
Application of the Health Belief Model for Breast Cancer Screening and Implementation of Breast Self-Examination Educational Program for Female Students of Selected Medical and Non-Medical Faculties at Umm al Qura University"

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Abstract: Background: Breast cancer has been considered as a major health problem among females because of its high incidence in recent years. BSE is one of the most important methods for early diagnosis of breast cancer. More than 90% of all breast cancers can be diagnosed in the early stage by BSE. The **aim** of this study was to identify female college students' breast cancer screening beliefs and practice based on the Health Belief Model, evaluate their compliance with breast cancer screening behaviors and implement a breast self-examination educational program for female college students. **Subjects and methods:** Quasi experimental research design was used. A convenient sample consisted of 600 students in the age group (18-21 years) were recruited from three medical and three non-medical faculties at Umm Al Qura University. A self-administered questionnaire, Champion's Health Belief Model Constructs Scale (CHBMS) and an observation competency checklist for BSE were used to collect the data. **Results:** The present study revealed that there was no statistically significant difference between medical and non-medical students regarding perceived susceptibility and perceived severity ($P = 0.30$ and 0.75 respectively). However, there was a statistically significant difference between medical and non-medical students regarding perceived benefits, perceived barriers, cues to action (motivation) and self-efficacy. In addition the study revealed that more than three quarters of students don't perform breast self-examination. Statistically significant improvements in students' knowledge and practice regarding breast self-examination were recorded in the post test. Good practice with positive attitudes regarding all domains of Health Believe Model increased after students had attended the educational program. **Conclusion:** The present study concluded that, there was a high percentage of students from each group that had unsatisfactory knowledge, negative attitude and poor practice regarding breast self-examination and breast cancer at pretest. The results of the present study also confirmed the positive effects of an educational program according to HBM on females' knowledge, beliefs and practice regarding breast self-examination and breast cancer. **The present study recommends that:** Breast cancer awareness programs should be developed in universities on a regular basis and should focus on removing perceived barriers to screening and enhancing self-efficacy among female students. Policy makers should integrate breast cancer awareness programs in the routine programs provided in all healthcare centers. Attention should be paid to barriers to women undergoing mammography, such as costs, shame and accessibility. Target population awareness and positive attitudes towards benefits of early breast cancer screening should be increased.

Key words: Breast Cancer– Breast Self-Examination- Health Belief Model.

1. Introduction

Cancer is a pan societal problem that affects two thirds of the world population. Breast cancer is the most common type of cancer diagnosed among women both in developing and developed countries.⁽¹⁾ It is the second cause of death in the world.⁽¹⁾ Approximately one out of eight women worldwide develops breast cancer. According to the American

Cancer Society report, breast cancer is diagnosed in about 1.3 million women annually worldwide and around 465,000 will die from the disease.⁽²⁾ The burden of the disease is increasing in both developed and developing countries and if no action is taken it will go out of control.⁽²⁾

Breast cancer (BC) is the most common cancer among Saudi females and accounted for more than

24% of all newly diagnosed cancer among them⁽³⁾. Breast cancer was the ninth leading cause of death for females in the Kingdom of Saudi Arabia (KSA) in 2010.^(4,5) It is expected that the incidence of breast cancer will increase over the coming decades in KSA due to population growth and ageing.^(6,7) Early detection of breast cancer plays an important role in reducing its morbidity and mortality. Theoretically, a 95% survival rate could be achieved if this cancer was diagnosed at an early stage.⁽⁸⁾

One of the screening methods for early detection of breast cancer is breast self-examination (BSE). A woman who performs regular BSE may be more motivated to seek medical attention, including mammography and clinical breast exams if available.⁽⁹⁾ Despite the relative benefits of BSE and breast cancer screening procedures, their application remains very low in the Kingdom of Saudi Arabia, a country with free health services.⁽¹⁰⁾

Furthermore, a lack of belief regarding the necessity of regular BSE has an impact on the screening behavior. Understanding women's beliefs regarding BSE can be used to design appropriate educational interventions which promote the desired screening behavior.⁽¹¹⁾ In order to improve the awareness and knowledge of women about breast cancer, it is important to initiate interventions that provide health education and to encourage preventive health care behaviors. One of the best models that proved to be efficient in studying preventive behaviors in cancer is the Health Belief Model (HBM)⁽¹²⁾

The Health Belief Model (HBM) is a psychosocial model that accounts for health behaviors by identifying factors associated with individuals' beliefs which influence their behaviors⁽¹³⁾. The Champion's Health Belief Model Scale (CHBMS) is a valid and reliable tool to measure beliefs about breast cancer and screening methods.⁽¹²⁾ The components of this model are perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action and self-efficacy⁽¹⁴⁾.

The first component of the HBM, is perceived susceptibility. It is defined as a subjective perception of the risk of an illness. In the context of breast cancer, perceived susceptibility may include the risk of a breast cancer diagnosis in the long term or immediate future. Individuals will seek preventive care if they believe they are personally at risk. It is one of the more powerful perceptions in promoting people to adopt healthier behaviors.⁽¹⁵⁾ Perceived severity is the second construct of the HBM. Perceived severity is one's belief about the seriousness of a medical condition, the sequence of events after diagnosis and feelings resulting from the consequences of a specific medical condition⁽¹⁵⁾. Possible medical consequences may include death, disability, and pain. Possible social

consequences may include effects on work, family life, and social relations.

The third component of HBM is perceived benefits which is one's belief in the efficacy of the advised action to reduce health risks.⁽¹⁶⁾ Perceived benefits of breast cancer screening behaviors include BSE and CBE for early detection of breast diseases. People tend to adopt healthier behaviors when they believe the new behavior will decrease their chances of developing a disease. Perceived benefits play an important role in the adoption of secondary prevention behaviors such as screening. Perceived barriers is the fourth component of HBM. It refers to the potential negative aspects or obstructions to take a recommended health action. This is the belief about physical and psychological costs of taking health action. Perceived barriers to exhibiting breast cancer screening behaviors can be emotional, social and physical. Potential barriers may include financial expenses, danger of the procedure, pain, feeling upset, inconvenience, and time-consumption⁽¹⁶⁾.

Cues to action are the strategies taken to activate one's readiness to take health action. Cues to action, formerly known as motivation, refer to internal incentives to live a healthy lifestyle. Cues to action for exhibiting breast cancer screening behaviors encourage people to undergo BSE, CBE, and mammography. Cues to action include health education or recommendations by a physician. The self-efficacy construct states that confidence in lifestyle alteration is essential before successful change is possible. Individuals must also feel able or self-efficacious to overcome perceived barriers to taking action^(17,18). The health Belief Model (HBM) was developed to show that a persons' response to their own health problems is directly related to their perceptions about the actual threat to their health and about whether or not any action they take regarding such problems worth it and whether it will benefit them⁽¹⁸⁾.

1.1. Significance of the problem

Breast cancer has been considered as a major health problem among females because of its high incidence in recent years. BSE is one of the most important methods for early diagnosis of breast cancer. 95% of all breast cancers can be diagnosed in the primary stage by BSE.⁽¹⁹⁾ Unfortunately, despite the relative benefits of regular BSE, few women actually examine themselves. In fact, the majority does not even know how to do a BSE⁽²⁰⁾. A cross-sectional study was carried out among 262 female undergraduate students in Putra University in Malaysia. The study showed that only 36.6% of girls performed BSE monthly⁽²¹⁾. All university students were at a stage where it was important to carry out BSE on a regular basis to feel any changes early.⁽²²⁾

The study focused on medical students as they are the future health care providers. They will play an important role in raising awareness of the community about the early detection of breast cancer as they usually have the closest contacts with female patients⁽²³⁾. Also positive attitudes can be developed by the young adults towards breast self-examination. This contributes in early breast cancer detection as well as reducing late breast cancer presentation. Thus, not only should young students learn more about BSE, but they also play an important role in teaching their mothers, sisters and friends to examine their breasts

In KSA, studies related to knowledge, attitudes and practices around breast cancer are scarce⁽⁷⁾. So, the aims of this study is to identify female college students' breast cancer screening beliefs and practices based on the Health Belief Model, evaluate compliance (self-efficacy) with breast cancer screening behaviors of female college students and implement a breast self-examination educational program for female college students.

1.2. Aim of the study: This study aims to:

- Identify female college students' breast cancer screening beliefs and practices based on the Health Belief Model.
- Evaluate female college students' compliance (self-efficacy) with breast cancer screening behaviors.
- Implement a breast self-examination educational program for female college students.

2. Subjects and Methods

2.1. Research design:

A quasi-experimental research design was utilized.

2.2. Research setting:

The study was conducted in selected medical and non-medical faculties, Umm Al Qura University in Makkah Al Mukkaramah.

2.3. Research subjects:

A convenient sample consisted of 600 students enrolled in the above mentioned setting in the age group 18-21 years. From each of the selected faculty, 100 students participated in this study.

Sampling technique:

The following sampling technique was applied. Three medical and three non-medical faculties at Umm Al Qura University were selected randomly. In each of the selected faculties, 100 students who accepted to participate in the study were recruited.

2.4 Tools of data collection

The following tools were used for data collection:

Tool I: A self-administered questionnaire (pre/post educational program):

It was designed by the researchers after reviewing relevant literatures and it consisted of two parts.

Part I was concerned with student's socio-demographic characteristics such as their age, college enrollment, family history of breast cancer.

Part II was concerned with students' knowledge regarding breast cancer and breast self-examination and sources of breast cancer information. Questions varied between open and close. It took 20 – 25 minutes to fill out the questionnaire.

Scoring system

Part II of the questioner consisted of 22 items that assessed students' knowledge related to breast cancer and 13 items that assessed students' knowledge regarding breast self-examination. Answers obtained from the students related to their knowledge were scored and calculated. Each correct response is scored by one grade and each wrong or "don't know" response is scored by zero. The total score of the students' knowledge regarding breast cancer was 22 grades (equal 100%) while the total score of the students' knowledge regarding breast self-examination was 13 grades (equal 100%). Accordingly the students' answers were classified as satisfactory knowledge (50% and more) or unsatisfactory knowledge (less than 50%). Pre designed key answers were used to check whether the obtained answers can be regarded as satisfactory or unsatisfactory knowledge.

Tool II: Champion's Health Belief Model Constructs Scale (CHBMS)⁽²⁴⁾ (pre/post educational program)

Tool II was used to assess students' beliefs and attitude regarding breast cancer and breast self-examination. The Champion Health Belief Model Scale (CHBMS) was utilized to measure HBM components. It is a self-report questionnaire adapted to measure perceived susceptibility, perceived seriousness, perceived benefits, perceived barriers, cues to action and self-efficacy related to frequency of breast self-examination. It is a method used to evaluate and explain individual differences in preventative health behavior. It consists of 65-statements classified as follows into six dimensions.

Susceptibility: A six-item scale was used to assess perceived susceptibility to breast cancer.

Severity (seriousness): A 12-item scale was used to assess perceived seriousness of breast cancer.

Benefits: A five -item scale of CHBMS was used to assess perceived benefits of performing BSE. Another five items were adapted from BSE model and used to assess perceived benefits of performing CBE.

Barriers: An eight -item scale was used to assess perceived barriers to performing BSE. Another nine

items were adapted from the BSE model to assess perceived barriers to performing CBE.

Cues to Action (Motivation): An eight-item scale was used to assess the motivation of living a healthy lifestyle.

Self-Efficacy: Twelve items were used to assess self-efficacy in performing BSE and getting CBE.

Scoring system

A three-point Likert Scale was used to measure responses. All statements were scored on a scale from 1-3. Students' responses were scored as follows: agree were scored as three, neither agree nor disagree were scored as two, while disagree were scored as one. The total attitudinal scores was 195 divided into two categories. Scores from 98 - 195 referred to positive attitudes while scores (<98) referred to negative attitudes.

Tool III: An observation competency checklist for BSE (pre/post educational program).

A checklist was designed by the researchers to evaluate students' performance of breast self-examination. This checklist consists of 7 practical steps. All steps were scored from (0-2). Each correct and complete practical step was scored as two grades, each correct but incomplete step was scored as one grade while each incorrect step was scored as zero. The total practical scores were 14 divided into two categories. Scores from 8- 14 referred to good practice while scores < 8 referred to poor practice.

2.4. Validity and reliability

Tool I & II of the present study were submitted to three academic nursing staff in the Obstetric and Gynecological Nursing field to test the content validity of the tools. All recommended modifications were performed according to the academic nursing experts' judgment on clarity of sentences and the appropriateness of the content. Internal consistency of tool I was calculated using Cronbach alpha and the degree of reliability alpha precision equaled 0.82 which indicates an accepted reliability of the tool.

2.5. Pilot study:

A pilot study was carried out on 10% of students at the previously mentioned settings to test the study tools for clarity, feasibility, applicability and time required to fill out the questionnaires. The necessary modifications were done through omission of unneeded or repeated questions and improvements were made prior to data collection according to the pilot study results. The sample of the students who participated in the pilot study was excluded from the main study sample.

2.6. Procedure:

Assessment phase:

The researchers attended the selected faculties two days per week, from 9.00 a.m. to 2.00 p.m. The

data collection lasted over two months starting from the beginning of September to the end of October 2015. The researchers held meetings with the students during their free classes time and during breaks. They briefly explained the nature and the purposes of the study. All students were informed that participation is voluntary. After obtaining the acceptance of students to participate in the present study, the self-administered questionnaires and the Champion's Health Belief Model Constructs Scale (HBM)(tools I &II) were distributed to each student to assess their socio-demographic data, and their knowledge, beliefs and attitudes regarding breast cancer and breast self-examination (pretest). Explanations and clarifications were provided according to students' questions. The data collectors ensured that all information pertaining to the sheet was complete. The average time needed to fill out the questionnaires was 30-40 minutes. For non-medical students the questionnaire was translated using a back-translation technique with the help of a panel of 3 experts and interpreters to translate the items from the source language (English) to the target language (Arabic) and then back-translation of it to the source language.

Implementation phase

A comprehensive health educational program was prepared and implemented for 184 medical students and 200 non-medical students who had finished filling out tool I &II. The educational program was preceded by observing students' performance of BSE (pretest) using the observational checklist (tool III). After assessing the students' knowledge and performance, the total sample was divided into small groups. Medical students were divided into 8 groups, each group ranged from 20-23 students. Non-Medical students were divided into 8 groups, each group consisted of 25 students. The health education was organized in two sessions. The researchers allocated one hour to cover the theoretical session and one hour to cover the practical session on two consecutive days for each group.

In the first session (theoretical part), the researchers used short interactive lectures and group discussions followed by interactive sessions with the students to clarify doubts using audio-visual aids. An additional 10 minutes were assigned at the end of each session for an open discussion with the students about this topic. Brochures containing brief points about breast cancer and BSE were distributed to students at the end of the session. In the second session, the researchers instructed the students on how to perform BSE through demonstration and re-demonstration on a breast model and with the aid of posters, printed materials handouts (brochure containing steps of breast self-examination) and educational video.

The educational content included the breast anatomy, prevalence of breast cancer among women, its morbidity and mortality rate, definition, risk factors, signs and symptoms of breast cancer, the importance of breast cancer screening methods in early detection, breast self-examination and how to perform BSE at home. In addition to this information, students received specific messages related to health motivation, susceptibility to breast cancer, the perceived benefits and barriers to undergoing mammography and perceived self-efficacy based on HBM.

Evaluation Phase:

The researchers used the same questionnaires of the pretest (Tools I & II) one week after implementing the educational sessions with the same students that received the educational program in order to evaluate the effect of the comprehensive health educational program on the level of students' knowledge and beliefs about breast cancer and breast self-examination. An observational competency checklist of BSE (Tool III) was used to evaluate students' performance of breast self-examination immediately after finishing education program (practical sessions).

2.7. Ethical and administrative considerations:

All official permissions to carry out the study were secured from pertinent authorities at the previously mentioned settings after explanation of the purpose of the study. An informed oral consent was obtained from all the participants before collecting data. All students were informed that their participation is voluntary and that the collected data would be only used for the purpose of the current study, as well as for their benefit.

2.8. Statistical analysis:

The data was analyzed using the Statistical Package for Social Sciences (SPSS) Version 20. Descriptive statistics was used to calculate percentages and frequencies. Chi square (X^2) and Z test was used to estimate the statistically significant differences. P. value was considered significant when it was <0.05 and highly significant when P value was <0.01 .

3. Results

Table (1) illustrates the distribution of the students according to their socio-demographic characteristics. It can be observed that, the age of around three quarters (73.9%) of the students' ranged between 20 – and 25 years. 44.2% of the students were in their third year of study. Most of the students (84.2%) were single. Moreover, more than three quarters of the students (79.5%) lived in an urban area compared to (20.5%) lived in a rural area. Most of the students (83.6%) had no family history of breast cancer.

Table (2) shows the percent distribution of the students according to their knowledge about breast cancer risk factors. The most widely known risk factors to medical students were family history of breast cancer and smoking (72.0 % and 65.0% respectively). For non-medical students the percentage were (46.7% and 58.0%) respectively. A statistically significant difference was found between medical and non-medical students ($p<0.05$). Knowledge of the students regarding breast cancer warning signs was illustrated in table (3). Warning signs of breast cancer which were known to more than two thirds of the medical students were breast lump (83.7%), bloody nipple discharge (72.0%), pain in breast (70.7%) and change in breast shape and/or size (83.0%). For no medical students the percentage were (76.0 %, 65.0%, 61.7%, and 72.3%) respectively. Regarding students' knowledge about breast cancer screening methods it can be observed that, more than one half of the medical students know that mammogram is a method of early detection (56.3%) and that mammogram could discover a lump earlier than clinical breast examination (63.0%). For no medical students the percentage were (30.3%, and 39.7%) respectively. A statistically significant difference was found between medical and non-medical students ($P<0.001$).

Regarding the students' sources of information about breast cancer and breast self-examination, figure (1) reveals that audio visual media is the most common source of information (76.6%) followed by social media (55.83%).

Table (4) reveals medical and non-medical student's attitude towards breast self-examination according the Health Believe Model HBM. It was found that there was no statistically significant difference between medical and non-medical students regarding perceived susceptibility and perceived severity ($P= 0.30$ and 0.75 respectively). However, there was a statistically significant difference between medical and non-medical students regarding perceived benefits ($P= 0.05$), perceived barriers ($P= 0.00$), cues to action (motivation) ($P= 0.03$) and self-efficacy ($P=0.02$).

Concerning, students' compliance with BSE screening behaviors, figure (2) illustrates that more than three quarters of medical and non-medical students (77% and 85% respectively) didn't perform breast self-exam. Less than one fifth of medical (13.0%) and non-medical students (8.5%) performed breast self-exam the past year. In addition, a minority of medical (7.0%) and non-medical students (4.5%) performed BSE in the past three months. Table (5) illustrates marked deficiency in students' knowledge among medical and non-medical students before the intervention. The implementation of the program was associated with statistically significant improvements

in students' knowledge regarding breast self-examination ($P = 0.03$) for medical students and $P = 0.001$ for non-medical students. The same table indicates statistically significant improvements in the students' practice ($P = 0.002$ among medical students and $P = 0.01$ among non-medical students).

Concerning students' knowledge regarding breast self-examination by using HBM before and after attending the educational program, table (6) shows that there is a statistically significant improvement in both medical and non-medical students' knowledge in all the HBM domains, perceived susceptibility ($P = 0.02$), perceived severity ($P = 0.00$), perceived benefits ($P = 0.00$), perceived barriers ($P = 0.05$), cues to action (motivation) ($P = 0.00$), and self-efficacy ($P = 0.00$).

Marked improvement of students' practice and attitude after the educational program was observed in table (7). Good practice with a positive attitude has increased after the test. This applies to both groups in the perceived susceptibility, perceived severity, perceived benefits, perceived barriers, perceived cues of action (motivation) and efficacy domains of the Health Believe Model. There was a statistically significant difference ($P < 0.001$). Table (8) shows the relationship between students' total knowledge and practice according to socio-demographic characteristics. It can be observed that satisfactory knowledge increased among 47.39% of the age group 20-25 years, 29.94% of third year students and 62.24% of students living in an urban area. There was

a statistically significant difference ($P = 0.029$, 0.00 and 0.027 respectively). In addition, good practice increased among 51.56% of the age group 20-25 years, 42.44 % of third year students and 70.57% of students living in an urban area. There was a statistically significant difference ($P = 0.016$, 0.053 and 0.267 respectively).

Table (1): Distribution of the students according to their socio-demographic characteristics (n=600)

Item	No.	%
Age (by years)		
< 20 year	157	26.2
20-25	443	73.9
Academic year		
Second year	219	36.5
Third year	265	44.2
Fourth year	116	19.3
Marital status		
Single	505	84.2
Married	195	15.8
Place of residence		
Urban	477	79.5
Rural	123	20.5
Family history of breast cancer		
Yes	98	16.4
No	502	83.6

Table (2): Percent distribution of the students according to their knowledge about breast cancer risk factors

Risk factors of breast cancer	Medical (n=300)			Non -medical (n=300)			Z	Sig
	Yes	No	Don't know	Yes	No	Don't know		
	%	%	%	%	%	%		
1. Advanced age:	47.7	25	27.3	36.7	37	26.3	1.692	0.09
2. Family history of breast cancer	72	20.3	7.7	46.7	28.3	25	6.812	0.00*
3. Early menarche <12	23.3	33.7	43	18	43	39	.006	0.995
4. Late menopause	24.3	24.7	51	20.3	41.7	38	1.79	0.07
5. Obesity	36.7	40.7	22.7	35	38	27	.912	0.362
6. Smoking	65.3	19.7	15	58	20.3	21.7	2.08	.037*
7. Never breast fed	47.3	24.3	28.3	47.3	30	22.7	.683	0.494
8. Lack of physical exercise	33.7	35.7	30.7	25.7	35.7	38.7	2.443	0.015*
9. Larger breast size	23.7	55.7	20.7	27	46.7	26.3	.390	0.697
10. Eating food rich in fat	42	30	28	43	22.7	34.3	.669	0.503
11. Use of HRT for a long duration	22.7	15	62.3	48	15	37	6.77	0.00*
12. Hormonal Contraceptive methods	47	14.7	38.3	46.3	15.7	38	.054	0.957

*: Significance

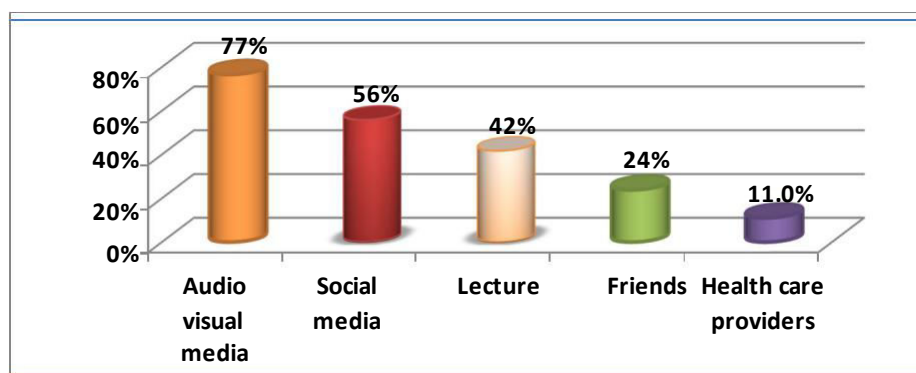


Figure (1): Percent distribution of the students according to their sources of information regarding breast cancer and breast self-examination (n=600)

Table (3): Percent distribution of the students according to their knowledge about breast cancer warning signs and screening methods

Warning signs of breast cancer	Medical (n =300)			Non-medical (n =300)			Z	Sig.
	Yes %	No %	Don't know%	Yes %	No %	Don't know%		
Warning signs of breast cancer								
1. Breast lump	83.7	2.3	14	76	11.7	12.3	1.91	0.05*
2. Bloody nipple discharge	72	14.7	13.3	65	10	25	2.41	0.01*
3. Nipple retraction	57.3	15	27.7	57.3	13	29.7	.204	0.83
4. Pain in breast	70.7	13.7	15.6	61.7	14.7	23.6	10.17	0.006*
5. Change in breast shape and/or size	83	8.7	8.3	72.3	10	17.7	3.31	0.001*
6. Redness of breast skin	59.7	14.7	25.7	57.7	10.3	32	.97	0.330
Screening methods of breast cancer								
1. Mammogram is a method of early detection	56.3	11.7	32	30.3	8.3	61.3	7.15	0.00*
2. Clinical breast examination is a method of early detection	75.2	9.3	15.5	66.7	10	23.3	2.37	0.01*
3. Mammogram could discover a lump earlier than Clinical breast examination	63	17	20	39.7	14	46.3	6.63	0.00*
4. Mammogram recommended to start at the age of twenty	31.7	45.7	22.7	30	15.7	54.3	5.16	0.00*

*: Significance

Table (4): Student's breast self-examination attitude among medical and non-medical students' by using health belief model HBM (n=600)

HBM dimensions	Medical (n =300)				Non-Medical (n =300)				X ² (p. value)
	Positive		Negative		Positive		Negative		
	No.	%	No.	%	No.	%	No.	%	
Susceptibility	167	55.7	133	44.3	154	51.4	146	48.6	1.04 (0.307)
Severity	252	84	48	16	250	83.3	50	16.7	0.09 (0.75)
Benefits	289	96.3	11	3.7	210	70	90	30	1.37 (0.05*)
Barriers	72	24	228	76	41	13.7	259	86.3	10.47 (0.00*)
Cues to action	27	9	273	91	14	4.7	286	95.3	4.24 (0.03*)
Self-Efficacy	232	77.3	68	22.7	207	69	93	31	5.30 (0.02*)
Total	290	96.7	10	3.3	289	96.3	11	3.7	0.049 (0.824)

*: Significance

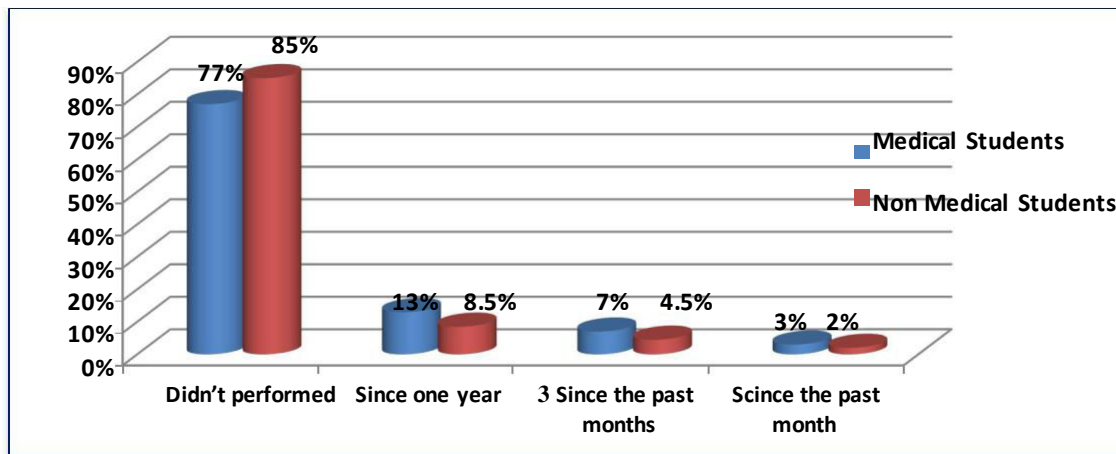


Figure (2): Distribution of the study sample according to their compliance (self-efficacy) of BSE

Table (5): Distribution of the students according to their total knowledge and practice pre & post educational program regarding breast self-examination (n=384)

Items	Medical (n = 184)				Non -medical (n = 200)				Total (n=384)			
	Pre		Post		Pre		Post		Pre		Post	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Total Knowledge												
Satisfactory	60	32.6	174	94.6	43	21.5	170	85	103	26.8	344	89.59
Un satisfactory	124	67.4	10	5.4	157	78.5	30	15	281	73.2	40	10.42
X ² (P)	5.11 (0.03*)				9.66 (0.001*)				16.36 (0.00*)			
Total practice												
Good	35	19.0	175	95.1	17	8.5	176	88	52	13.5	351	91.4
Poor	149	81	9	4.9	183	91.5	24	12	332	86.5	33	8.6
X ² (P)	9.06 (0.002*)				6.16 (0.01*)				5.65 (0.007*)			

*: Significance

Table (6): Percent distribution of the students' knowledge about breast cancer and breast self-examination by using HBM pre& post educational program(n=384)

HBM	Pre.				Post.				P. value
	Medical (n=184)		Non-medical (n=200)		Medical (n=184)		Non-medical (n=200)		
	S.	Un	S.	Un.	S.	Un.	S.	Un.	
Susceptibility									
Positive	21.2	4.34	14	5.5	88.59	1.63	82.5	3	2.29 (0.02*)
Negative	11.41	63.04	7.5	73	5.98	3.8	2.5	12	
Severity									
Positive	28.80	5.43	21.5	2.5	93.48	00	76	00	283.1 (0.00*)
Negative	3.80	61.96	00	76	1.09	5.43	9	15	
Benefits									
Positive	27.72	9.24	21.5	9	88.59	3.81	78.5	4.5	3.92 (0.00*)
Negative	4.89	58.15	00	69.5	5.98	1.63	6.5	10.5	
Barriers									
Positive	27.72	9.24	6.5	3.5	88.59	00	80.5	2.5	1.89 (0.05*)
Negative	4.89	58.15	15	75	5.98	5.43	4.5	12.5	
Cues to action									
Positive	22.83	11.96	18	9	88.59	3.8	70	4.5	133.8 (0.00*)
Negative	9.78	55.43	3.5	69.5	5.98	1.63	15	10.5	
Self-Efficacy									
Positive	20.65	9.24	11.5	6.5	76.09	1.63	69.5	10	98.24 (0.00*)
Negative	11.96	58.15	10	72	18.48	3.8	15.5	5	

S: Satisfactory knowledge / Un: Unsatisfactory knowledge

Table (7): Percent distribution of the students according to breast self-examination practice by using HBM pre & post educational program (n=384)

HBM	Pre.				Post.				P. value
	Medical (n=184)		Non-medical (n=200)		Medical (n=184)		Non-medical (n=200)		
	Good	Poor	Good	Poor	Good	Poor	Good	Poor	
Susceptibility									
Positive	19.02	6.52	8.5	11	89.13	1.09	85.5	0	125.9
Negative	00	74.45	00	80.5	5.98	3.80	2.5	12	(0.00*)
Severity									
Positive	15.76	15.21	4.5	15.5	88.04	00	76	00	72.83
Negative	3.26	65.76	4	76	7.07	4.89	12	12	(0.00*)
Benefits									
Positive	16.85	9.24	8.5	10	89.13	3.26	81.5	1.5	17.18
Negative	2.18	71.74	00	81.5	5.98	1.63	6.5	10.5	(0.00*)
Barriers									
Positive	19.02	17.93	6	4	88.59	0	81.5	1.5	154.9
Negative	00	63.04	2.5	87.5	6.52	4.89	6.5	10.5	(0.00*)
Cues to action									
Positive	9.23	25.54	8.5	18.5	89.13	3.26	73	1.5	33.9
Negative	9.78	55.43	00	73	5.98	1.63	15	10.5	(0.00*)
Self-Efficacy									
Positive	19.02	14.13	2	16	76.63	1.09	72.5	7	78.8
Negative	00	66.84	6.5	75.5	18.49	3.80	15.5	5	(0.00*)

*: Significance

Table (8): Distribution of the students according to their total knowledge and practice of BSE with socio demographic characteristics (n=384).

Items	Age (%)		Academic year (%)			Residence (%)	
	<20	20-25	Second	Third	Fourth	Urban	Rural
Total knowledge							
Satisfactory	32.29	47.39	25.26	29.94	29.16	62.24	17.44
Unsatisfactory	5.72	14.58	4.16	3.12	13.02	13.54	6.77
X² (p. value)	4.002	(0.029*)	21.11 (0.00*)			4.431 (0.027*)	
Total practices							
Good	42.187	51.56	27.6	42.44	23.69	70.57	23.18
Poor	1.30	4.94	2.34	1.30	2.60	5.20	1.04
X² (p. value)	5.347	(0.016*)	5.858 (0.053*)			.796 (0.267)	

*: Significance

4. Discussion

Breast cancer has been the most frequent cancer among females. It accounted for 21% of all cancer sites (**The National Cancer Registry 2005**)⁽³⁾. Breast cancer is commonly presented at a relatively young age and with an advanced stage of disease. This could be due to lack of awareness, and knowledge and due to certain beliefs about breast cancer and its management among females. Breast health awareness appears to be a pragmatic and simple tool which can play an important role in the detection of early breast cancers with a favorable prognosis (**Agarwal et al. 2007**)⁽²⁵⁾. In addition, performing breast self-examination (BSE) can detect 40% of breast lesions (**Gupta 2009**)⁽²⁶⁾. The aim of the present study was to

identify female college students' breast cancer screening beliefs and practice based on the Health Belief Model, evaluate their compliance with breast cancer screening behaviors and implement a breast self-examination educational program for female college students.

The results of the present study revealed that the most widely known risk factors among both medical and non-medical students were family history of breast cancer and smoking. This is consistent with the results of a study done by **Boulos and Ghali (2014)**⁽²⁷⁾ who indicated that the widely known risk factors by the students were smoking (66.9%), radiation to the chest (63.7%), genetic factors (63.7%) and family history of breast cancer (47.5%). The results of the

present study are also in line with a study carried out to determine the awareness of breast cancer risk factors and practice of breast self-examination among female students of the University of Nigeria Enugu Campus. It showed that the only risk factor that is widely known is family history of breast cancer (50%) (**Iheanacho et al., 2013**)⁽²⁸⁾. In addition, **Al Junaibi and Khan (2011)**⁽²⁹⁾ who studied the knowledge and awareness of breast cancer among university female students in Muscat, reported that the majority of participants knew about genetics or family history of breast cancer as established risk factors for the disease. The results of the present study are incongruent with the results of a study conducted in Saudi Arabia which reported that the most commonly known risk factor among respondents was absence of breast feeding (52.7%) (**Danash and Al-Mohaimed, 2007**)⁽³⁰⁾. In the present study, more than one third of the students did not know that early menarche <12 is one of the risk factors for breast cancer. This finding is in accordance with the results of a study done by **Al Junaibi and Khan (2011)**⁽²⁹⁾ who reported that more than 50 % of the respondents were unable to recognize early onset of menses as a complex risk factor of breast cancer.

Having knowledge about breast cancer symptoms is essential for early diagnosis and treatment of the disease. Results of the present study revealed that the most common symptoms reported by the students were breast lump, bloody nipple discharge, pain in breast and change in breast shape and/or size which are consistent with the results of study done by **Al Junaibi and Khan (2011)**⁽²⁹⁾ who revealed that the majority of the participants considered breast pain and breast lump as the most common presenting symptoms. This percentages were higher than the results of other similar studies done in UK (**Ba'Amer, 2010**)⁽³¹⁾. This increased awareness about early signs, symptoms and risk factors of breast cancer among female students could be attributed to their age and educational level especially among the medical group. However, the results of the present study are incongruent with the results of a study done by **Habib et al (2010)**⁽³²⁾ who reported that "swelling in the breast or axilla" was the most frequently identified symptom of breast cancer. Also, **Sambanje and Mafuvadze (2012)**⁽³³⁾ reported that the majority of participants were not aware of early signs of breast cancer such as changes in color or shape of the nipple.

Regarding the students' sources of information about breast cancer and breast self-examination, the present study indicated that the audio visual media was the most common source of information about breast cancer and breast self-examination. These results are in line with the results of **Boulos and Ghali**

(2014)⁽²⁷⁾, **Iheanacho et al (2013)**⁽²⁸⁾ and **Habib et al (2010)**⁽³²⁾ who reported that the main sources of information about breast cancer and breast self-examination were television and radio. However, these results are not on line with the results of **Rizwan and Saadullah (2009)**⁽³⁴⁾ who found friends and colleagues to be the main sources of information. The results of the present study reinforced the fact that mass media is a very beneficial and effective way to disseminate knowledge among the population at large. It plays a major role in shaping the development of future generations.

Knowledge is a basic requirement for any individual to maintain proper health. In the greater attempt to disseminate knowledge and increase awareness about a given health-related issue such as breast cancer, the researchers of the present study developed and delivered an educational program to the selected group of students. The present study assessed students' knowledge and practice regarding breast self-examination (BSE) and breast cancer before the educational program. It was evident that a large percentage of both medical and non-medical group had unsatisfactory knowledge and poor practice. These results are congruent with the results of **Boulos and Ghali (2014)**⁽²⁷⁾ who showed that female university students may not have adequate knowledge about BSE. However, the results are not on line with the results of **Al Junaibi and Khan (2011)**⁽²⁹⁾ who indicated that only 23% of respondents did not know the correct procedure to perform BSE. They wrongly believed that it should be performed either annually or occasionally while 61% of all participants knew the appropriate time to perform BSE.

According to the finding of the present study, a large percentage of medical and non-medical students did not perform BSE. This may be due to their lack of knowledge about this issue. Study done by **El Saghir et al (2007)**⁽³⁵⁾ that 90% of the participants heard about BSE and only 19% stated that they performed it on a regular monthly basis. Also, **Yelda et al (2012)**⁽³⁶⁾ found that 97% of women heard about breast self-examination but only 36.7% of respondents performed it.

Attitude is a more important factor in preventive behaviors including cancer control behavior than just knowledge about BSE. The Health Belief Model has been used in several studies as a theoretical framework to study BSE and other breast cancer detection behaviors. (**Cohen and Azaiza, 2005**)⁽³⁷⁾. The present study examined breast cancer beliefs and screening behaviors in relation to each domain of the Health Belief Model. Results from the present study indicate that a large percentage of the students from both groups have a negative attitude towards perceived susceptibility, perceived barriers and cues to

action (motivation). There was a statistically significant difference between medical and non-medical students regarding perceived benefits, perceived barriers, cues to action (motivation) and self-efficacy.

It is very important to note that the educational curriculum played a very important role in sending messages about this topic for medical students. Thus, it is important to give the right information through different channels to cover this area of knowledge about breast cancer and to change wrong beliefs. Furthermore, **Hajian et al (2011)**⁽³⁸⁾ concluded that we need to pay attention to barriers for women undergoing mammography such as costs, shame and accessibility, and increase the target population awareness and positive attitudes towards the benefits of early breast cancer screening. The findings of the present study are inconsistent with the results of a study done by **Radi (2013)**⁽³⁹⁾ and **Ahmed (2010)**⁽⁴⁰⁾ who reported higher perceived susceptibility ($P < 0.01$), higher cancer worries ($P < 0.05$), and fewer barriers to mammography ($P < 0.05$). Moreover, the health education program used in the present study had positive effects on knowledge and beliefs of student from both groups regarding breast cancer and breast self-examination in all domains of the Health Believe Model. These results are consistent with the results of a study done by **Mood et al (2011)**⁽⁴¹⁾ who indicated that the HBM mean scores were increased in all components (perceived susceptibility, perceived severity, perceived benefits and perceived barriers) after educational intervention.

In addition, student's practice of breast self-examination has also improved after attending educational program. According to HBM, women's perception of their susceptibility to breast cancer and the severity of the disease were associated with their knowledge about the disease (**Farmer 2007**)⁽⁴²⁾. So for women who received the educational intervention, the perceived susceptibility of having breast cancer increased. These results are in line with the findings of **Rezaeian (2014)**⁽⁴³⁾ who indicated that the educational intervention increased perceived benefits and decreased perceived barriers significantly in the intervention group compared to control group. In a study from Turkey, peer education increased perceived benefits of mammography and lowered the perceived barriers to undergoing mammography (**Gozum 2010**)⁽⁴⁴⁾. This improvement in students' attitude related to knowledge acquired from education program also reflected on the students practice.

Regarding the relationship between students total knowledge and practice levels according to their socio-demographic characteristics it can be observed that satisfactory knowledge and good practice increased among students of the age group 20-25

years, third year students and those living in an urban area. These results are supported by **Hadi et al (2010)**⁽⁴⁵⁾ who reported that the age, educational level and social status significantly influenced breast cancer knowledge. Results of a study done by **Guilford, (2011)**⁽⁴⁶⁾ revealed however that there is no significant influence of the grade average and level of knowledge.

5. Conclusions:

Based on the findings of the present study, it can be concluded that, there was a high percentage of students from each group that had unsatisfactory knowledge, negative attitude and poor practice regarding breast self-examination and breast cancer at pretest. The results of the present study also confirmed the positive effects of an educational program according to HBM on females' knowledge, beliefs and practice regarding breast self-examination and breast cancer.

Recommendations

Breast cancer awareness programs should be developed in universities on a regular basis and should focus on removing perceived barriers to screening and enhancing self-efficacy among female students.

Policy makers should integrate breast cancer awareness programs in the routine programs provided in all healthcare centers.

Attention should be paid to barriers to women undergoing mammography, such as costs, shame and accessibility.

Target population awareness and positive attitudes towards benefits of early breast cancer screening should be increased.

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