Original Paper

Breast Cancer Screening Behaviors Based on Health Belief Model

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ABSTRACT

Introduction: The incidence and mortality of breast cancer will be reduced by screening.

Objective: The study aimed to determine breast cancer screening behaviors based on the health beliefs model in women living in Mashhad City, Iran.

Materials and Methods: This analytical cross-sectional study was conducted on 406 women referring to five health-medical centers in Mashhad from July 2018 to May 2019. They were selected by the multistage sampling method. The study data were collected with a questionnaire based on health belief model constructs consisting of two parts. The first part collects sociodemographic information. The second part is based on constructs of the health belief model (perceived susceptibility, perceived barriers, perceived severity, cues to action, and self-efficacy). The collected data were analyzed using descriptive and inferential statistics (the Smirnov-Kolmogorov, the Pearson correlation, and the Spearman test).

Results: The Mean±SD age of the participants was 33.5±10.3 years, and perceived severity and perceived susceptibility of breast cancer screening behaviors were low and very low in 36.4% and 8.1% of the women, respectively. Perceived barriers were high in 70% of women; cues to action and self-efficacy were low in 57.4% and 17.2%, respectively. There was a negative and significant relationship between perceived barriers and perceived benefits (P=0.001, r=-0.160). Also, there were significant statistical relationships between preventive behavior with self-efficacy (P=0.001, r=0.896) and cues to action (P=0.001, r=0.269). However, the Pearson test showed a negative and significant relationship between age and self-efficacy (P=0.001, r=-0.231).

Conclusion: The present study highlights the educational programs for preventing breast cancer screening behaviors based on the health belief model. These programs should focus on increasing breast self-examination skills and understanding the perceived benefits of breast cancer screening behaviors.

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Highlights

• According to statistics, breast cancer is the common cause of death in Iranian women aged 35-55 years.

• The health belief model suggests that people's beliefs about health problems, perceived benefits of action, barriers to action, and self-efficacy explain engagement/non-engagement in health-promoting behavior.

• Every year, millions of cancer patients can be saved from premature death and suffering if they have timely access to early detection and treatment.

Plain Language Summary

Breast cancer is one of the most common cancers and accounts for one-third of all cancers in women. It is the second leading cause of cancer death. The incidence and mortality of breast cancer will be reduced by screening. This study aimed to determine breast cancer screening behavior among women and its relationship with the health belief model scales in Mashhad City, Iran. A total of 406 women referring to five healthcare centers in Mashhad were selected, and the health belief model was used in predicting breast cancer screening behavior of women. The study results showed that breast screening behaviors of women were undesirable. Most women did not have clinical breast exams. There were associations between preventive behavior with self-efficacy and cues to action. The results also showed a negative and significant relationship between age and self-efficacy.

Introduction

In 2020, 2.3 million women were diagnosed with breast cancer, and 685000 of them died globally. As of the end of 2020, there were 7.8 million women alive who have been diagnosed with breast cancer in the past 5 years, making it the world's most prevalent cancer. There are more lost disability-adjusted life years by women due to breast cancer globally than any other type of cancer [1]. According to an estimate in 2020, the greatest cancer-related mortality will be observed in developing countries. In contrast, disease burden will reduce in Western countries due to the healthy lifestyle and better health facilities [2]. In Iran, breast cancer has been identified as the most common cancer and the fifth leading cause of death among Iranian women. The standardized incidence rate is about 28 per 100000 people, which has increased in recent years [3].

Every year, millions of cancer patients could be saved from premature death and suffering if they had timely access to early detection and treatment [4]. Survival for breast cancer is generally good, particularly if it is diagnosed early [5]. The most effective early detection methods are breast self-examination, mammography, and clinical breast examinations by physicians and healthcare professionals [6]. Breast cancer mortality is reduced by 40% in women aged 40-74 years who participate in screening every 1-2 years [7]. Breast self-examination can help detect 10% of breast cancer cases, especially in younger women who did not undergo mammography [8]. Secondary prevention through monthly breast self-examination is the best option to tackle the rising incidence of breast cancer [9]. A study has shown that age, level of education, information about breast cancer, family history of cancer, and understanding the importance of screening are influential factors in performing breast cancer self-examination [10]. Another breast cancer screening method is the clinical breast examination by a physician. About two-thirds of the reduction in breast cancer mortality could be attributed to clinical breast examination [11].

In the study of Tuyen, 15.8% of women underwent clinical breast examination [12]. Mammography is one of the best screening methods. This method is an early and timely diagnosis of breast cancer before it reaches a diameter of 5 mm [13]. Use of mammography in women under 50 with timely diagnosis and treatment of cancer results in a 5-year relative survival rate of around 90% [14]. According to the investigations, despite the availability of appropriate, accessible, and low-cost screening programs for all individuals, public acceptance of using these facilities is negligible [15]. In the Alharbi study, the attitude of women teachers about breast cancer and its screening methods is positive, but most do not refer to breast screening [16]. Ramli found a relationship between women's health beliefs and mammography [17]. However, very few studies have

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been conducted on other factors related to screening tests for common cancers in Iran.

The Health Belief Model (HBM) has been widely used to assess health beliefs about cancer screening behaviors; it is a cognitive model that attempts to identify health behavior patterns. In general, this model focuses on changes in beliefs that lead to changes in behaviors [18, 19]. The effectiveness of this model has been reported on issues such as breast self-examination [20], breast cancer screening behavior [21], thalassemia education in high school students [22], and so on. In internal studies, it is affected on breast cancer screening behaviors [23], effect of education based on health belief model on the behavior of breast cancer screening [24]. Considering the rising trend of breast cancer in Iran, this study aimed to determine breast cancer screening behaviors based on HBM in Mashhad.

Materials and Methods

This study is an analytical cross-sectional study. The samples consisted of 406 women referred to five health centers in Mashhad City and agreed to participate in the study. The sample size was estimated based on previous studies. According to the previously published research, the actual frequency of perceived severity (one of the constructs of the health belief model) was 58% [25], and considering an attrition rate of 10%, the sample size is presented as it follows: (Z=1.96; P=0.58; d=0.05). The inclusion criteria were the ability to read, write, and speak in Persian, residence in Mashhad for at least 5 years, and no history of breast cancer. The exclusion criteria included people who completed the questionnaires incompletely or did not answer the questions at all. The study was carried out from July 2018 to May 2019, after the Ethics Committee approved the research project.

Based on the multistage cluster sampling method, each one of five major health centers in Mashhad was considered one cluster (five clusters in total). Besides, there was also a list of other health centers they covered. Then, each cluster was divided into subcategories based on the socioeconomic similarities of the districts. Next, one district was randomly selected from each cluster, and two health centers were randomly chosen from the list of centers in that region. The subjects with the inclusion criteria were selected from the patients of these centers. They were selected by the convenience sampling method.

The data collection tool was a questionnaire consisting of two parts. The first part collected sociodemographic data, including age, marital status, education, occupation, spouse occupation, household income, number of family members, insurance status, and family history of breast cancer. The second part consisted of questions based on Health Belief Model (HBM) constructs that measure women's beliefs about breast cancer screening. This part contains 83 items that were answered based on a 5-point Likert scale. Each item has 5 response choices ranging from strong disagreement (1 point) to strong agreement (5 points). The HBM constructs were the perceived susceptibility (3 items, the score range: 3 to 15), perceived severity (12 items, the score range: 12 to 60), perceived benefits (16 items, the score range: 16 to 80), perceived barriers (25 items, the score range: 25 to 125), cues to action (6 items, the score range: 6 to 30), and self-efficacy (18 items, the score range: 18 to 90) [26]. In this study, the psychometric version in Persian of this tool has been used [27].

The researcher attends the selected health centers after receiving the research approval from the University Ethics Committee and obtaining a referral letter from Mashhad School of Nursing and Midwifery. Then, the researcher submitted the referral letter to the authorities of the five health centers of Mashhad. After obtaining the women's consent to participate in the research, they were given an informed consent form, and the data were completed by face-to-face interview.

The data were analyzed in SPSS software, v. 16. To describe the data, statistical indices, standard deviation, and frequency distribution tables were used. Also, we used the Kolmogorov- Smirnov to check the normal distribution of data and the Pearson and Spearman tests for data analyses.

Results

In this study, 406 women were studied. The Mean±SD age of the women was 33.5±10.3 years. Table 1 presents the sociodemographic characteristics and breast screening behaviors of the women under study.

To determine the normal distribution of data, we used the Kolmogorov-Smirnov test. The Mean±SD score of health belief model constructs related to cancer screening behavior in women were as follows: perceived susceptibility, 66.4±18.9; perceived severity, 50.1±21.4; perceived benefits, 28.8±16.6; perceived barriers, 59.0±16.4; cues to action, 38.3±18.7; and self-efficacy 56.2±17.5.

Table 2 presents the severity of health belief model constructs among women about cancer screening be-

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havior. One percent of women had very low suscepti-bility. The self-efficacy of 2.2% of women was very low.

Table 3 presents the correlation between health belief models constructs. The results of the Pearson correla-tion coefficient showed that the relationship between perceived barriers and perceived benefits was negative and significant (P=0.001, r=-0.160) (Table 3).

Regarding the relationship between health belief constructs and women's preventive behaviors, the Spearman statistical test did not show significant rela-tionships between preventive behavior with perceived susceptibility, perceived severity, perceived benefits, and perceived barriers. But this test showed significant relationships between preventive behavior with self-efficacy (P=0.001, r=0.896) and cues to action (P=0.001, r=0.269) (Table 4).

The Pearson correlation test did not show significant relationships between self-efficacy and education, job, spouse's job, and income. However, this test showed a negative and significant statistical relationship between age and self-efficacy (P=0.001, r=-0.231).

Discussion

This study examines breast cancer screening behaviors in women in Mashhad health centers and determines its relationship with the constructs of the health belief model. Considering the results, the breast screening behaviors of women were undesirable. Most women did not have a clinical breast exam. Almost half of them did not do breast self-examinations during the last year. Many women did not refer for physician's examination during the last year and mammography in the last three years. Women in the Amani et al. study had a better performance concerning mammography and breast self-examination [28]. This difference may be related to education, occupation, and the context of conduct-ing research. Women in the Zahedi's study performed better than women in the present study in performing breast self-examination, clinical breast examination by a physician, and mammography [29].

The results showed that the women had moderate to high susceptibility and perceived severity of breast can-cer screening behaviors. They also had good self-efficacy but did not understand the benefits of breast screening and felt many barriers to breast cancer screening, too. Considering the results, women in the present study perceived fewer benefits for performing breast cancer prevention behaviors. But lack of knowledge or aware-ness of the benefits of breast cancer screening was not related to women's performance. The factor that led the women to study breast cancer screening was not its perceived benefits but the women's sense of self-effica-cy. The results of this study are in line with the Sahraei's study results. She reported that only 10.9% of women have regular breast self-examinations, and self-efficacy was a strong predictor of breast self-examination [30].

Considering the results, perceived benefits are directly related to perceived severity. The higher the perceived severity of the disease outcomes, the greater a person's belief in positive outcomes associated with breast can-cer prevention behaviors. Different perceived barriers within various levels (individual, intrapersonal, health systems, and community) play influential roles in wom-en's decisions to participate in breast cancer screening program. Another area where women are less likely to be screened for breast cancer is perceived barriers to their understanding. In summary, different barriers in-fluence women's decisions to undergo breast cancer screening behaviors. In the present study, most women reported moderate and high perceived barriers to breast screening. In another study, the most important per-ceived barriers to breast screening were lack of aware-ness, barriers to access (financial, geographical, cultural), fear (of consequences and pain), the performance of service providers, women's beliefs, delaying screening, embarrassment, long wait for receiving care [31].

The results demonstrated that perceived barriers had a statistically significant relationship with perceived sus-ceptibility and perceived severity but are inversely re-lated to perceived benefits. The cue to action is directly related to perceived benefits. Perceived severity has a significant relationship with perceived susceptibility. Perceived benefits are directly related to perceived se-verity. But only self-efficacy and cues to action could pre-dict breast cancer screening behaviors. HBM recognizes that sometimes wanting to change a health behavior is not enough to make someone do it. Accordingly, two more elements are necessary to get an individual to leap. In other words, two elements of cues to action and self-efficacy predict cancer screening behavior. Self-efficacy has statistically significant relationships with perceived susceptibility, cue to action, and perceived benefits.

Self-efficacy looks at people's beliefs in their abilities to make health-related changes. If women believe that they are at risk and know potential positive aspects of changing behavior to reduce the threat of disease, they have greater confidence in their ability and thus are more likely to engage in healthy behaviors. In Momenyan et al.

Table 1. Sociodemographic characteristics and preventive behaviors of women

Variables		No.(%)
Marital status	Single	91(22.4)
	Married	303(74.6)
	Divorced	12(3.0)
Level of education	High school	113(27.8)
	Diploma	127(31.3)
	Associate degree	31(7.6)
	Bachelor	98(24.1)
	Master and higher	37(9.1)
Job	Employed	157(38.7)
	Housewife	221(54.4)
	A retired teacher	1(0.2)
	Student	26(6.4)
	Retired	1(0.2)
Spous's job	Self-employed	191(61.8)
	Employee	98(31.7)
	Unemployed	16(5.2)
	Retired	4(1.3)
Household income	Higher than enough	15(3.7)
	Enough	319(78.6)
	Less than enough	72(17.7)
Number of family members	1	3(0.7)
	2	68(16.7)
	3	110(27.1)
	≥4	225(55.4)
Insurance status	Free	51(12.6)
	Social security	208(51.2)
	Armed forces	303(74.6)
	Rural	30(7.4)
	Health service	97(23.9)
	Retirement	1(0.2)
	Relief committee	1(0.2)

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Variables		No.(%)
Family history of breast cancer	Yes	38(9.4)
	No	368(90.6)
Breast self-examination during last year	Yes	198(48.7)
	No	208(51.3)
Doctor's examination in the last year	Yes	81(20.0)
	No	325(80.0)
Mammography in the last three years	Yes	35(8.6)
	No	371(91.4)

[32], Hosseini et al. [33], and Teymouri and Habibi [34] studies, there was a significant relationship between self-efficacy and breast self-examination. The results of the present study are consistent with their results. To explain this relationship, it can be said that women that feel and believe in more self-efficacy to prevent or control breast cancer are more engaged in breast cancer screening behaviors. A person with self-efficacy feels empowered in doing a particular activity, adopts health-promoting behaviors, and quits harmful behavior. Therefore, understanding self-efficacy can help maintain health-promoting behaviors. People with low self-efficacy have a more challenging time looking at issues and will have a one-dimensional, superficial view of problems. Self-efficacy means the belief in oneself to perform a particular behavior successfully and expect the results. Self-efficacy is an essential prerequisite for behavior. Self-efficacy affects a person's motivation and forces the person to strive and persevere in behavior [35].

Other results in the self-efficacy section showed that the sense of self-efficacy decreases with age. In the

study of Teymouri and Habibi, the sense of self-efficacy reduced with the increasing age of women [34]. One of the reasons for these findings is that as women get older, they feel that they can no longer take care of themselves or recognize the symptoms of the disease in their bodies earlier. Studies have shown that self-efficacy varies with age. In both sexes, self-efficacy increases throughout childhood and early adulthood, peaks in middle age, and decreases after age 60 [36].

The present study results showed that although the women in the study felt moderate to high self-efficacy, but did not show good performance in this area. A small percentage of women underwent clinical breast examination by a physician last year or have been referred for mammography for the past three years. The present study results are consistent with the results of Hosseini's study [33]. These results suggest that women think they have a lower chance of developing breast cancer. The studies have mentioned another reason for not performing screening behaviors, which was related to not feeling problems and pain in the breast. Women

Table 2. The severity of health belief model constructs related to cancer screening behavior in women

Constructs	No.(%)				
	Very High	High	Medium	Low	Very Low
Perceived susceptibility	88(21.7)	173(42.6)	112(27.6)	29(7.1)	4(1.0)
Perceived severity	34(8.4)	96(23.6)	128(31.5)	122(30.0)	26(6.4)
Perceived benefits	4(1.0)	13(3.2)	70(17.2)	208(51.2)	111(27.3)
Perceived barriers	34(8.4)	173(42.6)	145(35.7)	51(12.6)	3(0.7)
Cues to action	9(2.2)	39(9.6)	133(32.8)	173(42.6)	52(12.8)
Self-efficacy	32(7.9)	147(36.2)	157(38.7)	61(15.0)	9(2.2)

Table 3. Correlation between health belief models constructs in the study samples

Constructs		Perceived Susceptibility	Perceived Severity	Perceived Benefits	Perceived Barriers	Cues to Action
Perceived severity	r	0.494				
	P*	0.001				
Perceived benefits	r	0.064	0.211			
	P*	0.196	0.001			
Perceived barriers	r	0.261	0.059	-0.160		
	P*	0.001	0.001	0.001		
Cues to action	r	0.027	0.059	0.265	-0.078	
	P*	0.592	0.239	0.001	0.117	
Self-efficacy	r	0.125	-0.010	0.161	-0.042	0.391
	P*	0.012	0.835	0.001	0.395	0.001

* The Pearson correlation coefficient

avoid screening behaviors because they think that they should have a breast self-examination or visit by a doctor only if they have abnormal signs and symptoms in their breasts. This misconception is a major reason for many women who do not perform screening behavior [36].

A cue to action is something that helps move someone from wanting to make a health change to actually making the change. They are external events that prompt a desire to make a change. Cues in the environment trigger action and act on individual perceptions, such as perceived benefits. The present study results are similar to the results of Masoudi's study [37].

The health belief model is based on the theory that individuals' tendency to change toward healthier behaviors depends on factors, such as perceived suscep-

tibility, perceived severity, perceived benefits, and perceived barriers. Therefore, it can recognize the concerns of women for breast cancer screening behaviors. This study showed that breast self-examination behaviors (self-examination, clinical examination, and mammography) in women are low and undesirable. Self-efficacy and cues to action are the two main components of the HBM in performing breast cancer screening behaviors. Self-efficacy, which actually reflects a person's perception of performing the appropriate behavior to achieve the desired condition, has been introduced in many studies as a predictor of health behaviors, including self-examination and clinical breast examination. Therefore, by strengthening self-efficacy through educational programs, women can adopt appropriate behavior. Limitations of the present study included uncontrolled factors such as the subject's personality, cultural models, the

Table 4. Correlation of health belief model constructs and preventive behaviors

Constructs	Preventive Behaviors (r)	P*
Perceived susceptibility	0.056	0.224
Perceived severity	0.125	0.151
Perceived benefits	0.064	0.211
Perceived barriers	0.061	0.159
Cues to action	0. 269	0.001
Self-efficacy	0.896	0.001

* The Spearman correlation coefficient.

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effects of social class on behavior, and level of expectation which can influence the answers to questionnaires.

Since self-efficacy in the present study has been found to be the main factor for performing breast cancer prevention behaviors, it is suggested to examine the factors that increase self-efficacy to perform screening behaviors in women of different reproductive ages.

Ethical Considerations

Compliance with ethical guidelines

The study participants were informed about the study objectives, and they and one of their parents signed an informed consent form. They were also assured of the confidentiality of their information. Moreover, they were allowed to leave the study, and the study results would be available to them. This study obtained its ethical approval (IR. MUMS. REC. 2016. 593) from Mashhad University of Medical Sciences.

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Authors' contributions

Study concept and design, manuscript preparation: Morvarid Irani, Fatemeh Ghaffari Sardasht, and Khadije Mizaii Najmabadi; Literature review and statistical analysis: Maryam Fasanghari, Fatemeh Ghaffari, and Morvarid Irani; Designing, reviewing the questionnaire and manuscript review: All authors.

Conflict of interest

The authors declared no conflict of interest.

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