

Application of an Intervention Based on Health Belief Model on Knowledge and Compliance to Breast Self -Examination among Female Students at Risk for Radiation Exposure

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Abstract: Breast cancer is considered a global health problem of both developed and countries. Breast self-exam is considered the most important method for breast cancer early detection method at home. Purpose of the study: The purpose of the present study was to: investigate the effect of the application of an intervention based on health belief model on knowledge and compliance to breast self -examination among female students at risk for radiation exposure. Design: The researcher used the quasi-experimental design to achieve the stated purpose. Sample: A convenient sample of all female students (N =25) students was available. Setting: The study was conducted at Faculty of Applied Medical Sciences at Shebin El-kom city, Menoufia Governorate. The female students' knowledge regarding breast cancer, BSE and practice of BSE is inadequate before BSE education program. Therefore; targeted BSE education program was done for those female students to improve their early detection of breast cancer. Instruments: Instrument I: An interviewing questionnaire that consists of 38 questions of multiple choice type about the sociodemographic characteristics and knowledge, Instrument II Champion's Health Belief Model Constructs Scale (CHBMS) Instrument III: A breast self-exam checklist and Instrument IV: compliance of the female students to breast self-exam. Data were conducted by using Lierman Instrument. Compliance was measured in terms of frequency and accuracy (Lierman, 1988). Results: There was a high statistical significant difference in terms of knowledge and practice regarding breast cancer and breast self-exam among pre-post- test and compliance after 6 months. Conclusion: The nursing interventional program was effective in the improvement of knowledge and compliance of the university female students about breast self-exam. Recommendations Based on the findings of the study, the researcher recommends that breast cancer awareness programs should be developed in universities on a regular basis and should focus on removing the perceived barriers to breast self-exam and enhancing cues to action and self-efficacy among the female students

Keywords: Breast Cancer, BSE, female students, Compliance.

1. INTRODUCTION

Breast cancer is a major health concern in females. It is the most common and aggressive type of cancer across the world (Barnell, Ronning, Campbell & Krysiak, 2018). Its prevalence is increasing to be the second cause of women death worldwide (Siegel, Jemal & Ward, 2010). It is considered a global health problem of both developed and developing countries (Wilson, 2018). Bray (2018) reported that there were over 2 million new cases of breast cancer detected in 2018. Nelson & Milner (2018) reported that 627,000 women died from breast cancer that is approximately 15% of all cancer

deaths among women. There was sharp rise in breast cancer worldwide in 2012 where 1.7 million women were diagnosed with breast cancer. Also there were 6.3 million women alive who had been diagnosed with breast cancer in the previous five years. It is now representing one in four of all cancers in women worldwide (Fitzmaurice, 2013).

In Africa, it is estimated that 943.78 cases of breast cancer are diagnosed annually (Ferlay, 2018). Patients with breast cancer in Africa are often to be young and presenting at a late stage of a disease. So, it is a very growing problem especially in the low resource settings (Nelson & Milner, 2018).

In Egypt, it is the most common cancer among women representing 18.9% of total cancer cases (35.1% in women, 2.2% in men) as reported by the Egyptian National Cancer Institute (Hassan, Bayoumi & Atwa, 2016). Baheya Foundation for early detection and treatment of breast cancer in Egypt stated that 34 % of the Egyptian women suffer from breast cancer and commented that it is the most common and the most dangerous type of cancer threatening the Egyptian women (Emara, 2017). Locally in Al Menoufia governorate, a study was conducted by El-Senbawy, Abd El Bary, Shehata, Shaltout in 2018 among the female patients presented to oncology department in the period from 2012 to 2013 and reported that 41% of the female cancer patients were suffering from breast cancer.

Breast cancer is the cancer that develops from the breast tissue (Siegel, Miller & Jemal, 2016). It is a multi-factorial disease in which genetic and environmental factors contribute to its occurrence (Paik, 2016). Since breast cancer at early stage doesn't cause symptoms, most breast cancers usually are detected in a late stage which is associated with a bad prognosis and high mortality rates. Radiation increases the risk of breast cancer. The research evidence has identified an association between breast cancer and occupational factors including ionizing and non-ionizing radiation exposure. Raising awareness about severity of breast cancer and the importance of using the screening methods for the early detection of breast cancer is a key element in controlling hazards in occupational radiation (Goss & Sierra, 2010).

Knowledge and identification of risk factors for sporadic breast cancer are key challenges for health promotion and cancer prevention within nursing practice. Health Belief Model (HBM) is a psychological model designed to enhance the effectiveness of health education programmes. It was initially applied to preventive behaviors (Siddiqui, Ghazal, Bibi & Sajjad, 2016). According to this model, behavioral beliefs and modifying factors are effective in shaping behavior and when a female is susceptible to breast cancer (perceived susceptibility) and aware of the threat of disease on their health (perceived severity) and also know the benefits of screening methods (perceived benefits) than its barriers (perceived barriers), she most likely will follow the screening methods (cues to action) This model become one of the most widely recognized conceptual frameworks for creating healthy behaviors by focusing on positive behavioral change at the individual level (Romano & Scott, 2014).

Promotion of knowledge about the importance of adoption of breast cancer screening methods especially regular breast self-exam can help in detecting the disease in early non advanced stages which result in improving its prognosis especially in young aged (Boulos & Ghali 2014). A regular breast self-exam (BSE) is an effective and diagnostic method for early detection of breast cancer. (Siu, 2016). It is a simple, not costly, noninvasive with no special material or tool requirements and takes only five minutes to apply (Ayed, 2015).

Nurses play a unique and a vital role in the early detection of breast cancer as they usually have the closest contact with the female patients. The nursing responsibilities to teach early recognition of the signs and symptoms of malignancy are very important to enhance the timely use of medical and surgical methods for appropriate management and treatment of the disease (Jutagir, 2017). Compliance to regular breast self-exam is very important for the researchers and the clinicians for assessing the effectiveness of intervention and also for young females for the early detection of the breast cancer (Goss & Sierra, 2010).

Significance of the study

Breast cancer is considered the leading cause of cancer death among females in economically developing countries. Its prevalence is high in Egypt and the cases of breast cancer constitute 29 % of cancer cases treated at the National Cancer Institute (Ibrahim, 2014). It is estimated that about 95% of all breast cancer can be diagnosed in the primary stage by breast self-exam (Daling, 2015). Unfortunately, despite the relative benefits of regular breast self-exam., few women actually examine themselves. Only 17% of women respectively were observed to perform breast self-examination monthly (Boulos & Ghali, 2014). In fact, the majority of cases don't even know how to do a breast self-exam. (Alidosti, 2012).

According to Karadag (2014), there is a lack of belief regarding the necessity of regular breast self-examination which has an impact on the behavior toward breast self-examination. Understanding adolescent beliefs regarding breast self-examination can be used to design the appropriate interventions which promote the desired behavior toward breast self-exam.

Purpose of the Study

The purpose of the current study is to investigate the effect application of an intervention based on health belief model on knowledge and compliance to breast self -examination among female students at risk for radiation exposure.

Research Hypotheses:

H.1. Students who receive an intervention based on health belief model have higher level of knowledge about breast self-exam than before.

H.2. Students who receive an intervention based on health belief model have a higher level of competency in practicing breast self-exam than before.

H.3. Students who receive an intervention based on health belief model have higher compliance level to breast self-exam than before.

2. METHOD

Research design:

A non-equivalent quasi- experimental design was utilized to carry out the present study (pre-posttest and compliance after 6 months).

Setting of the study:

This study was conducted at Faculty of Applied Medical Sciences at Shebin El-kom city, Menoufia Governorate. One of the departments of Applied Medical Sciences Faculty is the Diagnostic and Therapeutic Radiology department. The female students in this department were enrolled in this study. These students are considered at risk for radiation exposure during their university education and their lifelong career. So they are at a higher risk to develop breast cancer.

Participants:

Participants' type: A convenient sample of all female students (N=25) students from Diagnostic and Therapeutic Radiology department were enrolled in the study from the above mentioned setting.

Sample size: The total number were 25 female students from Diagnostic and Therapeutic Radiology department of Applied Medical Sciences.

Instruments:

Instruments of data collection:

Four instruments were used and filled in by the researcher

Part (I): An interviewing questionnaire (38 questions). It was developed by the researcher based on the review of the related literature and revised by the experts. It included: sociodemographic characteristics, medical, surgical, family and menstrual history of the female students and knowledge of the female students about breast cancer and breast self-exam.

Part (II): Champion's Health Belief Model Constructs Scale (CHBMS) (pre/posttest): It was adapted from Champion (1993) to assess the female students' beliefs and attitude towards breast cancer and breast self-exam. The Champion Health Belief Model Scale (CHBMS) was utilized to measure the health belief model components. A 45-item was used to obtain the baseline data. Three-points Likert Scale was used to measure the responses. A self-administrated questionnaire was used to measure the six subscales which are perceived susceptibility (6 items), perceived severity (12 item), perceived benefits (5items), perceived barriers (8 items), cues to action (8 items) and self-efficacy (6 items) related to the frequency of breast self-exam.

Part III: An observational checklist for breast self-exam: It was designed by the researcher and revised by the experts to evaluate the students' performance of breast self-exam. This checklist consists of 3 phases which are preparatory phase, inspection phase and palpation phase.

Part IV: Compliance of the female students' to breast self-exam.

It was adopted from Lierman, (1988). Compliance was measured in terms of frequency and accuracy.

Validity and reliability:

For validity purposes, the researcher conducted an extensive literature review and developed the questionnaire from the previously used instruments and reviewing the pertinent reviews. Instrument I, III were designed by the researchers and revised by five experts in the field of maternal and newborn health nursing in the Faculty of Nursing of Menoufia University (for content validity), while Instrument II, was adapted from Champion (1993) and revised by five experts in the field of maternal and newborn health nursing in the Faculty of Nursing of Menoufia University (for content validity) and Instrument IV was adopted. The interview questionnaire underwent some modifications according to the panel of jurors regarding the clarity of sentences and appropriateness of content. Reliability analysis was used to determine the extent to which the items in the instrument are related to each other (test and retest reliability). The findings suggested that the current instrument could be used as a valuable instrument for data collection in this study. Scores from repeated testing were compared to test consistency and stability of the results overtime.

Ethical considerations

A primary approval was obtained from the Hearing and Ethical research committee at Faculty of Nursing, Menoufia University in 9/7/2017 before conducting the study. Also a written letter from Faculty of Nursing Menoufia University was directed to the Dean of Applied Medical Sciences Faculty before starting the data collection. A written informed consent was taken from all students before being enrolled in the study after explaining the purpose of the study. The students were informed that their participation in the study was voluntary and they could withdraw from the study whenever they decide. Confidentiality was achieved by the use of closed sheets with the names of the participated female students replaced by numbers. The students were informed that the information they provided during the study would be kept confidential and used only for statistical purpose after finishing the study.

Piloting the instruments

A pilot study was conducted to assess the applicability of the instruments, the feasibility of the study and to estimate the time needed for data collection. It was conducted on 10% of the total participants (3 female students). Each one was given the opportunity to freely refuse participation in the study. They were free to ask any question about the study details. On the basis of the piloting, the students were evaluated and the researcher made modifications in the data collection instruments and rephrased some questions and sentences, then set the final field work schedule.

Study Maneuver

The current study was carried out in four consecutive phases, namely, preparatory phase, implementation phase, evaluation phase and compliance phase.

The preparatory Phase:

A review of the past and current literature covering the various aspects of the problem was done using books, articles, magazines and network studies related to the effect of health belief model intervention on knowledge and compliance to breast self-exam among female students at risk for radiation exposure.

The implementation Phase:

The data collection of the study took six months starting in January 2018 and ending in June 2018 of a convenient sample of all female students enrolled in the study from the above mentioned setting. The researcher attended to the Faculty on Tuesday 9/1/2018 from 8 Am to 12 Pm. The researcher introduced herself to the students, provided verbal explanation of the study and answered all related questions. Then a structured questionnaire and the Champion's health belief model Constructs Scale (HBM) were distributed to all female students who were willing to participate in the study in their lecture rooms. The researcher held meetings with the students during the free classes' time and during break through the

assistance and the coordination of the Faculty Assistant Dean. The procedure was explained to the female students and permission was obtained to commence.

1-pre-test: -

- Assessing the female students' knowledge by an interviewing questionnaire which was distributed to the female students to explore their knowledge about breast cancer and breast self-exam.
- Assessing the students' attitude and beliefs toward breast cancer and breast self-exam by health belief model instrument which was distributed to the female students to explore their attitudes and beliefs.
- Assessing the students' practice of breast self-exam by using observational checklist for breast self-exam.
- The preliminary assessment showed that the female students' knowledge about breast cancer and breast self-exam was poor and their practice was inadequate.

2-Developing the guidelines:-

Some guidelines were developed according to the preliminary data assessment of knowledge, attitude and practice of breast self-exam. The evidence based recommendations of breast cancer and breast self -exam guidelines were developed by the researcher and revised by the experts.

Educational sessions

Implementation of educational sessions:-The implementation of breast cancer and breast self-exam health education program was implemented to the female students in the 2nd and 3rd years of Applied Medical Sciences students. It was implemented through teaching and learning methods as lecturing, group discussion and feedbacks, demonstration and redemonstration.

- The health belief model intervention session consisted of 2 sessions that were conducted for on 5 groups of female students. Each group involved 5 female students. Two sessions per week were conducted for each group. The session duration ranged from 45- 60 minutes. The sessions were held at the faculty lecture room.
- The researcher used a simple language that suits the educational level of the female students .It was mixed between Arabic and English. These health educational sessions include definition of each key concept and its objective.
- A booklet about breast cancer and breast self-exam was developed and used as a learning material.
- Different learning methods were used during the educational session namely, lecture and group discussion.

The Evaluation Phase:

Evaluation of the female students' knowledge and practice regarding breast self-exam:-

Post-test

- Determining whether there was effective and comprehensive effect on the female students' knowledge by using an interviewing questionnaire which was distributed to the female students to evaluate their knowledge about breast cancer and breast self-exam (pre-posttest).
- Determining whether there was effective and comprehensive effect on the female students' attitude and beliefs toward breast cancer and breast self-exam by the health belief model instrument which was distributed to the female students to evaluate their attitude and beliefs (pre-posttest).
- Determining whether there was effective and comprehensive effect on the female students' practice of breast self-exam by using observational check list for breast self-exam (pre-posttest).

The Compliance Phase: after six months:

The researcher also evaluated the students' knowledge of breast cancer and breast self-exam using pre-post administration of the questionnaire test questionnaire and performance of breast self -exam using BSE checklist after six months. The fourth session carried out 6 months after the implementation of the educational program to investigate the effect of the

program on the students' knowledge and practice and evaluated the students' compliance with BSE. The researcher evaluated the students' knowledge by using the pre-post-test questionnaire. Also evaluated the performance of breast self-exam through a compliance instrument after 6 months which was adopted from Lierman (1988). A breast self-exam checklist that was used in the pre-post-test evaluation and compliance to make sure that the female students were compiled to the procedure.

Data Analysis

Data was analyzed using the statistical package for social sciences (SPSS program, version 22). Qualitative variables as age categories, residence, marital status.....etc. were described in frequencies. Continuous data as knowledge score, perceived susceptibility, and perceived severity....etc. were described as mean and standard deviation. Chi-square test was used for discovering the relationship between two categorical variables. The Wilcoxon signed-rank test is a non-parametric statistical hypothesis test used to compare two related samples. The results were represented in tables. The level of significance was considered statistically significant if (P value is < 0.05) and was highly statistical significant if (P-value is < 0.01).

3. RESULTS

Section I: Characteristics of the study female students

Table (1): Socio-Demographic Characteristics of the Study Female Students.

Socio-Demographic Characteristics	The study female students (N=25)	
	No.	%
Age		
• ≤ 18 years old	12	48
• > 18 years old	13	52
Residence		
• Rural	22	88
• Urban	3	12
Marital status		
• Single	24	96
• Married	1	4

Table (1) shows the socio-demographic characteristics of the study female students. Nearly half of the study female students' ages were more than 18 years old. While the majority of them lived in rural area and nearly all of them were singles (96%).

Table (2): Family, Medical, Surgical and Menstrual History of the Study Female Students.

Family history	The study female students (N=25)	
	No.	%
Family member of the study female students who suffer from breast cancer		
• Yes	3	12
• No	22	88
Medical history		
Study female students who suffer from chronic disease		
• Yes	0	0.0
• No	25	100

Surgical history		
Past history of the study female students about surgical operation		
• Yes	0	0.0
• No	25	100
Menstrual history		
Age at menarche		
• > 12 years old	13	52
• ≤ 12 years old	12	48
Duration of menses		
• ≤ 5 days	16	64
• > 5 days	9	36
Interval		
• ≤ 28 days	20	80
• > 35 days	5	20
Amount of bleeding		
• Mild	3	12
• Moderate	21	84
• Severe	1	4
Pain with menstruation		
• Yes	21	84
• No	4	16

Table (2): reflects the family, medical and menstrual history of the study female students. This table shows that 88% of them had no history of breast cancer. All of them were free from any chronic diseases and did not have any past history of surgical operations. More than half of the study female students had menarche at the age of 12 years old. While nearly two thirds of them (64%) had duration of menstrual bleeding less than 5 days with menstrual interval ≤ 28 days. The majority of the study female students (84%) had moderate amounts of menstrual blood and suffered from pain with menstruation.

Section II: level of Knowledge of the study female students about breast cancer and breast self-exam.

Figure (1): Total Knowledge Score of the study female students about Breast Cancer Pre and Post – Intervention and compliance.

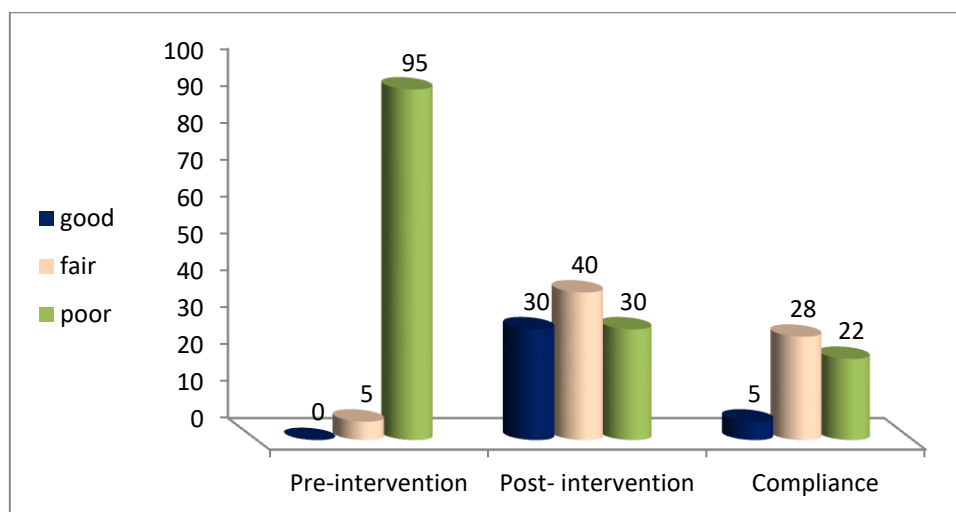


Figure (1): reveals the total level of knowledge score of the study female students about breast cancer pre, post intervention and compliance. This figure reveals that there was high statistical significant difference between the students’ pre, post intervention and compliance regarding their total knowledge about breast cancer

Table (3): Level of Knowledge of the Study Female Students about Breast Self-Exam:

Variables	Pre-intervention		Post- intervention		Compliance		Chi square χ	P-value
	No 25	% 100	No 25	% 100	No 25	% 100		
Meaning of breast self-exam								
Correct	6	24	22	88	20	80	a22.743	a<0.001*
Incorrect	7	28	3	12	5	20	b19.872	b<0.001
Don't know	12	48	0	0.0	0	0.0	c0.0595	c 0.702
Time of breast self-exam								
Correct	6	24	18	72	16	64	a12.650	a0.002*
Incorrect	6	24	4	16	6	24	b10.795	b0.005
Don't know	13	52	3	12	3	12	c 0.784	c 0.676
Proper position of the body for breast self-exam								
Correct	5	20	20	80	18	72	a18.935	a<0.001
Incorrect	10	40	4	16	5	20	b14.348	b0.001
Don't know	10	40	1	1	2	8	c0.550	c0.760
Benefits of performing breast self-exam								
Correct	5	20	18	72	16	64	a15.748	<0.001
Incorrect	7	28	5	20	5	20	b10.86	b 0.004
Don't know	13	52	2	8	4	16	c 0.784	c 0.676

Table 3 shows the study female students' level of knowledge about breast self-exam. This table reports that there was a highly statistical significant difference between pre, post intervention and compliance regarding their knowledge about breast self-exam (p value <0.001) (a) comparing pre-intervention & post- intervention, (b) comparing pre-intervention& compliance, (c) comparing post-intervention& compliance).

Section III: Attitude of the study female students regarding breast cancer and breast self-exam using Champion Health Belief Model.

Table (4): Total Attitude of the Study Female Students towards Breast Cancer and Breast Self-Exam Using Champion Health Belief Model.

Variables	Pre-intervention		Post- intervention		t-test	P-value
	No. 25	% 100	No. 25	% 100		
Perceived susceptibility						
Mean ± SD (Min- Max)	5.4±1.5 (3-8)		4.28±1.6207 (1-7)		2.536	0.015*
Perceived severity						
Mean ± SD (Min- Max)	16±3.605 (5-21)		13.92±2.9 (7-20)		2.248	0.029*

Perceived benefits				
Mean ± SD (Min- Max)	5.32±2.304 (0-9)	9.36±1.868 (2-10)	6.809	<0.001*
Perceived barriers				
Mean ± SD (Min- Max)	5.32±2.304 (6-12)	6.96±3.075 (1-12)	0.984	0.332
Cues to action				
Mean ± SD (Min- Max)	8.12±2.948 (4-14)	14.08±4.202 (9-33)	5.805	<0.001*
Self-efficacy				
Mean ± SD (Min- Max)	4.76±2.107 (0-9)	7.64±1.729 (4-10)	5.283	<0.001*
Total mean				
Mean ± SD (Min- Max)	46.56±6.678 (33-61)	56.92±7.279 (43-78)	5.244	<0.001*

Table 4 shows that there was a highly statistical significant difference between the study female students’ total attitude scores regarding breast cancer and breast self-exam using Champion health belief model within pre and post intervention(p value <0.001).

Section IV: Breast Self –Exam practice of the Study Female Students.

Table (5): Differences between The Study Female Students’ Scores Regarding Practice of Breast Self -Exam within Pre, Post Intervention and Compliance Using Observational Checklist for Breast Self-Exam.

Variables	Pre-intervention		Post- intervention		Compliance		Chi square χ	P-value
	No. 25	% 100	No. 25	% 100	No. 25	% 100		
Preparatory phase								
• Correct performance	0	0.0	11	44.0	9	36	a14.111	a0.01*
• Incorrect performance	23	92.0	13	52.0	15	60	b11.018	b0.004
• Not performed	2	8.0	1	4.0	1	4	c0.343	c0.842
Inspection phase								
• Correct performance	0	0.0	15	60.0	11	44	a36.667	a<0.001*
• Incorrect performance	5	20.0	10	40.0	13	52	b31.746	b<0.001
• Not performed	20	80.0	0	0.0	1	4	c2.007	c0.367
Palpation phase								
• Correct performance	0	0.0	16	64.0	14	56	a37.143	a<0.001*
• Incorrect performance	5	20.0	9	36.0	11	44	b36.25	b<0.001
• Not performed	20	80.0	0	0.0	0	0.0	c0.333	c0.0773

Table (5): shows the differences between the study female students’ scores regarding practice of breast self-exam within pre, post intervention and compliance. This table reveals that there was a highly statistical significant difference between pre, post intervention and compliance of the study female students’ scores regarding practice of breast self-exam within the pre, post intervention and compliance (p value <0.001) (a) comparing pre-intervention & post- intervention, (b) comparing pre-intervention& compliance and (c) comparing post-intervention & compliance.

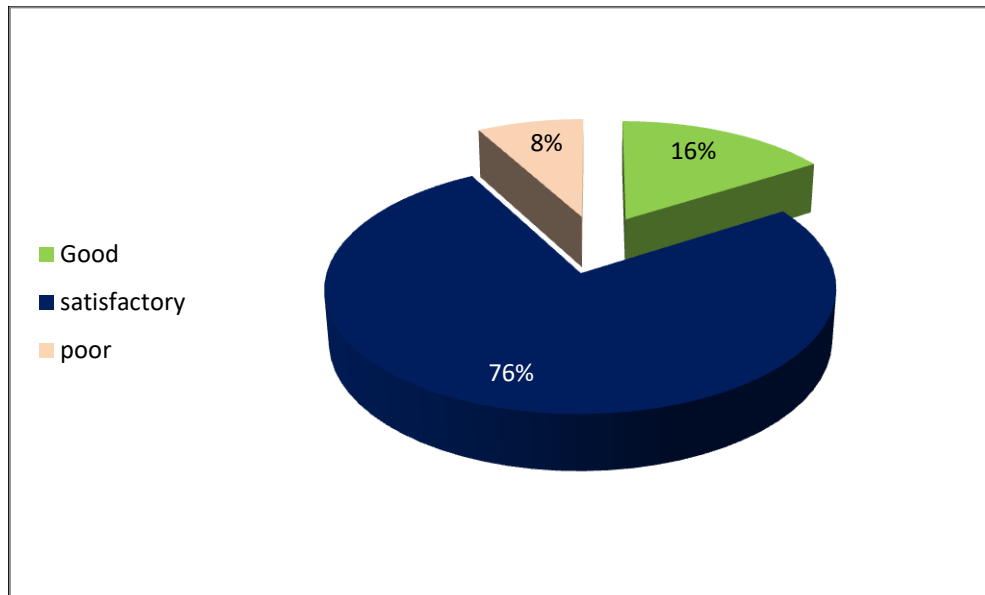
Section V: Compliance of the Study Female Students to Breast Self-Exam.**Figure (2):** Compliance of the Study Female Students' to Breast Self-Exam.

Figure (2): shows compliance of the study female students to breast self-exam. It shows that 76% of the study female students had a satisfactory compliance score to breast self-exam, 16 % had good compliance score and 8% of them had poor compliance score to breast self-exam.

4. DISCUSSION

The findings of the current study supported the three hypotheses that were formulated to achieve the purpose of the study. The findings are discussed in the following sequences: 1- General findings which include socio-demographic characteristic, family, medical, surgical and menstrual history of the study female students. 2-The findings that are related to knowledge of the study female students about breast cancer and breast self-exam. 3-The findings that are related to attitude of the study female students toward breast cancer and breast self-exam according to health belief model. 4-Finding that are related to the practice of breast-self-exam within the pre, post intervention & compliance using observational checklist for breast self-exam.5- The findings that are related to compliance of the study female students to breast self-exam within 6 months after the intervention.

Regarding socio-demographic characteristics, it is noted that nearly half of the study female students' age were more than 18 years old. This is rationalized as this study was conducted among undergraduate students "2nd and 3rd study year". This comes in agreement with Doshi (2012) who conducted a study entitled "breast self-examination: knowledge, attitude, and practice among female dental students in Hyderabad City, India" and reported that the age of the study population was more than 17 years old. American Cancer Society (2014) reported that women should be informed about breast self-exam at the beginning of their 20s.

This study revealed that 88% of the study female students lived in rural areas. So, most of the students noted that they suffered from transportation for the capital where the Faculty is located. This is contradicted with Mohamed, Ibrahim, Lamadah & El-Magd, (2016) who studied "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". The findings revealed that 79.5 % of the students lived in a urban areas.

The current study showed that nearly all of the study female students (96%) were singles. This comes in agreement with Erbil & Bolukbas (2014) who conducted a study entitled "health beliefs and breast self-examination among female university nursing students in Turkey" and showed that 98.4% of the study sample were single. Moreover, Asghari et al., (2016) studied "the relationship between health belief and breast self-examination among Iranian university students" and showed that 91.9% of the participants were singles. This may indicate that the students were occupied with their

university study rather than marriage. On the other hand, this finding is contradicted with Parsa (2008) who studied "reliability and validity of champion's health belief model scale for breast cancer screening among Malaysian women" and found that 88.9% of the studied participants were married.

Concerning level of knowledge about breast cancer, it is important to note that 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 researcher of the present study developed and delivered an educational program to the selected group of female students. The present study indicated that the female students' knowledge about breast cancer was poor (90%). Although the students had a pathology subject in their curriculum and they may have studied the disease, the majority of their knowledge scores were poor. This may be rationalized as the study sample were from undergraduate students "2nd and 3rd study years.

This comes in agreement Abolfotouh (2015) studied "Using the health belief model to predict breast self-examination among Saudi women" and stated that 54.2 % of the study participants had a low level of knowledge about breast cancer. In contrast, this finding is contradicted with a study conducted by Mafuvadze et al (2012) entitled "breast cancer knowledge and awareness among high school and college students in Mid-Western USA" and reported that 72% of university students reported knowledge about breast cancer.

Regarding the level of knowledge of breast self-exam, breast self-exam is very important in early detection and diagnosis of breast cancer. This is because 80% of women detected breast cancer by themselves either through regular breast self-exam, by chance or accidentally through medical examination (Aziato & Lamptey 2014). The current study reported that more than half of the study female students (56%) had fair knowledge about breast self-exam. This may reflect that the females are seeking for healthy behaviors and they were interested in being aware of their breasts. This comes in agreement with Naghibi, Vahidshahi, Yazdani & Noshnai (2011) who studied "Knowledge, attitude and practice of female health workers about breast self-examination in Makoo" and reported that 49.2% of them had a moderate level of knowledge. Moreover, Sani, Naab & Aziato (2017) studied "influence of educational level on knowledge and practice of breast self-examination among women in Sokoto, Nigeria" and presented that nearly half of the participants (45.4%) had average level of knowledge about breast self-exam.

The study findings revealed that 44% of the studied female students had poor knowledge about breast self-exam. This comes in agreement with Alivand, Doulah & Ziagham (2016) who studied "the knowledge and practice of women referred to the health centers affiliated to Ahvaz' university of medical sciences on breast cancer and its screening methods" and stated that 42.9% had poor knowledge about breast self-exam. In contrast, Reisi, Javadzade & Sharifirad (2013) studied "knowledge, attitudes, and practice of breast self-examination among female health workers in Isfahan, Iran and showed that 79.8% of the population had a good and acceptable knowledge of breast self-exam. In addition, Carelli, et al., 2008 studied "Knowledge, attitude and practice of breast self-examination in a female population of metropolitan São Paulo" and stated that 86.1% of the women had a very high level of knowledge about breast self-exam.

Regarding the attitude of studied female students towards breast cancer and breast self-exam using Champion health belief model, it is important to note that attitude is a more important factor in preventive behaviors including cancer control behavior than just knowledge about breast self-exam. The health belief model has been used in several studies as a theoretical framework to study breast self-exam and other breast cancer detection behaviors (Azaiza, 2015). The results of this study demonstrated the effectiveness of educational programs in promoting breast self-examination behavior among the study female students as well as an improvement in beliefs, cues to action, self-efficacy and practice of this screening method among the female students. The intervention program of this study which was grounded on the health belief model could significantly decrease the perceived susceptibility to breast cancer and decreased the perceived seriousness of the female students' breast cancer. Furthermore, this program succeeded to increase the study female students' perceived benefits from breast self-exam and decreases the study female students' perceived barriers to breast self-exam. Moreover, this program succeeded to increase their cues to action and their perceived self-efficacy to perform this behavior.

This finding comes in agreement with Cameron, Ahmad & Stewart (2005) who studied "a tailored intervention to promote breast cancer screening among south Asian immigrant women" and stated that the intervention had a positive impact on the participants' perceived benefits, cues to action and self-efficacy subscales. They also stated that the intervention had a negative impact on perceived susceptibility, perceived seriousness and perceived barriers subscales.

This finding comes in agreement with Aghamolaei (2011) who studied "improving breast self-examination: an educational intervention based on health belief model" in all Champion health belief model subscales except in the perceived susceptibility and perceived benefits subscales. Aghamolaei proved that his study had a negative impact on the perceived susceptibility and perceived benefits.

When the Champion health belief model (CHBMS) sub-scales scores were investigated, it was found that the average score of the perceived susceptibility sub-scale was 5.4 ± 1.5 , the average score of the perceived severity sub-scale was 16 ± 3 , the average score of the perceived benefits sub-scale was 5.32 ± 2.304 , the average score of the perceived barriers sub-scale was 5.32 ± 2.304 , the average score of the cues to action sub-scale was 8.12 ± 2.948 and the average score of the self-efficacy sub-scale was 4.76 ± 2.107 .

Ertem, Donmez & Dolgun (2017) studied "determination of the health belief and attitude of Women regarding breast cancer and breast self-exam" and investigated the CHBMS sub-scales in Turkey and found that the average score of the perceived susceptibility sub-scale was 7.79 ± 2.38 . The average score of the perceived severity sub-scale was 23.30 ± 5.82 . They also showed that the average score of the perceived benefits sub-scale was 15.48 ± 4 , the average score of the perceived barriers sub-scale was 26.34 ± 7.64 , the average score of the cues to action sub-scale was 32.77 ± 9.11 and the average score of the self-efficacy sub-scale was 25.20 ± 5.02 .

Concerning breast self-exam practice, it was evident in the current study that a large percentage of the study female students (80%) had a poor practice level of breast self-exam prior to the intervention. This showed that although the majority of the students had a fair knowledge about breast self-exam, their practice of it needs attention to be improved. This comes in agreement with Mohamed, Ibrahim, Lamadah & El-Magd, (2016) who studied "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" and stated that 86.5 % of the students had poor practice of breast self-exam. In addition Masoudiyekta et al. (2017) investigated "effect of education based on health belief model on the behavior of breast cancer screening in women" and found that 71% of the participants in the studied group did not perform breast self-exam prior to the intervention. This is consistent with Doshi, Reddy, Kulkarni & Karunakar (2015) who studied "breast self-examination: knowledge, attitude, and practice among female dental students in Hyderabad City, India" and showed that 92.4% of the first year, 88.7 % of the second year, 84.8 % of the third year and 80.9% of the fourth year had a poor practice of breast self-exam.

Regarding compliance of the study female students to breast self-exam, the present study revealed that 76% of the study female students had a satisfactory compliance score to breast self-exam. Amoroto (2014) studied "breast self-examination: awareness, compliance and confidence of Lyceum of the Philippines University -Laguna students" presented that more than 50% of the students were compliant to breast self-exam. Sani, Naab & Aziato (2017) studied "influence of educational level on knowledge and practice of breast self-examination among women in Sokoto, Nigeria" and found that 52.7% performed breast self-exam monthly.

The study findings revealed that the study female students were compliant to breast self-exam as follows: 40% of them performed it 6 times in the past 6 months post intervention and 60% performed it less than 6 times. Negeri, Heyi & Melka (2017) studied "assessment of breast self-examination practice and associated factors among female health professionals in Western Ethiopia: a cross sectional study" and reported that 35% of the participants performed breast self-exam 5-6 times in the 6 months and 32.2% performed it less than 5 times.

5. CONCLUSIONS

Based on the current findings, the present study concluded that: Students who received an intervention based on health belief model had higher level of knowledge about breast cancer and breast self-exam than before and this proved the first research hypothesis. Students who received an intervention based on health belief model had a higher level of competency in practicing breast self-exam than before and this proved the second research hypothesis. Students who had an intervention based on health belief model had higher compliance level to breast self-exam than before and this proved the third research hypothesis.

6. RECOMMENDATIONS

Based on the findings and conclusions, the researchers forwarded the following recommendations:

1. Through the university Assistant Dean a wellness program should be implemented every semester in different colleges for the students to realize the significance of breast self-exam.
2. The researcher recommends the presence of a booklet and brochure in the faculty library as a reminder of breast self-exam technique.

Future research:

The researcher recommends future studies to compare the knowledge, attitude and compliance to breast self-exam of other Universities and Colleges within the vicinity.

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