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Evaluation of the relationship between health belief of breast cancer screening and health anxiety; A cross-sectional study

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Abstract

Breast cancer (BC) is the most frequent type of cancer among women. Screening and early diagnosis is crucial for reducing the disease burden. However the screening rates for BC is not at desired levels. Health belief and health anxiety are two conditions that affect participation in cancer screening. The aim of this study is to explore the relationship between health beliefs regarding breast cancer screening and health anxiety among women. This cross-sectional study included 301 women between 20 and 69 years of age who were admitted to the family medicine outpatient clinic. The study data was collected using the Health Anxiety Inventory (HAI) and Champion's Health Belief Model Scale (CHBMS). The questionnaires were filled with face-to-face interview technique. To explain the relationship between anxiety and the components of the health belief model a multivariate linear regression model was used. High anxiety levels were positively correlated with the seriousness and health motivation components and negatively correlated with the self-efficacy component of the health belief model related to breast cancer ($p<0.001$, $p<0.001$, $p=0.001$, respectively). No significant relationship was detected between anxiety and the other components of the health belief model. In this study, it was observed that people with high levels of health anxiety score high in the seriousness and health motivation components and low in the self-efficacy component of the health belief model. Health anxiety can particularly affect health behavior and its effect on the decision to engage in screening programs.

Keywords: Cancer screening, health anxiety, health belief

Introduction

With a gradually increasing prevalence over the years, breast cancer is one of the most prevalent cancers among women. According to International World Cancer Research Fund data, 1.7 million new breast cancer cases were identified globally in 2012 [1]. Besides this, breast cancer is the second most fatal type of cancer after lung cancer around the world [2].

In Turkey, breast cancer is the most common and mortal cancer among women. The prevalence of breast cancer has increased by more than 2 folds during last twenty years in Turkey, and its incidence was reported as 45.1 per one hundred thousand women [3].

Early diagnosis is very important for the prognosis of the disease as early detection of breast cancer by screening reduces breast cancer-related mortality [4]. By means of mammography and other screening methods, 63.7% of breast cancers can be diagnosed at early stages, and the 5-year survival rate among early diagnosed patients can reach as high as 97.9% [4].

The participation of women in breast cancer screening is not at the desired levels around the world and in Turkey [4,5]. There are many social determinants that influence the participation of women in breast cancer screening programs such as age, education level, and marital status [6]; however, it is believed that there also are factors other than socio-economic charactheristicsthat have not been identified yet.

Emotions are the most effective source of motivation known, and they are the fundamental factor that defines the behavior of people regarding participation in cancer screenings [5]. Although women feel anxious about breast cancer screening due to various reasons, it is still unclear whether this anxiety they experience influences

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their decisions about participating in breast cancer screening methods positively or negatively [5].

The Health Belief Model (HBM) is a conceptual theoretical framework frequently used to identify people's behavior regarding breast screening methods such as mammography and breast self-examination [6]. According to the Health Belief Model the perceptions of susceptibility, seriousness, benefits, barriers, health motivation, and confidence (self-efficacy) influence people's health behaviors [6].

Health anxiety is an exaggerated negative interpretation of normal bodily sensations in people with no physical illnesses. Health anxiety has two fundamental components: the perception that the person has a serious illness and that this illness leads to adverse outcomes [7]. Recently conducted epidemiological studies reported the prevalence of health anxiety as 0.26-8.5% [8]. Studies conducted have also shown that the health perceptions of people with high levels of health anxiety are impaired and that these patients cause excessive health expenditures [8].

Studies conducted to date have focused on the general anxiety or cancer anxiety of people [5]. The number of studies that explore the association between health anxiety and health belief of breast cancer screening [5]. Besides this, there are not enough studies conducted about the effect of people's anxiety on the subdimensions of the Health Belief Model.

The goal of this study is to investigate the relationship between people's health anxiety level and their health beliefs regarding breast cancer screening.

Materials and Methods

Participants

The study have a cross-sectional design and study population involved women aged 20-69 years who applied to the outpatient clinic of Family Medicine Department of Izmir Katip Celebi University, Turkey during December 2016 and April 2017. The ethical approval for the study was obtained from the Izmir Katip Celebi University Non-Interventional Clinical Research Ethics Committee (approval number: 283, date of approval: 02.11.2016).

Participants were excluded if they were diagnosed with a psychiatric disease and were on medication, under 20 or over 69 years of age, who are illiterate, have communication barriers (auditory or verbal), who were physically or mentally unable to answer the questions, women whose mental condition prohibited them from comprehending and answering the questions, or that did not accept to answer the surveys or did not fill in the forms completely were excluded from the study.

Sample Size

The sample size was calculated by using GPOWER 3.1 software. In order to detect a statistical difference with a medium effect size (d=0.30) between CHBMS scores stratified by HAI threshold with 80% power, 5% type 1 error, the minimum number of sample size was calculated as 278. We increased this figure by 20% in order to handle with refusal and total sample size was 334.

Data Collection Tools:

In this study, the 15-question sociodemographic data form prepared by the researchers was used to determine the sociodemographic characteristics of the patients, the Champion's Health Belief Model Scale was used to assess health beliefs regarding breast cancer screenings, and the Health Anxiety Inventory was used to measure health anxiety level.

Sociodemographic characteristics;

The independent variables included sociodemographic characteristics, health Belief, and health anxiety. Participants' age was categorized into 2 age groups (40 years ≥, 40 years ≤). Marital status was classified as married and single/widowed. Educational level was coded into 3 levels of highest educational level attained: less than primary school or primary school, Middle school and high school and university and higher education. Other sociodemographic variables were coded as yes / no.

Champion's Health Belief Model Scale:

The scale developed by Champion in 1984 that assesses health beliefs regarding breast examination and mammography screenings was revised in 1993, 1997, and most recently 1999 [9]. The most recent revision of the scale was adapted into Turkish by Gozum et al9.The scale consists of 8 subdimensions, namely seriousness, health motivation, barriers and benefits regarding breast self-examination, self-efficacy, and benefits and barriers regarding mammography and 52 items. The scale is a Likert-type scale that is scored between 1 to 5, the answer "strongly disagree" is given 1 point, "I do not agree" is given 2 points, "undecided" is given 3 points, "I agree" is given 4 points, and "I strongly agree" is given 5 points. Each dimension of the scale is assessed individually, and they are not summed up in a single total score.

The Health Anxiety Inventory

The Health Anxiety Inventory developed by Salkovkis et al. to assess health anxiety is a self-reported scale that contains 18 items [10]. The Turkish validity and reliability study of the scale was performed by Aydemir and colleagues [10]. Fourteen of the items in the scale contain four consecutive statements that question the mental state of the patient. In the remaining 4 questions, patients are asked to express their opinions about how their mental state would be, assuming if they had a serious illness. The score of each item in the scale ranges between 0 and 3 and a total HAI score higher than 20 means that individual have a serious health anxiety [11].

Statistical Analysis

In this study, numeric data were expressed as average, mean, standard deviation, and value range and categorical data were expressed by descriptive methods such as ratio and percentage. The statistical comparison of mean values of two independent groups was performed using the Student t-test. The intergroup comparisons of categorical variables were performed using the Chi-square test. The relationships between two continuous variables were assessed using the Spearman/Pearson correlation tests.

The linear regression model was created for health anxiety score. The independent variables with a statistically significant relationship of $p \leq 0.10$ according to bivariate analysis were included in the multivariate linear regression model and adjusted coefficents are presented with their 95% confidence intervals.

Results

In total, 334 women were invited to the study and 301 of the women (90.1%) that filled in the forms completely were included in the study.

The mean age of the participants was 39 (min=20, max=69), 63.1% (n=190) were married, and 41.5% (n=125) had high education level. Of the participants, 58.1% (n=175) practiced breast self-examination and 27.9% (n=84) screened mammography.

The mean health anxiety scores of the patients were 18.02 and aproximately 40% of the patients had anxiety scores higher than 20. The mean and minimum-maximum values of the participant's scores in the HAI (Health Anxiety Inventory) and CHBMS (Champion's Health Belief Model Scale) subgroups are presented in Table-I.

The relationship between HAI scores and sociodemographic data is presented in Table-II. While individuals with a positive family history had higher anxiety levels (p=0.024), women who received mammography or clinical breast examination before and the ones with higher education level presented significantly lower scores of HAI compared to their counterparts (p=0,019, 0,039, 0,030, respectively).

Table 1. Descriptive findings for HAI and CHBMS

Scale subdimensions	Scores obtained		Scores	
	Min	Max	Mean	Standard deviation
Health Anxiety Inventory (HAI)	0	47	18.02	8.90
Health Belief Model Scale (CHBMS)				
Susceptibility	3	15	7.50	2.42
Seriousness	6	30	19.09	5.11
Health motivation	5	25	20.01	4.05
BSE benefits	4	20	15.36	3.48
BSE barriers	8	39	18.30	5.51
BSE self-efficacy	10	50	32.77	8.63
Mammography benefits	5	25	17.86	4.41
Mammography barriers	11	53	26.19	7.91

Table 2. The relationship between HAI scores and sociodemographic data

	HAI Total Score	
	Mean ± SD	p value
Age		0.853
<40	18.12 ± 8.01	
≥40	17.93 ± 9.77	
Marital Status		0.662
Single/widow	18.32 ± 9.09	
Married	17.85 ± 8.81	
History of breast cancer in a first degree relative		0.024*
None	17.51 ± 8.73	
Positive	20.62 ± 9.39	
Status of having a mammography		0.019*
Yes	16.22 ± 7.82	
No	18.72 ± 9.21	
Presence of a benign breast disease		0.178
Positive	19.70 ± 10.05	
None	17.74 ± 8.68	
Status of having received information about breast cancer		0.155
Yes	17.32 ± 8.07	
No	18.80 ± 9.71	
The desire to receive information about breast cancer		0.962
Yes	18.04 ± 8.62	
No	17.98 ± 9.86	
Breast self-examination		0.128
Yes	17.36 ± 8.53	
No	18.95 ± 9.35	
Status of having a clinical breast examination		0.039*
Yes	16.36 ± 8.58	
No	18.70 ± 8.96	
Education level		0.030*
Primary School and lower (Group I)	20.21 ± 10.75a	
Middle school and high school (Group II)	17.06 ± 7.79	
University and higher (Group III)	17.29 ± 8.11	
Frequency of performing BSE		0.245
Once a month (Group IV)	15.00 ± 6.56	
A few times a year (Group V)	17.90 ± 8.59	
Once a year (Group VI)	17.38 ± 11.37	

***p<0.05, **p<0.01, ***p<0.001**

a Group I is significantly higher than Group II and Group III
b Group III is significantly higher than Group I and Group II
c Group III is significantly higher than Group I
d Group II is significantly higher than Group III
e Group VI is significantly higher than Group IV and Group V

When the Health Anxiety Inventory was assessed based on the CHBMS subdimensions the susceptibility and seriousness score was significantly higher in the group with high HAI scores, and the self-efficacy score was significantly higher in the group with low HAI scores (p<0.001, p<0.001, p=0.001, respectively) (Table 3). A low or non-significant level of correlation was identified between the serious HAI score and the CHBMS susceptibility, seriousness, BSE self-efficacy and mammography benefits scores (0.224, 0.249, -0.185, -0.132, respectively) (Table-III).

Table 3. Comparison of HAI scores stratified by CHBMS subdimensions

Subdimensions of CHBMS	Health Anxiety Inventory			HAI total score correlation coefficients
	<20 (n=178)	≥20 (n=123)	Statistical Analysis	Statistical Analysis
	Mean ± SD	Mean ± SD	P value	r
Susceptibility	7.07 ± 2.32	8.37 ± 2.41	<0.001***	0.224[a]
Seriousness	18.21 ± 4.94	20.91 ± 4.98	<0.001***	0.249[a]
Health motivation	19.74 ± 4.08	20.59 ± 3.94	0.089	0.089
BSE benefits	15.51 ± 3.47	15.04 ± 3.49	0.266	-0.076
BSE barriers	18.15 ± 5.54	18.62 ±5.48	0.490	0.023
BSE self-efficacy	33.86 ± 8.51	30.53 ± 8.47	0.002**	-0.185[a]
Mammography benefits	18.11 ± 4.23	17.32 ± 4.75	0.145	-0.132[a]
Mammography barriers	25.25 ± 8.12	28.15 ± 7.12	0.003**	0.101
				*p<0.05, **p<0.01, ***p<0.001

[a] Low or non-significant correlation

According to the linear regression analysis model, those with high CHBMS seriousness and self-efficacy scores and who had a history of breast cancer in a first-degree relative had statistically significantly positive relationship with health anxiety scores (p<0.001, p=0.005, p=0.001, respectively) (Table-IV).

Table 4. The linear regression analysis model for health anxiety

Determinant factors	Model β	95% CI lower	95% CI upper
Age	-.018	-.099	.075
CHBMS Susceptibility score	.066	-.162	.623
CHBMS Seriousness Score	.298***	.305	.675
CHBMS BSE Self-Efficacy Score	-.240**	-.341	-.123
CHBMS Mammography Barriers Score	-.008	-.127	.110
CHBMS Health Motivation Score	.131*	.036	.505
Education level			
Low education level	.101	-.507	4.303
Middle education level	-.041	-2.809	1.315
History of breast cancer in a first degree relative	.194***	1.918	6.699
Clinical breast examination	.033	-1.925	3.126
Status of having a mammography	-.120	-5.163	.709
R2		48.1%	

β = Regression coefficient, * p <0.05, ** p <0.01, *** p <0.001

Discussion

In this study, the relationship between health anxiety and the components of the health belief model regarding breast cancer screening was evaluated. Women with low education level, presence of breast cancer history in a first-degree relative, who haven't undertaken clinical examination and ones who did not receive mammographies had higher levels of health anxiety. According to multivariable analysis, while seriousness and health motivation components of the health belief model regarding breast cancer was positively correlated with health anxiety, the self-efficacy component showed a negative correlation.

The average HAI score of the women that participated in our study was 18.2. While the HAI scores changed between 10.5 and 11.3 in a community-based study performed in the Netherlands [12], the HAI total scores can reach high levels such as 24.7 among people with chronic diseases, in particular, neurological diseases [13]. Most recent studies state that people with HAI scores higher than 20 may experience severe health anxiety and therefore can be evaluated with respect to hypochondriasis [13]. The high HAI average scores of the participants in our study in comparison to community-based studies may be due to the study population consisted of patients from a tertiary care hospital. In our study, we identified that low education levels increase the health anxiety score. Although our finding is similar to the results from the World Mental Health Survey Initiative, there are also contradictory reports such as performed by Niedermeier et al. that show that the education level has no effect on anxiety levels [14,15]. Even, there is still no clear conclusion about this subject in the literature, the finding from our study that low education levels increase anxiety might be due to the fact that low education levels reduce a person's income and such people have less vocational options.

In our study, health anxiety was significantly higher among people with a history of breast cancer in a first-degree relative and who had not undergone clinical breast examination. There are studies in the literature that have established that people with a family history of breast cancer have higher levels of anxiety [16]. This result may be due to people with a family history of breast cancer internalizing this condition more, attributing more risk to themselves, and their

development of a lower level of self-respect.

The result of our study that people who undergo clinical breast examination experience less health anxiety contradicts the results of some studies in the literature. The article by Sanvido et al. discuss that clinical breast examinations might increase anxiety [17]. However, the fact that the lower levels of anxiety levels among women who have received clinical breast examination in Turkey, a developing country, might be related with gathering information of the women with a low sociocultural level from their doctors during their clinical examination which might cause an increase in their awareness levels about breast cancer [18]. In our study, we concluded that people with high levels of health anxiety were less likely to uptake mammography, but considering the studies in the literature, it is unclear whether anxiety influences the decision to engage in cancer screening programs positively or negatively5. While some studies emphasize that the will to undertake a mammography increases with higher anxiety levels [19], some state that higher anxiety leads to behaviors of avoiding mammography [19]. It is necessary to perform more studies that will particularly explain the relationship between health anxiety and the decision to receive a mammography.

When we assessed the relationship between health anxiety and the components of the health belief model regarding breast cancer, we observed that individuals with high anxiety levels also had higher scores for seriousness and health motivation but lower self-efficacy scores. This result suggests that people with high levels of health anxiety undertake mammographies and breast self-examination more seriously and that they are more motivated regarding their health, but that their self-efficacy, in other words, their self-confidence is lower. There are limited number of studies in the literature that examine the effect of anxiety on the health belief model. In their study, Marmara et al. stated that anxiety has no effect on the components of the health belief model, but that the fear of being ill was positively related with the scores of all components of the health belief model [20]. Although the direction of the relationship between anxiety and behavioral motivation is discussed within different theoretical frameworks, some studies such as the study conducted by Winch et al. state that anxiety increases the motivation towards the behavioral goal [21]. Although our result that health motivation increases with health anxiety pertains to the patient's health beliefs, it is parallel with the results of studies in the literature that evaluate the relationship between general anxiety and behavioral motivation. However, this topic deserves to be evaluated with specific consideration of the patients' health motivation and health anxiety. Some studies in the literature have shown that self-efficacy and anxiety are inversely correlated [22]. Although the finding of our study that the self-efficacy component of the breast cancer health belief model has a negative correlation with anxiety is consistent with the previous literature, this topic should be studied specifically considering engagement in breast cancer screenings. In the study performed by Beydoun and et al. that examined the effect of anxiety on health beliefs regarding colorectal cancer screenings, they found that anxiety was associated with the perceived benefit and barrier components [23]. On the other hand, in our study, it was identified that anxiety did not significantly influence the benefit or barrier components of the health belief model regarding breast cancer screening. As emphasized in the article by Beydoun and colleagues, community-based studies are required to provide a better explanation of the effect of anxiety on the process of deciding to participate in breast cancer screening programs.

Conclusion

It was concluded that women with high levels of health anxiety have fewer mammographies and that their practice of breast self-examination is not affected by their health anxiety levels. In this study, it was observed that people with high levels of health anxiety score high in the seriousness and health motivation components and low in the self-efficacy component of the health belief model. Health anxiety deserves to be studied further because it can particularly affect health behavior and its effect on the decision to engage in screening programs should specifically be established in larger studies.

Competing interests
The authors declare that they have no competing interest

Financial Disclosure
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Ethical approval
The ethical approval for the study was obtained from the Izmir Katip Celebi University Non-Interventional Clinical Research Ethics Committee (Decision number: 283, date of approval: 02.11.2016).

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