The transtheoretical model, health belief model, and breast cancer screening among Iranian women with a family history of breast cancer

Ziba Farajzadegan, Fariba Fathollahi-Dehkordi[1], Simin Hematti[2], Reza Sirous[3], Neda Tavakoli[1], Reza Rouzbahani

Departments of Community Medicine and [2]Radiotherapy, Faculty of Medicine, Isfahan University of Medical Sciences, [1]Department of Community Medicine, Isfahan University of Medical Sciences, Isfahan, Iran, [3]Department of Radiology, University of Mississippi, Mississippi, USA

Background: Participation of Iranian women with a family history of breast cancer in breast cancer screening programs is low. This study evaluates the compliance of women having a family history of breast cancer with clinical breast exam (CBE) according to the stage of transtheoretical model (TTM) and health belief model (HBM). **Materials and Methods:** In this cross-sectional study, we used Persian version of champion's HBM scale to collect factors associated with TTM stages applied to screening from women over 20 years and older. The obtained data were analyzed by SPSS, using descriptive statistics, Chi-square test, independent *t*-test, and analysis of covariance. **Results:** Final sample size was 162 women. Thirty-three percent were in action/maintenance stage. Older women, family history of breast cancer in first-degree relatives, personal history of breast disease, insurance coverage, and a history of breast self-examination were associated with action/maintenance stage. Furthermore, women in action/maintenance stages had significantly fewer perceived barriers in terms of CBE in comparison to women in other stages ($P < 0.05$). There was no significant difference in other HBM subscales scores between various stages of CBE screening behavior ($P > 0.05$). **Conclusion:** The finding indicates that the rate of women in action/maintenance stage of CBE is low. Moreover, results show a strong association between perceived barriers and having a regular CBE. These clarify the necessity of promoting national target programs for breast cancer screening, which should be considered as the first preference for reducing CBE barriers.

Key words: Breast cancer, family history, health belief model, screening, transtheoretical model

INTRODUCTION

Breast cancer is the most common cancer among Iranian women, comprising nearly 21.4% of all cancers in this group.[1,2] Studies show that the trend of breast cancer incidence among Iranian women is increasing, and the age of breast cancer incidence is lower in comparison to women in other countries.[3,4] Although reports vary from 60% to 82% for actual percentages, widespread agreement exists among health-care professionals that the majority of Iranian women with breast cancer are diagnosed at advanced stages of the disease.[5,6] A family history of breast cancer, especially among first-degree relatives, is a strong risk factor for this disease. Women who have one first-degree relative with a history of breast cancer have 1.8 times higher risk of developing the disease than women with no such family history; furthermore, the risk tends to rise as the number of affected family members increase.[7]

Although studies in other countries demonstrate that women with a family history of breast cancer are more adherent to screening programs, Iranian women with a family history of breast cancer tend to participate in this screening at a lower rate than the average rate among their peers.[8,9] Mammography provides the main tool for breast cancer screening; however, clinical breast exam (CBE) as performed by a physician or other

Access this article online	
Quick Response Code:	**Website:** www.jmsjournal.net
	DOI: 10.4103/1735-1995.193513

trained health professional can also be useful. CBE has been reported to yield a much lower accuracy in detecting breast lesions compared to mammography, but its availability and low cost render it a supplementary approach for breast cancer screening, especially in low- to middle-income countries such as Iran.[9-13] According to the American Cancer Society recommendations in 2012, CBE should be started at age 20. Women between ages of 20 and 40 should receive a CBE every 3 years, and those over 40-year-old should undergo CBE each year.[7]

Behavioral studies have shown that a patient's education, perceived level of susceptibility to the disease, acceptance or rejection of screening techniques, and perceived level of potential benefit, or harm from the screening techniques all influence their willingness to participate in cancer screening programs, such as screening mammography or CBE.[14] For example, Magai *et al.* show that an optimistic attitude toward breast cancer screening programs is associated with higher rates of participation in them.[15] Other studies have demonstrated that women who have a positive mindset about CBE have sought care which includes a CBE more often[14,16] Nojomi *et al.* report that Iranian women who perceive fewer barriers and more benefits about CBE are more likely to undergo it.[17]

Many studies have applied health belief model (HBM) to evaluate factors associated with breast cancer screening method such as CBE.[13,18,19]

According to this model, people will follow healthy behavior, if they perceive susceptibility and seriousness of that situation and if they believe that benefits of doing the behavior are more than its barriers.[20]

Hence, in this study, HBM has been used as the conceptual framework to determine variables associated with CBE.

Moreover, because decision-making processes related to CBE breast cancer screening are very complex, the stage of change of TTM of behavior was used as a clue for the study.[21]

The transtheoretical model (TTM), among the most important behavioral models, was first developed by Prochaska and DiClemente. This model posits that behavioral changes occur through a dynamic process involving different stages.[22] As modified by the Rakoweski classification system, these stages are: precontemplation: Never had a CBE and is not thinking about receiving a CBE in the next 12 months (for women over 40-year-old) or the next 36 months (for women under 40-year-old), contemplation: Never had a CBE but is thinking about receiving a CBE in the next 12 months (for women over 40-year-old) or the

next 36 months (for women under 40-year-old), action: Had a CBE before and is going to receive another CBE in the next 12 months (for women over 40-year-old) or the next 36 months (for women under 40-year-old), maintenance: Had two or more CBE and is going to receive another CBE in the next 12 months (for women over 40-year-old) or the next 36 months (for women under 40-year-old), relapse: Had one or more CBE previously but is not going to receive a CBE in the next 12 months (for women over 40-year-old) or the next 36 months (for women under 40-year-old).[23]

Lee-lin study showed Chinese American immigrant women who were in precontemplation stage of mammography screening have significantly higher perceived barrier and lower perceived susceptibility than women in contemplation stage.[10]

According to our literature review, few studies evaluated factors associated with Iranian women participation in CBE screening program, and these studies were related to women who did not have a family history of breast cancer.[1,17] Because of the higher incidence of breast cancer among women with a family history of breast cancer,[7] it is important to identify factors influencing CBE screening behaviors. These factors are principal to designing suitable interventions to promote CBE screening among this at-risk group.

In this study, we evaluated TTM stages as applied to CBE in Iranian women with a family history of breast cancer. We have also assessed different demographic features that may be related to women's TTM stages as applied to CBE. We have also assessed the association between the HBM of Iranian women and their TTM stage as applied to CBE.

MATERIALS AND METHODS

Study design and sample

This is a cross-sectional study with a convenience sampling method which was conducted between June and August 2015 in Sayed-Al-Shohada Hospital, the main cancer treatment center in Isfahan Province in Iran.

Inclusion criteria were women aged 20 years and older residing in Isfahan, first- or second-degree relatives of breast cancer patients who referred to Sayed-Al-Shohada Hospital who was accompanied with patient, with no personal history of breast cancer. Women who do not desire to participate in the study were excluded from the study.

Most of the known cancerous patients with their family members referred to Sayed-Al-Shohada Hospital, so the selection bias seems likely to be negligible.

Sample size was estimated 192 by considering 80% for study power, $\alpha = 0.05$, $P = 48\%$, effect size = 7.7%, and 20% no response of participants.[24]

The face-to-face interview was conducted for eligible women who accompanied a breast cancer patient referring to S. AL-Shohada Hospital sections in Isfahan.

Initially, the interviewer explained the purpose of the study and voluntary participation to each of the women. The interviewer explained that all of the information would be kept confidential. Then, the interviewer filled the questionnaire for women who consented to participate. To control measurement bias, we have an interview protocol. Each interview took 20–30 min in a quiet room which was considered for this purpose at certain times of the day. The study continued until the sample size completed (between June and August 2015). Of the 200 women who were first- or second-degree relatives of patients referring to hospital during the study period, only 162 women were desire to participate.

Ethics
For the ethical reason, the information collected was kept confidential. Furthermore, informed consent from the participants was obtained. This study approved by Ethical Committee of Isfahan University of Medical Sciences (Ethical Number: 394130).

Instrument
Three categories of information were collected for each participant:

Demographic questions, TTM stages as applied to CBE, and HBM scores.

Demographic characteristics were obtained by collecting information about participant's age, level of education, marital status, health insurance status, income, employment status, history of breast disease, and history of breast self-examination (BSE).

To evaluate TTM stages as applied to CBE, we categorized women into five stages according to Rakoweski classification checklist: precontemplation, contemplation, action, maintenance, and relapse.[23]

To determine women's HBM about breast cancer screening, we used the latest Persian version of Champion's Revised HBM Scale which is the standard for Iranian women by Taymoori.[25] This scale includes 61-items in eight categories from which we used five subscales in this study. We assessed women's health beliefs about breast cancer and CBE, considering perceived sensitivity

(3-item, Cronbach's $\alpha = 0.82$), perceived severity (7-item, Cronbach's $\alpha = 0.84$), perceived benefits (6-item, Cronbach's $\alpha = 0.72$), and perceived barriers (10-item Cronbach's $\alpha = 0.73$), alongside health motivation (7-item, Cronbach's $\alpha = 0.77$). All of the HBM subscales questions were scored based on a 5-point Likert scoring system, ranging from strongly disagree (1) to strongly agree (5). Except for barriers toward CBE, for all other categories, higher scores mean more concordance with health belief.

The score of each five scales was calculated separately.

Statistics
Statistical Package for the Social Sciences Version 27. (SPSS inc., Chicago, IL, USA) was used for data analysis. Descriptive statistics was used for demographic variables and TTM stages as applied to CBE. Chi-square test was used to detect an association between demographic variables and TTM stages (precontemplation/relapse, contemplation, and action/maintenance). Analysis of covariance (ANCOVA) was used to compare HBM components (perceived sensitivity, perceived severity, perceived barrier, perceived benefit, and health motivation) among different TTM stages. Independent *t*-test was used to determine which TTM stage is significantly different from the others considering HBM components. The level of significance for $P < 0.05$.

RESULTS

Demographic characteristics
Of the 200 potential participants, 38 people were excluded due to their unwillingness to fill out the questionnaire (response rate of 81%). As a result, our final sample size was 162 women. In this study, we did not have missing data because an interviewer completed the questionnaire for each of the participants. Moreover, we did not have drop out data because we did not have any intervention or follow-up period.

The mean age of the participants was 37.6 years (standard deviation = 11.16, range from 20 to 73).

We categorized age variable into three age groups for further statistical analyses. Demographic characteristics are shown in Table 1. Thirty-two (20%) of participants had a history of benign breast disease. Approximately, 117 (72%) of the participants had a first-degree relative with a history of breast cancer, while 45 (28%) had a second-degree relative with a history of breast cancer.

Distribution of participants among transtheoretical model stages
The majority of women were in contemplation stage (68 [42%]), followed by women in action (28 [17.3%]),

Table 1: Women's characteristics with a family history of breast cancer, Isfahan (*n*=162)

Characteristics	*n* (%)
Marital status	
Married	127 (78.4)
Single or widow	35 (21.6)
Education	
High school or less	45 (28)
Diploma	46 (28.6)
College education	70 (43.5)
Employment	
Employment	21 (13)
Unemployment	141 (87)
Health insurance	
Yes	151 (93.2)
No	11 (6.8)
BSE	
Yes	104 (64.2)
No	58 (35.8)
Income status ($)	
<300	90 (55.6)
300-600	49 (30.2)
>600	23 (14.2)
Breast disease history	
Yes	32 (19.8)
No	130 (80.2)
Age group	
>30	41 (25.3)
30–39	65 (40.1)
□40	56 (34.6)
Relative degree	
First	117 (72.2)
Second	45 (27.8)

BSE=Breast self-examination

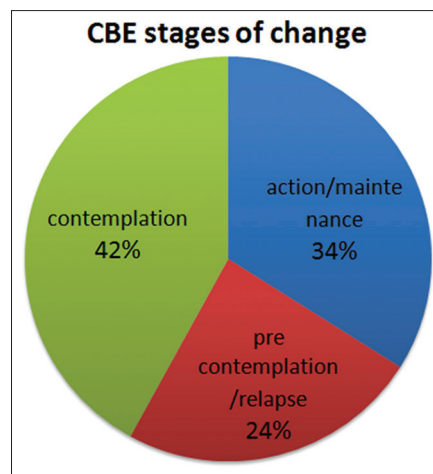**Figure 1:** Transtheoretical model stages applied to clinical breast exam for women with a family history of breast cancer (*n* = 162)

maintenance (27 [16.7%]), precontemplation (25 [15.4%]), and relapse stages (14 [8.6%]), respectively. To report the results, we combined relapse and precontemplation stages together, since women in these stages were not planning to undergo CBE. We also combined action stage with maintenance stage because women in these stages were planning to receive CBE [Figure 1].

Factors influencing participants transtheoretical model stages as applied to clinical breast exam

Our results showed that distribution of age group, health insurance status, BSE status, first-degree relative with a history of breast cancer (in comparison to second-degree relative), and personal history of breast disease have a significant difference in women's TTM stage as applied to CBE (*P* < 0.05). Results are demonstrated in Table 2.

Result showed that older women, women who had performed BSE at least once, women had a health insurance, women with a personal history of breast cancer, and women with a family history of breast cancer in their first-degree

relatives were significantly more in action/maintenance stages of CBE screening behavior (*P* < 0.05).

Relationship between women's transtheoretical model stages as applied to clinical breast exam and health belief model categories (perceived sensitivity, severity, benefit, barrier, and health motivation)

After adjusting for confounder variables (including age group, personal history of breast disease, BSE status, history of breast cancer in first-degree relative versus second-degree relative, and health insurance status), ANCOVA showed there is a significant difference between mean score of perceived barriers in different TTM stages as applied to CBE [Table 3]. Independent *t*-test showed women in action/maintenance stages had significantly fewer perceived barriers in comparison to women in precontemplation/relapse stages (*P* < 0.001) and contemplation stages (*P* < 0.001). In addition, women in contemplation stage had fewer barriers than women in precontemplation/relapse stages (*P* = 0.018). No significant difference was detected in the mean score of other HBM categories between TTM stages after adjusting for mentioned confounders [Table 3].

DISCUSSION

To our knowledge, this is the first study which has evaluated TTM stages as applied to CBE among Iranian women with a family history of breast cancer.

In this survey, we evaluated TTM stages as applied to CBE in Iranian women with a family history of breast cancer and factors associated with CBE screening behavior.

Our finding showed that most of the participants were in contemplation stage of TTM stages as applied to CBE and only one-third of them were in action/maintenance

Table 2: Association between transtheoretical model stage applied to clinical breast exam and women's characteristics

Variable	Precontemplation-relapse, *n* (%)	Contemplation, *n* (%)	Action-maintenance, *n* (%)	Total, *n* (%)	*P*
Age group					
<30	6 (14.6)	30 (73.2)	5 (12.2)	41 (25.3)	<0.001
30-39	19 (29.2)	21 (32.3)	25 (38.5)	65 (40.1)	
40☐	14 (25)	17 (30.4)	25 (44.6)	56 (34.6)	
Marital status					
Married	30 (23.8)	49 (38.9)	47 (37.3)	35 (21.6)	0.134
Single or widow	9 (25.7)	19 (54.3)	7 (20)	127 (78.4)	
Education					
High school or less	14 (31.8)	14 (31.8)	16 (36.4)	45 (28)	0.303
Diploma	11 (23.4)	24 (51.1)	12 (25.5)	46 (28.6)	
College education	14 (20)	30 (42.9)	26 (37.1)	70 (43.5)	
Employment					
Employment	6 (28.6)	5 (23.8)	10 (47.6)	21 (13)	0.169
Unemployment	33 (23.6)	63 (45)	44 (31.4)	141 (87)	
Income status ($)					
<300	23 (25.6)	41 (45.6)	26 (28.9)	90 (55.6)	0.079
300-600	7 (14.3)	22 (44.9)	20 (40.8)	49 (30.2)	
>600	9 (39.1)	5 (21.7)	9 (39.1)	23 (14.2)	
Health insurance					
Yes	33 (21.9)	66 (43.7)	52 (34.4)	151 (93.2)	0.043
No	6 (54.5)	2 (18.2)	3 (27.3)	11 (6.8)	
Breast disease history					
Yes	6 (18.8)	9 (28.1)	17 (53.1)	32 (19.8)	0.031
No	33 (25.6)	59 (45.7)	37 (28.7)	130 (80.2)	
BSE					
Yes	19 (18.3)	39 (37.5)	46 (44.2)	104 (64.2)	0.001
No	20 (34.5)	29 (50)	9 (15.5)	58 (35.8)	
Relatives degree					
First	19 (16.2)	51 (43.6)	47 (40.2)	117 (72.2)	<0.001
Second	20 (44.4)	17 (37.8)	8 (17.3)	45 (27.8)	

BSE=Breast self-examination

Table 3: Mean of health belief model components applying to clinical breast examination among different stages of transtheoretical model

Variable	Precontemplation-relapse		Contemplation		Action-maintenance		*F*	*P*
	n	Mean±SD	*n*	Mean±SD	*n*	Mean±SD		
Perceived sensitivity	39	9.33±3.03	68	9.71±2.59	55	10.90±2.48	2.211	0.113
Perceived severity	39	22.03±5.66	68	22.94±4.17	55	24.47±4.58	0.652	0.522
CBE benefit	39	18.38±2.42	68	18.91±2.67	55	20.15±2.75	0.282	0.755
CBE barrier	39	21.49±6.09	68	18.76±5.84	55	14.45±5.49	3.104	0.048
Health motivation	39	23.13±5.22	68	24.32±4.31	55	26.60±4.30	1.669	0.192

CBE=Clinical breast exam; SD: Standard deviation

stage of CBE behavior. However, having an older age, have a health insurance, history of the BSE, first-degree relative with breast cancer patient (in comparison to second-degree relative), and a personal history of breast disease seemed to have a significant association with being in action/maintenance stage of TTM stages as applied to CBE. Moreover, women in action/maintenance stage of CBE screening behavior had significantly fewer barriers compared with two other groups.

This study has shown that only one-third of the women who had a family history of breast cancer are in action/maintenance stages of TTM which is lower than the 48% reported by Tu *et al.* among Cambodian American women in 2002[24] However, Tu *et al.* used a different classification for TTM stages as applied to CBE and did not limit their study to women with a family history of breast cancer. Hence, the results of our study may not be fully consistent with theirs. However, a lack of active screening in Iran health system

and little knowledge about breast cancer risk factors may justify this result.

Our study reviled older women are more likely to be in action/maintenance stages. This finding is consistent with studies conducted by Tu *et al*., Ahmad and Stewart, Price *et al*., and Parsa and Kandiah which showed undergoing CBE increases as women become older.[13,16,24,26] This may be due to an increase in women's perceived risk of breast cancer as they get older. In contrast, Siahpush and Singh showed older women are less likely to engage in breast cancer screening programs.[27] However, that study was conducted more than a decade ago, and this difference may be due to the gradual increase in participation of older Iranian women in breast cancer screening programs during the last decade.

Similar to most of the earlier studies, we found out that performing BSE is associated with participating in other breast cancer screening programs such as CBE.[13,28]

We also found out that women with a history of breast disease are more likely to be in action/maintenance stages. Other studies have shown similar results.[13] In women with a personal history of benign breast disease, becoming more educated about breast cancer screening programs, alongside their excessive anxiety about the possibility of breast cancer in the future, may lead to their adherence to screening programs.

In our study, having a health insurance was associated with being in action/maintenance stages for undergoing CBE. Ahmadian and Samah have reported similar results in their review article about factors influencing breast cancer screening.[29] However, our findings are not compatible with the results from the study conducted by Parsa and Kandiah in Malaysian women.[13] It is possible that unique economic and health-care structure of each country plays a role in this variation. In this study, however, since there were few participants who did not have any health insurance at all, we cannot be too certain about this finding.

Furthermore, our results showed women with a family history of breast cancer in their first-degree relatives are more likely to be in action/maintenance stages compared to those with a family history of breast cancer in their second-degree relatives. Finney Rutten and Iannotti have also reported a positive correlation between a family history of breast cancer in closer relatives and compliance with breast cancer screening.[30] It seems the anxiety caused by the history of breast cancer in the first-degree relatives, promotes breast cancer screening participation in these women.[12]

In our study, from different HBM elements, only level of perceived barriers was significantly lower among women in action/maintenance stages compared to women in precontemplation/relapse and contemplation stages. This means women in action/maintenance stage have fewer barriers about time of CBE performing, place, pain, cost, and method of CBE performing. Moreover, they feel less embarrassed from CBE performing. Furthermore, women in contemplation stage had fewer barriers than those in precontemplation/relapse stages. Ahmadian and Samah in their review article have reported the same results.[29] However, other studies have reported that level of perceived susceptibility to breast cancer and perceived benefits from breast cancer screening are the most important determinants of willingness to participate in these programs.[13] However, the different designs of studies, such as target group risk factors can justify observed differences. Further studies are required to clarify the results.

Our survey was performed in a referral hospital in Isfahan in which a wide range of patients with various types of sociodemographic situation refers to; therefore, our findings can nearly represent CBE behavior among women with a family history of breast cancer. However, according to inclusion criteria, our finding can be extended only to women with a family history of breast cancer and not to the general population.

There were some limitations in this study that should be considered. The questionnaires were filled out according to the participants' self-reports. This may have led to recall bias, so we suggest using of recorded data for future studies.

Furthermore, we have used a cross-sectional design for our study, so we could not find any causal association between research variables. Further longitudinal studies may be required to clarify the causal relationship.

CONCLUSION

Our finding clarified that the rate of women with a family history of breast cancer that is in action/maintenance stage of CBE behavior is low. It reveals the need for national target interventions for this at-risk group. Furthermore, our findings clarified the factors associated to regular CBE. These factors should be used in designing efficient interventions by focusing on changeable CBE barriers. Further collaboration among government, health-care sections, and insurance companies is required to provide more education, alongside with social and financial supports to increase participation in breast cancer screening programs.

Financial support and sponsorship

Conflicts of interest

There are no conflicts of interest.

AUTHORS' CONTRIBUTION

- FFD Contributed in the conception of the work, analysis, interpretation of data for the work, conducting the study, revising the draft, approval of the final version of the manuscript, and agreed for all aspects of the work
- ZF Contributed in the conception of the work, conducting the study, analysis, revising the draft, approval of the final version of the manuscript, and agreed for all aspects of the work
- SH Contributed in the conception of the work, revising the draft, approval of the final version of the manuscript, and agreed for all aspects of the work
- RS Contributed in interpretation of data for the work, revising the draft, approval of the final version of the manuscript, and agreed for all aspects of the work
- NT Contributed in analyze of data, revising the draft, approval of the final version of the manuscript, and agreed for all aspects of the work
- RR Contributed in the conception of the work, revising the draft, approval of the final version of the manuscript, and agreed for all aspects of the work.

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