

Original Research Article

Effectiveness of intervention on awareness and knowledge of breast self-examination among the potentially at risk population for breast cancer

ABSTRACT

Aims: The aim of this study was to estimate the effectiveness of intervention on awareness and knowledge of breast cancer (BC) and breast self-examination (BSE) among the potentially, at risk population for breast cancer.

Study design: Descriptive pre-post study.

Place and Duration of Study: Private University students of faculty of pharmacy, AIMST University, Kedah state, Malaysia, between September, 2018 and May, 2019.

Methodology: A pre-validated questionnaire containing socio-demographic details along with awareness and knowledge based items regarding BC and BSE was distributed in class room setting after obtaining informed consent from study participants. Original blooms cut-off grades were used to categorize the scores. Descriptive statistics was computed for categorical variables and numerical data was presented as median (IQR), McNemers test was used for pre- and post-test differences, $P < .05$ considered significant.

Results: The overall response rate of the study population was around 92% (183/200). The awareness score regarding breast cancer was moderate (64%) at baseline. The most identified risk factors (61%) were presence of lumps, followed by smoking (56%). Only 65% and 31% were aware that, breast cancer is most common among women and their age-specific incidence rates. About 64% knew it could lead to death and 69% thought early detection improves survival rates. Upon intervention, there was a significant increase (99%, $p < .001$) in awareness towards all six items. At baseline the knowledge score was poor (51%), only 43% had any knowledge about breast cancer and only 32% were ever taught how to perform BSE. About 33% knew how often the BSE to be performed and 40% knew the best time for performing BSE. Hardly 24% ever practised BSE though 72% accepted performing BSE is good. However, only 38%, 28% and 22% knew the need of mirror, part of hand used and the direction of hand movement for performing BSE. The average knowledge score increased to 99% after intervention which showed statistically significant ($P < .05$) differences between baseline and post intervention studies.

Conclusion: This study results confirm that the study population had a fair awareness and poor knowledge at baseline. Intervention tool such as pamphlet providing clear, precise and required information about breast cancer, its signs and symptoms, risk factors, screening and steps for performing BSE are important to reduce breast cancer mortality. A nation wide reach-out with health education, barrier-specific counseling and community-based interventions are recommended.

Keywords: Awareness, knowledge, breast self examination, breast cancer

1. INTRODUCTION

Breast cancer is a global health issue and a leading cause of death among women (1). Data from the National Cancer Registry of Malaysia for 2007-2011 accounted for 32% of breast cancer; the second leading cause and the death rate in fourth place (6-8%) among all female cancers and related death. The global burden of cancer worldwide using the GLOBOCAN 2018 estimates about 11.6% of female breast cancer with a focus on geographic variability across 20 world regions (2). The age pattern in 2007-2011 showed a peak age-specific incidence rate at 50-59 years. However, the rate differs between the three main races and the incidence was highest among Chinese followed by Indian and Malay. The overall Age-Standardized Rate (ASR) was 31.1 per 100,000 populations. The ASR in Chinese was the highest with 41.5 per 100,000, followed by Indians at 37.1 per 100,000. This accounts for 1 in 22 Chinese, 1 in 24 Indians and 1 in 35 Malay women developing breast cancer at some stage in their lives (3).

Breast cancer is distinguished from other types of cancer as it occurs in visible organ and can be detected and treated at an early stage (4). The 5-year survival rate reached to 85% with early detection whereas, late detection decreased the survival rate to 56%. (5) The low survival rates can be attributed to the lack of early detection as well as inadequate diagnosis and treatment facilities in less developed countries (5).

Breast self-examination (BSE), clinical breast examination (CBE) and mammography are the screening methods recommended for breast cancer. BSE is the cost-effective method of early detection especially in resource poor countries. Over 90% of females breast cancer cases, when performed accurately and regularly for differences in breast tissue and lumps at an early stage can detect breast cancer by female themselves, focusing on monthly BSE between the 7th and 10th day of the menstrual cycle for any abnormal lumps or swelling to ensure a better prognosis when treated (6, 7). Therefore, it is important to have adequate awareness and knowledge about regular practice of BSE.

The outcome measures of this study were to estimate the awareness and knowledge of breast cancer and breast self-examination among the potentially, at risk population for breast cancer. The study findings could provide the health care system with a better understanding on the awareness and knowledge status of breast cancer and formulate appropriate strategy to address the national demon.

2. MATERIAL AND METHODS

2.1 Study Design and Population

A descriptive pre- post-test study using convenience sampling method was conducted among the female respondents from faculty of pharmacy, a private university in kedah state, Malaysia between September, 2018 and May, 2019. The male students, those involved in pilot study and/or not willing to participate in the study were excluded. The estimated

39 sample size was calculated at 95% CI, 5% margin of error, 50% response distribution and a 10% margin for drop-outs
40 was added and the final recommended sample was rounded off to 165 (8, 9).

41 **2.2 Development and Validation of Questionnaire**

42 The questionnaire was developed in English and contained socio-demographic details such as age, race, year of study,
43 etc., ten awareness related items (breast cancer, risk factors, signs and symptoms, preventive measures and treatment)
44 and 21 knowledge related items of breast self-examination (multiple-choice questions with one or multiple correct
45 answers) (10, 11, 12). One point was given for correct answer and a cumulative higher score indicates better awareness
46 and knowledge. The questionnaire was first content and construct validated among academicians from faculty of
47 medicine, faculty of pharmacy and school of nursing, AIMST University, Malaysia, later face validated among potential
48 respondents (n=23) and reliability tested using Cronbach's alpha coefficient for internal consistency. The questionnaire
49 showed acceptable reliability and stability ($\alpha = .78$) with positive correlations.

50 **2.3 Awareness and Knowledge scores**

51 The scoring grades attributed to each domain and overall was based on the original blooms' cut-off grades. a score <
52 60% was considered 'poor', 60% - 79% was considered 'moderate', and score $\geq 80\%$ was considered 'good' (13, 14).

53 **2.4 Ethical Considerations**

54 The research proposal along with the study instrument and informed consent form (ICF) was submitted to the institutional
55 review board (IRB), AIMST University human ethical committee (AUHEC) and the ethical clearance was obtained before
56 initiation of study and signed informed consent was obtained from each participant before distribution of survey forms.

57 **2.5 Modality of Obtaining Response**

58 The pre-validated questionnaires were distributed to female students in the class room setting after getting their signed
59 ICF and the completed questionnaires were used for data analysis.

60 **2.6 Statistical Analyses**

61 The analysis was performed using IBM SPSS statistics for windows (version 23). Descriptive statistics for frequency and
62 percentage was computed for categorical variables. Numerical data was not normally distributed and hence presented as
63 median and interquartile range. Differences in awareness and knowledge scores at pre- and post-test were computed
64 using McNemers test. The Chi-square test for independence was used to discover the association / differences between
65 categorical variables and P -value < .05 were considered significant. All percentages displayed in text or parentheses are
66 with no decimal places.

67 **0. RESULTS**

68 **1. Response rate**

69 The overall response rate of the study population was around 92% (183/200).

70 **3.2 Socio-demographic characteristics of the study population**

71 The average age of the respondents were 22±4 years. Table 1 shows the distribution of socio-demographic
72 characteristics among the study population.

Table 1: Socio-demographic characteristics of the study population (N=183)

Variables	N (%)
Age in Years	
18-20	41 (22)
21-23	128 (70)
24-26	14 (8)
Race	
Malay	3 (2)
Chinese	150 (82)
Indian	26 (14)
Others	4 (2)
Year of Study	

Year 1 42 (23)

Year 2 47 (26)

Year 3 40 (22)

Year 4 54 (30)

Marital Status

Single 165 (90)

In a relationship 18 (10)

Smoking History

*Yes 1 (1)

No 182 (99)

Family History of Breast Cancer

Yes 22 (12)

No 161 (88)

Family Relationship with Breast Cancer

Mother 3 (14)

*Siblings 1 (4)

Aunts 11 (50)

Relative 7 (32)

Native Location

City 70 (38)

Town 83 (45)

Rural 30 (17)

73

74 3.3 Awareness of the Respondents towards Breast Self-Examination

75 A total of ten awareness-based items were used, of which six with one correct answer and '1' score was given for each
76 correct response. The proportion of correct responses is summarized in Table 2 with statistically significant differences in
77 awareness levels at two time points, baseline and post intervention.

Table 2: Proportion of Correct Responses towards Awareness of BSE (Pre- Vs. Post-test)

Q. No.	Awareness Items	Pre intervention			Post intervention		
		Correct	Incorrect	*p	Correct	Incorrect	*P
		N (%)	N (%)	value	N (%)	N (%)	value
1.	Have you heard of breast cancer?	182 (99)	1 (1)	<.001	183 (100)	0	-

2.	Worldwide, breast cancer is most common cancer among women.	118 (65)	65 (35)	<.001	183 (100)	0	-
3.	What is the age at which breast cancer risk is highest?	57 (31)	126 (69)	<.001	183 (100)	0	-
4.	Do you think breast cancer could lead to death?	118 (65)	65 (35)	<.001	178 (97)	5 (3)	<.001
5.	Is there any treatment for breast cancer?	107 (58)	76 (42)	.02	179 (98)	4 (2)	<.001
6.	Do you think early detection of breast cancer improves survival rate?	126 (69)	57 (31)	<.001	183 (100)	0	-
Total Mdn (IQR) score		4 (2)			6 (0)		
Percentage of correct answers		64%			99%		

*Chi Square Test, $P < .05$ is statistically significant, Q = Question

78 Table 3 summarizes the multiple responses to each awareness based items. Most respondents came to know about
79 breast cancer through news or multimedia (76%), whereas, 78% respondents ascertained BSE as the tool for early breast
80 cancer detection, 69% thought healthy diet prevents breast cancer, whereas 50% conferred alcohol abstinence. The most
81 identified risk factors (61%) were presence of lumps, followed by smoking (56%).

Table 3: Multiple responses towards awareness items

Qn. No.	Awareness Items with multiple response	Response	*P
		N (%)	value
7.	What is the source of your information about breast cancer?		
	i. Newspaper/TV/Internet	138 (76)	<.001

ii.	Family doctor	6 (4)	
iii.	Family/ Friends	39 (20)	
8.	The tools utilized for early detection of breast cancer.		
i.	self-examination (BSE)	143 (78)	
ii.	Physical examination (PBE)	86 (47)	
iii.	mammography	80 (44)	<.001
iv.	ultrasound	35 (19)	
9.	Preventive measures against breast cancer.		
i.	alcohol abstinence	92 (50)	
ii.	Increase physical activity	118 (65)	
iii.	healthy diet	126 (69)	<.001
iv.	ideal body weight	93 (51)	
v.	avoid hormonal therapy	103 (56)	
10.	Which of the following are risk factors for breast cancer?		
i.	Decrease with increase in age	35 (19)	
ii.	Increase with smoking	102 (56)	
iii.	Increase with alcohol consumption	92 (50)	
iv.	Increase in obesity	89 (49)	
v.	Increase with lack of exercise	86 (47)	
vi.	Increase with early menstruation (< 12 years)?	32 (18)	
vii.	Decrease in breast feeding?	46 (25)	<.001
viii.	Increase with late pregnancy (> 30 years)	71 (39)	
ix.	Increases with contraceptive pills use	105 (57)	
x.	Increase in women never given birth	50 (27)	
xi.	Increase with presence of lump	112 (61)	
xii.	Increase with bloody discharge from nipple	115 (63)	

*Chi Square Test; $P < .05$ is considered statistically significant.

3.4 Knowledge of the respondents towards BSE

Out of 21 knowledge-based items, 17 items with '1' score for each correct answer were used to test the knowledge domain. All correct responses were summed-up to obtain the total knowledge score. Table 4 depicts the responses of the

85 respondents towards knowledge-based items regarding BSE. Among the 17 knowledge-based items, Q2, Q8 and Q11
 86 had the maximum percentage of correct responses (91%, 72 % and 72%) respectively.

Table 4: Proportion of Correct Responses towards BSE Knowledge

Q. No.	Knowledge Items	Pre intervention			Post intervention		
		Correct	Incorrect	*p	Correct	Incorrect	*P
		N(%)	N(%)	value	N(%)	N(%)	value
1.	Do you know what breast self-examination (BSE) is?	78 (43)	105 (57)	.05	176 (96)	7 (4)	<.001
2.	Have you heard of Breast Self-Examination (BSE)?	132 (72)	51 (28)	<.001	182 (99)	1 (1)	<.001
3.	Do you know that BSE is a useful tool for early detection of breast cancer?	113 (62)	70 (38)	.001	183 (100)	0	-
4.	Have you been taught how to do BSE?	59 (32)	124 (68)	<.001	183 (100)	0	-
5.	At what age do you think BSE should be started?	108 (59)	75 (41)	.02	183 (100)	0	-
6.	How often should BSE be done?	60 (33)	123 (67)	<.001	183 (100)	0	-
7.	What is the best time to carry out BSE?	73 (40)	110 (60)	.02	183 (100)	0	-
8.	Who should perform BSE?	166 (91)	17 (9)	<.001	183 (100)	0	-
9.	What are the major benefits of BSE?	87 (47)	96 (53)	.50	183 (100)	0	-
10.	Do you practice BSE?	44 (24)	139 (76)	<.001	68 (37)	115 (63)	<.01

87	Table	11.	Do you think BSE is a good practice?	132 (72)	51 (28)	<.001	178 (97)	5 (3)	<.001	5
		12.	Is BSE the most commonly used method for breast cancer detection?	98 (54)	85 (46)	.34	179 (98)	4 (2)	<.001	
		13.	What are the postures for performing BSE?	129 (70)	54 (30)	<.001	170 (93)	13 (7)	<.001	
		14.	Is a mirror required for performing BSE?	69 (38)	114 (62)	.001	183 (100)	0	-	
		15.	Which part of the hand is used for performing BSE?	52 (28)	131 (72)	<.001	180 (98)	3 (2)	<.001	
		16.	What is the direction of hand movement during BSE procedure?	41 (22)	142 (78)	<.001	180 (98)	3 (2)	<.001	
		17.	How should one respond if any abnormality is detected?	131 (72)	52 (28)	<.001	181 (99)	2 (1)	<.001	
		Total median score		9 (3)			16 (1)			
		Percentage of correct answers		51(%)			95(%)			

*Chi Square Test, $p < .05$ is statistically significant,

88 summarizes the multiple responses to each knowledge items and not included in total score calculation. Most
 89 respondents (55%) came to know about steps to perform BSE through brochures or internet sources. The area to
 90 examine when performing BSE, mostly all respondents ascertained armpit, whereas, 61% determined looking for lumps,
 91 nipple discharge and/or pain in breast during BSE that need a doctors visit.

Table 5: Response of Knowledge towards performing BSE

Q. No.	Knowledge Items	Response		*P value
		N (%)		

18.	Source of BSE performing knowledge		
	i. Mother	22 (12)	
	ii. *Sister	1 (1)	
	iii. Teacher	15 (8)	
	iv. Doctor	15 (8)	<.001
	v. Nurse	25 (14)	
	vi. Friend	5 (3)	
	vii. Others	100 (55)	
19.	Areas to examine when performing BSE		
	i. Breast	112 (61)	
	ii. Armpit	183 (100)	<.001
	iii. Between breast and collar bone	63 (34)	
20.	What should be looked for during BSE?		
	i. Breast skin colour/texture	62 (34)	
	ii. Lumps	112 (61)	<.001
	iii. Nipple discharge	78 (43)	
21.	What are the abnormalities that need a doctor visit?		
	i. Fixed or mobile mass	102 (56)	
	ii. Difference between breasts	77 (42)	
	iii. Changes in size during menstruation	25 (14)	<.01
	iv. Change in breast skin colour/texture	103 (56)	
	v. Nipple discharge	111 (61)	
	vi. Pain in breast	112 (61)	

*Chi Square Test; $P < .05$ is considered statistically significant. *Ignored for results interpretation

93 Comparison of median scores between Pre- and Post-intervention studies

94 Table 6 shows the median and IQR scores of the study participants at the two different phases of the study.

Table 6: Score of Awareness and Knowledge among the Respondents

Variable	Median	IQR	Min	Max
Baseline study Awareness	4	2	1	6

Baseline study Knowledge	9	3	1	15
Post-intervention Awareness	6	0	5	6
Post-intervention Knowledge	16	1	14	19

3.6 Comparison of Awareness scores at Pre and Post intervention

The awareness regarding breast cancer was good at baseline, whereas only 64% were aware, breast cancer is most common among women and 31% knew the age-specific incidence rate. About 64% were aware, breast cancer could lead to death, 58% knew there was any treatment and 69% thought early detection improves survival rates. Upon intervention, there was a significant increase (99%, $p < .001$) in awareness towards all six items (Table 7).

Table 7: Comparison of Awareness scores at Pre and Post intervention

Qn. No.	Awareness Item	Pretest N (%)	Post-test N (%)	*P value
1.	Have you heard of breast cancer?	182 (99)	183 (100)	<.001
2.	Worldwide, breast cancer is most common cancer among women.	118 (64)	183 (100)	<.001
3.	What is the age at which breast cancer risk is highest?	57 (31)	183 (100)	<.001
4.	Do you think breast cancer could lead to death?	118 (64)	178 (97)	<.001
5.	Is there any treatment for breast cancer?	107 (58)	179 (98)	<.001
6.	Do you think early detection of breast cancer improves survival rate?	126 (69)	183 (100)	<.001
	Average Total Score	64%	99%	
	Average Median (IQR) Score	4(2)	6(0)	

*McNemar's Test, $P < .05$ is significant

.7 Comparison of Knowledge scores at Pre- and Post-Intervention

At baseline, only 43% knew about breast cancer whereas 72% have heard about BSE and only 32% were ever taught how to perform BSE. About 33% knew how often the BSE to be performed and 40% knew the best time for performing BSE. Hardly 24% ever practised BSE though 72% accepted performing BSE is good. However, only 38%, 28% and 22%

104 knew the need of mirror, the part of hand used and the direction of hand movement for performing BSE. The average
 105 knowledge score was 51% at base line which increased to 95% after intervention (Table 8).

Table 8: Comparison of Knowledge scores at Pre- and Post-intervention

Qn. No.	Knowledge Item	Pretest N (%)	Post-test N (%)	*P value
1.	Do you know what breast self-examination (BSE) is?	78 (43)	176 (96)	<.001
2.	Have you heard of Breast Self-Examination (BSE)?	131 (72)	182 (99)	<.001
3.	Do you know that BSE is a useful tool for early detection of breast cancer?	113 (62)	183 (100)	<.001
4.	Have you been taught how to do BSE?	59 (32)	183 (100)	<.001
5.	At what age do you think BSE should be started?	108 (59)	183 (100)	<.001
6.	How often should BSE be done?	60 (33)	183 (100)	<.001
7.	What is the best time to carry out BSE?	73 (40)	183 (100)	<.001
8.	Who should perform BSE?	166 (91)	183 (100)	<.001
9.	What are the major benefits of BSE?	87 (48)	183 (100)	<.001
10.	Do you practice BSE?	44 (24)	68 (37)	<.01
11.	Do you think BSE is a good practice?	132 (72)	178 (97)	<.001
12.	Is BSE the most commonly used method for breast cancer detection?	98 (54)	179 (98)	<.001
13.	What are the postures for performing BSE?	129 (70)	170 (93)	<.001
14.	Is a mirror required for performing BSE?	69 (38)	183 (100)	<.001
15.	Which part of the hand is used for performing BSE?	52 (28)	180 (98)	<.001
16.	What is the direction of hand movement during BSE procedure?	41 (22)	180 (98)	<.001
17.	How should one respond if any abnormality is detected?	130 (71)	181 (99)	<.001
Average Total Score		51%	95%	

*McNemar Test, $P < .05$ is significant

4. DISCUSSION

4.1 Differences in awareness towards BSE

Person et al., 1995 recommended girls at school age to be started education about BSE in order to make BSE a habit (15). However, over the years, there has been some debate over just how valuable breast self-examination is in detecting breast cancer early and increasing the likelihood of survival. Due to some ongoing uncertainty, the American Cancer Society no longer recommends breast self-exam as a screening tool for women with average risk of breast cancer. (16)

The U.S. Preventive Services Task Force “supports all patients being aware of changes in their bodies about breast self-awareness and discussing these changes with their clinicians” based on the frequent incidence of self-detected breast cancer. (17) This study found significant differences in distribution of age, race, relationship status, smoking history, family history and native location. In general, the respondents’ awareness of breast cancer was poor. It was also evident through earlier studies by Montazeri et al., 2008 and Karayurt et al., 2008, the most common risk factor was poor knowledge for breast cancer. (18, 19) The percentage of correct answers to awareness based questions was only 64%, with moderate awareness level probably due to the lack of breast health care programs in Malaysia. (20)

In a study done by Adebamowo & Adekunle, 1999, it was observed that patients with positive family history tend to present early for screening and management. (21) The study results reported breast cancer (65%) was the commonest cancer among women worldwide which was slightly higher than 56% reported by Alwan et al., 2012 among the Iraqi population. (22) This study reported a better percentage of awareness (65%) about the possibility of death by breast cancer when compared to the study reported (46%) by Abdallah et al., 2015. (23)

A study by Marzouni et al. (2013) states that family history of breast cancer is significantly correlated with higher awareness, its screening and prevention. (24) It reported that women with positive family history had better information about preventing programs ($p > .001$). (24) In this study, respondents with family history of breast cancer have a slightly higher level of awareness regarding BSE. About 28% of respondents with family history had good awareness level compared to respondents with no family history (27%). Regardless of family history, women still need to be “breast aware” and accurately identify breast symptoms in order to receive timely treatment as quickly as possible. (25)

Most of the study respondents came to know about breast cancer through multimedia which was consistent (76%) with the study reported by Milaat (2000). (25) These findings indicated that multimedia continued to be one of the most

132 important resources of information about breast cancer and BSE and highlighted the coordination between public health
133 educators and the multimedia in dissemination of breast cancer related information.

134 A study conducted among female nursing college students in Riyadh, Saudi Arabia reported 66% of study population
135 perform BSE, and another study among female medical students in Taif reported only 17% perform BSE regularly and
136 89% knew BSE should be carried out every month. Similar results were reported among women in Al-Qassim region
137 (19%) perform BSE regularly; whereas, 70% had never heard of BSE. (26, 27) This study identified 24% of the
138 respondents practice BSE regularly, 54% accepted BSE as the most commonly used method for early detection and 72%
139 were aware of what to do if any abnormality was detected.

140 Regarding risk factors for breast cancer, about 63% and 61% respectively knew that bloody discharge from nipple and
141 presence of lump are risk factors, while 57% and 56% knew, use of contraceptive pills and smoking are also implicated
142 risk factors. Most of the respondents in this study didn't know the association between breast cancer and short periods of
143 breast feeding (25%), early menstruation (18%) and advanced age (19%). Also, around 49%, 50% and 39% of
144 respondents realized the effect of obesity, alcohol consumption and delivery of first child after the age of 30 years
145 respectively has risk factors of breast cancer. Respondents showed poor understanding about major breast cancer risk
146 factors. The perception of the use of contraception by 57% might reflect the religious appreciation that encourages natural
147 methods of birth control. (28, 29)

148 This study outcomes are closely associated with the studies reported a decade ago by Adebamowo & Ajayi, 2000;
149 Odusanya, 2001 and Adebamowo & Adekunle, 1997, that the incidence of breast cancer was slightly higher in persons
150 with: history of first degree relatives with breast cancer; early menarche; late menopause; oral contraceptive use; does not
151 breast feed; first birth after age 35 or nulliparous women. (29, 30) The incidence is also increased with increasing age,
152 smoking, obesity, physical inactivity, radiation exposure, intake of alcohol and high fat. Thus, further health education was
153 recommended on associated and protective risk factor.

154 **4.2 Differences in knowledge towards BSE**

155 In general, the respondents' knowledge on BSE was poor. The outcome is supported by reports from earlier studies (Haji
156 et al., 2002).The study reported the knowledge and behaviors of female health care workers concerning breast cancer is
157 relatively poor and it needs to be improved. (31) Considering the role that health care workers may play in communicating
158 health behaviors to the general public, planning health education interventions for females is essential. (32) The
159 percentage of correct answers to knowledge questions was only 51% and poor.

160 In this study, 20% of year four students had good knowledge level. A study from Gurdal et al. (2012) reported that higher
161 educational levels were positively associated with BSE performance. Overall, the results suggest that Turkish women,
162 regardless of their education level, need better education on BSE. (33) Most of the respondents have been thought about
163 BSE through internet and pamphlets which including 55% of respondents. However, the print medium has been found to
164 be commonest source of information in other studies. (34) Other studies from developed societies reported television and
165 radio as the most popular media and can reach a wide audience. (34, 35, 36, 37) A study among female medical students
166 in Nigeria reported that 97% were aware of BSE mainly through television/radio, (36) while in another survey from the
167 same country, the electronic media were found to be the major resource among female secondary-school teachers. (37)
168 This emphasizes that source of information varies by setting, which needs to be considered when promoting health
169 education.

170 5. CONCLUSION

171 In conclusion, the results presented in this study give an insight into the effects of pamphlet as an intervention
172 tool among university female students regarding BSE focused on awareness and knowledge. This study
173 results confirm that the awareness and knowledge levels in the study population was quite poor at baseline.
174 Hence, intervention tool such as pamphlet given in addition to providing clear, precise and required information
175 about breast cancer sign and symptoms, risk factors , its screening, its prevention and steps of BSE which is
176 important has been found to be useful. There was an increase in awareness and knowledge score levels
177 among the respondents between pretest and post-intervention test. This study revealed that pamphlet
178 education was equally effective in reaching the aims of increased knowledge about and frequency of BSE.

179 **COMPETING INTERESTS DISCLAIMER:**

180 **Authors have declared that no competing interests exist. The products used for this research are**
181 **commonly and predominantly use products in our area of research and country. There is absolutely no**
182 **conflict of interest between the authors and producers of the products because we do not intend to**
183 **use these products as an avenue for any litigation but for the advancement of knowledge. Also, the**
184 **research was not funded by the producing company rather it was funded by personal efforts of the**
185 **authors.**

187 REFERENCE

188 1. Hortobagyi GN, de la Garza Salazar J, Pritchard K, Amadori D, Haidinger R, Hudis CA, et al. The global breast
189 cancer burden: variations in epidemiology and survival. Clin Breast Cancer. 2005;6:391-401.
190 doi:: <https://doi.org/10.3816/CBC.2005.n.043>

UNDER PEER REVIEW

- 191 2. Bray F, Ferlay J, Soerjomataram I, Siegel RL, Torre LA, Jemal A. Global cancer statistics 2018: GLOBOCAN
192 estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA: a cancer journal for clinicians*.
193 2018;68(6):394-424. doi: 10.3322/caac.21492
- 194 3. Azizah AM, Nor Saleha IT, Noor Hashimah A, Asmah ZA, Mastulu W. Malaysian national cancer registry report
195 2007–2011. Malaysia cancer statistics, data and figure. Putrajaya: National Cancer Institute, Ministry of Health. 2016.
- 196 4. Taşçı A, Usta YY. Comparison of knowledge and practices of breast self examination (BSE): a pilot study in Turkey.
197 **Asian Pac J Cancer Prev: APJCP**. 2010;11(5):1417-20. PMID: 21198303
- 198 5. Hallal JC. The relationship of health beliefs, health locus of control, and self concept to the practice of breast self-
199 examination in adult women. **Nurs. Res** 1982;31:137-42. PMID: 6918918
- 200 6. Meijer-van Gelder ME, Look MP, Bolt-de Vries J, Peters HA, Klijn JG, Foekens JA. Clinical relevance of biologic
201 factors in male breast cancer. *Breast cancer research and treatment*. 2001;68(3):249-60. PMID: 11727961; doi:
202 10.1023/a:1012221921416
- 203 7. Memis S, Balkaya NA, Demirkiran F. Knowledge, attitudes, and behaviors of nursing and midwifery students
204 regarding breast self-examination in Turkey. In *oncology nursing forum* 2009; 36(1), E39-46. doi:
205 10.1188/09.ONF.E39-E46
- 206 8. Raosoft. Sample Size Calculator. Available from: <http://www.raosoft.com/samplesize.html>.
- 207 9. Cohen J. *Statistical power analysis for the behavioral sciences*. 2nd.edition
- 208 10. Gursoy AA, Hindistan S, Nural N, Kahrman I, Yilmaz F, Yigitbas Ç, Erdol H, Bulut HK, Çalik KY, Mumcu HK.
209 Comparison of three educational interventions on breast self-examination knowledge and health beliefs. *Asian Pacific*
210 *Journal Cancer Prevention*. 2009;10(5):765-2. PMID: 20104966
- 211 11. Jahan S, Al-Saigul AM, Abdelgadir MH. Knowledge, attitudes and practices of breast self examination among women
212 in Qassim region of Saudi Arabia. *Saudi medical journal*. 2006;27(11):1737-41. PMID: 17106553
- 213 12. Chioma C, Asuzu S. Knowledge, attitude and practice of self-breast examination among the female students of the
214 University of Ibadan, Nigeria. *Pakistan Journal Social Science* 2007;2007;4 Suppl 3: 400-2. doi:pjssci.2007.400.402
- 215 13. Kaliyaperumal KI. Guideline for conducting a knowledge, attitude and practice (KAP) study. *A ECS illumination*.
216 2004;4(1):7-9.
- 217 14. John J. The knowledge, attitude, practice and perceived barriers towards screening for premalignant cervical lesions
218 among women aged 18 years and above, in Songea urban, Ruvuma (Doctoral dissertation, Muhimbili University of
219 Health and Allied Sciences); 2011.

- 220 15. Persson K, Johansson I, EK AC. Breast self- examination among Swedish women: A survey of frequency,
221 knowledge, and attitudes. *Journal of Cancer Education*. 1995;10(3):163-7. PMID: 8534603; doi:
222 10.1080/08858199509528360
- 223 16. Oeffinger KC, Fontham ET, Etzioni R, Herzig A, Michaelson JS, et al., Breast cancer screening for women at average
224 risk: 2015 guideline update from the American Cancer Society. *Jama*. 2015;314(15):1599-614. doi:
225 10.1001/jama.2015.12783
- 226 17. Siu AL. Screening for breast cancer: US Preventive Services Task Force recommendation statement. *Annals of*
227 *internal medicine*. 2016;164(4):279-96. doi: 10.7326/M15-2886
- 228 18. Montazeri A, Vahdaninia M, Harirchi I, Harirchi AM, Sajadian A, Khaleghi F, Ebrahimi M, Haghighat S, Jarvandi S.
229 Breast cancer in Iran: need for greater women awareness of warning signs and effective screening methods. *Asia*
230 *Pacific family medicine*. 2008;7(1):6. doi: 10.1186/1447-056X-7-6
- 231 19. Karayurt O, Ozmen D, Çetinkaya AÇ. Awareness of breast cancer risk factors and practice of breast self examination
232 among high school students in Turkey. *BMC Public Health*. 2008;8(1):359. doi: 10.1186/1471-2458-8-359.
- 233 20. Budden L. Young women's breast self-examination knowledge and practice. *Journal of Community Health Nursing*.
234 1995;12(1):23-32. PMID:7897468; doi:10.1207/s15327655jchn1201_3
- 235 21. Adebamowo CA, Adekunle OO. Case- controlled study of the epidemiological risk factors for breast cancer in
236 Nigeria. *British Journal of Surgery*. 1999;86(5):665-708. PMID: 10361191. doi:10.1046/j.1365-2168.1999.01117.x
- 237 22. Alwan NA, Al Attar WM, Eliessa RA, Madfaic ZA, Tawfeeq FN. Knowledge, attitude and practice regarding breast
238 cancer and breast self-examination among a sample of the educated population in Iraq. 2012; *EMHJ*, Vol 18.
239 PMID:22768695
- 240 23. Abdallah AS, El-Gharabawy RM, Al-suhaibany HO. Knowledge, attitude and practice about breast cancer among
241 women in Saudi Arabia. *International Archives of Medicine*. 2015; 248(8):1-13. doi: 10.3823/1847.
242 doi: <http://dx.doi.org/10.3823/1847>
- 243 24. Marzouni HZ, Lavasani Z, Shalilian M, Najibpour R, Fakhr MS, Nazarzadeh R, Farshad A, Bahrami N. Women's
244 awareness and attitude toward breast self-examination in dezful city, Iran, 2013. *Iranian Red Crescent Medical*
245 *Journal*. 2015;17(1). e17829. doi:10.5812/ircmj.17829. doi: 10.5812/ircmj.17829
- 246 25. Millat WA. Knowledge of secondary-school female students on breast cancer and breast self-examination in Jeddah,
247 Saudi Arabia. *Eastern Mediterranean Health Journal*, 2000;6 (2-3), 338-344. PMID: 11556021

- 248 26. Alsaif AA. Breast self-examination among Saudi female nursing students in Saudi Arabia. Saudi Medical Journal.
249 2004;25(11):1574-8. PMID:15573181
- 250 27. Nemenqani DM, Abdelmaqsoud SH, Al-Malki AH, Oraija AA, Al-Otaibi EM. Knowledge, attitude and practice of breast
251 self examination and breast cancer among female medical students in Taif, Saudi Arabia. Open Journal of Preventive
252 Medicine. 2014;4(02):69-77. doi: 10.4236/ojpm.2014.42011
- 253 28. Paul C, Barratt A, Redman S, Cockburn J, Lowe J. Knowledge and perceptions about breast cancer incidence,
254 fatality and risk among Australian women. Australian and New Zealand Journal of Public Health. 1999;23(4):396-400.
255 PMID: 10462863; doi: 10.1111/j.1467-842x.1999.tb01281.x
- 256 29. Adebamowo CA, Ajayi OO. Breast cancer in Nigeria. West African journal of medicine. 2000;19(3):179-91.
- 257 30. Odusanya OO. Breast cancer: knowledge, attitudes, and practices of female schoolteachers in Lagos, Nigeria. The
258 breast journal. 2001;7(3):171-205. PMID:11469930; doi:10.1046/j.1524-4741.1998.410062.x-i1
- 259 31. Haji- Mahmoodi M, Montazeri A, Jarvandi S, Ebrahimi M, Haghghat S, Harirchi I. Breast Self- Examination:
260 Knowledge, Attitudes, and Practices Among Female Health Care Workers in Tehran, Iran. The breast journal.
261 2002;8(4):222-5. PMID: 12100114; doi: 10.1046/j.1524-4741.2002.08406.x
- 262 32. Ceber E, Turk M, Ciceklioglu M. The effects of an educational program on knowledge of breast cancer, early
263 detection practices and health beliefs of nurses and midwives. Journal of Clinical Nursing. 2010;19(15- 16):2363-71.
264 PMID:20659208; doi: 10.1111/j.1365-2702.2009.03150.x
- 265 33. Gurdal SO, Saracoglu GV, Oran ES, Yankol Y, Soybir GR. The effects of educational level on breast cancer
266 awareness: a cross-sectional study in Turkey. Asian Pacific Journal of Cancer Prevention. 2012;13(1):295-300. doi:
267 10.7314/APJCP.2012.13.1.295
- 268 34. Dundar PE, Ozmen D, Ozturk B, Haspolat G, Akyıldız F, Çoban S, Çakıroğlu G. The knowledge and attitudes of
269 breast self-examination and mammography in a group of women in a rural area in western Turkey. BMC cancer.
270 2006;6(1):43. doi: 10.1186/1471-2407-6-43
- 271 35. Irurhe NK, Olowoyeye OA, Arogundade RA, Bassey RB, Onajole AT. Knowledge, attitude and practice of breast Self-
272 Examination among female medical students in the University of Lagos. The Internet Journal of Health. 2011;12(1).
- 273 36. Kayode FO, Akande TM, Osagbemi GK. Knowledge, attitude and practice of breast self examination among female
274 secondary school teachers in Ilorin, Nigeria. European journal of scientific research. 2005;10(3):42-47.
- 275 **37.** Uche EE. Cancer awareness among a Nigerian population. Tropical doctor. 1999 Jan;29(1):39-40.
276 doi.org/10.1177/004947559902900114