

Assessment of breast cancer awareness among university female students at Al Furat A-Awsat Technical University, Iraq

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ABSTRACT

Introduction: Breast cancer cases are increasing both globally and in Iraq. Twenty-three percent of all female cancers globally are breast cancers, making it the most common sickness among females. The implementation of effective intervention cancer education programs in universities could help to reduce delays in diagnosis and improve cancer survival by increasing awareness of risk factors and symptoms among students. This study aimed to assess the effectiveness of an educational intervention on breast cancer awareness among female university students in Najaf, Iraq.

Designs and sample; A pilot study (experimental study), A stratified random sample of 76 female students in AL- Furat Al-Awsat Technical University in the city of Najaf/Iraq was assigned. Divided into two groups, knowledge of female students before intervention (pre-test), and immediately after intervention (post-test), intervention female students in the experimental group received a 30-minute lecture about awareness among female university students about the early detection of breast cancer. While the control group received a 30-minute lecture about family violence.

Results: The data analysis revealed a normal distribution, A total of 76 students aged 18-27 participated, with 71.1% living in owned residences, and all giving a 100% response rate. 86.8% of the experimental group believed regular breast exams support early detection, compared to 57.9% in the control group. When it came to risk factor awareness, more intervention (pre-test) 78.9% versus 60.5% in the control group thought that the largest risk factor was a family past history of breast cancer. 89.5% of intervention had no family past of breast cancer than 73.7 of the control. Overall, we found significant changes in breast cancer awareness and breast self-examination practices after the educational intervention.

Conclusion: The study confirms that the participating female students had insufficient awareness of early detection of breast cancer at the beginning, which improved significantly after the educational intervention. It is recommended to introduce similar educational programs on a state level, targeting both rural and urban female populations.

Keywords: risk, knowledge, breast cancers, sample

INTRODUCTION

Breast cancer is the most common type of cancer worldwide, with approximately 2.3 million new cases and 685,000 fatalities reported in 2020 [1]. The American Cancer Society (ACS) classifies breast cancer into two types: in situ and invasive [2]. In situ breast cancer begins in the milk duct and remains localized. This type of breast cancer includes ductal carcinoma in situ, which is considered non-invasive breast cancer or pre-invasive breast cancer. Invasive breast cancer has the ability to spread to surrounding breast tissue and includes invasive ductal carcinoma and invasive lobular carcinoma [1, 2]. It causes three out of ten premature deaths worldwide from non-communicable diseases (30.3% in the 30-69 age group) and is among the top three causes of death in this age group in 177 out of 183 countries [3]. Additionally, A woman's likelihood of developing breast cancer is significantly affected by modifiable risk factors like alcohol consumption, smoking, obesity, and physical activity, as well as non-modifiable risk factors such as BRCA1 or BRCA2 mutations, a family history of breast cancer, and hereditary breast cancer syndromes [4]. Menopause is a significant milestone in a woman's life, resulting from the decline in ovarian function and marking the conclusion of her reproductive phase. Research indicates that early menopause raises the risk of cardiovascular disease, atherosclerosis, stroke, osteoporosis,

and Alzheimer's disease. Conversely, late menopause has been linked to a higher risk of breast cancer [5]. Advanced glycation products are compounds produced by the body during the metabolism of sugar. Exogenous Advanced glycation products, such as those found in food, combined with endogenous Advanced glycation products, make up the body's total AGE load. AGEs accumulate in tissues over time, affecting cell signaling pathways and altering protein function. Studies show an association between AGEs and BC risk. The primary sources of exogenous estrogen are oral contraceptives and hormone replacement therapy. These medications can lead to breast enlargement and sensitivity [6]. There is a slight increase in the risk of breast cancer among women who use oral contraceptives compared to those who have never used them, the use of these medications may overstimulate breast tissue, potentially raising the risk of breast cancer [7]. Moreover, with a higher-fat and low-fiber diet, Obesity can have a significant impact on women because it is linked to an increased risk of breast cancer [8]. Breast cancer patients suffer from similar psychological problems related to the shock of diagnosis, the side effects of treatments with resulting changes in body image and sexual behavior, fear of recurrence, and the end of life. Coping with breast cancer also causes severe stress for patients and their families [9]. According to the Global Cancer Observatory, breast cancer accounts for approximately 23% of all cancer diagnoses and 18% of cancer-related deaths in Nigeria, making it the largest cause of cancer-related deaths in the country [10]. Breast cancer accounts for a higher number of disability-adjusted life years (DALYs) lost globally compared to other cancers [11]. In Pakistan, there were 25,928 reported cases of breast cancer in 2020, representing 14.5% of all cancer cases. Although treatment options have improved, early detection of breast cancer remains essential for enhancing health outcomes. Breast health education organizations advise that women should start conducting regular breast self-examinations once their breasts are fully developed. For instance, the Maurer Foundation suggests that women begin performing breast self-examinations at least once a month starting at the age of 18. This regular practice helps women become more familiar with their breasts, making them more likely to notice any changes [12]. Breast cancer risk has increased in Pakistan, with one in nine women at risk of developing the cancer in their lifetime [13], [14]. The Iraqi Cancer Registry published its annual report in 2020, and it revealed that the top 10 cases overall were 6,255, or 19.74 percent, while the number of deaths was 1,367, or 12.87 percent. [15] According to the 2021 annual report of the Iraqi Cancer Registry, breast cancer ranked among the top ten cancers in Iraq, with a total of 7246 cases (30.63%) and 1416 fatalities (17.34%). [16] Developing effective screening programs, performing annual mammograms in the target group, raising public awareness of breast cancer symptoms and signs, and motivating women to act quickly are some of the ways to achieve early diagnosis of the disease. A patient's survival from breast cancer depends largely on access to timely, effective, and affordable medical care. Early detection of breast cancer is critical to survival. When combined with timely access to treatment and appropriate follow-up and post-surgical care, it can lead to a significant lowering in breast cancer mortality [17]. There are three common techniques for breast cancer screening and early detection. The first and most widely accepted technique is mammography, which is the only stand-alone method of breast examination. The other two techniques are breast self-examination and clinical breast examination, which can serve as a significant supplementary factor in the early detection of cancer and the overall management of breast health care [18]. Breast self-examination is a home-based screening technique for the early detection of breast cancer. This simple, cost-effective, and easy method allows women to check their breast tissue for any physical or visual irregularities. By performing breast self-examinations, women can increase their likelihood of receiving treatment and improve their chances of survival [19]. Understanding the disease is crucial for its early detection. This knowledge enables individuals to mitigate the associated risk factors. Heightened awareness of breast cancer can encourage women to follow screening recommendations, leading to earlier diagnoses that facilitate better management by healthcare providers and enhance patient monitoring. This study focuses on female university students in Iraq and assesses their awareness of breast cancer risk factors, signs and symptoms, and screening practices before and after the implementation of an educational program.

METHODS

Sampling and sample

A pilot study, as part of a larger experimental research initiative aimed at enhancing breast cancer awareness, was implemented from October to December 2024. The study was conducted in two departments at Al-Najaf Technical Institute, a division of Al-Furat Al-Awsat Technical University. A random sample of 76 female students participated, with the sample equally divided into two groups: 38 students in the experimental group and 38 in the control group.

Data collection

A structured –self-administered questionnaire translated from English to Arabic was used to elicit the information from the study participants. The questionnaire included the following domains;

Domain 1: Socio-demographic data These include women's age, residence, marital status, occupation of the respondent, occupation of husband, family income, educational level, educational level of husband, residency type, and breast cancer family past.

Domain 2:Breasts cancer general knowledge: include information about breast cancer in general, including 5 Items.

Domain 3:Breast cancer risk factors knowledge, including 14 items.

Domain 4: Breast cancer signs and symptoms knowledge, including 14 items.

Domain 5:Breast cancer early detection knowledge, including 24 items.

Intervention

Female students in the experimental group received a 30-minute lecture on "Awareness about the Early Detection of Cancer." Additional information was provided through posters, brochures, and video clips. After the lecture, they participated in a discussion session, addressing both pre-determined questions and queries arising from their personal experiences. In contrast, the control group attended a 30-minute lecture on "Family Violence".

Measurement and scoring

Students' breast cancer awareness was assessed before intervention (pre-test), and immediately after the intervention (post-test 1), the student's answers concerning awareness about breast cancer. Scoring:concerning awareness includes 57 questions, and has a score range of 0 to 3. According to the results range of (0-171), the maximum score response was 171 and the minimum score response was zero, categorized and subdivided into three groups (poor ≤ 57 , fair 58-114, good ≥ 115). were scored and calculated. "YES" Answers were scored as 3, "NO" answers were scored as 2, and "I don't know" scored as 1 [17].

Statistical analysis

The data were analyzed using IBM SPSS Statistics, version 28. Descriptive statistics were calculated for selected numerical and categorical variables to summarize the data. For inferential analysis, both the T-test and the Mann-Whitney U test were employed to evaluate differences between the experimental and control groups.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

- The ethical approval was taken from the College of Health and Medical Technologies/Kufa, Al-Furat Al-Awsat Technical University
- The approval of the formations of the Al-Furat Al-Awsat Technical University was obtained.
- Verbal consent was taken from all participants.

RESULTS

The total number of respondents was 76. The age range of the data, which was normally distributed, is 18-27 years, with mean \pm SD. Are (20.89 ± 1.797) for intervention and 20.15 ± 1.533 for the control group). The response to the questionnaire was 100%. Table 1 shows that 94.7% of females in the intervention and control groups were aged 18-22 years. As for geographic location, 76.3% of female participants in both intervention and control were from urban areas, and also, 89.5% of them were single. According to husband job, the most of interventions were government jobs 5.3% and private jobs 5.3% for control groups. 5.3% of their husband were institute in the intervention and the same percentage was intermediate for control. The education level for intervention and control is a diploma. The sample included in the study were medical and administrative, as the intervention included 32 female students from a medical and 32 female students from an administrative specialist, the majority of the sample from intervention and control owned a house, 89.5% of the intervention had no family past of breast cancer and 73.7% of the control.

| | Intervention | | | Control | | P-value |
|----------------|----------------|------|------|---------|------|---------|
| | Totally 38 | Freq | % | Freq | % | |
| Age group | 18-22 Y | 36 | 94.7 | 35 | 92.1 | *0.058 |
| | 23Y and more | 2 | 5.3 | 3 | 7.9 | |
| Residency | Rural | 9 | 23.7 | 10 | 26.3 | **0.792 |
| | Urban | 29 | 76.3 | 28 | 73.7 | |
| Marital status | Single | 34 | 89.5 | 35 | 92.1 | **0.694 |
| | Married | 4 | 10.5 | 3 | 7.9 | |
| Husband Job | Not working | 2 | 5.3 | 0 | 0 | **0.938 |
| | Government job | 2 | 5.3 | 1 | 2.6 | |

| | | | | | | |
|-------------------|----------------------|----|-------|----|-------|---------|
| | Privet Job | 0 | 0 | 2 | 5.3 | |
| Husband Education | Read & write | 1 | 2.6 | 0 | 0 | **0.730 |
| | Intermediate | 1 | 2.6 | 2 | 5.3 | |
| | Institute | 2 | 5.3 | 1 | 2.6 | |
| Education level | Diploma | 38 | 100.0 | 38 | 100.0 | **1.000 |
| Specialty | Medical devices | 13 | 34.2 | 0 | 0 | **1.000 |
| | Health management | 13 | 34.2 | 0 | 0 | |
| | Management Accounted | 12 | 31.6 | 0 | 0 | |
| | Criminal evidences | 0 | 0 | 13 | 34.2 | |
| | Computer programing | 0 | 0 | 13 | 34.2 | |
| | Tourism | 0 | 0 | 12 | 31.6 | |
| Family No | > 5 | 8 | 21.1 | 13 | 34.2 | **0.203 |
| | ≤ 6 | 30 | 78.9 | 25 | 65.8 | |
| Residency Type | Owner | 27 | 71.1 | 29 | 76.3 | |
| | Rent | 4 | 10.5 | 4 | 10.5 | **0.633 |
| | Share | 4 | 10.5 | 5 | 13.2 | |
| History with BC | Yes | 4 | 10.5 | 10 | 26.3 | **0.078 |
| | No | 34 | 89.5 | 28 | 73.7 | |
| Who was | Sister | 1 | 2.6 | 0 | 0 | **0.49 |
| | Aunt | 3 | 7.9 | 4 | 10.5 | |
| | Grandmother | 0 | 0 | 2 | 5.3 | |
| | Cousin | 0 | 0 | 4 | 10.5 | |

- ❖ Categorization-based ILO,2023
- ❖ T-test for Independent Sample, Significant at the 0.05.percentile
- ❖ Mann-Whitney U test with independent samples

Results of (Table 2) Show that 26.3% of intervenors have gotten their knowledge about breast cancer early detection from the internet and 18.4% of females have their knowledge about breast cancer early detection from their family and relatives who suffered from breast cancer. However, 36.8% of the females in the control group heard about breast cancer early detection from the internet.

Table 2: Breast cancer early detection source of information for both groups

| Sources of information | | Intervention | | Control | | |
|------------------------|-----------------------------------|--------------|-------|-----------|-------|---------|
| | | Freq. | % | Fre q. | % | |
| | Family & Relative | 7 | 18.4 | 6 | 15.8 | **0.350 |
| | PHCs | 8 | 21.1 | 3 | 7.9 | |
| | Internet | 10 | 26.3 | 14 | 36.8 | |
| | Social Media | 2 | 5.3 | 1 | 2.6 | |
| | Posters | 1 | 2.6 | 0 | 0 | |
| | TV | 0 | 0 | 2 | 5.3 | |
| | Have not to get | 5 | 13.2 | 5 | 13.2 | |
| | Awareness campaigns | 1 | 2.6 | 5 | 13.2 | |
| | Internet-Social Media | 1 | 2.6 | 1 | 2.6 | |
| | Awareness campaigns- Social Media | 1 | 2.6 | 1 | 2.6 | |
| | Internet - Social Media | 2 | 5.3 | 0 | 0 | |
| | Total | 38 | 100.0 | 38 | 100.0 | |

** Mann-Whitney U

The results presented in Table 3 indicate the frequency of responses regarding general knowledge about breast cancer. Among the women in both groups, 84.2% identified breast cancer as the most prevalent cancer among women globally. Additionally, 2.6% of women in both groups viewed breast cancer as a hereditary condition. Furthermore, 78.9% of women across both groups believed that breast cancer is treatable with regular checkups

and early detection. Notably, a higher percentage of females in the intervention group (89.5%) than in the control group (81.6%) regarded breast cancer as a curable disease.

Table 3: Knowledge about Breast cancer awareness for both groups (pre-test).

| General Knowledge about BC | Control | | | Experimental | | |
|--------------------------------------------------------------------------------------|-----------|----------|--------------|--------------|----------|--------------|
| | Yes(F,%) | No(F,%) | I Don't Know | Yes(F,%) | No(F,%) | I Don't Know |
| Is breast cancer the most common cancer among women worldwide? | 32 (84.2) | 0(0.0) | 6(15.8) | 32(84.2) | 0(0.0) | 6(15.8) |
| Is breast cancer a hereditary disease | 1(2.6) | 30(78.9) | 7(18.4) | 1(2.6) | 31(81.6) | 6(15.8) |
| Breast cancer is a treatable disease if you do regular checkups and early detection. | 30(78.9) | 3(7.9) | 5(13.2) | 30(78.9) | 1(2.6) | 7(18.4) |
| Breast cancer is a curable disease. | 31(81.6) | 2(5.3) | 5(13.2) | 34(89.5) | 1(2.6) | 3(7.9) |
| Are all women at risk of breast carcinoma | 16(42.1) | 13(34.2) | 9(23.7) | 15(39.5) | 14(36.8) | 9(23.7) |

Table 4 shows the frequencies of the correct answers for breast cancer risk factors for each question. As indicated, there is a significant difference in responses between the intervention (pre-test) group and the control group. Specifically, 44.7% of females in the intervention (pre-test) group identified abstaining from breastfeeding as a risk factor for breast cancer, compared to 52.6% in the control group. Additionally, 39.5% of the intervention (pre-test) group correctly recognized hormonal contraceptive use as a breast cancer risk factor, while 34.2% of the control group did the same. 60.5% of female intervention (pre-test) than 28.9% of control answered correctly that being overweight and not exercising is a breast cancer risk factor. 36.8% of female intervention (pre-test) than 31.6% of control answered that delayed menopause at age 55 or older is a risk factor for breast cancer. 63.2% of females of intervention (pre-test) than 39.5% of control answered correctly that radiation exposure heightens the likelihood of developing breast cancer. Being infertile raises the chance of breast cancer, according to answers from being infertile 21.1% of female intervention (pre-test) and 15.8% of control. A greater likelihood of acquiring breast cancer is linked to a family past with it, according to responses from 78.9% of intervention (pre-test) and 60.5% of control. 47.4% of female intervention (pre-test), 39.5% of the control answered correctly that breast diseases increase the chance of developing breast cancer, and 55.3% of female intervention (pre-test), 68.4% of control responded that being female increases the probability of getting breast cancer.

Table 4: knowledge about the causes & risk factors of breast carcinoma for both groups (pre-test)

| knowledge about the causes & risk factors of breast carcinoma | Control | | | Experimental | | |
|----------------------------------------------------------------------------------------------------------------|----------|----------|--------------|--------------|----------|--------------|
| | Yes(F,%) | No(F,%) | I Don't Know | Yes(F,%) | No(F,%) | I Don't Know |
| Does abstaining from breastfeeding correlate with an elevated likelihood of breast carcinoma? | 20(52.6) | 6(15.8) | 12(31.6) | 17(44.7) | 8(21.1) | 13(34.2) |
| Does using hormonal contraception for long periods increase the risk of developing breast cancer? | 13(34.2) | 3(7.9) | 22(57.9) | 15(39.5) | 4(10.5) | 19(50.0) |
| Does smoking put one at risk for breast cancer? | 18(47.4) | 10(26.3) | 10(26.3) | 13(34.2) | 11(29.7) | 13(34.2) |
| Does being overweight and not exercising pose a risk for breast cancer? | 11(28.9) | 6(15.8) | 21(55.3) | 23(60.5) | 8(21.1) | 7(18.4) |
| Is there a relationship between a heightened risk of breast cancer and delayed menopause (at age 55 or older)? | 12(31.6) | 1(2.6) | 25(65.8) | 14(36.8) | 5(13.2) | 19(50.0) |
| Is there a relation between early menstruation—12 years of age or | 4(10.5) | 4(10.5) | 30(78.9) | 6(15.8) | 10(26.3) | 22(57.9) |

| | | | | | | |
|---------------------------------------------------------------------------------------------------------------|----------|----------|----------|----------|----------|----------|
| younger—and a rise in breast cancer risk? | | | | | | |
| Can radiation exposure heighten the likelihood of developing breast cancer? | 15(39.5) | 3(7.9) | 20(52.6) | 24(63.2) | 0(0.0) | 14(36.8) |
| Is there a higher chance of breast cancer if a female has their first child after turning thirty? | 9(23.7) | 7(18.4) | 22(57.9) | 8(21.1) | 7(18.4) | 23(60.5) |
| Does being infertile increase the risk of breast cancer? | 6(15.8) | 14(36.8) | 18(47.4) | 8(21.1) | 11(29.7) | 19(50.0) |
| Is there a higher chance of breast cancer in women with larger breasts? | 10(26.3) | 6(15.8) | 22(57.9) | 5(13.2) | 21(55.3) | 12(31.6) |
| your risk of developing breast cancer is increased if you have had breast cancer in one breast before | 9(23.7) | 6(15.8) | 23(60.5) | 14(36.8) | 10(26.3) | 14(36.8) |
| Is there a heightened predisposition to breast cancer among individuals with a family history of the disease? | 23(60.5) | 4(10.5) | 11(28.9) | 30(78.9) | 2(5.3) | 6(15.8) |
| Do benign breast diseases increase the chance of developing breast cancer? | 15(39.5) | 5(13.2) | 18(47.4) | 18(47.4) | 6(15.8) | 14(36.8) |
| Does being female make you more likely to get breast cancer? | 26(68.4) | 2(5.3) | 10(26.3) | 21(55.3) | 9(23.7) | 8(21.1) |

An overview of the frequency of accurately provided answers to questions about breast cancer symptoms and signs is shown in Table 5. Table 5 overall knowledge clearly shows that intervention responses are very different from those of the control group. A higher percentage of females in the intervention group, 73.7%, correctly identified that changes in the size and shape of the breast can indicate breast cancer, compared to just 47.4% of those in the control group. In the intervention group, 73.7% of females correctly identified that changes in the size and shape of the nipple could indicate breast cancer, whereas only 34.2% of those in the control group answered correctly. When asked if the appearance of a painful lump in one or both breasts is a symptom of breast cancer, 86.8% of intervention and 63.2% of the control group correctly answered yes. 71.1% of female intervention than 50% of control answered correctly the appearance of a painful lump under the armpit a symptoms of breast cancer. The appearance of bloody secretion from the nipple was identified by 68.4% of intervention than 42.1% of the control. 86.8% of interventions 47.4 of control answered correctly the feeling of pain in the breast, nipple, or under the armpit is a symptom of breast cancer. When asked if the redness, soreness, swelling, or dimpling of the breast skin is a sign of breast cancer, 86.8% of interventions than 52.6% of control answered correctly "yes". Even though 73.7% of the intervention 44.7% of the control correctly answered that swollen glands under the arm (lymph glands) were a symptom of breast cancer. In the intervention group, 36.8% of participants correctly recognized that itching and warmth in the breasts can be indicators, compared to just 18.4% in the control group.

Table 5: Knowledge of breast carcinoma symptoms and signs for both groups (pre-test)

| knowledge of breast carcinoma symptoms and signs | Control | | | Experimental | | |
|------------------------------------------------------------------------------------------------------------------|----------|---------|--------------|--------------|---------|--------------|
| | Yes(F,%) | No(F,%) | I Don't Know | Yes(F,%) | No(F,%) | I Don't Know |
| Is a change in the size and shape of the breast one of the characteristic signs and indicators of breast cancer? | 18(47.4) | 5(13.2) | 15(39.5) | 28(73.7) | 3(7.9) | 7(18.4) |
| Is a change in the size and shape of the nipple one of the characteristic signs and indicators of breast cancer? | 13(34.2) | 7(18.4) | 18(47.4) | 28(73.7) | 0(0.0) | 10(26.3) |
| Is the appearance of a painful lump in one of the breasts a symptom of breast cancer? | 24(63.2) | 6(15.8) | 8(21.1) | 33(86.8) | 1(2.6) | 4(10.5) |
| Is the appearance of a painful lump under the armpit a symptom of | 19(50.0) | 6(15.8) | 13(34.2) | 27(71.1) | 2(5.3) | 9(23.7) |

| | | | | | | |
|--------------------------------------------------------------------------------------------------|----------|----------|----------|----------|----------|----------|
| breast cancer? | | | | | | |
| Is the appearance of bloody secretions from the nipple one of the signs of breast cancer? | 16(42.1) | 3(7.9) | 19(50.0) | 26(68.4) | 1(2.6) | 11(28.9) |
| Is feeling pain in the breast, nipple, or under the armpit one of the symptoms of breast cancer? | 18(47.4) | 2(5.3) | 18(47.4) | 33(86.8) | 1(2.6) | 4(10.5) |
| Is redness, soreness, swelling, or dimpling of breast skin one of a sign of breast cancer? | 20(52.6) | 2(5.3) | 16(42.1) | 33(86.8) | 2(5.3) | 3(7.9) |
| Is a prominent vein on the surface of the breast one of a sign of breast cancer? | 9(23.7) | 11(28.9) | 18(47.4) | 10(26.3) | 10(26.3) | 18(47.4) |
| Is nipple inversion or nipple withdrawal a sign of breast cancer? | 7(18.4) | 8(21.1) | 23(60.5) | 14(36.8) | 5(13.2) | 19(50.0) |
| Is scaling and dry nipple skin a sign of breast cancer? | 7(18.4) | 10(26.3) | 21(55.3) | 14(36.8) | 6(15.8) | 18(47.4) |
| Are swollen glands under the arm (lymph glands) a symptom of breast cancer? | 17(44.7) | 5(13.2) | 16(42.1) | 28(73.7) | 1(2.6) | 9(23.7) |
| Are the orange peel's texture and the thickness of the breast skin indicators of breast cancer? | 9(23.7) | 7(18.4) | 22(57.9) | 15(39.5) | 4(10.5) | 19(50.0) |
| Is experiencing warmth and itching in the breasts one of the warning symptoms of breast cancer? | 7(18.4) | 6(15.8) | 25(65.8) | 14(36.8) | 4(10.5) | 20(52.6) |
| Are milky nipple secretions one of the obvious signs of breast cancer? | 10(26.3) | 5(13.2) | 23(60.5) | 11(28.9) | 6(15.8) | 21(55.3) |

Table 6 presents the frequencies of correct answers regarding knowledge of breast cancer early detection for each question, indicating that there are significant differences in responses between the intervention group and the control group. In 73.7% of the intervention group and 55.3% of the control group heard about breast self-examination. Additionally, 10.4% of the intervention group and 7.9% of the control group performed a breast self-examination. Furthermore, 86.8% of the intervention group and 57.9% of the control group acknowledged that BSE is essential for detecting tumors that may develop in the breast or under the armpit. 36.8% of intervention, and 15.8% of control done a breast self-examination monthly. When asked if you have avoided testing because you were concerned about finding a lump under your arm or in your breast, 73.3% of interventions 60.5% of control correctly answered "No" and 89.5% of interventions 81.6% of control answered that early detection of breast cancer assists in treatment to get best results, also 50% of intervention heard about clinical breast examination than 26.3% of control groups. 10.5% of intervention than 2.6% of control undergone a clinical breast examination while 52.6% than 31.6% of control answered that the reason for not having a clinical breast examination was that they did not know who to consult. 34.2% of control than 10.5% of control heard of a mammogram while 15.8% of intervention than 13.2% of control answered had a mammogram before. When asked if a difference between a breast self-examination and a clinical examination, 63.2% of intervention than 34.2% of control correctly answered "yes". When asked if emotional barriers prevent them from performing a clinical breast cancer examination, 50% of intervention than 39.5% answered correctly "No" while when asked if financial barriers prevent them from performing a clinical breast cancer examination, 60.5% of intervention than 28.9% control answered correctly "No". 42.1% of interventions than 55.3% of control not performing a breast self-examination because you do not how to perform the exam.

Table 6: Knowledge about early breast cancer detection for both groups (pre-test)

| Knowledge of early breast cancer detection | control | | | Experimental | | |
|--------------------------------------------------|----------|----------|--------------|--------------|----------|--------------|
| | Yes(F,%) | No(F,%) | I Don't Know | Yes(F,%) | No(F,%) | I Don't Know |
| Ever heard of a self-examination of the breasts? | 21(55.3) | 13(34.2) | 4(10.5) | 28(73.7) | 10(26.3) | 0(0.0) |
| Have you ever done a breast self-examination? | 3(7.9) | 31(81.6) | 4(10.5) | 4(10.4) | 34(89.5) | 0(0.0) |
| Is it necessary to detect tumors in the | 22(57.9) | 4(10.5) | 12(31.6) | 33(86.8) | 1(2.6) | 4(10.5) |

| | | | | | | |
|----------------------------------------------------------------------------------------------------------------|----------|----------|----------|----------|----------|----------|
| breast or under the armpit? | | | | | | |
| Do you perform a breast self-examination monthly? | 6(15.8) | 25(65.8) | 7(18.4) | 14(36.8) | 24(63.2) | 0(0.0) |
| Have you received education or training on how to perform a breast self-examination? | 1(2.6) | 32(84.2) | 5(13.2) | 3(7.9) | 35(92.1) | 0(0.0) |
| Can you teach others how to breast self-examination? | 12(31.6) | 14(36.8) | 12(31.6) | 9(23.7) | 26(68.4) | 3(7.9) |
| Was testing avoided because of your concern that you could discover a lump beneath your arm or in your breast? | 10(26.3) | 23(60.5) | 5(13.2) | 9(23.7) | 28(73.7) | 1(2.6) |
| Does early detection of breast cancer help in treatment to get better results? | 31(81.6) | 3(7.9) | 4(10.5) | 34(89.5) | 4(10.5) | 0(0.0) |
| Have you ever heard of clinical breast examination? | 10(26.3) | 23(60.5) | 5(13.2) | 19(50.0) | 18(47.4) | 1(2.6) |
| Have you undergone a clinical breast examination previously by doctors? | 1(2.6) | 35(92.1) | 2(5.3) | 4(10.5) | 34(89.5) | 0(0.0) |
| Is the reason for not performing a clinical breast examination because you do not know who you are consulting? | 12(31.6) | 13(34.2) | 13(34.2) | 20(52.6) | 15(39.5) | 3(7.9) |
| Does a trained nurse perform the clinical breast examination? | 12(31.6) | 8(21.1) | 18(47.4) | 14(36.8) | 8(21.1) | 16(42.1) |
| Is the clinical examination of the breast monthly? | 13(34.2) | 6(15.8) | 19(50.0) | 7(18.4) | 10(26.3) | 21(55.3) |
| Is a clinical examination of the breast ultrasound (sonar) performed? | 9(23.7) | 5(13.2) | 24(63.2) | 13(34.2) | 2(5.3) | 23(60.5) |
| Have you ever heard of a mammogram? | 4(10.5) | 19(50.0) | 15(39.5) | 13(34.2) | 14(36.8) | 11(28.9) |
| Have you had a mammogram before? | 5(13.2) | 20(52.6) | 13(34.2) | 6(15.8) | 31(81.6) | 1(2.6) |
| Is mammography one of the most effective tests for early detection of breast cancer? | 14(36.8) | 6(15.8) | 18(47.4) | 16(42.1) | 2(5.3) | 20(52.6) |
| Is mammography considered safe? | 6(15.8) | 3(7.9) | 29(76.3) | 7(18.4) | 4(10.5) | 27(71.1) |
| Is a mammogram painful? | 4(10.5) | 7(18.4) | 27(71.1) | 6(15.8) | 6(15.8) | 26(68.4) |
| Does the mammographic examination detect the mass (tumor) and whether it is clear and palpable or not? | 9(23.7) | 3(7.9) | 26(68.4) | 19(50.0) | 2(5.3) | 17(44.7) |
| Is there a difference between a breast self-examination and a clinical examination | 13(34.2) | 7(18.4) | 18(47.4) | 24(63.2) | 2(5.3) | 12(31.6) |
| Are there emotional barriers that prevent you from performing a clinical breast cancer examination? | 8(21.1) | 15(39.5) | 15(39.5) | 15(39.5) | 19(50.0) | 4(10.5) |
| Are there financial barriers that prevent you from performing a clinical breast cancer examination? | 11(28.9) | 11(28.9) | 16(42.1) | 11(28.9) | 23(60.5) | 4(10.5) |
| Is the reason for not performing a breast self-examination because you do not how to perform an exam? | 21(55.3) | 6(15.8) | 11(28.9) | 16(42.1) | 16(42.1) | 3(7.9) |

Table 7 presents the overall knowledge levels of both the intervention and control groups. While 100% of women in both groups had poor knowledge regarding breast cancer, only 57.9% of females in the intervention group, compared to 100% in the control group, demonstrated a fair understanding of breast cancer risk factors. Additionally, 97.4% of the control group exhibited poor knowledge about the signs and symptoms of breast cancer, whereas only 63.2% of the intervention group fell into this category. Furthermore, 36.8% of the intervention group had a fair understanding of early detection of breast cancer, compared to 97.4% of the control group.

Table 7: Overall knowledge estimation for both groups (pre-test)

| before Intervention | Control | | | Experimental | | | *P-value |
|----------------------------------------------|------------|------------|------------|--------------|------------|------------|----------|
| | Poor (F,%) | Fair (F,%) | Good (F,%) | Poor (F,%) | Fair (F,%) | Good (F,%) | |
| General Knowledge about BC | 38(100) | 0(0.0) | 0(0.0) | 38(100) | 0(0.0) | 0(0.0) | |
| Knowledge about the risk factors of BC | 38(100) | 0(0.0) | 0(0.0) | 16(42.1) | 22(57.9) | 0(0.0) | |
| Knowledge about the signs and symptoms of BC | 37(97.4) | 1(2.6) | 0(0.0) | 24(63.2) | 14(36.8) | 0(0.0) | |
| Knowledge about the early detection of BC | 1(2.6) | 37(97.4) | 0(0.0) | 24(63.2) | 14(36.8) | 0(0.0) | |

Table 8 indicates that the intervention group showed an improvement in overall knowledge after participating in the program compared to the control group. Specifically, 10.4% of the intervention group had a good understanding of breast cancer, while none of the control group did. Additionally, 63.2% of the intervention group demonstrated good knowledge of breast cancer risk factors, whereas 73.7% of the control group had only fair knowledge. Furthermore, 60.5% of the intervention group had good knowledge about the signs and symptoms of breast cancer, compared to 50.0% of the control group, which exhibited poor knowledge. Lastly, 55.3% of the intervention group had good knowledge regarding early detection of breast cancer, in contrast to 34.2% of the control group.

Table 8: Overall knowledge estimation for both groups (after intervention)

| After intervention | Experimental group | | | Control group | | | *P-value |
|----------------------------------------------|--------------------|------------|------------|---------------|------------|------------|----------|
| | Poor (F,%) | Fair (F,%) | Good (F,%) | Poor (F,%) | Fair (F,%) | Good (F,%) | |
| General Knowledge about BC | 1(2.6) | 33(86.8) | 4(10.5) | 38(100) | 0(0.0) | 0(0.0) | 0.957 |
| Knowledge about the risk factors of BC | 0(0.0) | 14(36.8) | 24(63.2) | 10(26.3) | 28(73.7) | 0(0.0) | 0.064 |
| Knowledge about the signs and symptoms of BC | 2(5.3) | 13(34.2) | 23(60.5) | 19(50.0) | 19(50.0) | 0(0.0) | 0.002 |
| Knowledge about the early detection of BC | 0(0.0) | 17(44.7) | 21(55.3) | 0(0.0) | 25(65.8) | 13(34.2) | 0.005 |

DISCUSSION

Worldwide, as the most common cancer to be diagnosed, in women, breast cancer is among the top causes of death [18]. Increasing breast cancer awareness, which is particularly important in low and middle-income countries such as Iraq [19]. The distribution of the study sample demographic characteristics (Table 1) has revealed that 94.7% of female students in the intervention and control groups were aged 18-22 years. The educational level of female university was diplomas from different specializations. Furthermore, preventing breast cancer is made difficult by the expense of diagnostic tests [20]. On the other hand, 89.5% of the intervention did not have a family history of breast cancer, and 73.7% of the control, which was nearly similar to other studies which showed 71.1% had no family history of breast cancer than 76.3% of control [21]. Regarding breast cancer early detection sources of information (Table 2), 18.4% of intervention and 15.8% of control knowledge resources were from family and relatives. This result is in line with one from a study carried out in Najaf, Iraq, where 26.3% of cases and 10.5% of control of their knowledge resource were from family [21]. 26.3% of intervention and 36.8% of control obtained their information about breast cancer from the internet, while 21.1% of intervention and 7.9% of control obtained their information about B.C. from the PHC center, this result was not very much different compared to the results in a study conducted in Basrah, Iraq where 43.3% of respondents obtained their information from health worker than 30% of respondents obtained their information from social media [22]. The current study found a notable change in breast cancer knowledge after an educational intervention among female university students in Najaf, Iraq, all participants they were contacted again for a post-test survey. The 100% response rate to the post-test survey is understandable because all participants in this study were students in residence at the university or were living in their home throughout the study period. After educational intervention, we evaluated the knowledge level of the same participants. This is a consistent study conducted in Bangladesh [23]. In these studies, participants showed a significant increase in their knowledge of breast cancer symptoms, risk factors, screening methods, and the practice of breast self-examination following educational sessions [24]. Regarding general knowledge of breast cancer (Table 3), 78.9% of the intervention groups and 84.2% of the control groups considered breast cancer to be the most common cancer among women worldwide; the results in this study were better than those in studies conducted among women in northern and eastern China, which showed that 72.8% of women knew about breast cancer. [25] This

difference was due to the difference in age group, as the age group in the current study was (18–22) while the age group in the Chinese study was (25–70). 2.6% of the intervention and control groups answered that breast cancer is a hereditary disease. The results in this study were positive compared to research conducted among female university students in Baghdad, which showed that only 13.75% of the respondents answered correctly to the question (breast cancer is a hereditary disease). [26] 78.9% of females in both the intervention and control groups responded that regular breast examination helps in the early detection and treatment of breast cancer, which is better than studies conducted among women in northern and eastern China and among a sample of the educated population in Iraq. [25,27] The results showed (80.1% and 74.2%) respectively, and this difference comes from the variation in the age group and the source of information about breast cancer and early detection of breast cancer for the study sample, as the age group was (18–22) and the source of information was 26.3% for the intervention group from the Internet 36.8% among the control women, and in China, the age group was (25–70) and the source of information was 30.6% television or broadcast, and in Iraq, the age group was (18–63) and the source of information was 55.9% television. Regarding breast cancer risk factors and causes (Table 4), The pre-test results indicated that knowledge of risk factors was generally low, which aligns with findings from studies conducted among adolescents in Sri Lanka and a previous study in Nigeria. Many students lacked awareness of the protective benefits of breastfeeding, which is crucial for making informed decisions about breastfeeding in the future. The majority of students were also unaware that some lifestyle choices were associated with an increased risk of breast cancer, such as physical inactivity, obesity, and excessive alcohol consumption [28]. 44.7% of the Intervention compared to 52.6% of the control group responded that abstaining from breastfeeding it is a risk factor for breast cancer, a result similar to the results revealed by studies in Saudi Arabia and Jordan (67.3%, 67.6%), respectively [29]. The present study revealed that only 39.5% of interventions compared to 34.2% of the control group indicated that extended use of oral contraceptives was identified as a risk factor for breast cancer (pre-study test). The results were similar to those of a study conducted in the Medina region which found that (42%) [30]. 78.9% of interventions and 60.5% of controls reported a family history of the disease as a risk factor for breast cancer; this is comparable to a study in the United States that found 88 % of cases had this information. The majority of participants were not aware of the warning signs and symptoms of breast cancer. When asked what they knew about the signs and symptoms of breast cancer (Table 5), 73.7% of the participants and 47.4% of the control group responded that one of the warning signs and symptoms of breast cancer is a change in the size, shape or color of the breast; this result was similar to another study conducted in Saudi Arabia at 79.8% [31]. In the intervention group, 86.8% of participants correctly identified that the emergence of a painful lump in the breast or beneath the armpit is a symptom of breast cancer, compared to 63.2% in the control group. This result is agree with a study conducted in the AL- Madina Al Munawara Region, where 59.9% of participants recognized that a painless lump in the breast or axilla is a symptom associated with breast cancer [29]. In the intervention group, 86.8% identified pain in the breast, nipple, or underarm as a symptom of breast cancer, while only 47.4% of the control group did the same. Similarly, a study involving university students in Shariah found that 73.3% recognized this symptom [32]. [33] In the intervention group, 68.4% identified bloody discharge from the nipple as a sign of breast cancer, compared to 42.1% in the control group. Additionally, 73.7% of the intervention group and 44.7% of the control group recognized that enlarged lymph nodes under the arm are indications of breast cancer. Furthermore, 36.8% of the intervention group correctly identified breast warmth and itching as symptoms, while only 18.4% of the control group did. These results are relatively identical to a study conducted in Jordan, where 71.5% recognized bloody discharge from the nipple, 77.2% identified swollen axillary glands, and 50.6% acknowledged breast warmth and itching as signs and symptoms of breast cancer. Regarding knowledge of early detection of cancer (Table 6), While approximately 73.7% of the intervention group and 55.3% of the control group reported being aware of breast self-examination, only a small percentage of students actually performed the examination, with 36.8% in the intervention group and 15.8% in the control group. This is identical to results from Riyadh city, where only 3.4% of students conducted breast self-examinations every month [34,35]. [36] In the study, 89.5% of the intervention group and 81.6% of the control group indicated that early detection of breast cancer can lead to improved treatment outcomes. This finding is similar to a study conducted in Saudi Arabia, where 96.9% of participants believed that better outcomes are possible when breast cancer is detected early. (Table 7) have shown that the general knowledge about breast cancer was poor but significantly improved following a lecture on the topic (post-test). The results were in agreement with the results of many studies [37–39]. The lecture included a definition of breast cancer, its risk factors, signs and symptoms, the importance of early detection and self-examination of the breast, and a two-minute video recording on methods of early detection of breast cancer, the mechanism of self-examination, and the use of visual aids and audio-visual media as one of the successful means of detecting breast cancer [40,41]. At the conclusion of the presentation, there was a question and answer session. Each student was then given an educational brochure that covered breast cancer risks, signs and symptoms, as well as instructions on how to conduct a breast self-examination to take home and review. Understanding the risk factors can aid in preventing breast cancer in women [42]. Good knowledge was reported by female university students after the test for the intervention group compared to the control group.

Overall, knowledge of risk factors improved from 42.1% poor and 57.9% fair to 36.8% fair and 63.3% good (post-test), early detection of breast cancer in females can only be achieved when they are aware of its symptoms and signs. In the present study, participants had low knowledge of breast cancer signs and symptoms including 63.2% poor in intervention and 97.4% poor in control (pre-test), we observed that the knowledge level of the intervention group improved to 60.5% good after the lecture and discussion on the topic. Khadija Al-Hasani reported the same result [43]. Knowledge of breast cancer screening tests is vital for early detection of cancer, The US Preventive Services Task Force advises that women aged 20 to 30 should receive a clinical breast examination by a healthcare professional every three years, while those aged 40 and older should have the examination annually. In the current study, participants demonstrated a lack of knowledge regarding early breast cancer detection, with 63.2% exhibiting poor understanding. Likewise, in Iran, the primary obstacles reported by women regarding breast cancer screening included feelings of embarrassment, fear of a breast cancer diagnosis, and a belief in fate were the main barriers reported by females to breast cancer screening [37,38,43]. While the level of knowledge about early detection improved to 55.3% of good knowledge for the intervention group after lectures, videos, and brochures on this topic.

CONCLUSION AND RECOMMENDATIONS

In summary, university students displayed a limited understanding of breast cancer risk factors, signs and symptoms, as well as breast screening practices. Notably, the majority of the participants were studying in medical fields. Our results demonstrate that the intervention group, who participated in a lecture and discussion, exhibited a notable increase in their knowledge about breast cancer. Meanwhile, the control group showed no change, suggesting they require sustained exposure and knowledge enrichment to develop positive attitudes toward this topic. The intervention group's enhanced knowledge did not immediately translate into a positive attitude shift, highlighting the need for continued education and exposure over time.

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