RESEARCH ARTICLE

Editorial Process: Submission:04/18/2022 Acceptance:12/02/2022

Factors Associated with Breast Cancer Mammographic Screening Behavior among Iranian Women

Farzaneh Esna-Ashari[1], Narges Saffari[2], Hamideh Parsapour[3], Forouzan Rezapur-Shahkolai[4]*

Abstract

Breast cancer is one of the most common diseases of women, which can increase the survival of patients with its early diagnosis. Despite the existence of relatively sensitive methods of early detection of breast cancer, such as mammography, statistics show that a small number of women perform mammography according to the recommended clinical guidelines. Using the health belief model, this study aims to determine the factors affecting mammography among women teachers in Hamedan. **Methods:** This study was conducted on 458 female teachers aged 40 years and older of Hamadan city, in western part of Iran, during October to December of 2019. The participants were asked about the factors affecting mammography based on the health belief model. Questionnaires were completed by self-reported method and analyzed by SPSS software at 95% confidence interval. **Results:** The average age of the study participants was 46±4.1 years. Among the participants, about 41.5% had performed mammography at least once. In univariate analysis, the constructs of the health belief model generally predicts performing mammography between 35 and 49 percent. In multivariate analysis, age 46 to 50 years, having supplementary insurance, history of breast disease, perceived barriers with odds ratio of 3.4, 3.4, 10.6 and .89, respectively, were significantly related to mammography. **Conclusions:** Female teachers over 45 years of age with a history of breast disease, if they do not have financial or other barriers to do mammography, perform breast cancer screening.

Keywords: Breast cancer- screening- health belief model- Iran

Asian Pac J Cancer Prev, **23 (12)**, 4073-4078

Introduction

Different types of cancer are of the leading causes of illness and death in the world (Bray et al., 2018). The burden of cancer in developing countries is increasing because of the aging of the population as well as the lifestyle coupled with smoking, immobility, and westernization of diets (Jemal et al., 2011).

Breast cancer is a serious health problem that affects both developing and developed countries, and its prevalence is higher in many developed countries. (Bray et al., 2018). Breast cancer as the most prevalent malignancy in women worldwide accounts for 11.7% of all new cases of cancer and 24.5% of the all-new cases of cancer in women. It is also the cause of 6.9% of all cancer deaths and 15% of all cases of death due to cancer in women (Bray et al., 2018).

More than 2 million cases of breast cancer (47.8 per 100,000) are reported annually, and more than 600,000 cases (13.6 per 100,000) lose their lives to breast cancer (Bray et al., 2018). During the last ten years, the incidence of cancer in women and the younger population of Asia has increased, and this increase has occurred mostly in breast, thyroid and lung cancers. Studies have shown that the incidence of breast cancer in Asian-Pacific women aged 20 to 49 has increased from 2004 to 2013 (Shoemaker et al., 2018). According to the global cancer statistics (GOLOBOCAN), in 2018, the standardized age in all Asian countries and West Asian countries were reported to be 36.8 and 45.3 per 100,000 respectively, and the standardized mortality rate were reported to be 11.9 and 13.6 per 100,000 people (Bray et al., 2018) Generally, 1,026,171 new cases of breast cancer in Asia (10.8% of all cancers and 22.9% of women's cancers), 346,009 deaths (6% of all cancer-related deaths in Asian countries) and a five-year prevalence of 3,218 496 (141.97 per 100,000) has been reported (Global Cancer Observatory., 2020).

In Iran, breast cancer has been reported to be the most common cancer in women emerging at a age standardized incidence rate and mortality rate of 35.8 and 10.8 per

*[1]Department of Community Medicine, School of Medicine and Research Center for Social Determinants of Health, Hamadan University of Medical Sciences, Hamadan, Iran. [2]General Physician, School of Medicine, Hamadan University of Medical Sciences, Hamadan, Iran. [3]Department of Obstetrics and Gynecology, Fatemieh Hospital, Hamadan University of Medical Sciences, Hamadan, Iran. [4]Department of Public Health, School of Public Health and Research Center of Health Sciences, Hamadan University of Medical Sciences, Hamadan, Iran.*For Correspondence: forouzan.rezapour@gmail.com*

100,000 people, respectively (Global Cancer Observatory Iran., 2020). Early diagnosis in order to improve the outcome of the breast cancer is the most important factor in cancer control.

The survival rate of breast cancer is strongly related to the diagnostic stage of the cancer. In carcinoma in situ, the 5-year survival rate is 99%, while breast cancer with distant metastasis has a 5-year survival rate of 29% (cancer stat facts., 2021). Several methods are used for breast cancer screening. Clinical breast examination (CBE), ultrasound, mammography and MRI (Luo et al., 2022).

CBE is used as an alternative method to mammography in low to middle income countries (da Costa Vieira et al., 2017).

Although about 5-10% of breast cancer cases can be detected by clinical examination, several factors such as the patient' age, the skill of the clinician, and the patient's body mass index affect the sensitivity of the method (Oestreicheret al., 2002). It should, however, be accompanied with long periods of time for examination. Moreover, follow-ups on false positives are also considered (Elmore et al., 2018).

Therefore, there is still controversy in the use of CBE as an effective screening method (Luo et al., 2022). Ultrasound is used as an easy, radiation-free and painless method for breast cancer screening (Guo et al., 2017).

Of course, ultrasound is a complementary method next to mammography or a substitute for it in special cases (Ma et al., 20211). Ultrasound is used instead of mammography in young women with very dense breasts (Melnikow et al., 2016).

Ultrasound has some disadvantages. It is totally dependent on the operator and may miss tiny nonobvious masses as well as fat-rich breast lesions (Luo et al.,2022).

Mammography is used as the most well-established technique in breast cancer screening. Although mammography is used as an effective method in the early detection of breast cancer, its effectiveness depends on several factors such as breast density, patient'age and lesion size. The breast density has the biggest impact on the efficacy of mammography in early diagnosis of breast cancer (Luo et al., 2022). The sensitivity of mammography is reduced in women with dense breasts compared to fatty breasts (30-64% versus 76-98%) (Niell et al.,2017). Early detection of breast cancer with mammography significantly reduces the death caused by breast cancer by 20 to 40%. Annual mammography screening of women aged 40 to 84 years prevents more deaths than screening every two years for women aged 50 to 74 years (Niell et al., 2017)

Breast cancer screening is done in Europe, the United States, Canada, Japan, the Republic of Korea, Singapore, Australia and New Zealand. Latin American countries, West and Central Asia, North Africa have little or no well-developed programs. In Sub-Saharan Africa, no country has a national program for breast cancer screening (Luo et al., 2022). Japan is the first Asian country that started breast cancer screening with CBE in 1987 and continued with mammography. The target age for screening in Japan was 40 years or older and the screening interval was two years (Hamashima et al., 2016).

China designed and implemented two large screening pilot studies in 2008 using CBE, mammography, and ultrasound. The target age of screening and its coverage in urban and rural areas were 35 to 69 years - 54.4% and 35 to 59 years - 63.1%, respectively (Huang et al. ,2016).

Malaysia implemented opportunistic breast cancer screening in 2009 using CBE every three years in women aged 20 to 39 years and annually in women older than 40 years. Mammography was performed in women who had a high risk of breast cancer. The percentage of screening coverage was 51.8% (Dahlui et al., 2011). The Republic of Korea started population-based screening in 1999 for those older than 40 years using CBE and mammography at two-year intervals (kim et al., 2011).

Singapore has also started breast cancer screening for ages 50 to 69 by performing mammography every two years since 2002 (Singapore MoH, 2010). Vietnam conducted a pilot screening study using CBE in 2008 with coverage of 15-20% (Nguyen et al., 2013). In Iran, the national breast cancer screening program has been started since. Women aged 30 to 69 years at the first level of primary health care system are assessed for the risk of breast cancer, taking into account clinical symptoms and medical histories (personal or family history of cancer as well as history of chest radiotherapy), and after Clinical breast examination, if one of the three mentioned cases is abnormal, based on the instructions to perform ultrasound, mammography, and also a visit to a surgical specialist after imaging, they will be referred to higher levels. Among the introduced people, a few will refer to higher levels for follow-up. In addition, apart from the national program, women can go privately for imaging (mammography or ultrasound) as well as a visit to a surgical specialist.

Due to the high prevalence of breast cancer in Iranian women and the sensitivity of mammography tests in the diagnosis of breast cancer, it seems necessary to encourage women to have mammograms. Encouraging women to have mammograms requires a change in their attitudes, beliefs, and behaviors, and to change people's behaviors, it is essential to know their beliefs and motivations. Many researchers have studied on mammography screening-related beliefs, using the Health Belief Model (HBM) as one of the most popular models to assess peoples' attitude, beliefs and behaviors and to improve behaviors through developing more appropriate interventional programs (Allahverdipour et al., 2011; Taymoori et al., 2012). The HBM has six constructs including Perceived susceptibility (subjective belief that a person may get a disease or a harmful condition as a result of a particular behavior); Perceived severity (belief in the extent of harm that can result from getting a disease or a condition as a result of a particular behavior); Perceived benefits (Belief in the advantages of the manners suggested for decreasing the risk or seriousness of the disease or a harmful condition resulting from a particular behavior); Perceived barriers (belief regarding actual and imagined costs of doing the suggested behavior); Cues to action (encouraging force that makes a person feel the need to take action); and Self-efficacy (confidence in one's ability to perform the new behavior) (Sharma, 2021).

Considering the importance of evaluating beliefs and

behaviors related to people's health in order to encourage them to perform preventive behaviors, this study aims to determine beliefs related to breast cancer screening behaviors with mammography among female teachers, using Health Belief Model.

Materials and Methods

This descriptive study was carried out in the female teachers of Hamadan, which is located in the west of Iran during October to December of 2019. The participants of the study, who were female teachers aged 40 years and older, were invited to participate in the study. After obtaining informed consent 458 out of 513 people participated in the survey (Response rate was 89%).

Data collection instrument was a researcher-made questionnaire. It consisted of four sections:

1. Demographic information included age, marital status and education level.

2. Mammography screening behavior with 7 questions was the second part of the questionnaire.

3. Knowledge related to breast cancer, its risk factors, and questions related to the benefits of mammography were included in the knowledge section of the questionnaire with 3, 18, and 7 questions, respectively.

4. Champions' questionnaire was used to measure mammography screening behavior based on health belief model.

The reliability and validity of this questionnaire has been evaluated by Teymoori and Berry among Iranian women. Although a few numbers of questions were added to the questionnaire and the opinions of the experts in the field of health education and promotion, community medicine and Gynecology were used to check the final validity. The Cronbach's alpha coefficient was used to measure the reliability of the questionnaire. The Cronbach's alpha values were 81.2, 84.5, 78.2, 89.8, 84.7, 90.1 and 81.7 percent, for the constructs of perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and Self-efficacy and knowledge, respectively.

The constructs of HBM with 5-point Likert scale ("completely agreed", scored with 1, to "disagreed", scored with 5) included perceived susceptibility with 3 questions (score ranged from 3 to 15); perceived severity with 10 questions (score ranged from 10 to 50); perceived benefits with 6 questions (score ranged from 6 to 30); perceived barriers with 13 questions (score ranged from 13 to 65); cues to action with 3 questions (score ranged from 3 to 15); and self-efficacy with 7 questions (score ranged from 7 to 35).

Obtained data were analyzed using SPSS version 23 software (SPSS Inc., Chicago, IL, USA). Continuous variables were reported as mean ± standard deviation (SD) and frequencies for categorical variables reported as n (%). Mentioned variables were compared in adherent and non-adherent groups using Chi-square test and t-test for qualitative and quantitative variables, respectively.

Every person who has done mammography at least once in their lifetime is considered as adherent group. To evaluate the factors associated with adherence to mammography, binary logistic regression analysis was performed. By using stepwise regression analysis (forward LR), all the independent variables which entered into the model, are sorted according to the value of the score from top to bottom, if they are significant. A significance level of 5% was considered.

Results

In this study, 458 female teachers with an average age of 46±4.1 years were included in the study. The demographic characteristics of the studied population are shown in the table1. Among the participants in the study, 190 (41.5%) people have performed mammography at least once, and the average age at which mammography was performed was 41.3±4.6 years (20~62).

One hundred one participants (58.7%) have performed mammography once and 78 participants (41.3%) have performed it more than once. The interval between each mammography was one year for 18 participants (23.1%), 2 years for 30 participants (38.5%), and the other 30 participants have performed mammography irregularly. The number of participants who have had their first

Table 1. Characteristics of the Study Population

Variables(n)	n (%)	Variables (n)	n (%)
Age group(432)		Education(451)	
40-45	212 (49.1)	Associate's	66 (14.6)
46-50	175 (40.5)	Bachelor's	281 (62.3)
>50	45 (10.4)	Master's	104 (23.1)
Marital Status(454)		Income(449)	
Single	47 (10.4)	High	56 (12.5)
Married	407 (89.6)	Moderate	268 (59.7)
Insurance (451)		Supplemental insurance (445)	
Health insurance	370 (82)	Yes	114 (25.6)
Other	81 (18)	No	331 (74.4)
Breast disease history (452)		Cancer history in family(458)	
Yes	112 (24.8)	Yes	36 (7.9)
No	340 (75.2)	No	422 (92.1)

Table 2. Level of Knowledge about Breast Cancer, Its Risk Factors, and Mammography in the Population Under Study

Knowledge	Adherent group Mean±SD	Non-adherent group Mean±SD	P value
Breast cancer	0.93±0.93	0.91±0.93	0.84
Risk factors	7.30±3.66	7.05±3.54	0.51
Mammography	3.84±1.51	3.69±1.5	0.69

Table 3. Constructs of the Health Belief Model and Performing Mammography

Health Belief model	Adherent	Non- Adherent	P value
Perceived susceptibility	9.1±2.8	8.4±3.1	0.019*
Perceived severity	37.1±6.6	37.5±7.2	0.628
Perceived benefits	24.2±3.5	23.5±3.8	0.105
Perceived barriers	30.1±8.6	37±9.7	<0.001*
Cue to action	53.9±1.4	53.1±2	0.183
Self-Efficacy	30.7±4	27.7±4.8	<0.001*

*, Statistically significant

mammography at the age of less than 40, between 40 and 45, and over 45 years was 100 (52.9%), 59 (31.2%), and 30 (15.9%) respectively. The age at which the last mammography was performed in 42 participants (57.5%) was less than or equal to 45 years, and in 31 participants (42.5%) was more than 45 years.

The level of participants' knowledge about breast cancer and its risk factors, as well as awareness of the benefits and importance of mammography scored 0.91±0.92 , 7.16±3.51 and3.79±1.49 respectively, which differ significantly from the maximum accountable answer (3-18-7) (p<0.001). No relationship was found between the level of knowledge and performance of mammography (Table 2). Mean score of perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cue to action, and self-efficacy were 8.7±3, 37.7±6.9, 23.8±3.7, 33.9±9.8, 53.6±1.7, and 28.9 ±4.8 respectively, which is significantly lower in comparison with the maximum acquired score in each field (one sample t –test, p value<0.001).

Table 4. The Predictive Demographic Factors of Performing Mammography

Health Belief model+F7:I37F7:J36F7:J35F7:KF7:K36	Adherent	Non- Adherent	Un-adjusted OR	Adjusted OR	CI for OR
Age group					
40-45 (reference group)	33.2	60.9	1		
46-50	51.1	33.7	2.9*	3.4*	1.8-6.4
>50	15.7	6.4	4.5*	2.2	0.8-6.1
Marital Status					
single (reference group)	8.5	11.7	1		
Married	91.5	88.3	1.4		
Education					
Associate's (reference group)	20.4	10.6	1		
Bachelor's	51.6	69.8	0.3*		
Master's	28	9.6	0.7		
Income					
High (reference group)	13.2	11.9	1		
Average	58.7	60.4	0.8		
Low	28.1	27.7	0.9		
Insurance					
Health insurance	76.2	90	2.8*		
Other (reference group)	23.8	10	1		
Supplemental insurance					
Yes	78.1	71.7	1.4	3.4*	1.8-6.4
No (reference group)	21.9	28.3	1		
Breast disease history					
Yes	46.6	9.1	8.7*	10.6*	4.8-23.2
No (reference group)	53.4	90.9	1		
Cancer history in family					
Yes	10.5	6	1.8		
No (reference group)	89.5	94	1		
HBM					
Perceived barriers	30.1±8.6	37±9.7	0.89*	0.89*	0.85-.92

*, Statistically significant; OR Odds ratio.

The relationship between the constructs of the Health Belief Model and performing mammography is shown in Table 3. In univariate analysis , according to the Cox&Snell R Square, the constructs of the health belief model generally predict performing mammography between 35 and 49 percent.

With logistic regression analysis, it was determined that only perceived barriers are significantly related to performing mammography (odds ratio= 0.891, CI (0.823-0.964). Knowledge about the importance and benefits of mammography and risk factors of breast cancer, respectively, predict 0.3 and 0.2 percent of the changes.

In the final multivariate analysis, by entering the studied variables into the model using a stepwise logistic regression model, variables of age, history of breast disease, having insurance , Perceived barriers and cue to action of HBM remained significantly in the model and about 82% were able to predict mammography, which is shown in Table 4.

Discussion

In this study, the relationship between health beliefs and breast cancer screening as well as the factors affecting it in female teachers were investigated. The present study revealed that a relatively high percentage of the sample under study had a history of mammography at least once (41.5%). In previous studies, the ratio of mammography in women varied from 20% to about 80% (Chkotua et al., 2017; Monfared et al., 2017). The frequency of mammography in developed countries and between the ages of 45 and 69 years is higher compared to the age of less than 45 years and more than 69 years.(Gumus et al., 2010).

The highest rate of mammography was performed at the age of under 40 years and only 15% of women over 45 years had performed mammography. The sensitivity and specificity of mammography for the early detection of breast cancer is age-dependent and is higher at older ages, and the positive predictive value at the age of less than 40 years is 1.3% (Ciatto et al., 2013). In younger women, the risk of developing cancer in the next ten years and the benefits of screening are not worth the stress, over diagnosis and over treatment, and even obvious physical harm (Klarenbach et al., 2018). It is suggested that mammography be performed in women aged 40 to 49 years with average risk based on consultation with the patient and evaluation of benefits and risks (Jordan et al., 2019; Qaseem et al., 2019).

Studies have shown that breast cancer occurs at a younger age in Asian countries compared to European countries, and the incidence of cancer after the age of 60 is less or similar to 45 to 55 years of age, while in European countries, the highest incidence rate is at 60 years and older and it steadily increases with age (Mousavi-Jarrahi et al., 2013). Also studies have shown that in Asian countries, despite the incidence of cancer at younger ages, the rate of mammograms performed at these ages is low (Wang et al., 2014). Although in the present study, 80% of women who had mammograms were less than 45 years old, and the results of the study showed that the only effective construct in the health belief model was perceived barriers, but this construct did not have a significant difference in different age groups.

Several studies have shown that having knowledge about breast cancer and its risk factors and screening with mammography has a significant impact on performing mammography. Although no significant results were obtained in this study. In general, according to the role of teachers in teaching students, increasing the awareness of teachers has an important role in preventing breast cancer.

Although teachers with higher education had more knowledge about braset cancer risk factors, this increase in awareness was not related to mammography In this study, having a history of breast disease compared to other variables had the greatest impact on mammography. About 80% of women who had a history of breast disease had a mammogram, and 100% of women who had a mammogram at the age of 40 had a history of breast disease. In some studies, the effect of history of breast disease has been investigated separately and it has been shown that women with a history of disease perform mammography twice as often.The other influential variables were age ,having supplemental insurance and the construct of perceived barriers, respectively. Studies have shown that age, place of residence, level of education, history of breast cancer, and hormone therapy all affect the likelihood of having a mammography.

In the present study, the effect of age on mammography is in line with the study conducted in Taiwan among women aged 60 to 69 years, where older women have performed more mammography., although in this study, generally a younger age group was studied. One of the most important and effective factors influencing the performance of mammography is having supplementary insurance. Considering that one of the sources of funding for Iran's health system is out-of-pocket payment, therefore supplementary insurance can be effective for mammography by reducing out-of-pocket payment. Of course, poor financial status can be a barrier in performing mammography, which has also been examined in the construct of perceived barriers.

This study has shown that women who have fewer barriers such as such as time-consuming, painful, fear of outcome, radiation hazards, cultural issues, lack of priority for mammography, lack of doctor's advice have performed more mammograms, significantly. In most studies done on the relationship between health belief model and mammography, the perceived barrier construct has been associated with mammography. In general, female teachers over 45 years of age with a history of breast disease, if they do not have financial barriers to do mammography, perform breast cancer screening.

Author Contribution Statement

Esna-Ashari F contributed to the conception and design of the study, Conducted data analysis and wrote the first version of the manuscript. Saffari N completed all data collection and contributed to the review of manuscript. Rezapur F and Parsapour H contributed to the writing and revision of the manuscript. All authors read and approved

the final manuscript.

Acknowledgements

The authors wish to thank all the teachers who participated in this research work The authors wish to thank all the teachers who participated in this reseach work as well as health deputy of Hamadan education and training department. This study was approved and supported by Hamadan University of Medical Sciences.

Ethical approval

This study was approved by Ethical Committee of Hamadan University of Medical Sciences (Code: IR.UMSHA.REC.1398.315).

Funding

This research work was supported by Deputy of Research and Technology of Hamadan University of Medical Sciences [grant number: 9804253257].

Availability of data

The data and their analysis are available

Declaration of competing interest

There was no conflict of interest.

References

Allahverdipour H, Asghari-Jafarabadi M, Emami A (2011). Breast cancer risk perception, benefits of and barriers to mammography adherence among a group of Iranian women. *Womens Health*, **51**, 204-19.

Bray F, Ferlay J, Soerjomataram I, et al (2018). Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA-Cancer J Clin*, **68**, 394-424.

Chkotua S, Peleteiro B (2017). Peer Reviewed: Mammography Use in Portugal: National Health Survey 2014. *Prev Chronic Dis*, **14**.

Ciatto S, Houssami N, Bernardi D, et al (2013). Integration of 3D digital mammography with tomosynthesis for population breast-cancer screening (STORM): a prospective comparison study. *Lancet Oncol*, **14**, 583-89.

Elmore JG, Aronson M, Melin J (2018). Screening for breast cancer: Evidence for effectiveness and harms. UpToDate [Internet].

Gumus AB, Cam O, Malak AT (2010). Socio-demographic factors and the practice of breast self examination and mammography by Turkish women. *Asian Pac J Cancer Prev*, **11**, 57-60.

Jemal A, Bray F, Center MM, et al (2011). Global cancer statistics. *CA Cancer J Clin*, **61**, 69-90.

Jordan V, Khan M, Prill D (2019). Breast cancer screening: why can't everyone agree?. *Prim Care*, **46**, 97-115.

Klarenbach S, Sims-Jones N, Lewin G, et al (2018). Recommendations on screening for breast cancer in women aged 40–74 years who are not at increased risk for breast cancer. *CMAJ*, **190**, 1441-51.

Monfared A, Ghanbari A, Jansar Hosseini L, et al (2017). Status of screening by mammography and its related factors in the general population of women in Rasht. *Iran J Nurs*, **30**, 32-41.

Mousavi-Jarrrahi SH, Kasaeian A, Mansori K, et al (2013). Addressing the younger age at onset in breast cancer patients in Asia: an age-period-cohort analysis of fifty years of quality data from the international agency for research on cancer. *ISRN*, **2013**.

Qaseem A, Lin JS, Mustafa RA, et al (2019). Screening for breast cancer in average-risk women: a guidance statement from the American College of Physicians. *Ann Intern Med*, **170**, 547-60.

Sharma M (2021). Theoretical foundations of health education and health promotion: Jones Bartlett Learning.

Taymoori P, Berry T, Farhadifar F (2012). Predicting mammography stage of adoption among Iranian women. *J Educ Health Promot*, **1**.

Wang W-L, Hsu S-D, Wang J-H, et al (2014). Survey of breast cancer mammography screening behaviors in Eastern Taiwan based on a health belief model. *Kaohsiung J Med Sci*, **30**, 422-27.