

Original Article

Impact of Web-Based Educational Intervention on Preventive Behaviors of Breast Cancer among Damanhour University Female Students

Asmaa Hamed Mohamed ¹, Enas Mohamed Ibrahim Hassan ², Abeer Abd El-Aziz Madian ³, & Amel Attia Abd Elghaffar Moustafa ⁴.

1. Assistant lecturer at Community Health Nursing, Faculty of Nursing, Damanhour University, Egypt.

2. Professor of Community Health Nursing, Faculty of Nursing, Damanhour University, Egypt.

3. Professor of Community Health Nursing, Faculty of Nursing, Damanhour University, Egypt.

4. Lecturer of Community Health Nursing, Faculty of Nursing, Damanhour University, Egypt.

*Corresponding author: Asmaa Hamed Mohamed, Assistant lecturer at Community Health Nursing, Faculty of Nursing, Damanhour University.

ABSTRACT

Background: Breast cancer, the most typical cancer in women, is a significant global health concern. Unhealthy habits that may influence students' health and way of life as adults usually accompany the university years. Following these health-promoting behaviors is one of the best strategies for university students to protect and regulate their health against breast cancer because they are closely linked to health promotion and illness prevention. **Aims:** to evaluate the impact of web-based educational intervention on preventive behaviors of breast cancer among Damanhour University female students.

Design: A Randomized educational intervention trial (pre- post& follow up) design. **Subjects:** fourth grade female university students. **Tools:** four tools; **tool (I)** online breast cancer knowledge assessment structured questionnaire. **Tool (II)** online Healthy Promoting Life-Style Behaviors Profile Scale (HPLP). **Tool (III)** online behaviors questionnaire sheet toward Breast self-examination, and **tool (IV):** web-based educational intervention satisfaction scale. **Results:** There was a positive correlation between students' attitude toward BSE, level of knowledge, level of BC prevention practices and level of HPLP behaviors respectively as the students' attitude toward BSE improved, the level of BC knowledge, BSE practices and total score of HPLP scale improved and vice versa. **Conclusion:** In order to improve university female students' BC preventative & screening practices (BSE), the study found that the research hypothesis is validated and that the HBM-based preventive educational website was a useful and effective way to do so. **Recommendations:** Researchers should repeat this study with an observational checklist of breast self-examination (BSE) to address BSE practices skills objectively.

Key words: Web-based, Educational intervention, Preventive behavior, Breast cancer & Female students.

INTRODUCTION

The young adult period, which starts at age 18 and lasts until age 25, is typically the time when people are studying at universities and is therefore the most valuable resource in the world. It is a stage of life with specific health and developmental needs and rights. ⁽¹⁾ Additionally, this is a period for knowledge and skill development, relationship management skills, and acquiring traits and skills that will be crucial for maintaining adult health. ⁽²⁾ During this time, people develop their independence in making lifestyle and health-related decisions, therefore education and preventive behaviors are crucial. ^(1, 2)

University life has a significant impact on how sensitive a group of adults are to developing morbidity as adults. ⁽³⁾ Young adults, especially females, are more likely to develop breast cancer and other cancers because of risky behaviors that have been linked to cancer's later start, such as being overweight and physically inactive, eating poorly, smoking, and alcohol drinking excessively. ⁽⁴⁾

The second leading cause of mortality worldwide and the main factor in cancer-related fatalities among women, cancer affects 2.1 million women annually. World Health Organization, 2018 ⁽⁵⁾ stated that, the most common form of cancer in women that causes death worldwide is breast cancer (BC), creating an issue for global public health. According to estimates, 627,000 women, or 15% of all women who died from cancer, did so as a result of breast cancer. Although rates are rising in almost every region worldwide, breast cancer rates are greater among women in more developed regions. 1.67 million new instances of breast cancer (about 25% of all malignancies) were discovered in 2012. In 2018, this number rose to 2.09 million new cases, or 11.6% of all malignancies. A lifetime diagnosis of invasive breast cancer will occur in 1 in 8 women (13%) and 1 in 39 women (3%) will pass away from the disease. ⁽⁶⁻⁹⁾

Primary preventive strategies for BC are currently scarce, and they tend to underestimate the importance of early detection in raising women's quality of life and reducing mortality associated with it. Therefore, the most important secondary preventative intervention for achieving such aims is screening. Notably, WHO stated in 2020 that risk factor avoidance and screening procedures might prevent 30 to 50 percent of malignancies. Mammography, clinical breast examinations, and breast self-examination (BSE) are suggested screening techniques for BC. Even though mammography screening is the best way to find breast cancer early, it is painful, has a high rate of false positive or false negative results because of dense breast tissue, and is only available once a year to women over the age of 45. ⁽⁴⁻⁸⁾

One of the key behaviors change models is the Health Belief Model (HBM), has been often used to measure attitudes towards preventative health behaviors like BSE, eating well, and exercising. Although it is crucial to assist women in their attempts to lower their cancer risk and improve their breast health behaviors, the HBM will benefit this age group the most. A psychosocial model for behavior modification is called the Health Belief Model (HBM), that looks at health behaviors to identify elements that may influence people's beliefs, which may then influence how they decide to engage in preventative health behaviors. Six constructions centered around the main tenet of the paradigm, which was changed over time to incorporate HBM. ^(10, 11)

Among the applications (apps) that could be used in interventions for health education, web-based stands out. Users using the group communication feature of this instant messaging service for desktops and smartphones can communicate audio, text, video, or locations. Clients and healthcare professionals' benefit from computerized health behavior interventions. Web-based applications (apps) provide a successful method for changing women's behavior in order to avoid breast cancer. This involves educating people about how to manage their weight, eat healthily, drink in moderation, exercise, breastfeed, and steer clear of things that can cause cancer, such smoking and using mixed estrogen and progestin hormones. ⁽¹²⁾

The process of testing for breast cancer is crucial, and community health nurses play a variety of responsibilities in the early cancer identification and prevention. The most typical function of community health professionals is awareness and information raising. Home visits were done to increase neighborhood awareness of breast cancer by going door to door. Other activities included giving educational talks in public places (like schools and youth centers) and community health centers, distributing informational leaflets and pamphlets, playing motivational videos on mobile phones and instructing women in BSE. Due to a lack of research, community health nurses are adopting web-based applications to improve breast cancer prevention strategies and encourage women to lead healthy lives to stave against the illness later in life. ⁽¹³⁾ The purpose of this study is to assess the impact of web-based educational intervention on preventive behaviors of breast cancer among Damanhour university female students.

SIGNIFICANT OF STUDY

Breast cancer (BC) is the most lethal malignancy for women in the world. The early stages of this disease's combat should focus on females. Breast cancer (BC) is regarded as the most prevalent malignancy among women that results in death worldwide, creating an issue for global public health. ⁽⁶⁾

In Egypt, WHO, 2018 ⁽⁷⁾ stated that an important public health issue is breast cancer, accounting for 35.1% of cases of newly diagnosed cancer. Because of interplay between genes and health behaviors, early onset breast cancer incidence has changed so quickly that it cannot be completely attributed to genetics. ⁽⁸⁾ Prevention has been suggested as an effective strategy to lessen the burden of breast cancer because many behavioral risk factors are changeable. Additionally, a healthy habit has been suggested for preventing breast cancer. ⁽⁹⁾

Early detection is very important and even more crucial to increase breast cancer awareness among young girls using efficient and preferred learning channels because breast cancer in young age is typically more aggressive and may result in worse survival rates. In order to improve university female students' knowledge of breast cancer risk reduction and early detection, this study aims to provide evidence for its utility and effectiveness. It also seeks to assess the effects of a social interaction channel on key knowledge about breast cancer through a web-based app. ⁽¹⁰⁾

AIM OF THE STUDY

This study was conducted to evaluate the impact of Web-based educational intervention on preventive behaviors of breast cancer among Damanhour University female students.

RESEARCH HYPOTHESIS

Damanhour University female students who receive education regarding preventive behaviors of breast cancer using Web-based educational intervention will exhibit higher knowledge, and preventive behaviors than those who are not.

MATERIALS AND METHODS

Materials

Study design:

Randomized educational intervention trial (pre- post) design was adopted to conduct this study.

Study setting:

The study was carried out at Damanhour University, El-Beheira Governorate {it includes eleven faculties that divided into 2 groups 5 scientific faculties and 6 literature faculties}.

Study subjects:

Six hundred and forty (640) fourth grade female students at previously selected faculties at academic year (2020- 2021) were taken as research subjects, because fourth grade students were mature enough to understand and practice effective breast self-examination.

Sample size:

The sample size was determined by applying a proportional allocation of 25% to the overall number of female students in each group of randomly chosen instructors. As a consequence, 640 female students met the minimum sample size requirement (320 in the intervention group and 320 in the control group).

Sampling technique:

Every odd number was assigned to the intervention group (n=320 students), and every even number was assigned to the control group (n=320 students). Students were chosen at random from a list. A web-based educational program for

preventing breast cancer was given to the intervention group before it was given to the control group at the conclusion of the program and assessment phase.

Inclusion criteria

- Girls who were not pregnant or breast fed.
- had access to the internet and a smart phone.
- There are no disabilities or chronic illnesses present.
- Never had breast cancer.
- Willing to participate in the study.

Study tools:

Data was acquired using the following study tools:

Tool (I): Online Breast Cancer knowledge assessment structured questionnaire:

This questionnaire was used in order to assess female student knowledge of breast cancer with different categories, and it included four parts as the following:

Part I: knowledge of breast cancer risk factors that contained 9 (yes/no) questions, was adopted from the Breast CAM (Breast Cancer Awareness Measure) ⁽¹⁴⁾ that received support for its validation from breast cancer care and breakthrough breast cancer. ⁽¹⁵⁾ For the total of 9 questions, each knowledge scored as follows: Correct response = 1, incorrect response = 0, and no response = 1. So, the total range of points was from (0-9). The score of the items summed-up and converted into percent score to be categorized to three levels as:

- < 50% (less than 4) = Poor level of knowledge.
- 50 % -75% (4 to 7) = Fair level of knowledge.
- >75% (greater than 7) = Good level of knowledge.

Part II: Knowledge of breast cancer warning signs and symptoms that contained 11 (yes/no) questions, was adopted from the Breast Cancer Awareness Measure (Breast CAM). ⁽¹⁴⁾ For the total of 11 questions, each knowledge was scored as following: Correct response = 1, incorrect response = 0, and no response = 1. So, the total range of points was from (0-11). The score of the items was summed-up and converted into percent score to be categorized to three levels as:

- < 50% (less than 5) = Poor level of knowledge.
- 50 % -75% (5 to 8) = Fair level of knowledge.
- >75% (greater than 8) = Good level of knowledge.

Part III: Knowledge of Breast Self-Examination (BSE) that contained 15 (yes/no) questions, was taken from Rosmawati N's (2010) work. ⁽¹⁶⁾ For the total of 15 questions, each knowledge was scored as follows: Correct response = 1, incorrect response = 0, and no response = 1. So, the total range of points was from (0-15). The score of the items was summed-up and converted into percent score to be categorized to three levels as:

- < 50% (less than 7) = Poor level of knowledge.
- 50 % -75% (7 to 11) = Fair level of knowledge.
- >75% (greater than 11) = Good level of knowledge.

Part IV: Student personal data was assessed from students; it included data as age, faculty name, residence, marital status, family history of breast cancer, parents' education and occupation.

In addition to these:

- Source of student knowledge regarding prevention of breast cancer was assessed.

Anthropometric measurements: weight and height were reported by students, and body mass index was calculated according to WHO standards.

Tool (II): Online Healthy Promoting Life-Style Behaviors Profile Scale (HPLP):

Healthy Promoting Life-Style Behavior Scale (HPLP), that was developed by Walker et al in 1987⁽¹⁷⁾ to measure the behavior improving one’s health in relation to their healthy lifestyle was adopted and used by the researcher; additionally, validity and reliability of the scale which included 52 items was made by Esin in 1997.⁽¹⁸⁾ All items of the scale were prepared in 4-point Likert type. Each item is scored with the numbers as following:

• Never = 1	• Often = 3
• Sometimes = 2	• Regularly = 4

The scale includes **six sub-scales**:

- Self-actualization sub-group** (9 items) determined one’s purpose of life, their individual ability to actualize themselves, how much they knew about themselves and how much they could satisfy themselves.
- Health responsibility sub-group** (9 items) determined the level of responsibility one has for their health and how much they take care of their health.
- Exercise sub-group** (8 items) determined how much one carries out exercises which are indispensable for a healthy life.
- Nutrition sub-group** (9 items) determined one’s values in selecting and arranging their meals and food selection.
- Interpersonal support sub-group** (9 items) determined the level of one’s communication with those with whom they had intimate relations and the continuity of this communication.
- Stress management** (8 items) determined the level of one’s familiarization with sources of stress and stress control mechanisms.

Tool (III): Online behaviors questionnaire sheet toward Breast self-examination:

This questionnaire was used to assess attitudes and practices of female students adopted from the previous work of Rosmawati N (2010)⁽¹⁶⁾ and included two parts:

Part I: from this tool included 13 five- point Likert scales to assess participants’ attitudes towards breast self-examination (BSE) such as asking them if BSE made them laugh while practicing it, BSE would be embarrassed for them, BSE wasted their time. It was ranging from 0 (strongly disagree) to 4 (strongly agree), with a total range of score was from (0-52), and was at three levels:

• < 50 % (< 26)	Negative attitude
• 50 %-75% (26-39)	Neutral attitude
• >75 (>39)	Positive attitude

Part II: of this tool included 7 five- point Likert scales to evaluate participants’ practices of BSE, such as asking them if BSE is practiced once a month and if friends advise to do a BSE. On a 5-point Likert scale, where 4 is for "always" and 0 is for "rarely,". Three levels and a total score range of 0 to 28 were used.

• < 50% (less than 14)	Poor level of practicing Breast Self-Examination.
• 50 % -75% (14 to 21)	Fair level of practicing Breast Self-Examination.
• >75% (greater than 21)	Good level of practicing Breast Self-Examination.

Tool (IV): Web-based educational intervention Satisfaction scale:

This tool was created after evaluating recent literature in order to gauge how satisfied female students were with the online learning environment. (overall web site design, structure, content, font typography and font size, graphics and photographs, prototype, knowledge presentation, usability and functionality) as (Do the objectives of that training were clear or not? – Do the training program content was introduced in attractive manner or not? – Were the content introduced in an organized manner or not?). The items were graded using a 5-point Likert scale, with 4 being the strongest

agreement and 0 being the strongest disagreement. The total range of scores was 0–20, and they were divided into three levels as follows:

- | | |
|--------------------------|--------------|
| • < 50 % (less than 10) | Dissatisfied |
| • 50 % -75% (10- 15) | Neutral |
| • >75% (greater than 15) | Satisfied |

Methods

Administrative process

- The Damanhour University department of learning and students' affairs received an official letter from the dean of the nursing faculty informing them of the study's objectives and requesting their consent to carry it out in the chosen faculties.
- After explaining the purpose of the study, permission was gained to perform it in the chosen location.

Development of study tools

- Tools I, II, and III have been translated into Arabic as:
- Tool (I) Online Breast Cancer knowledge assessment structured questionnaire that was adopted from the Breast Cancer Awareness Measure (Breast CAM) and employed to test the comprehension of breast cancer information among female students using various categories (risk factors, warning signs and symptoms, breast self-examination).
- Tool (II): Online Healthy Promoting Life-Style Behaviors Profile Scale (HPLP) that was created in 1987 by Walker et al. ⁽¹⁷⁾ to measure the behavior improving one's health in relation to their healthy lifestyle and was included six sub-scales; namely, self-actualization, health responsibility, exercises, nutrition, interpersonal support, and stress management.
- Tool (III): Online behaviors questionnaire sheet toward Breast self-examination that was adopted from the previous work of Rosmawati N (2010) ⁽¹⁶⁾ and used to assess attitudes and practices of female students, participants' attitudes towards breast self-examination (BSE), and evaluate participants' practices of BSE.
- After examining recent literature, the researcher created Tool IV to gather information from the research subjects.

Pilot study

The researcher conducted a pilot study with 64 university female students, or 10% of the total study population, in order to assess the tools' clarity, applicability, and comprehension, identify potential barriers to data collection, and gauge the required time.

Data collection

- Assessment phase started in January 2021 and ended in Mars 2021.
- Program development began in April 2021 and became available and valid from the start of August 2021. During this period, the pretest was done for both intervention and control group.
- The fieldwork of preventive web site was accomplished in 6 months during the period from 1/8/2021 to 31/1/2022.
- The posttest was done 3 months after closing the web site.

Developing the program:

Web-based breast cancer preventive educational program was applied according to the following phases:

1. Assessment phase:

- Students University Emails were obtained from the department of learning and students' affairs in each selected faculty.
- Permission E-mail message to all students of the selected faculties to obtain their acceptance for sharing in research and to determine the way for receiving the program.
- Two Telegram application groups; one for intervention group and another for control group were done to facilitate communication with them.

- Every odd number will be assigned to the intervention group (n=320 students), and every even number will be assigned to the control group (n=320 students). This allocation of students to each group was done at random from faculty student lists.
- The learning environment, as well as the learner's prior knowledge and skills, were recognized, and the instructional difficulty of the thesis was made clear.
- All students were instructed to measure their weight and height before filling in the study form.
- Before starting the program, Tools I, II, and III were given to every student in both Telegram application groups in order to execute the pretest phase and gather baseline data.

2. Planning phase:

- **Determining the website program objectives:** The general objective of the website program was to enhance the female student's understanding of and behavior towards BC prevention.
- **Determining the content of the website program:**

The information on the page is based on the Health Belief Model (HBM), one of the most significant behavior modification models that has been used extensively to look at attitudes about preventative health behaviors like BSE. Three key content categories on the website were information about breast cancer, prevention, and early detection.

A. The breast cancer category, which provided details on the disease and its risk.

B. The preventative category, which provided details on weight management, exercise, and a balanced diet.

C. Information on breast self-examination, clinical breast exams, and mammography were included in the early detection category.

3. Designing and development phase:

- The design phase of the website was systematic and specific.
- The website also had a responsive, mobile friendly design that means a website's design was automatically resized to fit the screen size on which it's being viewed.
- Website was created to run in any web browser and mobile android.
- Several web pages were created. Content was displayed through written information accompanied by info-graphs, images, and videos. The windows pages were consisted of the following: (Fig. 1, 2)
- Main Page: this page includes three main icons for moving to other page, namely (main, connect with us, and life stories), as the home page banner shows the program title “**pinky step for healthy life**” accompanied by visual effects.



Figure (1): Screen shot for main page of the educational program.

- Menue's page: contains the subject headings of the preventive health education Website, and when the students press the title of the subject it moves directly to the main screen of the content of the subject, and through it begins to involve within its elements which contains 8 topics.
 - 1) Breast cancer statistics.
 - 2) Overview about breast cancer.
 - 3) Types of breast cancer.
 - 4) Diagnosis of breast cancer.
 - 5) Prevention and treatment.
 - 6) Ways of Breast Self-Examination.
 - 7) False perceptions about breast cancer.

8) Most common queries on breast cancer.

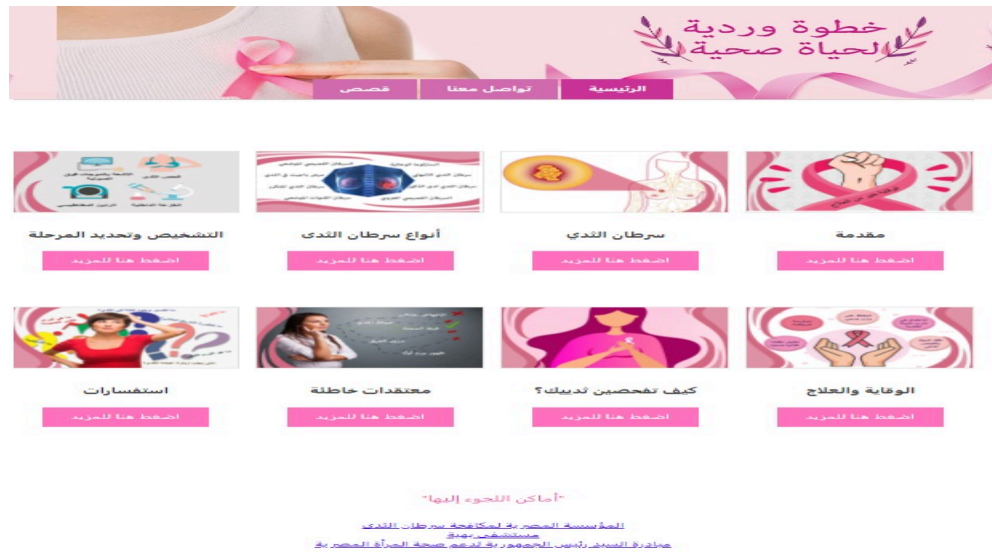


Figure (2): Screen shot for topics page of the educational program.

- A group of programs has been used for graphic design of website as Adobe Illustrator , photo shop, coding by HTML5, in addition to video editing by [Camtasia Studio application](#).
- The development of website was conducted by the developers through creating and assemble the content assets.
- For the Expert Consultations, three members of the community health nursing department at faculty of Nursing from different University provided their insights.
- The website premiered in April 2021 and reopened with password after edit and improvement on August 1st, 2021, providing information to the students who signed up in the study. Finally, in October 2021, the website link became accessible to study students without the login password (<http://aibcancer.com/index.html>) to overcome the login problems that happened when using password.

4. Field work implementation phase:

- The breast cancer preventive website was implemented for the intervention students in the form of eight topics in addition to life stories menu, interaction menu and link for referral system, each topic takes around 10-15 minutes to read effectively.
- Any problems related to website link password and form link were encountered to make sure that the links were running, and students were guided for what to do to open the links effectively.
- Daily Short health messages were sent to all students of the intervention group through Telegram application. These messages included important Breast Self-Examination skills, and healthy lifestyle instruction.
- Every week, one topic of health education content was appeared to studied students in website and was discussed with them through Telegram chat.
- One life story about breast cancer was delivered each week on the main page of the educational website as a motivator for implementation of breast cancer prevention practices.
- Participants had access to the latest breast cancer news and information through link for breast cancer pages on the bottom of main page which they could press on it and refer them to various pages as WHO breast cancer statistics, Breast Cancer Foundation of Egypt (BCFE) affiliated from ministry of social solidarity, and Baheya hospital website.

5. Evaluation phase:

- Two posttests were used for the intervention group's evaluation, immediate post intervention and follow up after 3 months of intervention of website education (using tools: I, II, and III).
- Satisfaction of students regarding web-based preventive educational program was evaluated for evaluation group using tool (IV).
- A posttest was conducted utilizing the same tools (I, II, and III) through the Telegram application for the control group and intervention group at the same time.

Statistical analysis:

- After data gathering, the obtained data was coded and converted into a format that was specifically created to be fed into a computer.
- The SPSS version 20 statistical program of social science (SPSS) was used to enter and analyse the data.
- After data entry, it was reviewed and corrected manually, through cross-tabulation and frequency analysis.
- Standard deviation (SD), range (minimum and maximum), arithmetic mean, and percentages were used to analyze the variables.
- The study's level of significance was set at $p < 0.05$.
- In order to examine the association between categorical variables, the Chi square test (version 2) was applied.
- The difference between two linked variables was assessed using a paired sample T-test.
- The strength between variables was assessed using the Pearson correlation coefficient (r-test).
- Graphs were created to visualize the data.

Ethical considerations:

- Every Dean of the chosen faculties was informed of the day and time of the data collection.
- After explaining the purpose of the study and assuring the participants that the data collected would only be used for the purpose of the study, online informed consent was obtained from the selected female students in the selected faculty involved in the study.
- Using university emails and phone numbers in place of names ensured the confidentiality and anonymity of each response.
- After the post test, the control group received the website's preventative health education content by being sent the link via the Telegram app.

RESULTS

Table (1): shows how the examined students were distributed across the intervention and control groups in terms of their personal characteristics. The study sample consisted of 640 participants, which was drawn from the population of Damanhour female university students who met the inclusion criteria. As seen in Table 1, the age of the studied students ranged from 20 to 23 years old with a mean (23 ± 1.2 years and 22.0 ± 1.3 years) among intervention and control groups respectively, as well as more than three quarters (80.9% & 75.3%) of them respectively were single, while the minority (3.8%, 4.7%) of them respectively had children.

According to students' parents' level of education, in excess of one third (37.2%) of intervention group and more than two fifths (42.2%) of control group respectively had fathers with high level of education, while more than one quarters (30.6%, 25.9%) of them respectively had mothers with high level of education. Regarding students' parents' occupation, more than three quarters (88.4%) of intervention group and more than two thirds (70.0%) of control group their fathers were work; on the other hand, more than two thirds (70.0%) of intervention group and more than three quarters (75.3%) of control group their mothers were housewives.

In terms of students' family history of breast cancer, the majority (93.7%, 94.7%) of intervention and control groups respectively reported that they had no family history of breast cancer, while only (6.3%, 5.3%) of both groups respectively reported that they had family history of breast cancer, with a p value of 0.01 indicating a statistically significant difference between the two groups.

Pertaining to the relationship between the students and the breast cancer affected family member, two fifths (40.0%) of the intervention group and more than one third (35.3%) of the control group stated that their grandmothers had breast cancer diagnoses, however there was no statistically significant difference between the two groups.

Table (1): Distribution of the studied students (intervention and control groups) according to their personal characteristics. (N=640)

Personal characteristics	Intervention group (n=320)		Control group (n=320)		Test	
	No	%	No	%		
Age/ years						
20< 21	62	19.4	41	12.8	$t= 0.8$ $P=0.044^*$	
21< 22	104	32.5	168	52.5		
> 22	154	48.1	111	34.7		
Min. – Max.	20-23 years		20-23 years			
Mean ± SD	23±1.2 years		22.0±1.3 years			
Marital state						
Single	259	80.9	241	75.3	$\chi^2= 1.8$	$P= 0.64$
Married	49	15.3	64	20.0		
Have Children	12	3.8	15	4.7		
Father Educational level						
Not read and write	22	6.9	31	9.7	$\chi^2= 3.24$	$P= 0.76$
Certificate of illiteracy	52	16.3	63	19.7		
Secondary education	127	39.6	91	28.4		
High education	119	37.2	135	42.2		
Father Occupation						
Work	283	88.4	224	70.0	$\chi^2= 3.16$	$P= 1.31$
Not Work	22	6.9	59	18.4		
Dead	15	4.7	37	11.6		
Mother Educational level						
Not read and write	19	5.9	23	7.2	$\chi^2= 3.16$	$P= 0.68$
Certificate of illiteracy	28	8.8	12	3.8		
Secondary education	175	54.7	202	63.1		
High education	98	30.6	83	25.9		

Mother occupation						
Work	75	23.4	68	21.3	$\chi^2=$ 3.74	$P=$ 0.10
Housewife	224	70.0	241	75.3		
Dead	21	6.6	11	3.4		
Family history of breast cancer						
No	300	93.7	303	94.7	$\chi^2=$ 17.49	$P=$ <0.01*
Yes	20	6.3	17	5.3		
<i>The relationship (n=20)</i>			<i>(n=17)</i>			
Mother	4	20	5	29.4	$\chi^2=$ 1.02	$P=$ 0.08
Sister	2	10	1	5.9		
Aunt	6	30	5	29.4		
Grandmother	8	40	6	35.3		

Figure (1): displays the student distribution under study (intervention and control groups) according to their residence. It was found that less than two thirds (60.3%, 62.8%) of intervention and control groups respectively were rural residents, while just more than one third (39.7%, 37.2%) of them respectively were urban areas residents.

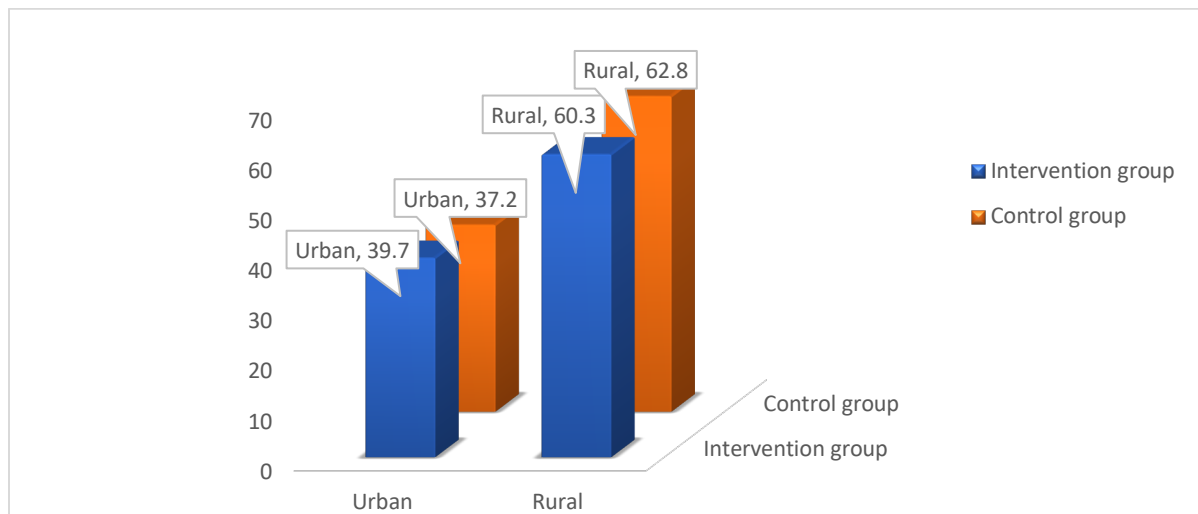


Figure (1): Distribution of the studied students (intervention and control groups) according to their residence.

Table (2): clarifies the distribution of the studied students (intervention and control groups) according to their total level of knowledge about BC throughout the program phases. The table shows that, most of intervention group (88.7%) had poor total level of knowledge about BC pre-program where, more than half (61.2%) and more than three quarters (75.4%) of them had strong understanding of the post-implementation of the follow-up program, respectively. On the other hand, the majority (93.7%, 74.7%) of control group pre and post program respectively had poor total level of knowledge about BC. There was a statistically significant difference between intervention students' total level of knowledge about BC post and follow up program implementation at (P2 <0.01, P3 <0.01) respectively.

Table (2): Distribution of the studied students (intervention and control groups) according to their total level of knowledge about BC throughout the program phases. (N=640)

Total level of knowledge	Pre		Post		Follow-up		P1	P2	P3			
	Intervention Group (n=320)	Control Group (n=320)	Intervention Group (n=320)	Control Group (n=320)	Intervention Group (n=320)	Control Group (n=320)						
	%	%	%	%	%	%	χ^2	χ^2	χ^2			
							p-value	p-value	p-value			
Good (>75%)	3.9	0.0	75.4	1.0	61.2	1.0	0.22	98.3	97.2			
Average (50 - 75%)	7.4	6.3	22.7	24.3	23.7	13.7				>0.03	<0.01*	<0.01*
Poor (<50%)	88.7	93.7	1.9	74.7	15.1	85.3						

Figure (2) illustrates the distribution of the studied students (intervention and control groups) according to their source of information regarding BC. This figure shows that less than half (40.6%, 49.7%) of intervention and control groups respectively reported that the mass media and the internet were the most common sources of information about breast cancer, with parents and friends and training courses coming in second and third (10.7% and 9.6%, respectively) and third and fourth (20.6% and 18.8%), respectively.

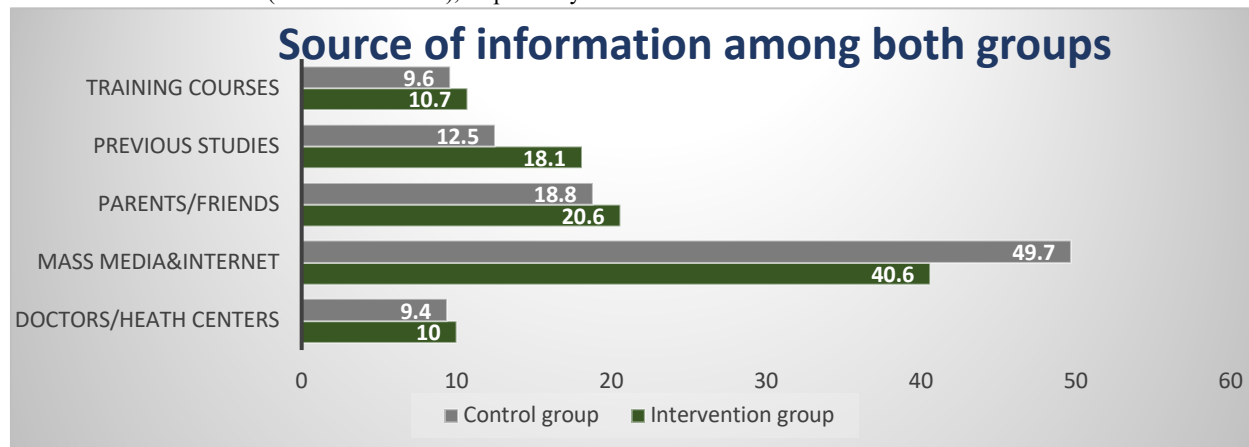


Figure (2): Distribution of the studied students (intervention and control groups) according to their source of information regarding Breast Cancer. (N=640)

Table (3): represents the distribution of the studied students (intervention and control groups) according to their total subscales of Health Promoting Lifestyle Behaviors Profile (HPLP) throughout the program phases. It was found that the highest mean \pm SD score at post and follow up program implementation was (35.9 \pm 9.3) & (31.8 \pm 13.3) respectively for intervention group regarding their nutritional habits compared to its value (6.6 \pm 6.2) at preprogram that was very low which indicated the effectiveness of educational intervention. On contrary, it was no obvious improvement of HPLP for control group regarding nutritional habits as the mean \pm SD score was (8.6 \pm 7.7) preprogram and became (13.8 \pm 7.1) & (11.6 \pm 9.2) at post and follow up program implementation respectively, with a highly statistically significant difference between both groups at (P <0.01). At pre, post, and follow up of the program implementation at (P1, P2), a highly statistically significant difference was seen between the total score for each of the six subscales of the (HPLP) for both examined groups regarding breast cancer.

Table (3): Distribution of the studied students (intervention and control groups) according to their total subscales of Health Promoting Lifestyle Behaviors Profile (HPLP) scale throughout the program phases. (N=640)

Total score for each of the six subscales of HPLP scale	Pre-Test		Post- Test		Follow up Test		Paired t test (1) p-value	Paired t test (2) p-value
	interventi on Group (n=320)	Contro l Group (n=320)	interventio n Group (n=320)	Control Group (n=320)	interventio n Group (n=320)	Control Group (n=320)		
	Mean \pm SD		Mean \pm SD		Mean \pm SD			
1. Health responsibility	6.4 \pm 2.8	5.9 \pm 2.1	9.5 \pm 2.7	9.9 \pm 2.7	10.8 \pm 3.3	6.5 \pm 2.4	15.682 <0.001*	12.876 <0.001*
2. Physical exercises	7.7 \pm 5.7	9.9 \pm 6.1	24.5 \pm 5.6	12.1 \pm 5	20.7 \pm 4.9	10.2 \pm 7.7	12.898 <0.001*	10.342 <0.001*
3. Nutrition	6.6 \pm 6.2	8.6 \pm 7.7	35.9 \pm 9.3	13.8 \pm 7.1	31.8 \pm 13.3	11.6 \pm 9.2	6.564 <0.001*	9.651 <0.001*
4. self-actualization	6.7 \pm 4	6.2 \pm 3.9	10.9 \pm 2.3	7.1 \pm 3.5	11.8 \pm 1.1	9.3 \pm 3.6	10.245 <0.001*	7.374 <0.001*
5. Interpersonal support	6.3 \pm 3.7	8.6 \pm 7.7	14.4 \pm 1.3	4.5 \pm 4.6	13.5 \pm 3.4	5.6 \pm 1.5	16.675 <0.001*	6.421 <0.001*

6. Stress management	7.8±5.7	6.2±3.9	21.3±4.5	12.6±6.1	23±3.4	14.6±8.2	12.765 <0.001* *	10.032 <0.001* *
-----------------------------	---------	---------	----------	----------	--------	----------	------------------------	------------------------

Table (4): illustrates the distribution of the studied students (intervention and control groups) according to their score for overall Health Promoting Lifestyle Behaviors Profile (HPLP) scale throughout the program phases. It can be seen from this table that, the majority (83.7%, 93.7%) of intervention and control groups had poor level of HPLP behaviors at preprogram phase, with no statistically significant difference between both groups ($\chi^2 = 0.27, P1 > 0.04$). On the other hand, the table clarifies drastic improvement among intervention group at post and follow up program implementation, while less than three quarters (73.1%, 65.6%) among them had good level of HPLP behaviors at post and follow up program implementation. On contrast, the majority (73.4%, 81.6%) among control group had poor score of HPLP behaviors at post and follow up program phases respectively. Meanwhile, there was a statistically significance difference at ($P1, P2 < 0.01$) between both groups regarding HPLP behaviors at post and follow up program implementation phases.

Table (4): Distribution of the studied students (intervention and control groups) according to their score for overall Health Promoting Lifestyle Behaviors Profile (HPLP) scale throughout the program phases. (N=640)

Score for overall HPLP scale	Pre		Post		Follow-up		P1	P2	P3
	Intervention Group (n=320)	Control Group (n=320)	Intervention Group (n=320)	Control Group (n=320)	Intervention Group (n=320)	Control Group (n=320)	χ^2 p-value	χ^2 p-value	χ^2 p-value
	%	%	%	%	%	%			
Good (>75%)	6.9	0.0	73.1	6.6	65.6	2.8	0.27 >0.04	96.7 <0.01*	72.1 <0.01*
Average (50 - 75%)	9.4	6.3	21.9	20.0	18.8	15.6			
Poor (<50%)	83.7	93.7	5.0	73.4	15.6	81.6			

Table (5): depicts the distribution of the studied students (intervention and control groups) according to their attitudes towards Breast Self-Examination (BSE) throughout the program phases. This table clarified that more than half (51.5%, 58.8%) among both groups had negative attitude toward BSE at preprogram phase. On the other hand, three quarters (75.0%) and more than half (51.6%) of intervention group post and follow up program phase respectively had positive attitude towards BSE, compared to only (22.8%, 13.4%) among control group. So, it was evidenced that there was no statistical significance at pre-program between intervention and control group ($P1 > 0.05$), while there was a highly statistically significant difference at post and follow up program between intervention and control group at ($P1 < 0.01, P2 < 0.001$).

Table (5): Distribution of the studied students (intervention and control groups) according to their attitudes towards Breast Self-Examination (BSE) throughout the program phases. (N=640)

Attitudes towards BSE	Pre		Post		Follow-up		P1	P2	P3
	Intervention Group (n=320)	Control Group (n=320)	Intervention Group (n=320)	Control Group (n=320)	Intervention Group (n=320)	Control Group (n=320)	χ^2 p-value	χ^2 p-value	χ^2 p-value
	%	%	%	%	%	%	χ^2 p-value		
Negative attitude (<50%)	51.5	58.8	9.7	35.0	17.8	46.0	0.19 >0.05	83.2 <0.01**	67 <0.001**
Neutral attitude (50 - 75%)	33.5	28.1	15.3	42.2	30.6	40.6			
Positive attitude (>75%)	15.0	13.1	75.0	22.8	51.6	13.4			

Table (6): demonstrates the distribution of the studied students (intervention and control groups) according to their BSE practices throughout the program phases. The table reveals that, less than three quarters (71.6%) of intervention group had poor score of total BSE practices preprogram compared to more than three quarters (76.6%) and more than half (58.8%) of them had good score post and follow up program implementation respectively, while around two thirds (64.0%, 71.9%) of control group had poor score of total BSE practices post and follow up program implementation respectively with a statistically significant difference between both groups at post and follow up tests only (P2, P3<0.01).

Table (6): Distribution of the studied students (intervention and control groups) according to their Breast Self-Examination (BSE) practices throughout the program phases. (N= 640)

BSE practices	Pre-test		Post-Test		Follow-up		P1	P2	P3
	Intervention Group (n=320)	Control Group (n=320)	Intervention Group (n=320)	Control Group (n=320)	Intervention Group (n=320)	Control Group (n=320)	χ^2 p-value	χ^2 p-value	χ^2 p-value
	%	%	%	%	%	%	χ^2 p-value	χ^2 p-value	χ^2 p-value
Good (>75%)	10.0	9.4	76.6	14.1	58.8	11.3	0.15	98.2	92.1

Fair (50 - 75%)	18.4	12.5	20.0	21.9	27.8	16.8	>0.05	<0.01*	<0.01*
Poor (<50%)	71.6	78.1	3.4	64.0	13.4	71.9			

Table (7): presents the relation and paired difference between the mean of Health Promoting Lifestyle Behaviors Profile (HPLP) scale and BSE practices in intervention students throughout the program phases. The table shows that, the mean students' total HPLP score related to students' BSE practices was (22,795±20.970) before the educational website intervention which increased significantly to (86.434±18.314) after the intervention, and (56.711±20.942) follow up 3 months after the program implementation with a highly statistically significant correlation at all three stages of program (P-value<0.001). Furthermore, this table shows highly significant improvement in students' BSE practices accompanied with significant improvement of their scores of HPLP scale post implementation of web based educational program with highly statistically significant differences between pre, post, and follow-up tests at (P<0.001) at all relations.

Table (7): Relation and paired difference between the mean of Health Promoting Lifestyle Behaviors Profile (HPLP) scale and BSE practices in intervention students throughout the program phases. (N=320)

Total HPLP		BSE Practices		Comp.	Paired Differences		Paired t-test	
		Mean	± SD		Mean	± SD	t	P-value
Total	Pre	22.795	± 20.970	Pre – Post	-63.639	± 33.154	-17.487	<0.001**
	Post	86.434	± 18.314	Pre – Follow up	-33.916	± 22.017	-14.034	<0.001**
	Follow Up	56.711	± 20.942	Post - Follow up	29.723	± 34.709	7.802	<0.001**

Table (8): reveals the relation between intervention students' total score of HPLP scale, BC knowledge, BSE practices and their attitudes toward BSE. It was noticed that there was a positive correlation (0.769, 0.875, 0.597) between intervention students' level of BC knowledge and their (BSE practices, attitudes toward BSE, total score of HPLP behaviors) respectively, as Pearson Correlation Coefficient (r-test) had a positive value between -1 and 1, which indicates a perfectly strong linear relationship where a change in students' knowledge is accompanied by a perfectly consistent change in their attitudes toward BSE, their BSE practices and their total score of HPLP scale, as while there was a positive direction when one variable increase, the other would increase and vice versa, with a highly statistically significant difference between them as p-value =0.000.

Table (8): Relation between intervention students' total score of HPLP scale, BC knowledge, BSE practices and their attitudes toward BSE. (N=320)

Items		Total score of knowledge	Total score of practice	Total score of attitudes	Total score of HPLP
Total score of knowledge	R	-----	0.769**	0.875**	0.597**
	p-value	-----	0.000	0.000	0.000
Total score of attitudes	R	0.597**	0.687**	-----	0.586**
	p-value	0.000	0.000	-----	0.000
Total score of practices	R	0.893**	-----	0.689**	0.896**
	p-value	0.000	-----	0.000	0.000
Total score of HPLP	R	0.996**	0.687**	0.472**	-----
	p-value	0.000	0.000	0.000	-----

Figure (3): clarifies the distribution of intervention students according to their total satisfaction regarding web-based educational intervention. It was found that, (86.3%, 62.5%) of intervention group were satisfied with the educational website at post and follow up program implementation respectively, compared to the minority (3.4%, 9.4%) of them who were dissatisfied at post and follow up program implementation respectively, with a statistically significant difference at $P < 0.01$. Overall, the result revealed that the website preventive educational program was satisfied for majority of intervention students.

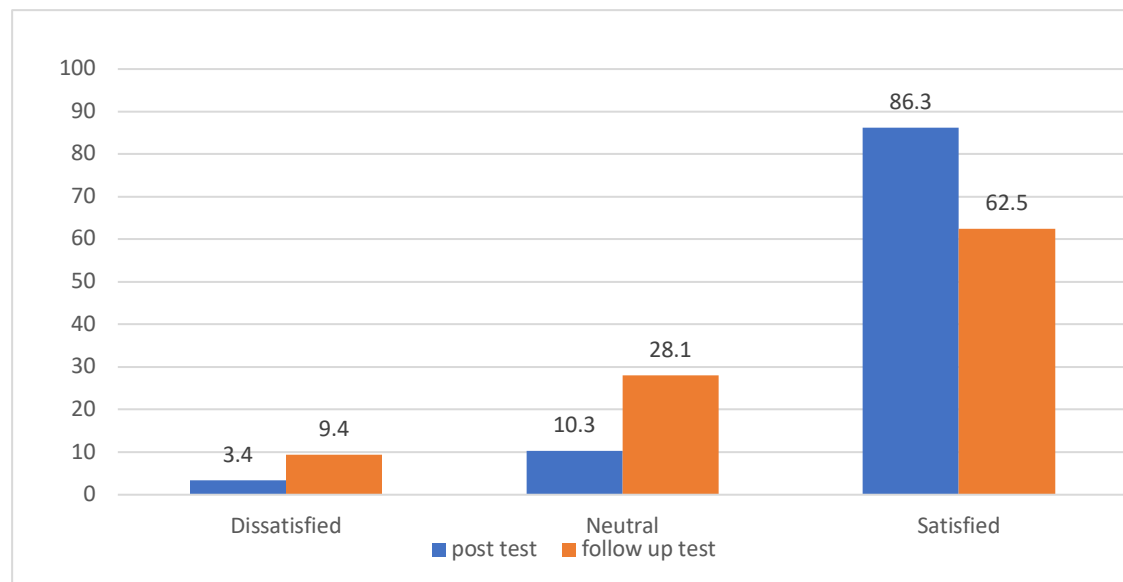


Figure (3): Distribution of intervention students according to their total satisfaction regarding web-based educational intervention. (N=320)

DISCUSSION

Despite being preventable by early detection, breast cancer is the most prevalent disease in women globally and its incidence is rising in many countries. It is one of the major reasons of increased death and disability among women. (19) WHO, fact sheet 2020 (20) stated that Every eighth woman born today will experience a breast cancer diagnosis at some point in her life. In emerging nations, the prevalence of breast cancer is quickly rising as a result of longer life expectancies, expanding urbanization, and the adoption of western lifestyles, particularly among younger women.

The present study gives a clear picture of 640 participants, who were driven from the population of Damanhour fourth grade female university students. It was found that the age of the studied students ranged from 20 up to 23 years old with a mean (23±1.2 years) among intervention group and (22±1.3 years) among control group. Out of all respondents recruited in this study, more than three quarters of them were single, more than half of them had Body Mass Index (BMI) values within normal range; this goes in line with the study conducted in Bangladesh by Sarker et al., (2022) (21) to evaluate how an educational intervention program affected young female university students' knowledge of breast cancer and their use of BSE.

All human being are motivated to take action when they are aware of what is happening with their bodies. Due to this reality, screening programs will assist female students in examining their bodies and become completely aware of what is happening inside them. Therefore, any public program must address these women's prior experiences and work to raise their level of understanding of BC disease. It is crucial to arm these women, whether they are younger or older, with a strong degree of knowledge and practice skills regarding this lethal condition since a motivated woman adheres better to public activities.(22)

Based on this fact, the current study attempted to determine your level of knowledge among studied sample and indicated that, majority of them had poor level of knowledge about breast cancer. This result was in accordance with the study performed by Anuwe et al., (2020), (23) Qasim et al., (2020) (24) and Ahmed H et al., (2018) (25) who found that around half of university students had poor level of knowledge about breast cancer and its early symptoms. The lack of health information sources for students during the study years, combined with the increased academic demands and adjusting to new life circumstances at the university level, may be the cause of this. These circumstances had an impact on the students' motivation to learn any health information.

On the other hand, this result disagreed with study carried out by Negi et al., (2017) (26) who carried out a study about breast cancer awareness and attitude among nurses of a tertiary care center and found that half of them had average level of knowledge about breast cancer, This outcome could be explained by the fact that BC illness is typically covered in nursing curricula.

To learn more about BC, sources of information are required. The participants in this study most frequently cited the internet and mass media as information sources. Various published articles were also indicated TV or internet as the most common source of information about BC as Alsowayan AA et al., (2020), (27) Manzour A.F et al., (2019), (28) Kan'an A et al., (2018) (29) and Hassan EE et al., (2017). (30) The majority of people, however, chose to learn about BC via family, friends, healthcare professionals, and educational training programs, according to the other researches as Al-Suroj HR et al., (2018), (31) Dinegde NG et al., (2017). (32) These findings demonstrate that one of the most significant sources of knowledge regarding BC and BSE is the media, and they also highlight the media's role in working with healthcare educators to disseminate accurate information about BC to young adults.

The Health Promoting Lifestyle Behaviors Profile (HPLP) mean score and its characteristics for the intervention group considerably improved both immediately and three months later when compared to the preprogram phase, according to the findings of the current study., but there was no significant difference found in the control group, which was consistent with those found in a study conducted by Kacan Y et al., (2019). (33) This finding was consistent with the study done in Iran (2020) by Solhi M et al. (34) who found that intervention groups' HPLP significantly improved after the implementation of the instructional program. Therefore, behavioral changes connected to a lifestyle that promotes health and its dimensions can be made with the help of educational interventions.

A set of feelings, thoughts, and behaviors towards a particular person, thing, or event is referred to as an attitude in psychology. Experiences frequently have an impact on attitudes. People's reactions can be strongly impacted by it, and

depending on the situation, they might act differently.⁽³⁵⁾ Therefore, it was important to assess how female students felt about BC and the concerns that it is related with. Moreover, half of the participants in the current study had unfavorable sentiments towards BSE during the preprogram phase.

This outcome can be a result of the students' unfavorable perceptions of the BC disease that affects children their age. This is in line with research results from Darawad (2020),⁽³⁶⁾ which discovered that more than two thirds of the students under investigation had poor attitudes about breast self-examination. However, a contrasting image was found in the study conducted in Jordan by Alsaraireh et al., (2018)⁽³⁷⁾ and claimed that two thirds of them agreed about how easier it is to treat cancer when it is caught early.

The BSE practices rate was disappointing, showing that slightly less than three-quarters of them had a poor degree of practice regarding self-examination. This finding was in addition to the current study's finding that the attitude was demoralizing. These findings were matching with the study conducted by Ayed et al., (2015)⁽³⁸⁾ who found low level of BSE practices among female health science students in Ethiopia. These findings might be the result of the younger age of the study population, which is typically not projected to be a breast cancer patient and hence does not report practicing BSE, may have contributed to these findings. Aside from the potential that they lacked breast cancer knowledge, training materials, and curricular information pertaining to breast cancer.

Over 75% of the intervention group had good BSE practices after the teaching program was put into place, which was a significant and obvious improvement. Similar improvement was reported in other studies done by Esfahani MS, et al., (2018)⁽³⁹⁾ Abd El Salam et al., (2020).⁽⁴⁰⁾ As opposed to, a study by Ceber et al., (2010)⁽⁴¹⁾ found that there were no significant differences in the BSE practices between the two groups. This discrepancy may be caused by the fact that the study participants did not major in health sciences, they never had the opportunity to receive training on breast cancer screening techniques, and that nurses and other healthcare professionals who made up the sample of the contrasted study were typically more knowledgeable about BSE than the study participants.

According to a study by Jabeen Z et al., (2021),⁽⁴²⁾ Regarding the knowledge, attitude, and practices of female university students, there was a statistically significant difference between the overall knowledge score and the practices of BSE. at Jinnah Sindh Medical University. This finding is consistent with that study's findings. A different study conducted by Ali A et al. (2020)⁽⁴³⁾ found a substantial correlation between BSE knowledge and practices. However, this contrasts with a study conducted by Azemfac K et al., (2019),⁽⁴⁴⁾ who observed that there was a significant disparity between knowledge of BSE and practices of BSE, with just 15% of their respondents practicing BSE while only 25% knew about BSE.

According to the aforementioned studies, a web-based educational intervention among female undergraduate students at Damanhour University had a substantial impact on their BC knowledge, attitudes about BSE, practices related to BSE, and HPLP level. All participants were reconnected with three months after the start of the educational website intervention in order to complete an online posttest survey. Given that all study participants were university-based fourth-grade dropouts who resided in their own dorms for the length of the study, the full response rate for the posttest looked reasonable.

In summary, breast cancer is a significant public health problem that has had a significant impact on women's health as well as the health of their families, communities, and offspring. Community health nurses must explain to their patients the advantages of online training programs, including the possibility of reducing learning time, self-paced learning, limitless access to training resources, the elimination of travel requirements, minimal interruption of university schedules, and the elimination of trip requirements. Education systems are increasingly working to modernize their information technology infrastructure as more schools adopt e-learning practices. The introduction of instructional programs for the web can be facilitated by this infrastructure. Community health nurses must offer sufficient services that benefit female students' educational experiences and may enhance future generations' comprehension of public health messaging. Therefore, numerous initiatives should be taken to protect female university students from breast cancer.

CONCLUSION AND RECOMMENDATIONS

Given how frequently it happens, breast cancer is a serious health problem. The most expensive type of medical treatment for breast cancer is acknowledged on a global scale. Nursing is a great professional resource that can help encourage positive changes through health education programs.

The study concluded that the research hypothesis is supported and that the HBM-based preventive educational website is an effective and efficient method in enhancing university female students' BC preventive & screening practises (BSE) and improving their knowledge level about BC. The findings gave the researcher baseline information about the level of breast cancer awareness among fourth-year undergraduate female students at Damanhour University.

This knowledge could help nurse educators target and customize educational initiatives to give students the knowledge and abilities they need to be successful breast cancer preventers. It can also be used as a guide for assessing upcoming campaigns to educate people about breast cancer. Thus, this study **recommended that**:

- The development of policies to institutionalize a healthier campus and create health promotion programs encouraging healthy choices among university students should involve faculty administrators, curriculum planners, and health educators.
- Make the most of the internet, social networks, and pertinent support groups, especially for educated women, to raise their level of understanding of the condition and available preventative treatments.
- Campaigns to raise awareness of BC prevention techniques and therapies are being launched, and they are aimed at a wider audience, including men, community and religious leaders, and medical professionals.
- Creating educational pamphlets on BC based on HBM to enhance screening practices, health beliefs, and knowledge.

Acknowledgment:

Our sincere appreciation goes out to the study participants who participated and provided us with all the necessary data. Last but not least, we appreciate the collaboration and assistance of the corresponding Damanhour University Faculty Deans during the data collection process.

REFERENCES:

1. Alderman H, Behrman J, Glewwe P, Fernald L, Walker S. Evidence of Impact on Growth and Development of Interventions during Early and Middle Childhood. In: Bundy DA, Silva N, Horton S, Jamison DT, Patton GC, (eds). Disease Control Priorities. 3rd ed. Washington, DC: World Bank; 2017.
2. Bundy DA, Appleby L, Bradley M, Croke K, Hollingsworth D. Mass Deworming Programs in Middle Childhood and Adolescence. In: Bundy DA, Silva N, Horton S, Jamison D, Patton GC, (eds). Disease Control Priorities. 3rd ed. Washington, DC: World Bank; 2017
3. World Health Organization (WHO). 2020. Adolescent development. Geneva: WHO.
4. Quinn GP, Vadaparampil ST, Johns T, Alexander KA, Giuliano AR. Adolescent sexual activity and cancer risk: physicians' duty to inform? *Curr Med Res Opin.* 2014; 30:1827–31. doi:[10.1185/03007995.2014.924913](https://doi.org/10.1185/03007995.2014.924913)
5. World Health Organization (WHO). World Health Organization prevention, diagnosis, and screening of breast cancer. Geneva: WHO; 2018.
6. Ferlay J, Soerjomataram I, Dikshit R, Eser S, Mathers C, Rebelo M, et al. Cancer incidence and mortality worldwide: Sources, methods and major patterns in Globocan 2012. *Int J Cancer.* 2015; 136(5):359-86. doi: 10.1002/ijc.29210.
7. World Health Organization (WHO). Global Health Estimates. Geneva: WHO; 2013. Available from: https://www.who.int/healthinfo/global_burden_disease/en/
8. Sun WJ, Zhang LJ, Chen DM, Zhang W. Progress in breast cancer screening awareness, behavior and its influencing factors. *Matern Child Health Care China.* 2018; 33(20):4798-801.
9. Campbell-Enns HJ, Woodgate RL, Chochinov HM. Barriers to information provision regarding breast cancer and its treatment. *Support Care Cancer.* 2017;25(10):3209–16.
10. Anwar M, Khalil D. Breast cancer knowledge, attitude and practice among medical and non-medical university students. *J Public Health from Theory to Practice.* 2020; E-head prints. doi.org/10.1007/s10389-020-01197-z

11. Wang XB, Chen DD, Xie T, Zhang W. Predicting women's intentions to screen for breast cancer based on the health belief model and the theory of planned behavior. *J Obstet Gynaecol Res.* 2019; 45(12):2440-51. doi: 10.1111/jog.14109.
12. Cadmus-Bertram L, Nelson SH, Hartman S, Patterson RE, Parker BA, Pierce JP. Randomized trial of a phone- and web-based weight loss program for women at elevated breast cancer risk: the HELP study. *J Behav Med.* 2016; 39:551–559. doi: 10.1007/s10865-016-9735-9.
13. Tuzcu A, Bahar Z, Gozum S. Effects of interventions based on health behavior models on breast cancer screening behaviors of migrant women in Turkey. *Cancer nursing.* 2016; 39: E40–50. doi: 10.1097/NCC.0000000000000268.
14. Linsell L, Burgess C, Ramirez A. Breast cancer awareness among older women. *Br J Cancer.* 2008; 99(8):1221–1225. doi.org/10.1038/sj.bjc.6604668
15. Linsell L, Forbes LJ, Burgess C, Kapari M, Thurnham A, Ramirez AJ. Validation of a measurement tool to assess awareness of breast cancer. *Eur J Cancer.* 2010; 46(8):1374–1381. doi.org/10.1016/j.ejca.2010.02.034
16. Rosmawati N. Knowledge, attitudes and practice of breast self-examination among women in a suburban area in Terengganu, Malaysia. *Asian Pac J Cancer Prev.* 2010;11(6):1503–1508.
17. Walker SN, Sechrist KR, Pender NJ. The Health-Promoting Lifestyle Profile: development and psychometric characteristics. *Nurs Res.* 1987; 36(2):76-81.
18. Esin N. Industrial workers in the field of health behavior and development of detection. Doctorate Thesis, Istanbul, University Health Sciences Institute; 1997.
19. Toi M, Kataoka M, Velaga R, Benson J, Takada M, Jatoi I. *Advances in Breast Cancer Screening: Precision, Imaging, and Harms.* 2023. p. 1-27.
20. Sheet WEF. WWW document. World Health Organization. 2020.
21. Sarker R, Islam MS, Moonajilin MS, Rahman M, Gesesew HA, Ward PR. Knowledge towards breast cancer, and breast self-examination practices and its barriers among university female students in Bangladesh: Findings from a cross-sectional study. medRxiv. 2021:2021.10. 20.21265262.
22. Das A, Shrivastav K, Taneja N, Awasthi A, Rashid S, Gogia A, et al. Knowledge and awareness of breast cancer and breast self-examination among college-going female students in Delhi-NCR: a cross sectional study. *Health Education.* 2022;122.
23. Anuwe PA. Perception of Breast Cancer Screening Among African Immigrant Women in Dallas: Walden University; 2020.
24. Qasim S, Tayyab H, Zulqadar K, Masood S, Qasim TB, Zubair Z. Breast Cancer knowledge and perceived barriers to help seeking among pre-clinical and clinical female medical students at King Edward Medical University, Lahore: a cross-sectional study. *BMC Medical Education.* 2020; 20:1-9.
25. Alrashidi AG, Alrashedi SA, Alshammeri KJK, Ahmed HG. Assessment of knowledge and perception towards breast cancer prevention and early detection. *Health Sciences.* 2018;7(1):65-76.
26. Negi RR, Singh M, Kaushal A, Raina SK, Pradesh H. Breast cancer awareness and attitude among nurses of a tertiary care centre of sub-Himalayan region. *J Evolution Med Dent Sci.* 2017;6(33):2710-13.
27. Alsowayan AA, Almotyri HM, Alolayan NS, Alissa LI, Almotyri BH, AlSaigh SH. Breast cancer knowledge and awareness among females in Al-Qassim Region, Saudi Arabia in 2018. *Journal of Family Medicine and Primary Care.* 2020;9(3):1712.
28. Manzour AF, Gamal Eldin DA. Awareness about breast cancer and mammogram among women attending outpatient clinics, Ain Shams University Hospitals, Egypt. *Journal of the Egyptian Public Health Association.* 2019; 94:1-9.
29. Kan'an A. Evaluation of breast cancer (BC) awareness among female university students in Zarqa University, Jordan. *European journal of breast health.* 2018;14(4):199.
30. Hassan EE, Seedhom AE, Mahfouz EM. Awareness about breast cancer and its screening among rural Egyptian women, Minia District: A population-based study. *Asian Pacific Journal of Cancer Prevention: APJCP.* 2017;18(6):1623.
31. Ali SI, Al-Suroj HR, Al Ali FB, Al-Saleh KH, Al-Hammar LE. Awareness and attitude among Saudi females toward breast cancer screening in Al-Ahsa, KSA.
32. Dinegde NG, Xuying L. Awareness of breast cancer among female care givers in tertiary cancer hospital, China. *Asian Pacific journal of cancer prevention: APJCP.* 2017;18(7):1977.
33. Yüksel Kaçan C, Örsal Ö. Evaluation of healthy lifestyle behaviors level of nursing students. *J Duzce Univ Health Sci Inst.* 2019;9(1):19-24.

34. Solhi M, Azar FEF, Abolghasemi J, Maheri M, Irandoost SF, Khalili S. The effect of educational intervention on health-promoting lifestyle: Intervention mapping approach. *Journal of education and health promotion*. 2020;9.
35. Wojtkowiak J. Towards a psychology of ritual: A theoretical framework of ritual transformation in a globalising world. *Culture & Psychology*. 2018;24(4):460-76.
36. Darawad M. Predictors of Breast Self-Examination Practice among Jordanian Female University Students. *Natural and Applied Sciences Series*. 2020;35(1).
37. Alsaraireh A, Darawad MW. Breast cancer awareness, attitude, and practices among female university students: A descriptive study from Jordan. *Health care for women international*. 2018;39(5):571-83.
38. Ayed A, Eqtaif F, Harazneh L, Fashafsheh I, Nazzal S, Talahmeh B, et al. Breast Self-Examination in Terms of Knowledge, Attitude, and Practice among Nursing Students of Arab American University/Jenin. *Journal of Education and Practice*. 2015;6(4):37-47.
39. Esfahani MS, Taleghani F, Noroozi M, Tabatabaieian M. An educational intervention on based information, motivation and behavior skills model and predicting breast self-examination. *Journal of preventive medicine and hygiene*. 2018;59(4): E277.
40. Abd El Salam Amin Yacout D, Yousef Mohamed N. Effect of Tailored Breast Cancer Screening Web-Based Educational Program on Women Experience and Satisfaction. *Egyptian Journal of Health Care*. 2020;11(2):525-50.
41. Ceber E, Turk M, Ciceklioglu M. The effects of an educational program on knowledge of breast cancer, early detection practices and health beliefs of nurses and midwives. *Journal of Clinical Nursing*. 2010;19(15-16):2363-71.
42. Jabeen Z, Shah N, Ahmer Z, Khan S, Khan AH, Khan M. Effect of health education on awareness and practices of breast self-examination among females attending a charitable hospital at North Karachi. *JPMA The Journal of the Pakistan Medical Association*. 2021;71(9):2156-62.
43. Ali A, Jameel N, Baig NN, SM ZHN, SI AJ, Younus M. Assessment of knowledge, attitude and practice regarding breast self-examination among females in Karachi. *JPMA The Journal of the Pakistan Medical Association*. 2020;70(11):1985-9.
44. Azemfac K, Christie S, Carvalho MM, Nana T, Fonje AN, Halle-Ekane G, et al. A community-based assessment of knowledge and practice of breast self-examination and prevalence of breast disease in Southwest Cameroon. *Journal of cancer epidemiology*, 2019.