Original Article

Improving Breast Cancer Preventive Behavior among Female Medical Staff: The Use of Educational Intervention based on Health Belief Model

Ameneh Eskandari-Torbaghan[1], Khadijah Kalan-Farmanfarma[1], Alireza Ansari-Moghaddam[1], Zahra Zarei[2]

Submitted: 3 Oct 2013
Accepted: 28 Jun 2014

[1] *Health Promotion Research Center, School of Health, Zahedan University of Medical Sciences, Zahedan, 9817667993 Iran*

[2] *Faculty of Psychology and Education, Allameh Tabatabai University, Tehran, 148984511 Iran*

Abstract

Background: **Breast cancer is one of the most common types of cancer prevalent among women worldwide. Preventive behaviors such as early diagnosis through screening tests play an important role in prevention and control of the disease. This study aimed to determine the effects of educational intervention using a health belief model on breast cancer preventive behaviors.**

Method: **This interventional study was conducted on 130 female employees of Zahedan University of Medical Sciences who were randomly divided into intervention and control groups. A questionnaire, made and validated by the researcher, was completed before and one month after training by the study subjects. Data were analysed using regression analysis, independent sample T-test, chi-square and Pearson's correlation coefficient using the SPSS software 18.**

Result: **There were significant changes in the training group, following educational intervention in the awareness construct and in some constructs of the model including perceived susceptibility, perceived benefits, and perceived barriers, as well as in practice compared to the control group ($P < 0.05$). Nevertheless, perceived barriers remained as the only predictor in the model, such that for every unit increase in this variable, the behavior score increased by 18%.**

Conclusion: **The use of educational intervention based on Health Belief Model had positive effect on knowledge of breast cancer preventive behaviors among participants.**

Keywords: *health education, preventive measures, breast cancer*

Introduction

Cancer is one of the major health problems in the world, causing more than 7 million deaths annually (1). It has also been estimated that the number of new cases of cancer will increase from 10 to 15 million annually by 2020 if the current trend continues without any change (1). Breast cancer accounts for 23% of all cancers in women, and it is the most common type of cancer, prevalent among women worldwide (2). Despite advances in diagnosis and treatment methods, breast cancer still remains the most common malignancy and the second leading cause of cancer deaths in women (3). The number of deaths due to breast cancer in 2010 was estimated at 40230 people (39840 women and 390 men) (4). Additionally, data shows an increase in the incidence of breast cancer globally and more rapidly in the developing countries, which had lower rates of breast cancer earlier (5).

There is some evidence that 23% of the breast cancer cases in Iran were observed in women younger than 40 years (6). Importantly, nearly 70% of women in Iran were diagnosed in advanced stages of cancer at the time of referral, when it is too late for appropriate treatment by healthcare providers (7). The continual rise in deaths from breast cancer in Iranian women might be partly due to lower utilisation of screening tests for breast cancer and late diagnosis (8). Epidemiological studies also showed that quitting smoking, adopting a healthy diet, increased physical activity, higher consumption of vegetables, lower alcohol intake, are among the primary preventive strategies for breast cancer (9). Currently, opportunities for primary prevention of breast cancer are limited, and given the importance of early diagnosis in improving the quality of life and survival rate of patients, screening is the

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best secondary prevention strategy for achieving these goals (10). Breast-cancer screening in women includes mammography, clinical breast examination (CBE), and breast self-examination (BSE) (11). The progress of 95% of cases to more advanced stages of breast cancer can be prevented with monthly BSE, appropriate CBE by physician, and mammography (12). Choosing a health training model is the first step towards planning an educational program. Effective health training depends on adept use of best theories and strategies appropriate to any event (13). Application of this model has frequently been confirmed in breast cancer screening training (14). Dimensions of the model include perceived sensitivity, severity, benefits, and barriers, and cues to action. In this model, the person has to be convinced that even with lack of symptoms, the disease or condition could still exist. When people consider themselves at risk of the disease (perceived susceptibility), and understand that there are potentially serious outcomes (perceived seriousness), believe that preventive action has positive results (perceived benefits), benefits gained can outweigh barriers, and also believe that they are capable of performing these health behaviors (self-efficacy), then it is more likely that they perform this behavior (15). On the other hand, there is a lack of study on improving preventive behaviors in the community of women employed at Zahedan University of Medical Sciences, who are in the age group at risk of breast cancer. Accordingly, the present study was conducted to determine the effects of training based on Health Belief Model (HBM) on breast cancer preventive behaviors among these female medical staff.

Materials and Methods

The sample size for this study was calculated by comparing two independent samples with continuous outcomes. To find out the required information for this equation, a pilot study was conducted on a sample of 20 subjects, which showed a difference of 1.2 between the mean scores of behavior (as the main variable of interest) between the two groups with a standard deviation of 2.4 after intervention. Assuming 95% confidence interval and a power of 80%, above-mentioned equation gives a sample size 63. Consequently, a sample size of 65 was considered for each group in the current study. Accordingly, this study was conducted on a total of 130 female employees of Zahedan University of Medical Sciences (ZUMS), who were included by convenient sampling method. They were randomly divided into either intervention (n = 65) or control groups (n = 65).

Data were collected through a questionnaire made by the researcher, the validity and reliability of which had been determined previously by the main investigators as part of their studies towards Master of health promotion science. Items with content validity ratio of > 0.62 and content validity indices > 0.79 were accepted. Cranach's alpha for reliability was obtained as 0.76. The questionnaire was also reviewed and approved by 10 experts in the field.

The questionnaire contained 53 questions, of which 3 items were related to demographic details (age, marital status, education level), 16 to awareness, 6 to perceived susceptibility, 5 to perceived seriousness, 5 to perceived benefits, 5 to perceived barriers, 5 to self-efficacy, 6 to cues to action, and 5 to behavior. To calculate participant's awareness, each item scored 2 for correct answers, 1 for no comment, and zero for wrong answers.

Attitude items, such as perceived susceptibility, perceived seriousness, perceived benefits and barriers, as well as self-efficacy were scored according to the 5-option Likert scale, with scores for each item ranging from totally agree 4 to agree 3, no comment 2, disagree 1, and totally disagree 0. In the section relating to preventive behavior items, scoring ranged from 3 for always to 2 for sometimes, 1 for often, and 0 for never. Scoring for the cues to action- construct was in percentages.

For the purpose of data collection, adequa te explanation about objectives of the study was presented first. The participants were also assured of the confidentiality of the collected data. Participants' consent for taking part in the study was also obtained. The educational intervention was designed according to the results obtained and analysed from the stage before intervention.

For the intervention group, educational program was held by the main investigators, which included lectures, questions and answers, PowerPoint presentations, videos and an educational booklet as well as a compact disc (CD) containing all mentioned materials. Intervention program was held in three sessions, each of which took about 1–1.5 hours. Each session was held by two researchers as the consistent educators. Educational materials was provided in accordance with the HBM, mostly to increase awareness of women about breast cancer symptoms, their knowledge regarding right time for mammography and to improve their practice on preventive behaviors of breast

cancer including physical activity and healthy diet including consumption of fruits and vegetables. The most important part of the instruction was to increase perceived sensitivity and perceived seriousness of women about the threat of this malignancy and their understanding to the barriers in performing breast cancer preventive behaviors. These constructs, in turn, could help woman to strength their ability and impart positive beliefs towards preventive behaviors including breast self-examining behavior, clinical breast examination and mammography. One month after the training intervention, the effects of the intervention on breast cancer preventive behaviors were measured, and compared with those in the control group. Data from before and one month after educational intervention were coded and analysed.

After collection, the data were entered into SPSS software (Version 18). Descriptive statistics was used to explore the frequency distribution of qualitative data and to provide central and dispersion parameters for quantitative data. Chi-square test was used to compare categorical data, and *t* test was used to compare the mean values of continuous variables for the two groups. Pearson's correlation coefficient was used to find out the association between the continuous variables. Finally, step-wise regression model was used to clarify the predictors of behavior change. The significance level was set at 0.05.

The study was approved by the Human Research Ethics Committee of the Zahedan University of Medical Sciences. The control group received all the training materials after completion of intervention.

Results

This study included a total of 130 female medical staff of ZUMS in 2013. They were divided into two groups: (i) intervention/training, and (ii) control group. The mean age of the participants in the intervention group was 35.38 years (SD 8.01), and in the control group was 34.39 years (SD 8.98), with no evidence of heterogeneity (Table 1). There were no significant differences between the two groups in terms of educational levels and marital status ($P > 0.05$). About two thirds of the participants in both the study groups had bachelor's degree and higher. Furthermore, the majority of participants, 76.9% in intervention group and 80% in control group, were married.

Table 2 presents the changes in mean scores of the constructs of the model in both the groups, after intervention. All the parameters of the construct between the two groups were approximately the same at the baseline. However, scores of the 5 items, including awareness, perceived susceptibility, perceived benefits, perceived barriers, and behavior, increased significantly after intervention among the participants in the intervention group compared to those in the control group ($P < 0.05$). However, there were no significant differences between two groups after intervention in scores of perceived seriousness and self-efficacy.

A stepwise multiple regression analysis was employed to identify the predictors of the behavior change. To do this, all health belief model constructs were entered simultaneously in the model. The results indicated that the overall model was statistically significant (F = 8.79,

Table 1: Baseline characteristics of study subjects

Study group/variable	Intervention (n = 65)		Control (n = 65)	
	Number	Percent	Number	Percent
Educational level				
High school diploma	5	7.70	8	12.3
Associate diploma	15	23.1	15	23.1
Bachelor's degree and higher	45	69.2	42	64.6
Marital status				
Single	12	18.5	11	17.0
Married	50	76.9	52	80.0
Divorced	1	1.50	1	1.50
Widowed	2	3.10	1	1.50
Age (Mean SD) years	35.38 (SD 8.01)		34.39 (SD 8.98)	

P = 0.004). Nevertheless, perceived barriers remained in the model as the only predictor of individual's behavior change (Table 3). Indeed, a positive linear relationship was found between perceived barriers and behavior (B = 0.183, *t* = 2.964, *P* = 0.04) such that for every 1 unit of increase in perceived barriers, the behavior scores increased by 0.18. Goodness of fit for this model (adjusted R square) was 0.067, which means that 7% change in behavior scores was related to the scores of perceived barriers.

Discussion

In this study, an educational program based on the health belief model significantly increased the awareness, perceived susceptibility, benefits, barriers, and behavior of the participants in the intervention group compared to those before the educational program.

The present study, showed a significant difference, in the awareness score of the women after receiving educational program, which is in line to a study in Turkey which showed that training increased the breast self-examination awareness (16). Additionally, the results of studies in America (17) and other part of Iran, aiming to assess the effects of training in creating breast cancer screening behaviors based on health belief model are in agreement with the results of the present study (18), indicating the importance of training and its impact on breast cancer preventive behaviors.

The mean scores of perceived susceptibility

Table 2: Comparison of changes in mean scores of health belief model constructs after intervention between two groups

Construct	Group	Score before intervention	Score after intervention	Difference (After – Before)	*P* Value*
		Mean(SD)**	Mean (SD)	Mean (SD)	
Awareness	Intervention	20.4 (4.50)	23.8 (4.05)	3.45 (5.11)	< 0.001
	Control	18.6 (4.63)	17.9 (5.32)	–0.68 (5.93)	
Perceived susceptibility	Intervention	16.0 (2.79)	17.3 (2.39)	1.31 (3.57)	0.005
	Control	16.1 (2.66)	15.5 (2.74)	–0.55 (3.31)	
Perceived seriousness	Intervention	14.5 (3.77)	14.6 (2.81)	0.14 (4.23)	0.931
	Control	13.2 (3.18)	13.3 (2.65)	0.07 (3.81)	
Perceived benefits	Intervention	15.5 (3.01)	18.0 (2.16)	2.45 (2.54)	< 0.001
	Control	15.2 (3.12)	14.6 (2.48)	–0.64 (3.61)	
Perceived barriers	Intervention	12.2 (2.95)	12.8 (2.99)	0.59 (3.36)	0.004
	Control	12.2 (3.18)	10.6 (3.58)	–1.64 (4.62)	
Self-efficacy	Intervention	11.4 (3.96)	13.7 (3.26)	2.33 (4.18)	0.108
	Control	11.0 (2.85)	11.8 (5.34)	0.83 (5.51)	
Behavior	Intervention	6.00 (2.30)	7.21 (1.85)	1.21 (2.54)	0.045
	Control	5.43 (2.48)	5.58 (2.34)	0.15 (2.94)	

**P* value obtained from independent sample *t* test comparing mean of score differences between two groups after intervention;
***SD = Standard Deviation.

Table 3: Predicting breast cancer preventive behavior in study subjects

Significant	*t*	Standardised coefficients	Unstandardised coefficients		Model
		Beta	Standrad Error	B	
0.003	3.039		0.254	0.783	Constant
0.004	2.964	0.274	0.062	0.183	Barrier

before and after intervention showed a considerable difference. Similarly, studies on breast self-examination using the health belief model (19) among girl students in Thailand (20), Chinese women in Australia (21) and Canada (22), showed positive effects of educational intervention. All these studies showed increase in scores of perceived susceptibility after intervention. Agreement among various studies could be ascribed possibly to the fact that a person sensitive to a health issue and aware of carrying an asymptomatic disease can lead to prevention of wrong behaviors, and affliction with the disease (23).

These findings, however, showed no considerable increase in the score of perceived seriousness after intervention. In comparison, results of studies in England (24) and Iran (25) demonstrated that perceived severity score after intervention increased considerably compared to before intervention. On the other hand, a study (26) on American-Korean women revealed that the culture-oriented education on mammography screening caused increased perceived benefits and reduced barriers and fear and perceived seriousness. This is in agreement with the present study, except for the construct of perceived barriers. The point worth noting is that sometimes when the perceived seriousness is very strong, and the person's perception deems it incurable, it can produce reverse effects on breast cancer screening behavior. In fact, it acts as a source of threat to the awareness of affliction with the disease, and the person thinks it is better not to know if he/she has the disease, than to know he/she has an incurable disease (27).

The significant difference in mean scores of perceived benefits after training in the intervention group agrees well with a study in Turkey on health beliefs associated with breast self-examination among women. The study showed that perceived benefits of self-examination in women that regularly did BSE were more than that in the group that did not (28). Perceived benefits of a behavior is indicative of the person's understanding of benefits gained from conducting a behavior (29). The more people understand the benefits of a preventive behavior, the more they do that behavior.

Another studied psychological factor is perceived barriers, which points out the person's perception of intrinsic and extrinsic obstacles in performing a behavior. In this study, a significant difference was observed between the scores of perceived barriers after intervention, which was in line with the results of a study conducted in the United States (US) (30). However, in a study by Sicginli et al. (31) on barriers to mammography, no significant difference was observed, which disagrees with the results of the present study. Increase in mean score of perceived barriers reveals that after intervention, people were more aware of barriers that impeded them from performing preventive behaviors, and tried to resolve those impediments.

The score of behavior increased significantly after intervention in the current study. The increased scores of constructs perhaps had an impact on people's behavior. In a study by Saatsaz et al. (32), performing mammography for screening purposes increased after training (32), which is a reminder of the effective role of training, and its importance (33). The results of a study in Turkey also indicated that training in students increased awareness and breast self-examining behavior (34).

The study also clarified that perceived barriers are the strongest constructs in predicting the performing preventive behaviors. A previous study in Iran demonstrated that construct of self-efficacy has the highest power of predicting behavior intention (35). Nevertheless, a study in the US showed that self-confidence and perceived barriers were predictors of performing BSE in American women (36). It seems the reason for more profound effect of perceived barriers, compared to other constructs of the model is that the participating women possibly paid more attention to the barriers in performing breast cancer preventive behaviors than to the benefits of these behaviors.

The strong points of this study were: determining efficacy of the health belief model, including cancer prevention behaviors, in female staff of the University, who are currently the health service providers. Study limitations included the short interval between intervention (1 month), and measuring the effect of training.

Conclusion

The findings of this study indicated that health promotion program using health belief model could be effective in increasing knowledge, perceived susceptibility, benefits, barriers and practices of breast cancer preventive behaviors in the intervention group. Additionally, the study clarified perceived barriers as an important predictor for behavior change among study participants. Therefore, interventions should

center on reducing or reframing barriers and enhancing other constructs of the HBM model when developing educational program on adoption of breast cancer preventive behavior.

Female medical staffs are a large and important group of healthcare professionals that could provide a great opportunity for health intervention strategies at the first line of prevention. Furthermore, they are better able to transfer and disseminate received information effectively to all the women at the community level. Therefore, educational programs based on Health Belief Model should be applied to all female medical staff to maintain and enhance women's health in the community.

Acknowledgements

We sincerely thank all participants in this study, and all related organisations for their cooperation.

Conflicts of Interest

None.

Funds

Zahedan University of Medical Sciences.

Authors' Contribution

Conception and design, drafting of the article, provision of study materials or patient, provision of study materials or patient: AET, KKF
Analysis and interpretation of the data, collection and assembly of data, administrative, technical or logistic support: AET, KKF, AAM
Final approval of the article, administrative, technical or logistic support: AET, KKF, AAM, ZZ
Statistical expertise: AAM

Correspondence

Khadijah Kalan-Farmanfarma
MSc (Iran)
Department of Health Education, Health Promotion Research Center
School of Health
Zahedan University of Medical Sciences
Zahedan, 9817667993, Iran
Tel: +98 9189 0867
Fax: +98 541334 25375
Email: kalan_farma@yahoo.com
farmanfarmak@gmail.com

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