

Determinants of mammography screening behavior in Iranian women: A population-based study

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Background: Breast cancer remains a substantial health concern in Iran due to delay and late stage at diagnosis and treatment. Despite the potential benefits of mammography screening for early detection of breast cancer, the performance of this screening among Iranian women is low. For planning appropriate intervention, this study was carried out to identify mammography rates and explore determinants of mammography screening behavior in females of Isfahan, Iran. **Materials and Methods:** In this population-based study, 384 women of 40 years and older were interviewed by telephone. The Farsi version of Champion's Health Belief Model scale (CHBMS) was used to examine factors associated with mammography screening. The obtained data were analyzed by SPSS (version 16.0) using statistical Chi-square, Fisher Exact test, t-test and multiple logistic regression model to identify the importance rate of socio-demographic and Health Belief Model (HBM) variables to predict mammography screening behavior. In all of tests, the level of significant was considered $\alpha = 0.05$. **Results:** Mean age \pm SD of women was 52.24 ± 8.2 years. Of the 384 participants, 44.3% reported at least one mammogram in their lifetime. Logistic regression analysis indicated that women were more likely to have mammography if they heard/read about breast cancer (OR = 4.17, 95% CI 2.09, 8.34), menopause in lower age (OR = 0.2, 95% CI 0.87, 0.99) and history of breast problem (OR = 0.9, 95% CI 0.12, 0.32). Also, women who perceived more benefits of mammography (OR = 1.84, 95% CI 1.63, 2.09), fewer barriers of mammography (OR = 0.91, 95% CI 0.86, 0.96) and had more motivation for health (OR = 0.94, 95% CI 0.89, 1) were more likely to have mammography. **Conclusion:** The findings indicated that the rate of mammography screening among women in Isfahan province is low and highlights the need for developing a comprehensive national breast cancer control program, which should be considered as the first priority for healthcare providers. Also, identification of these factors can help to design an appropriate educational intervention that focuses on benefits of mammography screening, decreasing changeable barriers, improving access to mammography, increasing health motivation, promoting perceived self-efficacy and mammography adherence.

Key words: Breast cancer, health belief model, mammography screening, women

INTRODUCTION

In recent years, breast cancer remains a substantial health concern because it is the most frequently diagnosed type of cancer among women throughout the world.^[1,2] International statistics reveals incremental incidence of breast cancer and it is growing more quickly in low incidence rate communities.^[3,4] The American Cancer Society estimated that 226,870 new cases of invasive breast cancer and 39,920 deaths (39,510 women and 410 men) occurred in the United States in 2012.^[5]

In Asian countries, especially, Islamic Republic of Iran, this increase in incidence rate has provoked breast cancer as one of the most common cancers among Iranian women.^[6] According to the literature, there are few reports about breast cancer in Iran. The National Cancer Registry reports from 2003 to 2006 showed that the numbers and rates of breast cancer among women are rising sharply, as new cases of breast cancer and Age-Standardized Rate (ASR) increased nearly two-fold from 2003 (3,250 cases, 12.40 per 100,000) to 2006 (6,456 cases, 25.06 per 100,000).^[7] The latest formal report from the Cancer Institute of Iran showed that breast cancer constitutes 25% of all cancers in Iranian females and the most in age group of 35–44 years.^[8] On the whole, breast cancer encompasses 41.24% and 93.25% of women cancers in our country and Isfahan, respectively.^[9] Results of an epidemiological review on breast cancer in Iran demonstrated that 82% of women are diagnosed with advanced stage breast cancer (18% Stage II and 77% Stage III).^[6]

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Diagnosis of breast cancer in the late stage and delay in prompt treatment of this disease is related to lower survival rate.^[10,11] If breast cancer were detected at an early stage, survival rate could be improved to as high as 95%.^[6] Several surveys have indicated decrease in breast cancer-related mortality among women since 1990, the result of both early detection and improvement in treatment.^[5,12,13] Although breast cancer incidence rate in Iran is still low in comparison with developed countries (25/100,000 in Iran compared with 140.8/100,000 in U.S.), Iranian females have a higher risk of breast cancer death in contrast with these countries.^[7] Mousavi *et al.* study showed that over 36% tumors occur in women who are under 40 years old.^[14] In reality, one of every four Iranian female receives their diagnosis when the disease has already spread.^[10]

As a result of having the opportunity to be diagnosed in preclinical stage, reducing breast cancer morbidity and mortality depends on secondary prevention.^[13,15] The object of breast cancer screening is to combine early diagnosis with effective treatment to decrease in both morbidity and mortality rate.^[16] Mammography, clinical breast examination (CBE), and breast self examination (BSE) are generally used as secondary preventive methods.^[1,17]

Ministry of Health and Medical Education in Iran recommends the following schedule for breast cancer screening: (1) Mammography: women 40 years and older should have a mammogram every year, (2) CBE: women between 20 and 40 years should have a CBE every 3 years and after the age 40 years a yearly CBE by a health professional, (3) BSE: women 20 years of age and older should perform a BSE every month.^[18] Also, The American Cancer Society, the American Medical Association (AMA) and the American College of Obstetricians and Gynecologist (ACOG) recommend that women aged 40 and older should have screening mammography annually and going on it as long as they are in good health.^[5,13,19]

At present, population-based breast cancer screening techniques, especially mammography, are presented in the majority of western countries. This program is present only in two countries of Asia: Japan from 1987 and Singapore from 2003.^[20] The sensitivity and specificity of mammography screening is estimated to be 39% to 89% and 94% to 97% respectively.^[21] Population-based screening program in U.S. in 463,372 mammography screenings showed a general sensitivity of 75% and specificity of 92.3%.^[22]

Despite the potential benefits of mammography screening for breast cancer in women aged 40 years and older, the finding of studies (few studies) revealed that the performance of breast cancer screening among Iranian women is low (1.3% to 30.5%).^[8,23-27] Therefore, maximizing participation

of women in our community in mammography screening must be considered a fundamental priority. Previous studies have shown that mammography screening is associated with perceptions of risk, benefits, and barriers by using a reasoning process that encompasses personal and social effects and attitudes.^[19,28]

Many mammography studies applied Health Belief Model (HBM) to distinguish factors related to mammography.^[26,28-31] The most important barriers reported pain of mammography, embarrassment, not having a doctor recommending it, and barriers related to the health care system.^[29,32-34] Effectiveness factors in having a mammography screening among Iranian women are unknown. Therefore, in this study, the HBM has been applied as the theoretical framework to determine variables related to mammography screening performance.

The HBM is by far the most commonly used theory in health education and health promotion.^[35,36] This model is a psychological model, which originally advanced in the 1950s as a way to explain why medical screening programs offered by U.S Public Health Services, especially tuberculosis, were not very successful.^[35,36] The basic concept of HBM is that health behavior is determined by personal beliefs or perceptions about a disease and the strategies available to reduce its action.^[35,36] The HBM has been extensively used to investigate beliefs linked to breast cancer screening behaviors such as mammography.^[19,37-39]

The HBM comprises 6 concepts: (1) Perceived susceptibility (women believe that they have the chances of getting breast cancer), (2) perceived severity (belief that breast cancer is a serious and fatal disease), (3) Perceived benefits (perceive more benefits from mammography screening), (4) Perceived barriers (perceive barriers to having a mammography), (5) Health motivation (women's motivation related to performing the health behaviors) and (6) Self-efficacy: (level of women's confidence about successfully having a mammography).^[37,40-42] Many researchers have introduced the predictive power of the HBM in breast cancer screening behavior, particularly mammography.^[34,43,44]

In our review of the scientific literature, few studies have examined factors related to mammography screening behavior in Iran, and these studies are targeted towards special groups of women.^[26,32,45] Also, no research has investigated these variables in Isfahan women. Given the high rate of breast cancer in Isfahan,^[9] determining these factors can provide useful framework for designing appropriate interventions to promote mammography screening in Isfahanian women. Therefore, the purpose of this study was to identify mammography rates and explore factors associated

with mammography screening behavior by employing components from HBM among females of Isfahan, Iran.

MATERIALS AND METHODS

Study design and sample

This study was a population-based survey in which the factors related to mammography screening behavior on the basis of HBM were investigated. The sample population of this research was women aged 40 years and older in Isfahan, a city located in the central region of Iran. Inclusion criteria for participation in this study included being a Isfahanian women aged 40 years and older, no personal history of breast cancer, willingness to participant in the survey, and being able to speak. Therefore, we excluded females with a history of breast cancer and women <40 years old.

Telephone interviews were carried out with 348 women >40 years of age randomly selected from the communication center of Isfahan, Iran. At first, 2500 immobile telephone numbers were acquired from Isfahan communication center, which were randomly chosen from all of telephone centers of Isfahan city. Telephone interviews were accomplished over a 14-week period from March 2011 through June 2011. One female PhD student of health education conducted all telephone interviews. At first, the interviewer briefly explained the purpose of the survey and how their response may help future planning for women's health. Also, confidence was given to each person including its anonymous and voluntary nature. Then, data was collected from those who verbally consented to participate. Each telephone interview lasted about 20–45 minutes. From a total of 2500 telephone calls, there was no response from 985 (39.4%) telephone calls, 82 (3.28%) of the telephone numbers were blocked, 196 (7.8%) were not women, 648 (25.92%) women were in the unsuitable age group (<40 years old), and 589 (23.56%) contained a woman in the appropriate age group (>40 years old) which 205 women were not eligible to be interviewed in the study due to unwillingness to participate or having personal history of breast cancer [Figure 1]. For each telephone number for which there was no response or where the women were absent, telephone dialing was repeated a total of three times at different times of the day with at least one time being the weekend. As a result, 348 women were interviewed by telephone. The Ethical Committee of Isfahan Medical University approved the study.

Instruments

Data collection instruments include four sections:

Socio-demographic questions, knowledge about breast cancer and mammography, screening behavior of mammography, and the HBM scale.

Information such as age, marriage age, age of first birth, level of education, current marital status, number of children, breastfeeding duration, menopausal status, health insurance coverage, monthly household income, having first-degree relatives with history of breast cancer, and personal history of breast problems provided the socio-demographic variables.

To measure the women's level of knowledge of breast cancer, we used 11 questions in a checklist, which was developed by the researchers based on an extensive review of the published studies. These questions were about breast cancer risk factors (6 items), signs and symptoms of breast cancer (1 item), early detection of breast cancer, and mammography screening (4 items). For all of the questions, except the symptom of breast cancer, the answers were "true", "false," and "don't know." For each question, true response was scored 1, false and don't know = 0. Thus, for each woman, a score between 0 and 11 was computed.

Mammography screening behavior was assessed using three questions. These questions were included: (1) "Have you ever had a mammogram (yes/no)" (2) If yes, "number of mammography," and (3) "The time of last mammography screening."

To assess beliefs and attitudes about breast cancer and mammography, we used the Champion Health Belief Model Scale (CHBMS). It is a commonly used scale to measure HBM components. The CHBMS was developed in 1984 and it has been revised three times.^[46] The latest version of the CHBMS was adapted for Iranian use by Taymoori and Berry.^[47] In this study, we used the Farsi version of the CHBMS after obtaining allowance from authors. This scale includes 61 items with eight subscales of which six subscales were used in this survey.

Perceived susceptibility:

This subscale measures a woman's perceptions about her chances of getting breast cancer by three items including: (1) "It is likely that I will get breast cancer," (2) "My chances of getting breast cancer in the next few years are great," and (3) "I feel I will get breast cancer sometime during my life" (Cronbach $\alpha = 0/82$).

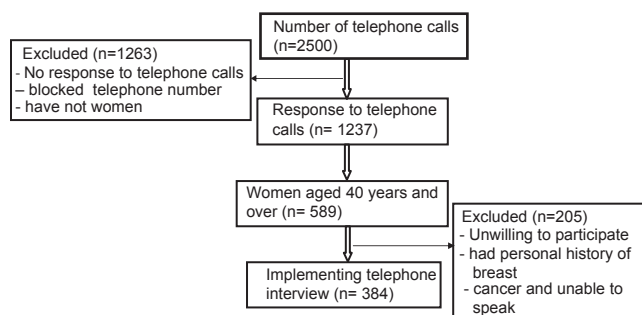


Figure 1: Flow chart of study participants

Perceived severity

Perceived severity was assessed using a seven-item scale about a female’s beliefs with reference to severity of breast cancer: (1) “The thought of breast cancer scares me,” (2) “When I think about breast cancer, my heart beats faster,” (3) “I am afraid to think about breast cancer,” (4) “Problems I would experience with breast cancer would last a long time,” (5) “Breast cancer would threaten my relationship with my husband,” (6) “If someone had breast cancer, her whole life would change,” and (7) “If someone developed breast cancer, she would not live longer than 5 years” (Cronbach a = 0/84).

Health motivation

Health motivation was measured by the following seven-item scale: (1) “I want to discover health problems early,” (2) “Maintaining good health is extremely important to me,” (3) “I search for new information to improve my health,” (4) “I feel it is important to carry out activities that will improve my health,” (5) “I eat well-balanced meals,” (6) “I exercise at least 3 times a week,” and (7) “I have regular check-up even when I am not sick” (Cronbach a = 0/77).

Mammography benefits

Mammography benefits were determined using a six-item scale: (1) “When I get a recommended mammogram, I feel self-satisfied,” (2) “If I get a mammogram and nothing is found, I don’t worry as much about breast cancer,” (3) “Having a mammogram will help me find breast lumps early,” (4) “Having a mammogram will decrease my chances of dying from breast cancer,” (5) “If I find a lump through a mammogram, my treatment for breast cancer may not be as bad,” and (6) “Having a mammogram is the best way for me to find a very small lump” (Cronbach a = 0/72).

Barriers of mammography

Barriers of mammography were evaluated by a 10-item scale: (1) “I am afraid to have a mammogram because I might find out something is wrong,” (2) “I am afraid to have a mammogram because I don’t understand what will be done,” (3) “I don’t know how to go about getting a mammogram,” (4) “Having a mammogram is too embarrassing,” (5) “Having a mammogram takes too much time,” (6) “Having a mammogram is too painful,” (7) “I cannot remember to schedule a mammogram,” (8) “I have other problems more important than getting a mammogram,” (9) “I am too old to need a routine mammogram,” and (10) “If regularly performing Breast Self Examination, don’t need to have mammography.” (Cronbach a = 0/73).

Mammography self-efficacy

Mammography self-efficacy surveyed women’s confidence in having mammography screening using following four-item scale: (1) “I am confident that I can have a mammogram”; (2)

“I am confident that I can get a visit time from physician for mammography”; (3) “I am confident that I can regulate my time”; and (4) “I am confident that I can get a mammogram even if it would be painful” (Cronbach a = 0/84).

All items of HBM subscales have five response options ranging from strongly disagree = 1 to strongly agree = 5. Higher scores express more agreement with health beliefs except for barriers to mammography. Each subscale was calculated separately, and therefore, six different scores were obtained for each subject.

Data analyses

The obtained data were analyzed by SPSS version 16.0 (SPSS Inc, Chicago, Illinois). Descriptive analyses were used to summarize the subject’s variables. Chi-square,

Table 1: Sample characteristics based on telephone conversation (n = 384)

Variable	Mean (SD)	N	%
Age	52.24 (8.21)		
Marriage Age	17.16 (4.13)		
First pregnancy Age	19.12 (4.16)		
Menopause Age	47.75 (5.41)		
Marital status			
Married		322	83.9
Widowed		54	14.1
Divorced/separated		8	2.1
Education			
Illiterate		69	18
Reading and writing ability		40	10.4
Elementary		101	26.3
Guidance		31	8.1
High school		28	7.3
Diploma		78	20.4
University		37	9.6
Employment status			
Employed		82	21.4
Housekeeper		302	78.6
Health Insurance			
Yes		321	83.6
No		63	16.4
History of breast problems			
Yes		113	29.4
No		271	70.6
Family history of breast cancer			
Yes		12	3.1
No		372	96.9
Ever heard/read about breast cancer			
Yes		242	63
No		142	37
Mammography in lifetime			
Yes		170	44.3
No		214	55.7

Fisher Exact test, and t-test were used for analyses. We conducted multiple logistic regression model to identify the importance rate of socio-demographic and HBM variables to predict mammography screening behavior. In all of tests, the level of significant was considered $\alpha = 0.05$.

RESULTS

Sample characteristics

The sample consisted of 384 women and their characteristics are shown in Table 1. It should be noted that a statistical formula was used to determine the sample size. The age of participants ranged from 40 to 80 years, with a mean of 52.24 years (SD = 8.21). Most participants (41.7%) were between 50 and 59 years of age. Mean of marriage age, the first pregnancy age, and menopause age was 17.16, 19.12, and 47.75 years, respectively. The majority of subjects (26.3%) had elementary graduation (grade less than 5). Most of the women (83.9%) were married, 14.1% were widowed, and 2.1% were separated or divorced. The majority of the women (78.6%) were housekeepers.

Most of the women (83.6%) had health insurance. Nearly one-third of the women (29.4%) reported history of problem or discomfort in their breast. Among these women, 45.1% expressed breast pain as the most common breast problem. Only 12 women (3.1%) had a first-degree relative who had been diagnosed with breast cancer. Forty-four percent of women reported having had at least one mammogram in their lifetime. Among these women, 14.3% stated receiving their most recent mammogram within the last 2 years, 17.4% between previous 2–5 years, and 68.2% reported longer than 5 years ago. Also, 63% of subjects stated that they heard/read information about breast cancer.

Factors related to having mammography

Comparison of the women's characteristics in the two groups (having mammography versus not having mammography) showed significant difference between the two groups with regard to menopause ($X^2 = 4.46$, $P = 0.03$), menopause age ($t = -2.24$, $P = 0.02$), hysterectomy ($X^2 = 7.77$, $P = 0.007$), income level ($X^2 = 9.57$, $P = 0.02$), history of breast problem ($X^2 = 89.5$, $P = 0.001$), family history of breast cancer ($X^2 = 4.7$, $P = 0.03$) and ever heard/read about breast cancer ($X^2 = 10.01$, $P = 0.001$) [Table 2]. Age, marriage age, pregnancy age, marital status, education, employment status, and health insurance were not related variables with having mammography.

To determine the relationship between having mammography and CHBMS subscales, independent t-test was used [Table 3]. Four subscales of HBM (health motivation ($t = 2.82$, $P = 0.005$), benefits ($t = 15.58$, $P = 0.001$), barriers ($t = -12.1$, $P = 0.001$), and self-efficacy ($t = 6.35$, $P = 0.001$) for mammography screening behavior) showed significant differences between the two groups (having mammography and not having mammography). Women who previously had at least a mammogram in their lifetime had higher levels of health motivation, perceived benefits, and perceived self-efficacy to mammography screening and fewer perceived barriers to having a mammogram. No significant differences were observed between two groups with regard to perceived susceptibility ($t = 1.96$, $P = 0.05$) and perceived severity ($t = 1.5$, $P = 0.1$).

Logistic regression analysis was used to predict factors related to having mammography. The result of this analysis showed three variables with significant odds ratio [see Table 4]. Women who stated heard/read about breast cancer were over four times more likely to having mammography

Table 2: Bivariate predictors of having mammography (n = 384)

Characteristics	Having mammography (n = 170)		Not having mammography (n = 214)		Statistics
	Mean (SD)		Mean (SD)		
Age	52.4 (7.1)		52.1 (8.9)		$P = 0.7$
Menopause age	46.9 (5.8)		48.5 (4.9)		$P = 0.02$
Menopause					$P = 0.03$
	Yes	108	63.5	113	52.8
	No	62	36.5	101	47.2
Hysterectomy					$P = 0.007$
	Yes	26	15.3	14	6.5
	No	144	84.7	200	93.5
Family monthly income					$P = 0.02$
	<3 00\$	39	22.9	49	22.9
	300-699\$	111	65.3	157	73.4
	700-999\$	17	10	6	2.8
	≥1000\$	3	1.8	2	0.9
History of breast problem					$P = 0.000$
	Yes	92	54.1	21	9.8
	No	78	45.9	193	90.2
Family history of breast cancer					$P = 0.03$
	Yes	9	5.3	3	1.4
	No	161	94.7	211	98.6
Ever heard/read about breast cancer					$P = 0.001$
	Yes	122	71.8	120	56.1
	No	48	28.2	94	43.9

than those who had not (OR = 4.17, 95% CI 2.09, 8.34). Women in menopause age were near to one time more likely to have mammography than those who not having (OR = 0.2, 95% CI 0.87, 0.99) and women who reported had history of breast problem were more likely to have had mammography than those who had not (OR = 0.9, 95% CI 0.12, 0.32).

Then, the CHBMS subscales were entered into logistic regression analysis to be tested as predictor factors for having mammography. Three significant odds ratios were identified [See Table 4]. The women who perceived more benefits of mammography (OR = 1.84, 95% CI 1.63, 2.09), fewer barriers of mammography (OR = 0.91, 95% CI 0.86, 0.96), and also had more motivation for health (OR = 0.94, 95% CI 0.89, 1) were more likely to have a mammography.

DISCUSSION

Breast cancer is one of the most common cancers, which have an enormous impact on the health of Iranian women.^[48] Mammography is one of the most effective methods for early detection of breast cancer. Literature published to date demonstrated that the mammography usage rate among Iranian women is lower^[8,26] compared with developed countries.^[33,49,50] Therefore, we need to study factors associated with mammography screening behavior among Iranian women.

In a few researches, were examined associated factors with mammography screening behavior in Iran. Also, samples of these studies were particular groups of women such as worker,^[26] and women attained to hospital or health centers.^[8,23-25,27] This study was conducted in

population-based sample. The study finding indicated that 44.3% women had at least one mammogram in their lifetime. Although this rate is higher in comparison with previous studies in Iran (range 1.6–30.5%),^[23-27] it is much lower than reported rates (ranging 15–79%) in developed countries.^[28,31,33,49] However, the rate of mammography can be different in different regions. One explanation for these differences can be due to socioeconomic conditions and healthcare system. Based on WHO prediction, a breast cancer epidemic in developing countries will occur as a result of socioeconomic conditions and increase in life expectancy.^[51] Despite this fact, screening rate is less than 5% in most developing countries.^[26] For example, Heidari’s study on women in south of Iran is surprising, considering that only 1.3% of the women had a mammography throughout their lifetime.^[8]

Mousavi *et al.* stated that because of high prevalence of cancer risk factors, increase of numbers of aging people, and increase in life expectancy, it is expected that in future the cancer cases will rise rapidly in Iran.^[52] Unfortunately, few national programs according WHO recommendation and guidelines for cancer screening are active in Iran.^[53] Annual mammography has recently been recommended for women 40 years and older by Iran Ministry of Health, but any nationwide population-based breast cancer screening programs were not accomplished in Iran. Several randomized trials and population-based programs have displayed that mammography screening increases successful treatment and decreases mortality risk among women.^[15,21,54,55] Most of the studies agreed that early detection is the only prevention method for breast cancer. Consequently, it is necessary to inform women regarding importance of annual mammography in decreasing

Table 3: Mammography compliance in evaluated individuals based on knowledge and CHBMS subscale. (n = 384)

Variables	Mammography in lifetime (n = 170)		No mammography in life lifetime (n = 214)		Statistics
	x	SD	x	SD	
Knowledge about breast cancer	5.07	3.1	3.76	3.2	P = 0.000
Perceived susceptibility	10.04	2.6	9.52	2.4	P = 0.05
Perceived severity	24.14	4.2	23.47	4.4	P = 0.13
Health motivation	23.63	5.5	22.09	5.1	P = 0.005
Perceived benefits	23.15	3.5	18.97	1.5	P = 0.000
Perceived barriers	20.51	6	27.86	5.8	P = 0.000
Perceived self-efficacy	12.88	4.3	10.29	3.7	P = 0.000

Table 4: Logistic regression analysis of sample characteristics for having mammography

Variables	B	S.E.	Wald	P-value	Odds ratio	95% confidence interval
History of breast problem	-1.55	0.24	41.71	0.000	0.211	0.12–0.32
Menopause age	-0.68	0.33	4.15	0.042	0.934	0.87–0.99
Ever hard / read about breast cancer	1.43	0.35	16.35	0.000	4.176	2.09–8.34
Mammography benefits	0.613	0.06	91.44	0.000	1.84	1.63–2.09
Mammography barriers	-0.92	0.03	12.37	0.000	0.91	0.86–0.96
Health motivation	-0.055	0.03	3.83	0.05	0.94	0.89–1.00

mortality of breast cancer in women and how to obtain these services.

The finding of bivariate analysis for examining variables associated with having mammography revealed significant relationship with menopause age, menopause, hysterectomy, income level, history of breast problems, family history of breast cancer, and ever heard/read information about breast cancer. Excluding (Except) variables of menopause age, menopause, and hysterectomy, other mentioned findings are in accordance with results of previous studies.^[34,56,57] These findings showed that women who had become menopausal in lower age or had history of hysterectomy more likely used mammogram in their lifetime, perhaps because these women more referred to physician for gynecology examination and were recommended to have mammography. Previous studies stated that recommendation by healthcare provider such as physician's recommendation and having a gynecologist as a regular physician are associated with higher mammography rate.^[28,33,58,59] Currently, there isn't a comprehensive national and free program for breast cancer screening in our country, and the women require a physician's prescription for getting mammography and must pay cost of mammography themselves.

Also, this study indicated that the women with low income level were less likely than others to have mammography screening. Thus, providing low-cost or free access to mammography in women 40 years and older, especially women with low socioeconomic conditions and the women who don't have insurance, is very essential. Kerlikoske *et al.* stated that providing free facilities in different parts of the community increases mammography screening in women.^[60]

Contrary to other studies, our study did not demonstrate any association between age,^[26] pregnancy,^[30] education,^[28,30,33,56] marital status,^[33] health insurance,^[28,33] and mammography use.

Like other studies, our study found that having a history of breast problems and having a family history of breast cancer were positively correlated to mammography use. Having history of breast cancer in first-degree relatives affects women's perception of breast cancer risk. Results of present study demonstrated that an important factor for having mammography was knowledge about breast cancer and mammography screening. The women who had ever heard/read about breast cancer were more likely to have a mammogram. This finding is consistent with previous studies that suggest knowledge about breast cancer and mammography is facilitators' factors of mammography utilize.^[28,30,61,62] Montazeri *et al.* suggested that "lack of

knowledge about breast cancer is an important factor in Iran and there is a need for public educational program especially for less educated women."^[10]

Comparison of women's knowledge and practice in this study indicated that there is a gap between knowledge and having mammography. Although 63% of women stated that ever heard/read about breast cancer, only 44.3% of them had at least a mammogram in lifetime. It should be mentioned that although knowledge is essential for having mammography, it is not adequate. Previous studies indicated similar results.^[26,63]

On the basis of the HBM, subscales of perceived susceptibility, severity, benefits, self-efficacy, and health motivation are positively related to health behavior such as mammography screening behavior and perceived barriers have negative relationship.^[64] The results of this study suggest that the women aged 40 and older who perceive more benefits, more self-efficacy, and fewer barriers to mammography screening, and also women who have more motivation for health, more likely use mammography screening. It is similar to the finding of other researches that have found a positive association with perceived benefits,^[26,28,34] perceived self-efficacy,^[28,34,65,66] and health motivation^[19] and a negative association with perceived barriers^[26,28,34] and having mammography.

The top three identified benefits in the current study were feeling satisfied, reducing worry, and increasing probability of detecting tumor in early stage. Also, the most important identified barriers by women who never had a mammography included don't feel any symptoms, don't need to have mammography, other problems more important than getting a mammogram, fear of mammography, and lack of knowledge about where to get a mammogram. Other barriers such as embarrassment, lack of time, pain, and cost of mammography were significant. The majority of previous studies have found these barriers to mammography use.^[26,30,33,34,67]

In contrast to HBM, perceived susceptibility and perceived severity were not significantly associated with mammography use. This finding is in agreement with findings of previous studies^[26,34,62] and is in contrast with some studies.^[19,28,34,40,66,68] One explanation for the inconsistent finding regarding perceived susceptibility and perceived severity may be because of lack of knowledge about breast cancer. Based on HBM, people's perception of perceived threat depends on their knowledge about the disease. Furthermore, implementing education intervention for increase of women's knowledge about breast cancer can be effective in promoting their perception from risk factors, signs, and symptoms and their susceptibility to breast cancer and benefits of mammography screening.

Finally, in this study we have found six factors as predictors of mammography screening among Isfahanian women 40 years and older: menopause age, ever heard/read about breast cancer, history of breast problems, perceived benefits, perceived barriers, and health motivation. Finding of other studies showed that social support^[34] and religious beliefs^[26] had significant association with mammography use. These factors were not investigated in our study and it is recommended that in further researches are surveyed.

In our study and more previous studies, women showed that the likelihood of having mammography in women is more associated with socio-demographic, cognitive, and behavioral variables; whereas mammography screening behavior also depends on healthcare system or provider. Thus, it is an important issue that must be investigated in future researches.

In conclusion, our study findings indicated that the rate of mammography screening among Iranian women is low and highlights the need for developing and implementing a comprehensive national breast cancer control program, which should be considered as the first priority for healthcare providers and health policy makers. Also, the study results can inform researches regarding associated factors with having mammography screening behavior. Identification of these factors can help to designing an appropriate educational intervention that focuses on benefits of mammography screening, decreasing changeable barriers, improving access to mammography, increasing health motivation, promoting perceived self-efficacy, and adherence mammography.

Limitation

Because the current study conducted by telephone interview, some bias may have been introduced into this study by elimination women who did not have a telephone or their telephone numbers were blocked, and recall bias, especially among older women because mammography use was examined by self-report. Despite these limitations, the telephone interview is an effective method of data collection that is used in many studies.^[69-73]

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