

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 awareness and knowledge of breast cancer and breast self-examination and to estimate the effectiveness of intervention on awareness and knowledge of breast cancer and breast self-examination among the potentially, at risk population for breast cancer.

Study design: Pre-post study design.

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. A well-constructed and validated educational intervention tool (pamphlet) was distributed at all participants after baseline study. The original Blooms cut-off grades were used to categorize the scores. Descriptive statistics for categorical variables; numerical data as median (IQR); McNemar's test for pre- and post-test differences was computed, $P < .05$ 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 was smoking (56%) and symptoms was were presence of lumps (61%). 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 (64%→99%, $p < .001$) in awareness scores and (51%→95%, $P < .001$) in knowledge scores. 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 and direction of hand movement for performing BSE. The average awareness and knowledge scores 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, symptoms, risk factors, screening and steps for performing BSE are important to reduce breast cancer mortality. A nation wide reach-out with barrier-specific counseling, community-based interventions and nationwide population driven breast cancer screening are recommended for rural and urban area female population.

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

1. INTRODUCTION

Breast cancer (BC) 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 about 32% of breast cancer; the second leading cause where the death rate is in fourth place (6-8%) among all female cancers and related death. The GLOBOCAN 2018 estimated the global burden of cancer worldwide and reported 11.6% of female breast cancer with a focus on geographic variability across 20 world regions (2). The age pattern in 2007-2011 National Cancer Registry of Malaysia 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 treated if detected 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 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 most cost-effective method of early detection especially in resource poor countries. Over 90% of females breast cancer cases, when BSE performed accurately and regularly for differences in breast tissue and lumps at an early stage can be detected by female themselves. Focusing on monthly examination between the 7th and 10th day of the menstrual cycle ensures 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 and to estimate the effectiveness of intervention on 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. MATERIALS AND METHOD

2.1 Study Design, Study Population and Sample size

A 'Pre- post' study design using convenience sampling was conducted among the female respondents from faculty of pharmacy, a private university in kedah state, Malaysia between September, 2018 and May, 2019. All male students, those involved in pilot study and those not willing to participate in the study were excluded. The estimated sample size was calculated at 95% CI, 5% margin of error, 50% response distribution plus a 10% margin for drop-outs was added and the final recommended sample was rounded off to a minimum of 165 participants (8, 9).

2.2 Development and Validation of Questionnaire

The questionnaire was developed in English and contained socio-demographic details such as age, race, year of study, etc. (listed in Table 1), ten awareness related items (BC, risk factors, signs and symptoms, preventive measures and treatment) and 21 knowledge related items (multiple-choice questions with one or multiple correct answers) about BC and BSE (10, 11, 12). The questionnaire was first content and construct validated among two academicians, each from faculty of medicine, faculty of pharmacy and school of nursing, AIMST University, Malaysia. Later it was face validated among potential respondents (n=23) and reliability tested using Cronbach's alpha coefficient for internal consistency. The questionnaire showed acceptable reliability and stability ($\alpha = .78$) with positive correlations.

2.3 Development and Validation of Education Intervention Tool (Pamphlet)

The educational pamphlet/ Fact sheet was developed with at-most care, so that the most important information's relating to breast cancer identification, prevention and management were clearly and precisely conveyed to the study populations and will be able to gain the necessary awareness and knowledge for need and practice of breast self-examination. The contents of the educational pamphlet were derived from the fact sheets regarding breast cancer from WHO and other informative sites from the internet sources (13, 14). The prepared intervention tool (Pamphlet) was subjected for content validation to the above said panel in section 2.2 and their remarks were accommodated. Hence, the finalized intervention tool (educational pamphlet) was prepared.

2.4 Awareness and Knowledge scores

The scoring grades attributed to each domain and overall were based on the original Blooms' cut-off grades. a score < 60% was considered 'poor', 60% - 79% was considered 'moderate', and score $\geq 80\%$ was considered 'good' (15, 16). One point was given for each correct answer and a cumulative higher score indicates better awareness and knowledge scores.

2.5 Modality of Obtaining Response

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

66 **2.6 Statistical Analyses**

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

73 **3.0 RESULTS**

74 **3.1 Response rate**

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

76 **3.2 Socio-demographic characteristics of the study population**

77 The average ages of the respondents were 22 ± 4 years. Table 1 shows the distribution of socio-demographic
78 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 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)

UNDER PEER REVIEW

80 3.3 Awareness of the Respondents towards Breast Self-Examination

81 A total of ten awareness-based items were used, of which six were with one correct answer and '1' point was given for
 82 each correct response. The proportion of correct responses is summarized in Table 2 with statistically significant
 83 differences in 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 value	Correct	Incorrect	*P value
		N (%)	N (%)		N (%)	N (%)	
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	-
Median (IQR) Awareness score		4 (2)			6 (0)		

Median Awareness score

64%

99%

Percentage Knowledge score

84 Table 3 summarizes the multiple responses to each awareness based items. Most respondents came to know about
85 breast cancer through news or multimedia (76%), whereas, 78% ascertained BSE as the tool for early breast cancer
86 detection, 69% thought healthy diet prevents breast cancer, whereas 50% conferred alcohol abstinence. The most
87 identified symptoms/risk factors were presence of lumps (61%) and 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)	
	ii. Family doctor	6 (4)	<.001
	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)	<.001
	iii. Mammography	80 (44)	
	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/symptoms for breast cancer?		
	i. Decrease with increase in age	35 (19)	
	ii. Increase with smoking	102 (56)	
	iii. Increase with alcohol consumption	92 (50)	<.001
	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)
vii. 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 were given '1' point for each correct answer to test the knowledge domain. All correct responses were summed-up to obtain the total knowledge score. Table 4 depicts the responses of the respondents towards knowledge-based items regarding BC and BSE. Among the 17 knowledge-based items, Q2, Q8 and Q11 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		*p value	Post intervention		*P value
		Correct	Incorrect		Correct	Incorrect	
		N (%)	N (%)		N (%)	N (%)	
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 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
11.	Do you think BSE is a good practice?	132 (72)	51 (28)	<.001	178 (97)	5 (3)	<.001
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
Median (IQR) Knowledge score		9 (3)			16 (1)		
Percentage Knowledge score		51(%)			95(%)		

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

Table 5 summarizes the multiple responses to each knowledge items and not included in total score calculation. Most respondents (55%) came to know about steps to perform BSE through brochures or internet sources. Mostly all respondents ascertained armpit as the area to examine when performing BSE, whereas, 61% responded looking for lumps, nipple discharge and/or pain in breast need a doctor's 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)	<.01
	ii. Difference between breasts	77 (42)	

100	iii. Changes in size during menstruation	25 (14)
101	iv. Change in breast skin colour/texture	103 (56)
102	v. Nipple discharge	111 (61)
103	vi. Pain in breast	112 (61)

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

3.5 Comparison of Awareness scores at Pre- and Post-intervention

The awareness regarding BC was good at baseline, whereas only 64% were aware, BC is most common among women and 31% knew the age-specific incidence rates. About 64% were aware BC could lead to death, 58% knew there was any treatment available and 69% thought early detection improves survival rates. Upon intervention, there was a significant improvement (99%, $p < .001$) in awareness score towards all six items (Table 6).

Table 6: Comparison of Awareness scores at Pre- and Post-intervention

Qn. No.	Awareness Item	**Pre-test 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
	Percentage Awareness Score	64%	99%	
	Median (IQR) Awareness Score	4(2)	6(0)	

*McNemar's Test, $P < .05$ is significant; ** The frequency and percentage of correct responses to each questions.

3.6 Comparison of Knowledge scores at Pre- and Post-Intervention

At baseline, only 43% knew about BC whereas 72% have heard about BSE and only 32% were ever taught how to perform BSE for themselves. About 33% knew how often the BSE should 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, the part of hand to be used and the direction of hand movement for performing BSE. The average knowledge score was 51% at baseline which increased to 95% after intervention (Table 7).

Table 7: 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	41 (22)	180 (98)	<.001

procedure?

17. How should one respond if any abnormality is detected?	130 (71)	181 (99)	<.001
Median (IQR) Knowledge score	51%	95%	
Percentage Knowledge score	9(3)	16(1)	

*McNemar Test, $P < .05$ is significant; ** The frequency and percentage of correct responses to each questions.

4.0 DISCUSSION

4.1 Differences in awareness towards BSE

Person *et al.*, 1995 recommended girls at school age should be started with education about BSE in order to make BSE a habit (17). However, over the years, there has been some debate over just how valuable BSE is in detecting breast cancer early and increasing the likelihood of survival. Due to some ongoing uncertainty, the American Cancer Society, no longer recommends BSE as a screening tool for women with average risk of breast cancer (18). 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 (19). 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 (20, 21). The percentage of correct responses towards awareness based questions was only 64%, with moderate awareness level probably due to the lack of breast cancer preventive programs in rural areas of Malaysia (22).

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 (23). 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 (24). This study reported a better percentage of awareness (65%) about the possibility of death by BC when compared to the study reported (46%) by Abdallah *et al.*, 2015 (25).

A study by Marzouni *et al.*, 2013, states that family history of breast cancer is significantly correlated with higher awareness, its screening and prevention (26). It further reported that women with positive family history had better information about preventing programs ($P > .001$). In this study, respondents with family history of breast cancer have a

139 slightly higher level of awareness regarding BSE. About 28% of respondents with family history had good awareness level
140 compared to respondents with no family history (27%). Regardless of family history, women still need to be “breast aware”
141 and accurately identify BC symptoms in order to receive timely treatment as quickly as possible (27).

142 Most of the study respondents came to know about BC through multimedia which was consistent (76%) with the study
143 reported by Milaat., 2000 (27) These findings indicated that multimedia continued to be one of the most important
144 resources of information about BC & BSE and highlighted the coordination between public health educators and the
145 multimedia in dissemination of BC related information.

146 A study conducted among female nursing college students in Riyadh, Saudi Arabia reported 66% of study population
147 perform BSE, and another study among female medical students in Taif, KSA reported only 17% perform BSE regularly
148 whereas, 89% knew BSE should be carried out every month. Similar results were reported among women in Al-Qassim
149 region (19%), KSA who perform BSE regularly; whereas, 70% had never heard of BSE (28, 29). This study identified 24%
150 of the respondents practice BSE regularly, 54% accepted BSE as the most commonly used method for early detection
151 and 72% were aware of what to do if any abnormality was detected.

152 Regarding symptoms for breast cancer, about 63% and 61% respectively knew that bloody discharge from nipple and
153 presence of lump should be reported immediately, while 57% and 56% knew, use of contraceptive pills and smoking are
154 implicated risk factors. Most of the respondents in this study didn't know the association between breast cancer and short
155 periods of breast feeding (25%), early menstruation (18%) and advanced age (19%). Also, around 49%, 50% and 39% of
156 respondents realized the effect of obesity, alcohol consumption and delivery of first child after the age of 30 years
157 respectively has risk factors of breast cancer. Respondents showed poor understanding about major breast cancer risk
158 factors. The perception of the use of contraception by 57% might reflect the religious appreciation that encourages natural
159 methods of birth control (30, 31).

160 This study outcomes are closely associated with the studies reported more than a decade ago by Adebamowo & Ajayi.,
161 2000; Odusanya., 2001 and Adebamowo & Adekunle., 1997, that the incidence of breast cancer was slightly higher in
162 persons with: history of first degree relatives with breast cancer; early menarche; late menopause; oral contraceptive use;
163 does not breast feed; first birth after age 35 or nulliparous women (31, 32). The incidence is also increased with
164 increasing age, smoking, obesity, physical inactivity, radiation exposure, intake of alcohol and high fat. Thus, further
165 health education was recommended on associated and protective risk factor.

166 **4.2 Differences in knowledge towards BSE**

167 In general, the respondents' knowledge on BSE was poor. The outcome is supported by reports from earlier studies (Haji
168 *et al.*, 2002). The study reported the knowledge and behaviours' of female healthcare workers concerning breast cancer is
169 relatively poor and it needs to be improved (33). Considering the role that healthcare workers may play in communicating
170 health behaviours to the general public, planning health education interventions for females is essential (34). The
171 percentage of correct answers to knowledge questions was only 51% and poor.

172 In this study, 20% of year four students had good knowledge level. A study from Gurdal *et al.*, 2012, reported that higher
173 educational levels were positively associated with BSE performance. Overall, the results suggest that Turkish women,
174 regardless of their education level, need better education on BSE (35). Most of the respondents have been thought about
175 BSE through internet and pamphlets which including 55% of respondents. However, the print medium has been found to
176 be commonest source of information in other studies (36). Other studies from developed societies reported television and
177 radio as the most popular media and can reach a wide audience (36, 37, 38, 39). A study among female medical students
178 in Nigeria reported that 97% were aware of BSE mainly through television/radio, (38) while in another survey from the
179 same country, the electronic media were found to be the major resource among female secondary-school teachers (39).
180 This emphasizes that source of information varies by setting, which needs to be considered when promoting health
181 education.

182 **4.3 Effect of Intervention tool (Pamphlet)**

183 This study found significant awareness scores [64% → 99%; Mdn. 4(2) → 6(0)] and knowledge scores [51% → 95%,
184 Mdn. 9(3) → 16(1)] differences between pre- and post-intervention among the study participants. The overall awareness
185 score was moderate at baseline whereas, knowledge was poor. However, after educational intervention using pamphlet,
186 both awareness and knowledge scores improved significantly to good category. Among the age categories, participants
187 aged 24 years and older; among the races, Chinese; and year two respondents showed greatest increase in awareness
188 and knowledge scores between pre- and post-intervention studies. It is probably due to higher the age, better the
189 exposure to healthcare related courses and greater capability of understanding (40). Among the native location, rural
190 areas respondents showed good awareness and knowledge scores between the two phases of study. These good and
191 positive results indicate that well-structured and information tailored educational pamphlet is useful as a education tool to
192 increase awareness and knowledge among the target population (41).

193 **5.0 CONCLUSION**

194 In conclusion, the results presented in this study give an insight into the effects of pamphlet as an intervention tool among
195 university female students regarding BC and BSE focused on awareness and knowledge. This study results confirm that

196 the awareness and knowledge levels in the study population was quite poor at baseline. Hence, educational intervention
197 using pamphlet providing clear, precise and required information about breast cancer and steps for performing breast self-
198 examination has been found to be useful. There was an increase in awareness and knowledge scores among the
199 respondents between pre-test and post-intervention test. This study revealed that pamphlet education was equally
200 effective in accomplishing the aims and objectives of this study.

201 **Ethical Consideration and Consent**

202 The research proposal along with the study instrument, intervention tool and informed consent form (ICF) was submitted
203 to the Institutional Review Board (IRB), AIMST University Human Ethical Committee (AUHEC) and the ethical clearance
204 was obtained before initiation of study and signed informed consent was obtained from each participant before distribution
205 of survey forms.

206 **LIMITATIONS OF THE STUDY**

207 The study population of this consisted only of pharmacy students from a private University in Kedah state, Malaysia. The
208 results cannot be generalized to all university students or to all ages throughout Malaysia. Although the reliability
209 coefficient was found to be high, interpretation of the results were solely limited to responses being self-reported and
210 prone to subject bias.

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