

Breast Cancer Prevention Behaviors In women with low levels of health literacy of Reproductive Age: Application of Health belief Model

ABSTRACT

Background and Objectives: Breast cancer is the most common malignant disease in women and the leading cause of death worldwide. Early detection of this cancer greatly increases the chances of successful treatment. This study was conducted to determine the effect of an educational intervention based on the health belief model on adopting breast cancer prevention behaviors in women of reproductive age.

Materials and Methods: This randomized controlled trial was performed on 84 (42 cases per group) women of reproductive age from 2020 to 2021 in Qazvin, Iran. The intervention group was subjected to educational intervention based on health belief model- provided in four sessions through e-learning and uploading the pre-prepared educational contents in a social media group. Participants in both groups completed the questionnaire before, immediately after, and three months after the intervention. Data were analyzed by SPSS 16 software

Results: After the intervention, the mean scores of health belief model constructs (awareness, perceived sensitivity, perceived severity, perceived benefits, perceived barriers, perceived self-efficacy, cues to action, and behavior) were significantly higher in the intervention group than in the control group ($p < 0.05$). While the mean score of perceived sensitivity and guideline for operation in the intervention group was significantly higher than the control group after intervention.

Conclusion: The health belief model could effectively promote breast cancer prevention behaviors in women of childbearing age.

Paper Type: Research Article

Keywords: Educational Intervention, Health Belief Model, Breast Cancer, Women

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Introduction

Breast cancer is the most common malignant disease in women and the leading cause of death worldwide (1). Based on the GLOBOCAN estimates of cancer incidence in 2018, there were more than two million new cases of breast cancer (11.9% of all cancers worldwide) and 626679 breast cancer-related deaths worldwide (6.6% of all deaths caused by various types of cancer in the world) (2). The increasing prevalence of breast cancer in developing countries has become a health issue, and more than half of breast cancers in women occur in less developed countries (3). According to the latest statistics presented in 2018, 9795 new cases of breast cancer (incidence: 24.5%) and 3304 breast cancer-related deaths were reported in Iran (14.2%) (4). Research shows that in Iran more than 30% of patients are under 30 years old. Therefore, breast cancer is a serious problem in the field of women's health (5).

One of the effective factors in reducing the prevalence of breast cancer and its consequences is health literacy. Health literacy refers to the individual and social characteristics of individuals and communities to access, understand, evaluate, and use information resources and services to make decisions about their health (6). In recent years, health literacy is known as an important skill that patients need to prepare for proper health decision-making in difficult situations. Improving the health of individuals leads to consequences such as increasing the potential of patients to obtain informed decisions, reducing health threats, increasing the prevention of diseases, promoting security, increasing quality of life, and increasing quality of care (7).

Studies have shown that the limitation of health literacy has several complications in different health areas such as lack of access to proper health services, less tendency to

follow-up therapy, low drug adherence as well as increased the rate of referral to emergency, the length of treatment in hospital, and the rate of mortality. These complications lead to develop adverse effect on the use of caring services (8). In addition, negative economic impact due to low level of health literacy skills and health care information can not be ignored. This indicates the need for attention to health literacy (9).

Based on the study carried out by Rakhshkhorshid and colleagues in Iran, it has been shown that half of the Iranian population has a limited health literacy, and this limitation is higher in vulnerable groups, including the elderly, housewives, and unemployed people. Women are at risk for breast cancer from puberty (10), the most important methods to achieve early detection of the disease are mammography and physical examination of the breasts by a physician, health care worker, clinical breast examination (CBE), and breast self-examination (BSE). According to Johns Hopkins Medical Center, 40% of patients diagnosed with breast cancer are women who feel a lump in the breast. Therefore, regular examination of the breast is important for early breast cancer diagnosis (11). According to the Global Health Guidelines for low- and middle-income countries, early detection of breast cancer reduces mortality in women with breast cancer by increasing awareness of BSE and mammography. Early detection of breast cancer can increase the survival rate up to 95%. BSE has been suggested to reduce breast cancer mortality in low- and middle-income countries (12).

Various theories have been used to increase the understanding of the factors influencing the change of health behavior. The Health Belief Model (HBM) is one of the first models to be widely used for cancer screening interventions (13). This comprehensive model plays a significant

role in prevention and it is designed based on motivation to promote human health. In general, HBM focuses on change in beliefs, which leads to change in behavior (14). HBM is a preventive model that was developed in the 1950s by a workgroup of social psychologists and public health services experts in the USA. HBM was influenced by the value expectancy theory of Kurt Lewin (15).

According to the HBM, performing a health behavior depends on the individual to believe in the special health problem and issue; accept its reality; be sensitive to its effects on health (perceived sensitivity); consider it as an important health concern in life; perceive the effect of its various economic, social, physical, and mental complications (perceived severity). Likewise, use cues to action are convinced that preventive measures are applicable, beneficial, and cost-effective; and consider perceived barriers more cost-effective than its benefits. By all these happen, a person will perform preventive health measures quickly (16). Recognizing and improving the factors associated with breast cancer prevention behaviors will be helpful in women. Identifying these factors also helps researchers design and implement more appropriate interventions to change behavior. Health education is one of the most important measures in correcting behavior and preventing diseases that help people to achieve the desired level of health and ultimately promote health(17).

Given the significant impact of breast cancer on various aspects of life, considering the level of health literacy for educational interventions seems useful. This study was designed to evaluate the effect of educational intervention based on health belief model in adopting breast cancer prevention behaviors in the population of women aged 18-49 years. The study assessed the level of women's health literacy before the educational

intervention.

The aim of this study was to determine the effect of an HBM-based educational intervention on the adoption of breast cancer prevention behaviors in women of childbearing age referred to comprehensive health centers in Qazvin.

Materials and Methods

The present study was second phase of a clinical trial and conducted on 96 women of reproductive age (18 to 49 years) referring to health centers in Qazvin from 2020 to 2021. The sample size was estimated to be 48 cases in each group. Considering the confidence level of 95%, test power of 80%, and assuming a four-unit increase of the women's attitude in the intervention group to have a significant effect (10% of the average reported by Dr. Kalan Farmanfarma et al.), which was finally considered to be 48 cases due to possible attrition. It should be noted that the standard deviations were used from the study by Kalan Farmanfarma et al. (18). The samples which met the inclusion criteria were selected from 25 comprehensive health centers. For sampling, each health center was considered as a stratum. First, health centers were divided into five strata based on geographical area, cultural and economic conditions. Then, two centers were randomly selected from each stratum. In the first phase, sampling was performed from 10 health centers, and four strata, Then continuous sampling was done to reach the sample size in each center. The sample allocation was done in two stages. In the first stage, 96 people who had the lowest health literacy score were selected from phase one. In the second stage, we used the block permutation method to assign samples into the control and intervention groups

Participants met inclusion criteria if they have read and write ability, low level of health literacy, and a medical document in the health

centers, and they could be excluded because of migration, breast cancer, and certain physical and neurological diseases. Six cases from both groups were excluded from the study.

The phasol measurement tool in this study was a health literacy questionnaire. The completion method of the questionnaires was conducted as an individual interview and using adult performance literacy questionnaire, one of the most important and most prominent questionnaires worldwide. This questionnaire has two parts of reading and computing, and 50 questions of reading each one had 1 scores and in total, 50 points, and 17 computing questions were also made by applying a coefficient to 50 (by beating the score of each question in number of 2/941). The questionnaire rating was calculated from 100. Based on the separation points of 59 and 74, the health literacy of individuals was classified at three levels inadequate, boundary, and adequate which instrument designers had proposed these points for the level of understanding of reading ability. It contains 3 text in the field of readiness commands for shooting the upper gastrointestinal tract, the patient's salary and responsibilities in the insurance sheets and the standard form of a hospital satisfaction that has been removed 50 words. Women target group should select deleted words from four proposed options. The computing section also includes a series of explanations for taking medications, time visits, grants, and a result of blood glucose testing, which was given in the form of a sheet to women aged ages 18 -49 years. The relevant questions include 17 questions. The performance literacy score includes three levels as follow: inadequate levels (0 -59), border (60 -74), and sufficient (75 -100). The validity and reliability of questionnaire in Iran was conducted by Benighi Tehrani and colleagues. Its reliability was obtained by Cronbach's alpha test with a

95% and 0.88% confidence coefficient for the calculation and reading sections.

The data collection tool was designed based HBM-based questionnaire and psychometric assessment were done by Kalan Farmanfarma et alIt includes two parts with 53 items according to the constructs of the HBM (19). The first part assessed demographic information, such as age, educational status, and marital status, and the second part included awareness questions (16 questions) such as which rate increases the risk of brease cancer? Or what are the signs of breast cancer symptoms?

perceived sensitivity includes 6 questionsfor my very young breast cancer such as I do not need to do itself or If my breast cancer is treated timely, I will have a normal life.

Intensity perceived contain 5 questions as follow: If I get to breast cancer, life will be hard for me or breast cancer is released to other members of the body.

The benefits perceived includes 5 questions such as I do your breast self because this action is comfortable and simple or consumption of fruit and vegetables prevents breast cancer.

Barriers perceived involves 5 questions inlcuds the breast examination is embarrassed by your doctor or the cost of mamo is a lot of graffi.

Self Efficacy contains 5 questions such as I can do the breast self-examination without the help or I have enough cost to perform examinations and mammography.

Cues to action includes 6 questions (e.g., what is your most frequent source of breast cancer diagnosis tests) and behavior contains 5 questions(e.g., have you ever referred to a doctor or health centers to diagnose breast cancer? Or Have you ever been mammography?).

The constructs of perceived sensitivity, perceived severity, perceived benefits, perceived barriers, and self-efficacy were scored on a five-

point Likert scale from "completely agree" (5 points) to "completely disagree" (1 point). The construct of awareness was rated with "yes" (1 point), "no" (0 points), and "I do not know" (0 points) answers. The cues to action construct were scored on a five-point Likert scale from "completely desirable" (5 points) to "undesirable" (1 point). The construct of behavior was rated on a four-point Likert scale from "always" (4 points) to "never" (1 point).

The intervention was provided as four one-hour online sessions. It was designed based on the research objectives, reliable sources, pre-test scores of the target group (women of reproductive age), and based on the HBM using BigBlueButton. In this study, four continuous training sessions were conducted through WhatsApp for the intervention group during the week.

Educational content was based on increasing awareness about breast cancer and its complications, familiarity with screening methods, such as the right time for mammography, examination by a physician, how to perform BSE, a healthy lifestyle, and best sources of encouragement based on the HBM. Educational content was provided using lecturing through BigBlueButton, voices, short clips, text messages, animation, PowerPoint presentation, pictures, and online questions and answers. The intervention and control groups were evaluated immediately and three months after the educational intervention by completing the questionnaires again. Informed consent was obtained from the subjects, and they were assured of the confidentiality of information. Also, the control group received the intervention after the study.

Data were analyzed using SPSS 16 software. Regarding inferential statistics, data were assessed by Chi-square and Fisher's exact tests to evaluate the homogeneity of qualitative variables in the two groups. independent t-test was tested to compare the quantitative variables in the

two groups. An independent t-test was used to compare the constructs of the HBM in the two groups. Analysis of variance with repeated measures was used to compare the mean scores of HBM constructs in adopting preventive behaviors before, immediately, and three months after the intervention. The significance level in this study was considered less than 0.05.

Results

The range of health literacy score were categorized in three levels. In this study, 1% of participant had inadequate level of health literacy, 1.1% had borderline health literacy and 94.9% had adequate level of health literacy

This study was conducted on eighty-four reproductive women who referring to health centers in Qazvin. The mean age of women in the control and intervention groups was 35.1 ± 8.6 and 34.3 ± 7.3 years, respectively (Table 1).

Table 1. Demographic characteristics of the studied women

Personal information		Control		Intervention		Test result
		Percentage	Number	Percentage	Number	
Marital status	Single	5	11.9	4	9.5	$\chi^2=0.724$ df=1 p=0.124
	Married	37	88.1	38	90.5	
	Total	42	100	42	100	
Education	Below diploma	9	21.4	8	19	$\chi^2=1.28$ df=2 p=0.526
	Diploma	15	35.7	11	26.2	
	Academic	18	42.9	23	54.8	
	Total	42	100	42	100	

There was no significant difference between the mean scores of awareness, severity, perceived barriers, and self-efficacy in control and intervention before the intervention ($p > 0.05$). However, the educational intervention was effective on all constructs of the HBM except the perceived sensitivity and cues to action ($p < 0.05$; Table 2).

Table 2. Mean scores of the constructs of the Health Belief Model in the intervention and control groups before and after the intervention

Variables	Group	Before the intervention		Immediately after the intervention		Three months after the intervention		Test result
		Mean	SD	Mean	SD	Mean	SD	
Awareness	Control	9	3.15	8.59	3.10	9.52	2.76	F=4.652 P=0.012
	Intervention	9.14	2.96	10.95	2.95	11.07	2.44	F=7.324 p=0.001
	Test result	t=-0.214; df=82 p=0.831		F=11.047 p=0.001		F=13.897 p<0.001		
Perceived sensitivity	Control	19.50	1.62	19.66	1.73	19.38	1.68	F=0.707 p=0.496
	Intervention	21.54	2.00	22.57	6.39	21.92	1.82	F=0.762 p=0.47
	Test result	F=25.52 p<0.001		F=1.751 p=0.189		t=-5.144; df=82 p<0.001		
Perceived severity	Control	19.28	1.72	19.42	1.84	19.42	2.00	F=0.615 p=0.543
	Intervention	18.95	3.18	22.19	2.67	20.71	4.16	F=11.021 p<0.001
	Test result	t=0.596; df=82 p=0.553		F=33.402 p<0.001		F=4.741 p=0.032		
Perceived benefits	Control	18.47	2.50	18.33	1.97	18.16	2.19	F=0.939 p=0.395
	Intervention	20.04	2.41	20.97	1.81	20.66	2.72	F=2.23 p=0.114
	Test result	t= -2.92; df=82 p=0.004		F=29.261 p<0.001		F=12.175 p=0.001		
Perceived barriers	Control	11.30	1.35	12.50	3.56	12.04	2.26	F=3.633 P=0.031
	Intervention	11.54	2.73	11.00	2.97	10.30	2.72	F=2.172 P=0.12
	Test result	t= -0.506; df=82 p=0.614		F=4.662 p=0.034		F=10.712 p=0.002		
Self-efficacy	Control	16.76	1.94	16.00	1.91	16.2	1.88	F=10.383 p<0.001
	Intervention	16.69	3.03	18.73	1.87	18.92	3.51	F=8.636 p<0.001
	Test result	t=0.128; df=82 p=0.898		F=51.807 p<0.001		F=24.001 p<0.001		
Cues to action	Control	22.61	1.26	22.66	1.60	22.97	1.50	F=1.551 p=0.218
	Intervention	21.26	3.42	24.66	3.62	23.35	3.54	F=11.185 p<0.001
	Test result	t= 2.41; df=82 p=0.018		F=10.948 p=0.001		F=1.414 p=0.238		
Behavior	Control	11.28	1.51	11.33	1.95	11.19	1.68	F=17.956 p<0.001
	Intervention	12.54	2.53	14.38	2.18	15.00	2.15	F=31.226 p<0.001
	Test result	t=-2.76; df=82 p=0.007		F=51.392 p<0.001		F=51.804 p<0.001		

Discussion

This study aimed to investigate the effect of the HBM-based educational program on adopting preventive behaviors for breast cancer in women of reproductive age in Qazvin. Our results showed a significant difference in the mean scores of HBM constructs after the intervention between the two groups, indicating the educational program's effectiveness in promoting preventive behaviors from breast cancer in studied samples.

In the present study, the mean score of women's awareness increased significantly immediately and three months after the educational intervention, which is consistent with the results of Ansarifar et al. (20), Kalan Farmanfarma et al. (18), Masoudi Yekta et al. (21), Hajian et al. (22), and Eskandari et al. (23).

Sadeghi et al. (24) showed that before and after the educational intervention, the mean score of awareness in both groups was not statistically significant, which is not consistent with our results and can be due to the number of training sessions (two 60-min sessions).

In the present study, the mean score of perceived sensitivity of women immediately after the training intervention was not statistically significant and the mean score of perceived sensitivity increased significantly three months after the educational intervention. These results are consistent with the results of Kalan Farmanfarma et al. (18), Modi et al. (25), Eskandari et al. (23), and Bakhtari et al. (26). Ansarifar et al. (20) showed that the mean score of perceived sensitivity significantly increased immediately after the educational intervention in the intervention group compared to the control group, which is not consistent with our study. According to HBM, if a person believes that he or she is at risk for a disease, such as cancer (perceived sensitivity) and understands the degree of danger and severity of its various

complications in her life (perceived severity), he/she will adopt preventive behaviors (27).

In this study, the mean score of perceived severity significantly increased after educational intervention, which is in line with the findings of Ghaffari et al. (28) and Ansarifar et al. (20). Nahidi et al. (29) showed that the mean score of perceived severity after the educational intervention was not statistically significant between the two study groups, which is not consistent with the results of our study and can be due to the duration of the training sessions (90 min per session) that can result in fatigue and paying no attention to the educational content. It is believed that having information and awareness alone is not enough to perform a behavior, and the way of thinking and attitude toward disease is an important factor in taking a preventive measure (30).

In the present study, the mean score of women's perceived benefits after the educational intervention was significantly increased, and the mean score of perceived barriers was significantly reduced. These results are consistent with the results of Karimi et al. (30), Ansarifar et al. (20), Modi et al. (25), Hajian et al. (22), Kalan Farmanfarma et al. (18), and Mood et al. (25). Nahidi et al. (29) showed that the mean score of perceived benefits did not show a significant difference between the two groups after the educational intervention and this finding is not consistent with the results of our study. HBM puts perceived barriers and benefits in the context of value expectation, which means that when perceived barriers prevail over expected benefits, there is a low chance to perform a behavior (31). There is a strong relationship between perceived benefits and adopting a preventive behavior. On the other hand, perceived barriers play the most important role in expecting preventive behaviors (30).

In the present study, the mean score of female

self-efficacy after educational intervention significantly increased, which is consistent with the results of Ansarifard et al. (20), Hajian et al. (22), Abbar et al. (32), Kalan Farmanfarma et al., Ghaffari et al. (28), and Sharifikia et al. (33). Self-efficacy is the understanding of a person to perform a behavior. Self-efficacy plays an important role in self-examination behaviors and has a prominent effect on health behaviors so that self-efficacy increases the persons' capability to perform a behavior.

In the present study, the mean cues to action increased significantly immediately after the educational intervention; however, its mean score showed no significant difference three months after the intervention. This result is consistent with the results of Talazar et al. (34) and is not consistent with those of Sadeghi et al. (24), Baharzadeh et al. (35), which can be due to the stages of study; in both studies, post-test was done only three months after the intervention, which can make the control group more sensitive to the subject.

In the present study, the mean score of women's behavior after the educational intervention significantly increased, which is consistent with the results of Eskandari et al. (23), Nahidi et al. (29), and Alavi Langroudi et al. (36) and is not consistent with those of Ghaffari et al. (28). The reason for inconsistency can be due to differences in the sample size and statistical population. Our used program that was provided continuously for a month significantly increased self-efficacy and preventive behavior, and the HBM-based educational program promoted the HBM constructs in participants. Therefore, using this model is recommended for other educational and prevention programs.

The HBM-based educational program promoted the constructs of HBM; thus, the intervention used was proportional to the

HBM. Considering the importance and effect of education on increasing breast cancer preventive behaviors, there is a need for education large-scale studies based different measures and it should be considered as a priority.

In this study, the implementation of educational intervention was at the time of the COVID-19 outbreak in Iran and the world; thus, we assessed some limited breast cancer prevention behaviors using social media. Also, the sample size was small, and the study was performed in Qazvin, which may affect the Generalizability of the results. Data collection using self-reporting was another limitation of this study. Conducting the study on women as a vulnerable group and those who transmit health messages to relatives and friends was the strength of this study. Based on the findings of the present study indicating the positive effect of the educational program on the adoption and promotion of breast cancer prevention behaviors, it is suggested that these programs be widely used for vulnerable groups along with other health care to make the families of high-risk people involved in the training and be provided with educational contents. Also, conducting relevant interventions and studies to assess the effectiveness of e-learning to promote preventive behaviors of breast cancer using a larger sample size.

Conclusion: The HBM is effective in promoting breast cancer prevention behaviors. Therefore, continuous educational interventions with focus on increasing awareness, reducing perceived barriers, and improving self-efficacy regarding breast cancer are recommended.

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Competing of Interest: The authors declare that they have no competing interests.

References

- Huston TL, Simmons RM. Ablative therapies for the treatment of malignant diseases of the breast. *The American journal of surgery*. 2005;189(6):694-701. <https://doi.org/10.1016/j.amjsurg.2005.03.011> PMID:15910722
- Bray F, Ferlay J, Soerjomataram I, Siegel RL, Torre LA, Jemal A. Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA Cancer J Clin*. 2018;68(6):394-424. <https://doi.org/10.3322/caac.21492> PMID:30207593
- He R, Zhu B, Liu J, Zhang N, Zhang W-H, Mao Y. Women's cancers in China: a spatio-temporal epidemiology analysis. *BMC Women's Health*. 2021;21:116. <https://doi.org/10.1186/s12905-021-01260-1> PMID:33743648 PMID:PMC7981806
- Momayyezi M, Fallahzadeh H. Construction and validation of breast cancer awareness scale in Iranian women. *J Caring Sci*. 2020;9(3):140-7. <https://doi.org/10.34172/jcs.2020.021> PMID:32963982 PMID:PMC7492964
- Nafissi N, Khayamzadeh M, Zeinali Z, Pazooki D, Hosseini M, Akbari ME. Epidemiology and histopathology of breast cancer in Iran versus other Middle Eastern countries. *Middle East J Cancer*. 2018;9(3):243-51.
- jannat alipoor Z, fotokian Z, keyhaian S, mahmoudian A, jahangasht K, samkhanian Z. wearing brassiere - a less well known factor associated with breast cancer in women. *Nurs Midwifery J*. 2019; 16 (12) :891-901
- Halbach SM, Ernstmann N, Kowalski C, Pfaff H, Pfoertner T-K, Wesselmann S, et al. Unmet information needs and limited health literacy in newly diagnosed breast cancer patients over the course of cancer treatment. *Patient education and counseling*. 2016;99(9):1511-8. <https://doi.org/10.1016/j.pec.2016.06.028> PMID:27378079
- Chew LD, Bradley KA, Boyko EJ. Brief questions to identify patients with inadequate health literacy. *Family medicine*. 2004;36(8):588-94.
- Eichler K, Wieser S, Brügger U. The costs of limited health literacy: a systematic review. *International journal of public health*. 2009;54(5):313-24. <https://doi.org/10.1007/s00038-009-0058-2> PMID:19644651 PMID:PMC3785182
- Rakhshkhorshid M, Navaee M, Nouri N, Safarzaii F. The association of health literacy with breast cancer knowledge, perception and screening behavior. *European journal of breast health*. 2018;14(3):144. <https://doi.org/10.5152/ejbh.2018.3757> PMID:30123879 PMID:PMC6092154
- Birhane K, Alemayehu M, Anawte B, Gebremariam G, Daniel R, Addis S, et al. Practices of breast self-examination and associated factors among female debre Berhan university students. *Int J Breast Cancer*. 2017;2017:8026297. <https://doi.org/10.1155/2017/8026297> PMID:28596921 PMID:PMC5449747
- Siddharth R, Gupta D, Narang R, Singh P. Knowledge, attitude and practice about breast cancer and breast self-examination among women seeking out-patient care in a teaching hospital in central India. *Indian J Cancer*. 2016;53(2):226-9. <https://doi.org/10.4103/0019-509X.197710> PMID:28071615
- Babaei S, Shakibazadeh E, Shojaeizadeh D, Yaseri M, Mohamadzadeh A. Effectiveness the Theory-Based Intervention Based on Health Belief Model on Health Promotion Lifestyle in Individuals Susceptible to Cardiovascular Diseases. *Iranian Journal of Health Education and Health Promotion*. 2020;8(3):224-39. <https://doi.org/10.29252/ijhehp.8.3.224>
- Glanz K, Rimer BK, Viswanath K. *Health behavior and health education: theory, research, and practice*. Hoboken: John Wiley & Sons; 2008.
- Vahedian-Shahroodi M, Tehrani H, Robat-Sarpooshi D, GHolian-Aval M, Jafari A, Alizadeh-Siuki H. The impact of health education on nutritional behaviors in female students: An application of health belief model. *International Journal of Health Promotion and Education*. 2021;59(2):70-82 <https://doi.org/10.1080/14635240.2019.1696219>
- Pourhaji F, Pourhaji F, Tehrani H, Talebi M, Peyman N. Perceived Threat and Stress Responses in The Face of Covid-19 based on Health Belief Model. *Journal of Health Literacy*. 2022;7(1):17-25.
- Khoshnoodi far M, Arabnezhad Z, Tehrani H, Akbari farmad S. The effect Blended training on comparison with in-person training on self-care behaviors in type 2 diabetes patients. *Iranian Journal of Health Education and Health Promotion*. 2019;7(4):333-42. <https://doi.org/10.29252/ijhehp.7.4.333>
- Kalan-Farmanfarma K, Zareban I, Jalili Z, Shahrakipour M. Effectiveness of education based on the health belief model on performing preventive measures for breast cancer among female teachers in Zahedan. *J Educ Community Health*. 2014;1(1):11-8. <https://doi.org/10.20286/jech-010111>
- Kalan Farmanfarma K, Jalili Z, Zareban I, Shahrakipour M, Bahrami M. Predictors of preventive behavior breast cancer based on health belief model in teachers of secondary schools of Zahedan city. *J Zabol Med Sch*. 2013;5(3): 47-56
- Ansarifar T, Karimi Moneghi H, Ranjbar H, Farzadmehr M,

- Sadeghi M. Evaluating the effect of education based on the health belief model in taking the preventive behaviors for breast cancer among female health workers. *J Torbat Heydariyeh Unive Med Sci*. 2020;8(2):14-22. [Persian]
- 21- Masoudiyekta L, Rezaei-Bayatiyani H, Dashtbozorgi B, Gheibizadeh M, Malehi AS, Moradi M. Effect of education based on health belief model on the behavior of breast cancer screening in women. *Asia Pac J Oncol Nurs*. 2018;5(1):114-20. https://doi.org/10.4103/apjon.apjon_36_17 PMID:29379843 PMCID:PMC5763428
 - 22- Hajian S, Vakilian K, Najabadi KM, Hosseini J, Mirzaei HR. Effects of education based on the health belief model on screening behavior in high risk women for breast cancer, Tehran, Iran. *Asian Pac J Cancer Prev*. 2011;12(1):49-54.
 - 23- Eskandari-Torbaghan A, Kalan-Farmanfarma K, Ansari-Moghaddam A, Zarei Z. Improving breast cancer preventive behavior among female medical staff: The use of educational intervention based on health belief model. *Malays J Med Sci*. 2014;21(5):44-50.
 - 24- Sadeghi R, Khanjani N, Hashemi M, Movagheripour M. Using health belief model to prevent skin cancer among farmers. *Iran J Health Educ Health Promot* 2014;2(3):215-22.
 - 25- Moodi M, Mood MB, Sharifirad GR, Shahnazi H, Sharifzadeh G. Evaluation of breast self-examination program using Health Belief Model in female students. *J Res Med Sci*. 2011;16(3):316-22.
 - 26- Bakhtariagdam F, Nourizadeh R, Sahebi L. The role of health belief model in promotion of beliefs and behaviors of breast cancer screening in women referring to health care centers of Tabriz in 2010. *Med J Tabriz Uni Med Sciences Health Services*. 2012;33(6):25-31.
 - 27- Glanz K, Rimer BK, Viswanath K. *Health behavior: Theory, research, and practice*. 5th edition. Hoboken: John Wiley & Sons; 2015.
 - 28- Ghaffari M, Esfahani SN, Rakhshanderou S, Koukamari PH. Evaluation of health belief model-based intervention on breast cancer screening behaviors among health volunteers. *J Cancer Educ*. 2019;34(5):904-12. <https://doi.org/10.1007/s13187-018-1394-9> PMID:29987586
 - 29- Nahidi F, Dolatian M, Roozbeh N, Asadi Z, Shakeri N. Effect of health-belief-model-based training on performance of women in breast self-examination. *Electron Physician*. 2017;9(6):4577-83. <https://doi.org/10.19082/4577> PMID:28848633 PMCID:PMC557138
 - 30- Karimi M, Hasani M, Khoram R, Gafari M, Niknami ShAD. The effect of education, based on health belief model on breast self-examination in health liaisons of Zarandieh city. *Zahedan J Res Med Sci (Tabib-E-Shargh)*. 2009;10(4):283-91.
 - 31- James AS, Campbell MK, Hudson MA. Perceived barriers and benefits to colon cancer screening among African Americans in North Carolina: how does perception relate to screening behavior? *Cancer Epidemiol Biomarkers Prev*. 2002;11(6):529-34.
 - 32- Abhar R, Hassani L, Montaseri M, Paydar Ardakani M. Survey of prostate cancer-preventive behaviors based on the health belief model constructs among military men. *J Prevent Med*. 2017;4(2):8-18.
 - 33- Sharifikia I, Rohani C, Estebsari F, Matbouei M, Salmani F, Hossein-Nejad A. Health belief model-based intervention on women's knowledge and perceived beliefs about warning signs of cancer. *Asia Pac J Oncol Nurs*. 2019;6(4):431-9. https://doi.org/10.4103/apjon.apjon_32_19 PMID:31572765 PMCID:PMC6696815
 - 34- Tol A, Majlessi F, Shojaeizadeh D, Esmaelee Shahmirzadi S, Mahmoudi Majdabadi M, Moradian M. Effect of the educational intervention based on the health belief model on the continuation of breastfeeding behavior. *J Nurs Educ*. 2013;2(2):39-47.
 - 35- Baharzadeh Kh, Marashi T, Saki A, Zare Javid A, Araban M. Using of health belief model to promote preventive behaviors against iron deficiency anemia among pregnant women. *J Res Health*. 2017;7(2):754-62.
 - 36- Alavi Langroudi SM, Fallahzade H, Mostafavi Darani F. The effect of education based on health belief model on knowledge and attitude of health care workers towards colon cancer screening in Yazd, Iran. *J Health Syst Res*. 2019;15(3):177-83. <https://doi.org/10.32592/hsr.2020.15.3.109>