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.
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.
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-
behavior. One percent of women had very low susceptibility. 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 correlation 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 relationships 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 conducting 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 cancer 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 awareness 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-efficacy. 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 cancer prevention behaviors. Different perceived barriers within various levels (individual, intrapersonal, health systems, and community) play influential roles in women’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 influence 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 perceived barriers to breast screening were lack of awareness, 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 susceptibility and perceived severity but are inversely related 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 severity. But only self-efficacy and cues to action could predict 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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In the studies of Teymouri and Habibi, the sense of self-efficacy reduces 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)  |
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 susceptibility, 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

| 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 | p = 0.196 |
| Perceived barriers | r = 0.261 | p = 0.001 |
| Cues to action | r = 0.027 | p = 0.592 |
| Self-efficacy | r = 0.125 | p = 0.012 |

* The Pearson correlation coefficient

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.
effects of social class on behavior, and level of expecta-
tion 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 pre-
vention behaviors, it is suggested to examine the factors
that increase self-efficacy to perform screening behav-
iors 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 ethi-
cal approval (IR. MUMS. REC. 2016. 593) from Mashhad
University of Medical Sciences.

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Authors’ contributions

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manuscript review: All authors.

Conflict of interest

The authors declared no conflict of interest.

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