studied women according to their knowledge regarding mammography. It was observed that there was improvement in all mammography knowledge items at post intervention with a highly statistically significant difference (P <**0.0001**). As evidence, knowledge levels increased substantially from (20.0%, 14.0%, 46.0%, 24.0%, 38.0%, and 16.0%) pre intervention to (96.0%, 76.0%, 92.0%, 80.0%, 76.0%, and 74.0%, respectively) post intervention among the studied women for key statements such as mammography uses X-rays at a little higher dose than a chest X-ray; it can also find breast tumors smaller than 0.5 cm; it is a reliable method for early detection of breast cancer; it is the best diagnostic technique for identifying irregular micro-calcification, the early indication of breast cancer; it can also be performed in women's 20s; and it can be used to detect all forms of breast cancer.

Table 5 demonstrates high statistically significant differences regarding knowledge related to fibro glandular density items among the studied women post intervention (P <0.0001). It is obvious that correct responses related to the definition of fibro glandular density increased from 24% pre to the vast majority, 92.0%, post intervention. Additionally, knowledge related to risk factors of fibro glandular density, such as contraceptives and hormonal therapy, improved from 56.0% & 36.0% pre intervention to the vast majority,

90.0% & 86.0%, post intervention, respectively. The most common levels of fibro glandular density were almost entirely fatty (10.0% incidence level) and scattered fibro glandular (40.0% incidence level). On the other hand, all the studied women demonstrated the awareness of the need for alternative screening techniques for high-density levels (3rd and 4th levels of fibro glandular density) and recognized ultrasound as a suitable alternative.

Concerning the Knowledge' dimensions level among the studied women, **figure (1)** illustrates a significant improvement in all knowledge levels regarding breast cancer, mammography, and fibro glandular density at the post intervention program. As evidence, the level of knowledge score improved from low (76.0%, 54.0%, and 80.0%, respectively) pre intervention to high (72.0% and 88.0%, respectively) for breast cancer, mammography and moderate (56.0%) for fibro glandular density among the studied women at the post intervention program. Moreover, the total knowledge score changed from low (80.0%) pre intervention to high (70.0%) post intervention among the studied women, underscoring the effectiveness of the intervention.

Table 6 shows mammography-related practices among the studied women pre and post intervention. The women' practice level regarding mammography (before, during, and after) was improved after intervention among women, with highly statistically significant differences (P <0.0001). It is clarified that correct practices before mammography increased substantially, including awareness of the mammography's duration (a mammogram requires roughly half an hour, (96.0% post-intervention vs. 28.0% pre-intervention) and avoiding companions in the examination room due to radiation exposure (96.0% post-intervention vs. 32.0% pre-intervention). Additionally, 92.0% of women adopted the correct practice of avoiding the application of powder or deodorant under their arms on the day of the mammography test post intervention compared with 4.0% pre intervention.

During mammography, significant improvements were observed in practices such as informing the radiologist about intolerable pain (98.0% post-intervention vs. 62.0% pre-intervention), proper arm positioning (98.0% post-intervention vs. 54% pre-intervention), and remaining motionless throughout the mammography process, as movement produces inaccurate findings (86.0% post-intervention vs. 6.0% pre-intervention). Furthermore, 92.0% of women agreed to consult a specialized physician after mammography post-intervention, compared to 72.0% pre-intervention.

Figure (2) displays the studied women' practice regarding mammography; there was a significant improvement in all practice items (before, during, and after mammography) at post intervention. It is noticed that the studied women with satisfactory practice levels increased from (4.0% and 4.0%, and 24.0%, respectively) pre intervention to (94.0%, 90.0%, and 86.0%, respectively) post intervention. Furthermore, the total practice level towards mammography was satisfactory among 96.0% of the studied women post intervention in comparison with 2.0% pre intervention.

Table 7 reveals that there was a marked improvement in all attitude items (positive attitude) regarding mammography and fibro glandular density at post intervention, with a highly statistically significant difference at **P < 0.001**. It clarified that the proportion of women with positive attitudes increased substantially, with 100.0% agreeing on the importance of knowledge about mammography and understanding the mammography process (before, during, and after) post-intervention, compared to 28.0% and 22.0% pre-intervention, respectively. Furthermore, there was a considerable improvement in attitude items toward fibro glandular density, with women recognizing the association between dense breast tissue and increased breast cancer risk, as well as the composition of dense breast tissue.

Figure (3) demonstrates that (20.0% and 8.0%, respectively) of the studied women have a positive attitude regarding mammography and fibro glandular density at the pre intervention. While changed to (90.0% and 86.0%, respectively) at the post intervention. Moreover, the total attitude score improved from 12.0% pre to 96.0% post intervention among the studied women.

Table 8 reveals significant positive correlations between the studied women's knowledge, attitudes, and practices regarding breast cancer. It shows that there was a highly statistically significant correlation found between total knowledge about breast cancer and total knowledge about mammography ($r = 0.443$, $p = 0.001$) and total practice score ($r = 0.331$, $p = 0.019$). Moreover, a significant correlation was observed between total knowledge about mammography and total practice score ($r = 0.454$, $p = 0.001$). These findings suggest that improved knowledge about breast cancer and mammography is associated with better practices.

Table (1): Distribution of the studied women according to their socio-demographic characteristics (n=50):

Socio-Demographic Characteristics (n=50):		No.	%
• **Age group**	<50 year	26	52.0
	≥50 year	24	48.0
	Mean±SD	48.96±14.5	
	median (range)	47(25-74)	
• **BMI**	Mean ±SD	30.91±7.28	
	Median (range)	27.5(21.5-46.9)	
• **Marital status**	Married	30	60.0
	Divorced	4	8.0
	Widow	16	32.0
• **Residence**	Rural	36	72.0
	Urban	14	28.0
• **Education**	Primary	34	68.0
	Preparatory	6	12.0
	University	10	20.0
• **Job**	Housewife	44	88.0
	Working	6	12.0

Table (2): Distribution of the studied women according to their Obstetrics and gynecological, menstrual, breast screening history (n=50):

Variables			No.	%
•	**Obstetrics and gynecological history**			
o	Number of gravidity	1-2	24	48.0
		>2	26	52.0
o	Number of parity	None	6	12.0
		1-2	18	36.0
		>2	26	52.0
o	Breast fed babies	No	14	28.0
		Yes	36	72.0
o	Gynecological diseases	No	6	12.0
		Yes	44	88.0
o	Family history of breast cancer	No	32	64.0
		Yes	18	36.0
o	Breast self-examination	No	38	76.0
		Sometimes	10	20.0
		Yes	2	4.0
•	**Menstrual & contraceptive history**			
o	Menstrual rhythm	Regular	38	76.0
		Irregular	12	24.0
o	Intake hormonal contraceptive	Yes	24	48.0
		No	26	52.0
o	Duration of intake(month)	Mean ±SD	6.8±6.2	
		Median (range)	3.5(1-15)	
o	Intake hormonal replacement therapy	Yes	12	24.0
		No	38	76.0
o	Duration of intake(month)	Mean ±SD	24.5±13.6	
		Median (range)	30(3-36)	
•	**Present history of breast screening**			
o	Previous mammography	No	16	32.0
		Yes	34	68.0
o	Number of previous mammography	1	32	64.0
		2	2	4.0
o	Breast dense tissues	No	16	32.0
		Yes	34	68.0
o	Categories of fibro glandular density	Almost entirely fatty	16	32.0
		Scattered fibro glandular	28	56.0
		Heterogeneously dense breasts	6	12.0
o	Alternative screening	No	8	16.0
		Ultrasound	37	74.0
		MRI	5	10.0

Table (3): Distribution of the studied women according to their knowledge regarding breast cancer items pre and post intervention (n=50):

Knowledge regarding breast cancer items	Pre intervention				Postintervention				p-value
	Correct		Incorrect		Correct		Incorrect		
	No.	%	No.	%	No.	%	No.	%	
A. Definition of breast cancer:	11	22.0	39	78.0	43	86.0	7	14.0	**0.0001***
B. Risk factors of breast cancer:									
1. Positive family history	32	64.0	18	36.0	43	86.0	7	14.0	**0.0001***
2. Early menarche/late menopause	19	38.0	31	62.0	35	70.0	15	30.0	**0.0001***
3. Advanced age	19	38.0	31	62.0	44	88.0	6	12.0	**0.0001***
4. Women who do not breastfeed	14	28.0	36	72.0	38	76.0	12	24.0	**0.0001***
5. Obesity	10	20.0	40	80.0	35	70.0	15	30.0	**0.0001***
6. Alcohol	4	8.0	46	92.0	29	58.0	21	42.0	**0.0001***
7. Hormonal contraceptive	20	40.0	30	60.0	45	90.0	5	10.0	**0.0001***
8. Giving birth at an older age	6	12.0	44	88.0	28	56.0	22	44.0	**0.0001***
9. High breast density	7	14.0	43	86.0	27	54.0	23	46.0	**0.0001***
10. long-term use of hormonal replacement therapy	14	28.0	36	72.0	35	70.0	15	30.0	**0.0001***
11. Exposure to radiation at a young age	11	22.0	39	78.0	36	72.0	14	28.0	**0.0001***
12. Consumption of fatty food	15	30.0	35	70.0	34	68.0	16	32.0	**0.0001***
C. Signs and symptoms:									
1. Breast lump	48	96.0	2	4.0	50	100.0	0	0.0	0.58
2. Increase in size of the breast	24	48.0	26	52.0	44	88.0	6	12.0	**0.0001***
3. Ulcer on the breast	13	26.0	37	74.0	29	58.0	21	42.0	**0.0001***
4. Sever persistent pain and is not related to the menstrual cycle	43	86.0	7	14.0	48	96.0	2	4.0	0.18
5. Swollen axillary glands	21	42.0	29	58.0	38	76.0	12	24.0	**0.0001***
6. Skin thickening	8	16.0	42	84.0	27	54.0	23	46.0	**0.0001***
7. Orange peel texture to the skin	8	16.0	42	84.0	27	54.0	23	46.0	**0.0001***
8. Redness or swelling of the breast	22	44.0	28	56.0	40	80.0	10	20.0	**0.0001***
9. Discharge from the nipple	22	44.0	28	56.0	36	72.0	14	28.0	**0.0001***
10. Nipple changes (inversion/retraction)	32	64.0	18	36.0	50	100.0	0	0.0	**0.0001***
11. Breast warmth and itching	20	40.0	30	60.0	41	82.0	9	18.0	**0.0001***
12. Asymmetry of breasts	11	22.0	29	58.0	37	74.0	13	26.0	**0.0001***
D. Screening technique required for diagnosis of breast cancer:									
1. Breast self-examination (BSE)	11	22.0	39	78.0	38	76.0	12	24.0	**0.0001***
2. Clinical breast examination (CBE)	48	96.0	2	4.0	49	98.0	1	2.0	0.99
3. Mammography	41	82.0	9	18.0	48	96.0	2	4.0	0.065
4. Ultrasound	15	30.0	35	70.0	40	80.0	10	20.0	**0.0001***
5. MRI	3	6.0	47	94.0	24	48.0	26	52.0	**0.0001***
E. Treatment of breast cancer:									
1. Chemotherapy	23	46.0	27	54.0	46	92.0	4	8.0	**0.0001***
2. Radiotherapy	9	18.0	41	82.0	30	60.0	20	40.0	**0.0001***
3. Surgical	25	50.0	25	50.0	30	60.0	20	40.0	0.405

p- Value of MCNemar test, *p<0.05 significant, p≥0.05 no significant

Table (4): Distribution of the studied women according to their knowledge regarding mammography items pre and post intervention (n=50):

Knowledge regarding mammography items	Pre intervention				Post intervention				p-value
	Correct		Incorrect		Correct		Incorrect		
	No.	%	No.	%	No.	%	No.	%	
1. Mammography screening can save lives.	25	50.0	25	50.0	49	98.0	1	2.0	**0.0001***
2. Mammography uses X-rays at a little higher dose than a chest X-ray.	10	20.0	40	80.0	48	96.0	2	4.0	**0.0001***
3. The ideal time to have a mammogram a week after the end of the menstrual cycle.	30	60.0	20	40.0	46	92.0	4	8.0	**0.0001***
4. The breasts are gently compressed between two plates during a mammogram.	41	82.0	9	18.0	50	100.0	0	0.0	**0.001***
5. Mammography can also find breast tumors smaller than 0.5 cm.	7	14.0	43	86.0	38	76.0	12	24.0	**0.0001***
6. The best option for screening for breast cancer is mammography.	28	56.0	22	44.0	50	100.0	0	0.0	**0.0001***
7. Avoid using cosmetics like lotion, talcum powder, and deodorant right before a mammogram.	44	88.0	6	12.0	50	100.0	0	0.0	0.06
8. Mammography screening is a reliable method for early detection of breast cancer.	23	46.0	27	54.0	46	92.0	4	8.0	**0.0001***
9. After the age of 40, every woman should undergo a mammography screening every year or every two years.	24	48.0	26	52.0	42	84.0	8	16.0	**0.0001***
10. The best diagnostic technique for identifying irregular micro-calcification, the early indication of breast cancer, is mammography.	12	24.0	38	76.0	40	80.0	10	20.0	**0.0001***
11. It is advisable to obtain past mammograms and any evaluation reports before performing a mammography.	38	76.0	12	24.0	50	100.0	0	0.0	**0.0001***
12. Mammography screening can also be performed in 20s.	19	38.0	31	62.0	38	76.0	12	24.0	**0.0001***
13. Mammography screening reduced the death rate from breast cancer.	20	40.0	30	60.0	33	66.0	17	34.0	**0.0001***
14. Mammography can be used to detect all forms of breast cancer.	8	16.0	42	84.0	37	74.0	13	26.0	**0.0001***
15. A specialist should check a patient who presents with a breast mass first, and if necessary, a mammography or breast ultrasound should be done.	33	66.0	17	34.0	44	88.0	6	12.0	**0.0001***

p- Value of MCNemar test, *p<0.05 significant, p≥0.05 no significant

Table (5): Distribution of the studied women according to their knowledge regarding fibro glandular density items pre and post intervention (n=50):

Knowledge regarding fibro glandular density items	Pre intervention				Post intervention				p-value
	Correct		Incorrect		Correct		Incorrect		
	No.	%	No.	%	No.	%	No.	%	
A. Definition of fibro glandular density	12	24.0	38	76.0	46	92.0	4	8.0	**0.0001***
B. Risk factors of fibro glandular density									
1. Hormonal therapy	18	36.0	32	64.0	43	86.0	7	14.0	**0.0001***
2. Contraceptives	28	56.0	22	44.0	45	90.0	5	10.0	**0.0001***
3. Younger women	15	30.0	35	70.0	30	60.0	20	40.0	**0.0001***
4. Lower body mass indices	5	10.0	45	90.0	22	44.0	28	56.0	**0.0001***
C. levels of fibro glandular density									
1. Almost entirely fatty	21	42.0	29	58.0	34	68.0	16	32.0	**0.0001***
2. Scattered fibro glandular	13	26.0	37	74.0	34	68.0	16	32.0	**0.0001***
3. Heterogeneously dense breasts	10	20.0	40	80.0	28	56.0	22	44.0	**0.0001***
4. Extremely dense	14	28.0	36	72.0	30	60.0	20	40.0	**0.0001***
D. Incidence of each level									
1. 1 in 10 women (10%)	20	40.0	30	60.0	35	70.0	15	30.0	**0.0001***
2. 4 out of 10 women (40%)	11	22.0	39	78.0	35	70.0	15	30.0	**0.0001***
3. 4 out of 10 women (40%)	7	14.0	43	86.0	29	58.0	21	42.0	**0.0001***
4. 1 in 10 women (10%)	12	24.0	38	76.0	32	64.0	18	36.0	**0.0001***
E. Degree that requires referral to another screening technique (3rd and fourth level)	29	58.0	21	420	50	100.0	0	0.0	**0.0001***
F. Alternative screening techniques needed									
1. Ultrasound	44	88.0	6	12.0	49	98.0	1	2.0	0.075
2. MRI	24	48.0	26	52.0	44	88.0	6	12.0	**0.0001***
3. Others	4	8.0	46	92.0	18	36.0	32	64.0	**0.0001***

P- Value of MCNemar test, *p<0.05 significant, p≥0.05 no significant

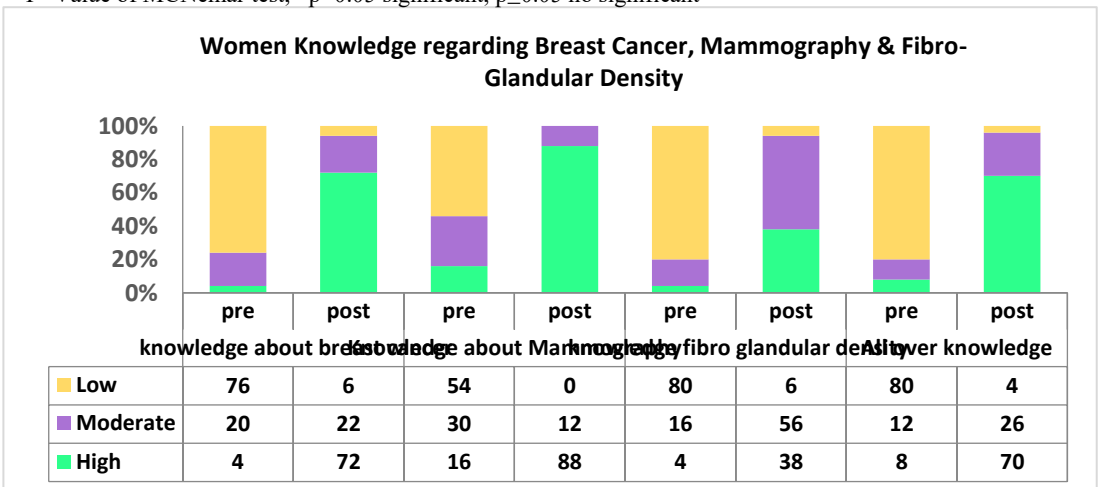

Figure (1):Knowledge' dimensions level concerning breast cancer,mammogram, of fibro glandular density at pre& post intervention program (n= 50)

Table (6): Distribution of the studied women according to their practices regarding mammography items pre and post intervention (n=50):

Practices regarding mammography	Pre intervention				Post intervention				p-value
	Done		Not Done		Done		Not Done		
	No.	%	No.	%	No.	%	No.	%	
• **Before mammography**									
1. Scheduled mammography during a period of reduced breast pain perception	14	28.0	36	72.0	47	94.0	3	6.0	**0.0001***
2. Be aware that a mammogram requires roughly half an hour.	14	28.0	36	72.0	48	96.0	2	4.0	**0.0001***
3. Told her companions that they are not allowed to enter the examination room for fear of exposure to radiation.	16	32.0	34	68.0	48	96.0	2	4.0	**0.0001***
4. Don't apply powder or deodorant under your arms on the day of the mammography test.	2	4.0	48	96.0	46	92.0	4	8.0	**0.0001***
5. Take the medications that your doctor suggested an hour prior to the exam to help you deal with any discomfort that might arise.	41	82.0	9	18.0	48	96.0	2	4.0	0.065
6. Take off all clothing and remove any jewelry or decorations from the upper body.	15	30.0	35	70.0	47	94.0	3	6.0	**0.0001***
7. Put on a dress with a front opening.	4	8.0	46	54.0	43	86.0	7	14.0	**0.0001***
8. Notify the mammogram technologist if she has (cosmetic) breast implants.	12	24.0	38	76.0	45	90.0	5	10.0	**0.0001***
• **During mammography**									
1. Take a position in front of the mammography scanner that is being utilized.	32	64.0	18	36.0	49	98.0	1	2.0	**0.0001***
2. Place the breast on the hard surface of the mammogram machine close to another surface until its area is expanded and the tissues are sufficiently distributed.	27	54.0	23	46.0	49	98.0	1	2.0	**0.0001***
3. If the pain becomes intolerable, tell the radiologist knows.	31	62.0	19	38.0	49	98.0	1	2.0	**0.0001***
4. Extend your arms beyond the frame for the picture.	27	54.0	23	46.0	49	98.0	1	2.0	**0.0001***
5. Remaining motionless throughout the mammography process as movement produces inaccurate findings.	3	6.0	47	94.0	43	86.0	7	14.0	**0.0001***
6. Holding breath during mammography.	2	4.0	48	96.0	42	84.0	8	16.0	**0.0001***
7. After taking pictures of the first breast from every angle, carry out the same procedures with the other breast.	15	30.0	35	70.0	47	94.0	3	6.0	**0.0001***
• **After mammography**									
1. Putting on clothes.	47	94.0	3	6.0	49	98.0	1	2.0	0.25
2. Establish a timetable to get the test findings.	12	24.0	38	76.0	42	84.0	8	16.0	**0.0001***
3. Consult the specialized physician again.	36	72.0	14	28.0	46	92.0	4	8.0	**0.0001***

p- Value of MCNemar test, *p<0.05 significant, p≥0.05 no significant

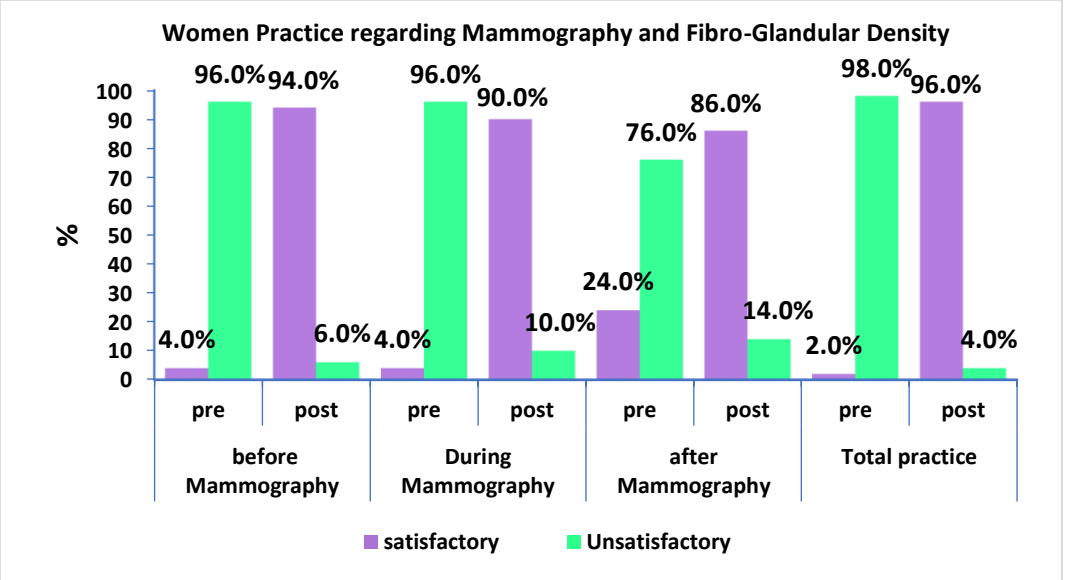

Figure (2): Distribution of the studied women according to their practice regarding mammography at pre& post intervention program (n= 50)

Table (7): Distribution of the studied women according to their Attitude regarding mammography items pre and post intervention (n=50):

Attitude regarding mammography items	Pre intervention				Post intervention				p-value
	Positive		Negative		Positive		Negative		
	No.	%	No.	%	No.	%	No.	%	
• **Attitude items regarding mammography**									
1. No one desires mammography. (r)	28	56.0	22	44.0	36	72.0	14	28.0	**0.0001***
2. I'm afraid about the radiation I'll receive from a mammogram. (r)	26	52.0	24	48.0	29	58.0	21	42.0	0.125
3. A mammogram is uncomfortable. (r)	20	40.0	30	60.0	22	44.0	28	56.0	0.25
4. Shame is a result of mammograms. (r)	13	26.0	37	74.0	24	48.0	26	52.0	**0.0001***
5. It is essential to be knowledgeable about mammography.	14	28.0	36	72.0	50	100.0	0	0.0	**0.0001***
6. Understanding the mammography processes is essential (before, during and after).	11	22.0	39	78.0	50	100.0	0	0.0	**0.0001***
7. Making a mammogram plan is crucial.	7	14.0	43	86.0	49	98.0	1	2.0	**0.0001***
• **Attitude items regarding fibro glandular density**	.	.			.	.			
1. A slightly greater risk of breast cancer may exist for women with thick breast tissue.	4	8.0	46	92.0	46	92.0	4	8.0	**0.0001***
2. Compared to fatty tissue, dense breast tissue has more fibrous and glandular tissue.	8	16.0	42	84.0	41	82.0	9	18.0	**0.0001***
3. Tumor visibility on mammograms may be obstructed by dense tissue, necessitating further imaging studies.	4	8.0	46	92.0	37	74.0	13	26.0	**0.0001***
4. Because of women's thick breast tissue, MRIs and ultrasounds are appropriate imaging studies.	4	8.0	46	92.0	34	68.0	16	32.0	**0.0001***
5. I feel discomfort when talking with me about breast density. (r)	27	54.0	23	46.0	33	66.0	17	34.0	0.065

(r) Reverse item p- Value of MCNemar test, *p<0.05 significant, p≥0.05 no significant

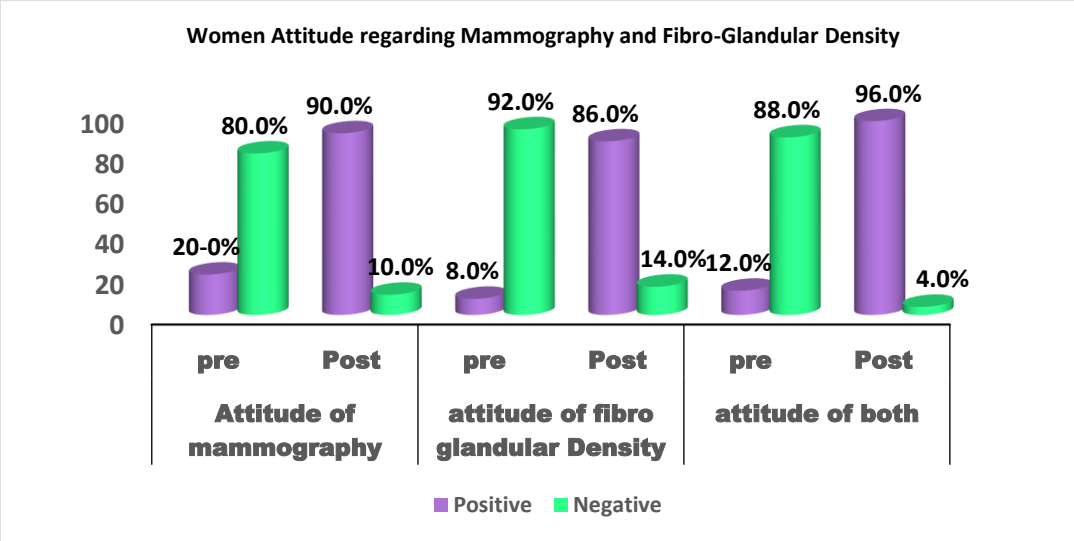

Figure (3): Distribution of the studied women according to their Attitude' level concerning mammography and fibro glandular density at pre& post intervention program (n= 50)

Table (8): Correlation matrix between Knowledge about breast cancer, Knowledge score about Mammography, Attitude score regarding mammography,Practice score regarding mammography

Variables	Knowledge about breast cancer		Knowledge score about Mammography		Attitude score		Practice score	
	r	P	r	p	R	p	R	P
○ Knowledge score about Mammography	0.443**	0.001	1					
○ Attitude score	0.126	0.383	0.033	0.818	1			
○ Practice score	0.331*	0.019	.454**	0.001	0.226	0.114	1	

Pearson' correlation coefficient(r), ** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the <0.05 level (2-tailed).

Discussion

Mammographic breast density (MBD) has drawn more attention from patients, researchers, doctors, and policymakers as a risk factor for breast cancer and a crucial evaluable feature in breast imaging. To evaluate the usefulness of breast density for cancer detection and patient outcome prediction, numerous studies have presented both quantitative and qualitative evaluations of breast density utilizing various imaging modalities, such as mammography, ultrasound, and MRI. **(Li, X. et al. 2022).**

Regular screenings and preventive measures are essential for lessening the harmful effects of cancer. By reducing cancer incidence and mortality rates, these methods enhance public health in addition to helping individuals by promoting early detection and reducing healthcare risks and expenses. (**Bray et al., 2024**).

As regards to socioeconomic characteristics of the studied women, the present study declared that the mean age was 48.96±14.5, three fifth of them were married, more than two thirds were from rural areas and had a primary education, the majority of them were housewife and suffer from obesity.

These findings are in partial agreement with **(Abdelaziz et al., 2021)** who stated that the majority of the participants in their study were aged between 36 and 45 years old, married, living in an urban location, having a higher

degree education, and working. Also, **El-Adham & Shaban, (2023)** study showed that the mean age of women was (45.98+9.18), the majority were married, lived in cities, had a secondary education, and worked. Meanwhile **Al-Mousa et al. (2020)** reported that most participants in his study were not employed, and they were from the rural area. This variation may be attributed to environmental, cultural factors and differences of lifestyle.

Based on the data of the present study, more than half of the women had a history of more than two pregnancies and deliveries, nearly three-quarters had breastfed their children. Also, the vast majority of women reported prior gynecological diseases. More than one third of them had a family history of breast cancer, while nearly three-quarters of women did not undergo breast self-examination. This is in congruence with **(AL-Mousa et al. 2020)** who reported that less than one fifth of their participants had a family history of breast cancer.

Moreover, **El- Adham & Shaban, (2023)** study revealed that two-fifths of women experienced gynecological disorders, breast cancer, a family history of breast cancer, and breast self-examinations, whereas half of women had more than two pregnancies, births, and nursed babies.

As regards breast screening history, the present study finding reveals that more than three fifth of the studied women underwent mammography at least once. The results showed the presence of dense breast tissue in more than two thirds of the women who underwent mammography. Additionally, ultrasound was used as an alternative screening method in nearly three-quarters of the studied women.

Similarly, **Smith et al., 2024** who found that about half of the participants had had breast MRIs, two-thirds had dense breasts as recorded by a mammography during the previous five years, and the majority had undergone surgery for early-stage breast cancer (stages 0-II) within the previous six to eighteen months. There is evidence that in comparison to people with lower-density breast tissues, those with denser breasts show higher expression of DNA damage signals and altered DNA response (**Bray et al., 2024**).

This suggests that most women did not accurately retain the information concerning breast density in their notifications because it was not usually comprehended and was not further discussed with their physicians. Women may not ask clinicians about the breast density information in their alerts because they are too overwhelmed or concerned about receiving a breast cancer diagnosis.

According to level of studied women knowledge, current study demonstrates a considerable improvement in the knowledge items regarding breast cancer, mammography, and fibro glandular density after the intervention program among the studied women, with a highly statistically significant difference ($P \leq 0.0001$).

Additionally, awareness of major signs and symptoms of breast cancer, including breast lumps, nipple changes (inversion/retraction), and severe persistent pain (not related to the menstrual cycle).Moreover, knowledge related to risk factors of fibro glandular density, such as contraceptives and hormonal therapy, awareness of the need for alternative screening techniques for high-density levels (3rd and 4th levels of fibro glandular density) improved after implementation of educational program.

These findings are in the same line with **(El-Adham.2023, Al-Zalabanim et al. 2018, Majed 2019 & Mansur et al. 2021)** who presented that mammography screening and breast cancer were not well understood by the majority of respondents. Prior to program implementation, study participants lacked enough knowledge about breast cancer definition, clinical manifestation, causes, risk factors, diagnostic techniques, therapy, and breast self-examination and mammography.

Similarly, **Alenezi et al., (2022)** who mentioned that there was a statistically significant increase in knowledge' levels about breast cancer screening tools after educational program implementation. Additionally, **(Autier et al., 2024)** reported that the majority of the

participants had extra knowledge about breast cancer, and mammogram.

AL-Mousa et al., (2020) also specified that the majority of Jordanian women had an acceptable intermediate level of knowledge about breast cancer, only 3.9% of the study sample had a poor level of knowledge, and a small percentage had good to excellent knowledge, the low mammography screening rates suggested the need for additional awareness campaigns. One of the most common explanations for not paying attention to screening measures is a lack of awareness and knowledge of the significance of cancer screening measures.

Moreover, **(Brown j et al., 2019)** study showed approximately two-thirds of respondents were not aware of the higher risk of breast cancer linked to thick breasts, and nearly half of respondents were not aware of the breast density in their state. Even though two-thirds of those surveyed believed they required additional information regarding breast density and imaging.

Vice versa, **Robertson et al., (2020)** study which found the phrase "breast density" was familiar to 60% of those surveyed. Women in South Australia have a significantly lower awareness rate than women in Western Australia (>80%), where breast density notification has been more common. Out of five questions about breast density, fewer than three-fifths of participants gave accurate answers to two or more of them. These results highlight a basic lack of awareness regarding breast density among Australian women.

The linguistic differences between the current and earlier studies could be the cause of these discrepancies. There may be chances to improve women's understanding of breast density in the current study by using a simplified version of Arabic. Disparities in awareness were found to be influenced by factors such as education, screening history, and preferred language. Research on the evaluation and comprehension of particular aspects that may be connected to breast density awareness and knowledge, as well as inequalities in breast cancer screening and mortality, is currently insufficient.

Many studies have shown that the ministries of health and non-governmental organizations' recent educational efforts regarding breast cancer screening and early diagnosis (informative meetings, TV shows, brochures, social media sharing, etc.) have significantly increased women's awareness of breast cancer and mammography screening. **(Blahova et al., 2025)**.

The present study results shows that there was a significant improvement in all practice items (before, during, and after mammography) among the studied women post intervention, with a highly statistically significant difference (P <**0.0001)**.

Similarly, **El- Adham & Shaban, 2023** study announces that following the implementation of the teaching program, the majority of the study group experienced acceptable practice (before to, during, and immediately following the mammography procedure). This result contradicts with **(Al-Zalaban et al. 2018)** who determined that Most participants had never been admitted for a mammography examination or had previously been screened for breast cancer.

Current study findings displays that there was a marked improvement in all attitude items related to mammography and fibro glandular density after intervention with a highly statistically significant difference at (P <**0.0001**).

These findings are in congruence with **(Al-Adham & Shaban, 2023)** who reported that after the educational package was implemented, the majority of women had favorable views on the day of the mammography. According to the researchers, the impact of the educational program is responsible for the improvement in women's attitudes. These results are in consistent with **(Mansur et al. 2021)** who conveyed that The vast majority of their participants were positive and described their readiness for mammography screening as a helpful method of detecting breast cancer, their capacity to handle any pain or discomfort during

the procedure, and their belief that these feelings would not interfere with their ability to perform the mammography. From the perspective of the researchers, this might be because the survey's study participants were women.

Meanwhile, **Abiodunet al., (2022)** study in Nigeria reported that in spite of the fact that most respondents thought mammograms were good ways to detect breast cancer; only 17% of those who qualified for the test had one. According to 40 (43%) of the study participants, the lack of mammogram availability at the facility was the reason why no mammogram was performed. Lack of awareness, the absence of national screening programs, and a lack of mammography facilities were some of the factors contributing to the low practice of mammography.

This is contrary **Agwu et al., (2022)** studies to what is obtainable in the western world. Most women have had a mammogram at least once in their lives, according to the Europe database on screening mammography among women aged 50 to 69.

In order to guarantee practice and client teaching, it is crucial to incorporate continuing education programs, as practice was also a strong constant predictor of client teaching in this study. The results of this study indicate that better practices are linked to increased awareness about mammography and breast cancer. It reveals significant positive correlations between the studied women's knowledge, attitudes, and practices regarding breast cancer. It shows that there was a highly statistically significant correlation found between total knowledge about breast cancer and total knowledge about mammography ($r = 0.443$, $p = 0.001$) and total practice score ($r = 0.331$, $p = 0.019$). Moreover, a significant correlation was observed between total knowledge about mammography and total practice score ($r = 0.454$, $p = 0.001$).

These findings go in line with El-**Adham & Saban, (2023)** study who found that following the implementation of the instructional module, there was a statistically significant correlation between the women's knowledge, attitudes, self-efficacy, and practices regarding breast cancer screening mammography. In this connection, **(Heena et al. 2019)** stated that the participants' inadequate understanding, unfavorable attitudes, and improper behavior regarding breast cancer screening mammography.

Furthermore**, Marmarà (2018)** who investigated the relationship between women's attitudes about their behavior during mammography screening exams and revisions to the guidelines, and discovered a relationship between the guidelines and psychological status, beliefs, and practices during mammography**.(Elshami et al. 2022)** also revealed that the interventions based on an instructional paradigm improved self-care and laid the groundwork for women in their study to screen for breast cancer more frequently. Researchers believe that educational programs and instructional modules are valuable resources for enhancing women's knowledge, attitudes, and practices during breast cancer screening mammograms.

From the researchers' point of view, the educational programs and instructional modules are valuable resources for enhancing the knowledge, attitudes and practices of women receiving mammography for breast cancer screening.

This is supported by **(Brevik et al. 2021 &Mubin et al. 2021)** who detailed that personalized education could increase knowledge, correct attitudes, and enhance performance of mammography screening among women. **(Emami et al. 2021)** also support the idea that health policymakers should put health promotion initiatives into place in various community locations to increase women's desire to get breast cancer screening mammograms and lower barriers to accessing them.

Conclusion

The present study achieved its goals and objectives, the research hypothesis was met, and women's knowledge, attitudes and practices about breast cancer, mammography and fibro glandular density were positively impacted or enhanced. This is seen by the difference between their pretest and posttest scores. A

substantial correlation between the women's knowledge, practices and attitude about breast cancer screening mammography was also established by the current study ($p<0.001$).

Recommendations

Breast cancer screening mammography and fibro glandular density as a risk factor should be emphasized in nursing curricula and health education programs as a crucial method for early breast cancer detection. All women should have access to a variety of breast cancer screening mammography information sources at various times of their lives to enhance their practices, attitudes, knowledge, and self-efficacy. In order to reduce the mortality and morbidity rates associated with breast cancer, all women in all healthcare settings should have access to breast cancer screening mammography services. Further research on women's intention and readiness to perform breast cancer screening mammography, as well as factors influencing its use, should involve maternity and gynecological nurses.

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