A quasi-experimental study of the effect of health education on the knowledge of breast cancer screening among nursing students in Plateau State, Nigeria

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Abstract

Background: Knowledge of breast cancer screening is poor in developing countries and this may cause poor uptake of breast screening, late presentation in the hospital and increased mortality from breast cancer. Nurses are front-line health workers and increasing knowledge of breast screening among them is important for the education of the general public. This study aimed at assessing the effect of health education on the knowledge of breast cancer screening among nursing students in Plateau State, Nigeria.

Methods: A quasi-experimental study involving 50 female nursing students that were selected using a systematic random sampling each from the Colleges of Nursing Jos South Local Government Area (LGA) (experimental group) and Jos North LGA (control group). The intervention involved health education training in the experimental group only. A structured questionnaire was used to elicit data and composite variables were calculated for knowledge. Data analysis was done using IBM SPSS Version 22. ANOVA was used to compare mean changes in knowledge scores. Results were presented in tables and $p < 0.05$ was taken as statistically significant.

Result: There was no statistically significant difference in mean knowledge score at baseline (p=0.07). However, there was a statistically significant difference in the mean scores of experimental and control groups post-intervention. In the experimental group, there was a statistically significant difference in the mean knowledge scores among at least two phases (F [3, 196] = [81.906], p <0.001), Effect Size=0.56.

Conclusion: Health education intervention was effective in improving knowledge of breast cancer screening.

Keywords: Breast Cancer, Breast Screening, Female Nursing Student, Health Education, Knowledge, Plateau State

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Background

Globally, Breast cancer accounts for 33% of all female cancers[1] and is the commonest cause of cancer mortality among women.[2] In the year 2020, 2.3 million women were diagnosed with breast cancer and 685 000 mortalities were recorded worldwide.[3] At the end of the year, there were about 8 million women alive who were diagnosed to have breast cancer in the past 5 years, making it the world's commonest cancer. Moreover, the malignancy records the most lost disability-adjusted life years (DALYs) by women when compared to other cancers.[3]The burden of breast cancer and case fatality rates are highest in sub-Saharan Africa.[2] This increased death in developing climes has partially been ascribed to late presentation by the patient as 4 out of 5 individuals with the malignancy present with complicated and metastatic disease.[4]

Preventing the occurrence of breast cancer seems to pose some challenges. This is because even when women adopt all hypothesized interventions to reduce the risk of the malignancy such as regular physical activity, avoidance of harmful use of alcohol and tobacco, and weight control etc; the risk of occurrence of breast cancer can only be reduced by at most 30%.[3] In fact one out of two women who are diagnosed with breast cancer have no identifiable risk factor besides age above 40 years.[3] Moreover, most breast cancer deaths in developing countries are attributed to late detection.[5] Efforts towards reducing mortalities have therefore been directed towards increased survival through early detection and treatment.[6] Providentially, approximately one-third of advanced cancer may have been prevented when diagnosed early,[7] breast cancer being one of the cancers that can be diagnosed early.[8] Medical screening tests ensure early detection of diseases among asymptomatic individuals so that interventions can be adopted to avert serious disease.[9] Breast cancer screening tests include self-breast examination, clinical breast examination, ultrasonography, mammography, and Magnetic Resonance Image (MRI).[10]

Knowledge of breast screening is poor in many developing countries[11-13] and this has negative effects including poor uptake of breast screening,[14] late presentation in the hospital,[15] and increased mortality from breast cancer.[16] Health education is an important intervention in improving the knowledge of breast cancer and its screening,[13,17,18] thereby increasing screening uptake and reducing morbidity and mortality.[18]

Nurses are the front-line health workers who come in contact with patients before the doctors. They are also usually involved in giving health education to patients at both health facilities and the community. However, it has been shown that nurses in sub-Saharan Africa only have

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good knowledge of the signs and symptoms of breast cancer but they have poor knowledge of the risk factors for the disease.[19] This may negatively impact their ability to provide sufficient information when giving health education. Moreover, female undergraduates have been shown to have poor knowledge of breast cancer screening in Nigeria.[20] Furthermore, studies have shown that health schools provide excellent opportunities to deliver educational intervention and equip graduating health students with adequate knowledge to be able to engage the public on health promotion activities.[15, 21] The objectives of this study were to assess the baseline knowledge of breast cancer screening among the study and control groups of nursing students in Plateau State, Nigeria and also to assess the effect of health education on the knowledge of breast cancer screening among them.

Methods

Study Area

This study was carried out in Plateau State, Nigeria. Created in 1976, Plateau State is situated in the North-central region of Nigeria. There are 17 local government areas (LGAs) in the state, a land area of 26,026km^2, a projected population of 4,717,300 in the year 2022, and a population density of 181.3km^2.[22] The state has over 1,000 government hospitals and two colleges of nursing where this study was conducted. These colleges of Nursing are situated in the Jos North and Jos South Local Government Areas. Jos North LGA has its headquarters in the centre of Jos. It has a projected population of 643,200 in 2022 and an area of 291km^2. Languages spoken in the LGA include Anaguta, Afizere and Berom.[23] Jos South LGA has its headquarters in Bukuru town. It had a projected population of 458,100 in year 2022 and an area of 510km^2. The language spoken is Berom.[24]

Study Population

Female nursing students of the Colleges of Nursing Jos South Local Government Area (LGA) (Experimental Group) and Jos North LGA (Control Group).

Study Design

This was a quasi-experimental study that was conducted in 3 phases – Pre-intervention, Intervention, and Post-Intervention phases.

Pre-Intervention Phase

In this phase, a baseline assessment of both the experimental and control groups was done by eliciting baseline data from both groups using a semi-structured, self-administered questionnaire. These data served as reference to evaluate the effect of the health education intervention on the participants in the experimental group.

Intervention

The intervention involved health education training on anatomy of the breast, breast cancer, and breast screening in the experimental group only while the control group was given lectures in other unrelated areas such as Non-Communicable Diseases like hypertension and diabetes. These took place in the respective colleges for a period of six weeks which spanned between July and August 2022. The training curriculum had six (6) modules. (1 & 2): Introduction – These modules introduced the researchers and more importantly, the research and its purpose to the participants (3) Defining cancers and risk factors for breast cancer (4) Classification of breast cancer and the prognostic indicators (5 & 6) Breast cancer screening – Practical demonstration of breast self-examination. Health education methods adopted included role plays, health talks, and pictorial demonstrations on PowerPoint as well as individual and group exercises. These methods were used to demonstrate other breast screening methods such as clinical breast examination and mammography. The training was anchored by the researchers using relevant IEC materials.

Post-Intervention Phase

This involved an assessment of the effect of health education in the experimental and the control groups in three phases-immediate post-intervention, one-month post-intervention, and three-month post-intervention. The one-month post-intervention was carried out in September 2022 while the three months post-intervention was conducted in November 2022. The post-intervention evaluation was carried out using the same questionnaire that was used during the pre-intervention evaluation to determine the immediate and residual gains in terms of the effect of the health education intervention on the knowledge of breast cancer screening. Evaluation of the effects of the training was done using calculated scores during analysis.

Sample size

The minimum sample size (n) was calculated using the statistical formula for comparing proportions between two different groups[$(Za/2+ Zß)^2$ (p1q1 + p2q2) / (p1-p2)^2]. A standard normal deviate of 1.96, 95% confidence interval (C.I), and power of 80% were used. After adjustments for 20% for attrition rates, a total of 28 participants was gotten. However, 50 participants each were included in both the experimental and control groups.

Subject Selection and Sampling Methods

This study was carried out in the Colleges of Nursing Jos South LGA (experimental group) and Jos North LGA (control group). The experimental group was

determined via balloting. The sampling frame of the female students was obtained from the school authorities and systematic random sampling was used to select the desired number of participants from each college irrespective of the class or level of the students.

Inclusion Criterion
All female nursing students who were 18 years old and above

Exclusion Criteria
All female nursing students with a family history of any form of breast disease or breast lump.

Study Tool and Data Collection
A semi-structured self-administered questionnaire constructed from the review of similar literature was used to elicit data from the participants. These included socio-economic data, data on knowledge of breast cancer and breast cancer screening. The validity of the instrument was ensured by a review of experts on the research subject. The questionnaire was pre-tested among ten (10) students of the University of Jos and necessary adjustments made.

Data management and analysis
The questionnaires were cross-checked for errors and cleaned. Statistical analysis was done using Statistical Package for Social Sciences (SPSS) (IBM SPSS Inc., Chicago, IL) version 22.0. Categorical variables were summarized as frequencies and percentages, and continuous variables as means and standard deviations. Composite variables (aggregate score) for the participants' baseline knowledge of breast cancer and breast cancer screening were computed from items on the questionnaire for the experimental and control groups. These included close-ended questions with options of "Yes" and "No". Every correct knowledge was scored as 1 and wrong knowledge was scored as 0 giving a total knowledge score of 35 for all the items. The mean knowledge score at every phase was calculated. The effect of the intervention was tested on knowledge of breast cancer screening. Independent sample T-test compared the effect of intervention at each phase between the experimental and the control groups. ANOVA was used to compare mean scores and differences for knowledge across all four phases (baseline, immediate post-intervention, one-month post-intervention, and three-month post-intervention) for the experimental group. Results were presented as tables and $p < 0.05$ was taken as statistically significant

Ethical Considerations
Ethical clearance was obtained from Babcock University Health Research Ethics Committee and Plateau State Ministry of Health, Jos. Similarly, an introduction letter from the Public Health Department of Babcock University and informed consent forms for the participants were taken to the two (2) Colleges of Nursing.

Results
Table 1 shows the socio-demographic characteristics of the participants. There was a statistically significant difference between the experimental group and the control only in marital status (p=0.026). About two-fifths (38.0%) of the participants in the experimental group were married as compared to only one-fifth (18.0%) of the control group who were married.

Table 2 shows that more respondents in the control group (98.0%) knew information about breast cancer could be obtained from the radio as compared to 84.0% of the experimental group. This difference was statistically significant (p= 0.014). All subjects in the control group knew information about breast cancer could be obtained from the hospital as compared to 90.0% of the experimental group. This difference was also statistically significant (p=0.022). About three-fifths (58.0%) of the experimental group knew breast self-examination could be done monthly as compared to 72.0% of the control group. This difference was not statistically significant (p=0.142)

The majority of the participants (82.0% experimental and 84.0% control group) knew breast self-examination is done by the individual. Four-fifths (80.0%) and 90% of the participants in experimental and control groups respectively knew clinical breast-examination may be done by a doctor. Also majority (96.0% experimental; 94.0% control group) knew that nurses could perform clinical breast-examination. Equal number of participants (88.0%) in the experimental and

Table 1: Socio-demographic Characteristics of respondents (n=50)

Variable	Experimental Grp n(%)	Control n(%)	Test Statistics
Age (Years)			
<25	21 (42.0)	26 (52.0)	
25-34	22 (44.0)	17 (34.0)	χ^2= 1.173
≥35	7 (14.0)	7 (14.0)	P=0.556
Marital Status			
Single	31 (62.0)	41 (82.0)	χ^2= 4.960
Married	19 (38.0)	9 (18.0)	P=0.026
Religion			
Christianity	48 (96.0)	47 (94.0)	χ^2=0.211
Islam	2 (4.0)	3 (6.0)	P=1.00
State of Origin			
Plateau	34 (68.0	39 (78.0)	χ^2=0.211
Others	16 (32.0)	11 (22.0)	P=1.00

control groups knew clinical breast examination is useful for early detection of breast cancer.

Table 3 compares mean scores for the experimental and control groups at each phase.

Table 2: Knowledge of breast cancer screening among participants

Variable	Experimental Grp n(%)	Control n(%)	Test Statistics
Breast Cancer is an infectious disease			
Yes	17 (34.0)	25 (50.0)	χ^2=3.537
No	33 (66.0)	25 (50.0)	P=0.472
Breast cancer is never an inherited disorder			
Yes	5 (10.0)	11 (22.0)	χ^2= 6.083
No	45 (90.0)	39 (78.0)	P=0.193
Information on breast cancer can be gotten from radio			
Yes	42 (84.0)	49 (98.0)	χ^2= 5.983
No	8 (16.0)	1 (2.0)	P= 0.014
Knowledge of breast cancer can be obtained from the hospital			
Yes	45 (90.0)	50 (100.0)	χ^2= 5.263
No	5 (10.0)	0 (0.0)	P= 0.022
Breast self-examination should be done by individuals			
Yes	41 (82.0)	42 (84.0)	χ^2=0.071
No	9 (18.0)	8 (16.0)	P=0.790
Breast self-examination should be done monthly			
Yes	29 (58.0)	36 (72.0)	χ^2=2.154
No	21 (42)	14 (28.0)	P= 0.142
Breast Self-examination is useful for early detection of breast cancer			
Yes	41 (82.0)	44 (88.0)	χ^2= 0.706
No	9 (18.0)	6 (12.0)	P= 0.401
Knows how to do breast Self-examination			
Yes	39 (78.0)	43 (86.0)	χ^2=1.084
No	11 (22.0)	7 (14.0)	P=0.298
Clinical breast examination is useful for early detection of breast Ca			
Yes	44 (88.0)	44(88.0)	χ^2=0.000
No	6 (12.0)	6 (12.0)	P= 1.000
Clinical breast examination may be done by a doctor			
Yes	40 (80.0)	45 (90.0)	χ^2= 1.961
No	10 (20.0)	5 (10.0)	P= 0.161
Clinical breast examination may be done by a trained nurse			
Yes	48 (96.0)	47 (94.0)	χ^2=0.211
No	2 (4.0)	3 (6.0)	P=0.646

There was no significant difference in the mean knowledge scores of the experimental and control groups at baseline (p=0.070). However, mean knowledge score was significantly higher among experimental groups at immediate post-intervention and one month post-intervention as compared to the control group (p=0.001 and <0.001 respectively). Nevertheless, mean knowledge score was significantly higher in the control group at three months post-intervention (p=0.001) as compared to the experimental group. In the experimental group, mean knowledge score was noticed to be higher at immediate-post-intervention (27.28 ± 1.617), one-month post-intervention (27.94 ± 0.240) and three-month post-intervention (26.26 ± 1.838) as compared to the baseline score (23.14 ± 2.232). However, the one-month post-intervention mean score in the control group (22.20 ± 2.807) was lower than the baseline score (24.26 ± 3.691) in this group.

Table 3 Comparison of mean scores for experimental and control groups

Group	Mean	Independent sample t-test	95% C.I	P-Value
Baseline				
Experimental	23.14 ± 2.232			
Control	24.26 ± 3.691	-1.836	-2.334 to 0.094	0.070
Immediate post-intervention				
Experimental	27.28 ± 1.617			
Control	25.90 ± 2.435	-3.339	-2.202 to -0.558	0.001
One-month post-intervention				
Experimental	27.94 ± 0.240			
Control	22.20 ± 2.807	14.409	4.940 to 6.540	<0.001
Three-month post-intervention				
Experimental	26.26 ± 1.838			
Control	27.38 ± 1.413	-3.416	-1.771 to -0.469	0.001

Table 4: ANOVA Analysis of mean knowledge in experimental group

	Sum of Squares	DF	Mean Square	F	P-value	Effect Size R2
Experimental Group						
Between Groups	677.655	3	225.885	81.906	<0.001	0.56
Within Groups	540.540	196	2.758			
Total	1218.195	199				

Table 4 shows ANOVA analysis for knowledge of breast cancer/screening among the experimental group. There

Table 5: Tukey's HSD Test for Multiple Comparison in Experimental Group

	Mean Difference	95% Confidence Interval	P-value
Baseline/immediate Post-intervention	-4.140	-5.00, -3.28	<0.001
Baseline/One-month Post-intervention	-4.800	-5.66, -3.94	<0.001
Baseline/Three -month Post-intervention	-3.120	-3.98, -2.26	<0.001
Immediate Post-intervention/One-month Post-intervention	-0.660	-1.52, 0.20	0.196
Immediate Post-intervention/Three-month Post-intervention	1.020	0.16, 1.88	0.013
One-month Post-intervention/Three-month Post-intervention	1.680	0.82, 2.54	<0.001

was a statistically significant difference in the mean knowledge of breast cancer/screening among at least two phases (F [3, 196] = [81.906], p <0.001), Effect Size=0.56.

Table 5 shows that the mean value of knowledge of breast cancer/screening among experimental group was significantly different at baseline compared to immediate post-intervention (p<0.001, 95% C.I= [-5.00, -3.28]); one-month post-intervention (p < 0.001, 95% C.I. = [-5.66,-3.94]) and three-month post-intervention (p=<0.001, 95% C.I=[-3.98, -2.26]). It was also significantly different at immediate post-intervention to three-month post-intervention (p=0.013, 95% C.I = [0.16, 1.88]); It was also statistically different at one-month post-intervention compared to three-month post-intervention (p < 0.001, 95% C.I. = [0.82, 2.54])

Discussion

In this current study, the experimental and control groups were similar in terms of socio-demographic characteristics. There were also no significant differences in the mean knowledge scores between the experimental and control groups at baseline. However, differences were recorded between the two groups after the intervention. A statistically significant difference (p<0.001) was recorded across all phases in the experimental group with a medium effect size (0.56).

This current study showed that the experimental and the control group participants were essentially similar in terms of socio-demographic characteristics. This similarity concurs with what was reported in the studies by Rakshani et al[17] and Alameer et al.[25] This similarity may imply that the two groups were comparable and that the control group was ideal comparison for the experimental group. In a similar vein, this current study observed that there were no statistically significant differences in the baseline mean knowledge scores between the experimental and control groups. This also aligns with findings from other studies.[17,25]

The mean knowledge scores increased after intervention in this present study. This was in consonance with the findings in a similar study among nurses in the United Arab Emirates.[26] It also concurs with what was reported among female students in Akure, southwest Nigeria[27] and in different parts of Iran.[17,28] The finding also agrees with what was documented by Kisuya et al[13] where health education intervention increased the knowledge of women from 0% to 45% in an East African rural community. However, contrary to the findings of this current study, Goel et al reported that there were no differences in the knowledge of breast cancer between intervention and control groups during a study in a predominantly Spanish-speaking community.[29]

Knowledge of breast cancer usually forms the bases of prevention. Unlike developed countries where the knowledge of breast cancer and screening is good,[30] studies have shown that knowledge of breast cancer is poor in many developing societies.[12,13] The implication of the findings of this current study is that improving nurses' knowledge of breast cancer and breast screening may help in enlightening these developing societies with poor knowledge since nurses play a vital role in educating patients, colleagues and the larger community. The increase in knowledge may also imply that the health education methods adopted in this study were effective and may be adopted in real life on larger scales in improving the knowledge of women concerning breast cancer.

Although knowledge of the experimental group increased and was significantly higher than the control group immediate post-intervention and one-month post-intervention, the knowledge of the control group was higher at three-month post-intervention. This may be a result of possible experimental contamination where some of the participants in the control group had been informed of the intervention by their counterparts in the experimental group since students in the two colleges were likely to know each other and had regular communications. It may also be as a result of the information they got about the subject from their curricula. Moreover, this finding of higher knowledge score among the control group at three-month post-intervention may indicate the need for message enforcement as a component of health education particularly among the youths.

Conclusion:
Health education plays a key role in improving the knowledge of breast cancer screening especially among key populations such as nurses who are usually responsible for educating people on health-related matters.

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