



Investigation of the Effect of Women's Breast Cancer Worry Levels on Breast Cancer Prevention Behavior

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ABSTRACT

Objective: The aim of this study was to investigate the extent of worry about breast cancer (BC) amongst a sample of women and to examine the effect of this on behavior to prevent BC.

Materials and Methods: This cross-sectional study was conducted in 271 women aged 18 years and above who attended the Family Medicine Outpatient Clinic of a tertiary hospital and met the inclusion criteria. Data were collected using the following tools: Patient Information Form; Breast Cancer Worry Scale (BCWS); Breast Cancer Prevention Behaviors Identification Scale (BCPBIS); and Mammography Processes of Change Scale (MPCS).

Results: When evaluated according to BCWS scores (mean 8.43 ± 3.36), the BC worry levels were found to be low. The behavior adopted for prevention was also found to be positive according to BCPBIS (mean 119 ± 15.26) and MPCS (mean 82.38 ± 12.81) scores. A significant correlation was found between the BCWS and both the BCPBIS and MPCS scores, and again between the BCPBIS and MPCS scores ($p < 0.001$ for all). There was a correlation with three scale scores in those who had knowledge about BC, and those who had regular clinical breast examination (BE) ($p < 0.05$ for all). The BCPBIS score was found to be higher in those aged between 41-65 years, those who had mammography, and performed *p* self-BE ($p = 0.002$; $p < 0.001$; $p < 0.001$, respectively). According to the MPCS score, mammography behaviors was found to be more positive in those who had regular gynecological examinations and those who had mammography ($p = 0.08$ and $p = 0.011$).

Conclusion: The participants generally had low BC worry levels and had adopted positive behavior for prevention. Being informed about BC and screening and having regular BE increased BC worry. Those with high BC worry, those who had mammography before, those who had knowledge about BC and screening, and those who regularly performed BE showed more positive behaviors toward preventing BC.

Keywords: Breast cancer screenings; mammography; preventive behaviors; worry

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Key Points

- Concern about breast cancer (BC) can positively affect participation in screening, as well as cause avoidance of screening.
- Having knowledge about BC and screening tests and having regular breast examination are factors that may increase BC anxiety.
- However, although these factors will increase BC anxiety, they are important in terms of exhibiting more positive behaviors of women to participate in screening and prevent BC.

Introduction

Breast cancer (BC), is the most common type of cancer in women and the most common cause of cancer-related deaths, especially in low- and middle-income populations (1). Detection of BC at an early stage and reducing mortality rates are thus important for public health (2). In this context, it is recommended to perform BC screening both by self-examination and clinical breast examination (BE) and mammographic imaging (3).

Although BC screening is planned according to age and risk factors, there are many factors that affect the participation of women. First of all, differences in socio-cultural status may affect risk perception of BC differently and may lead to the development of different attitudes towards screening programs. In particular those with a low socio-cultural level may have a low awareness of BC (4, 5). Having BC risk factors, having a family history of BC, fear of being diagnosed with BC and losing the breast may increase levels of BC anxiety and positively affect participation in BC screening. However, these same factors can

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also lead to screening avoidance, depending on individual perceptions. Thus, it has also been shown that fear of being diagnosed with BC may also cause avoidance of mammographic imaging (6, 7).

In addition, the lack of sufficient knowledge about BC screening programs, concern about privacy during BE and mammographic imaging, and the fact that mammographic imaging is performed with a painful technique cause mammographic imaging avoidance behavior. These negative attitudes towards mammographic imaging, which can detect cancerous tissue even when very small, hinder BC screening programs (8, 9).

The evidence has shown that worry about BC may both positively affect participation in screenings, as well as cause avoidance of screening. The aim of the present study was to investigate the anxiety levels of women towards BC and to examine the effect on their behavior towards preventative measures for BC.

Materials and Methods

This cross-sectional study was carried out with female individuals who were admitted to the Family Medicine Outpatient Clinic of a tertiary hospital between 23 December 2021 and 15 May 2022, and who met the inclusion criteria. A brief pre-assessment interview was conducted with volunteers aged 18 years and over and without a personal or family history of cancer in their first-degree relatives. Their personal medical history and their initial anxiety levels were investigated. Information about previous chronic metabolic and psychiatric diseases and medications was checked via the online health system. The participants were also questioned in terms of feeling nervous, anxious and tense in the two weeks preceding the appointment. Women who do not describe these symptoms and who did not have a known psychiatric disease or drug use were included in the study.

Exclusion Criteria

Those under the age of 18 years, those with either a personal or family history of cancer in their first-degree relatives, those who were considered to have anxiety in the brief pre-assessment interview, who had a known psychiatric disease and who used drugs for it, and those with a disability to communicate (hearing and speech impairment, cognitive dysfunction) were excluded from the study.

After the participants were informed in detail about the study, their verbal and written consent was obtained. All procedures were carried out in compliance with the Declaration of Helsinki. The study was performed with the approval of the local ethics committee (date: 22.12.2021, no: 396 - Gaziosmanpaşa Training and Research Hospital Clinical Research Ethics Committee).

Data Collection Tools

Patient Information Form, Breast Cancer Worry Scale (BCWS), Breast Cancer Prevention Behaviors Identification Scale (BCPBIS), and Mammography Processes of Change Scale (MPCS) were used to obtain data.

Patient Information Form

The Patient Information Form was created by the researchers using published studies as a basis. The form collected sociodemographic characteristics (age, marital status, educational status) of the participants, the presence of chronic diseases, any history of gynecological examination, and factors related to BC screening, such as having knowledge about BC screening, and performance of clinical and self-BE and mammographic imaging.

Breast Cancer Worry Scale

Lerman et al. (10) developed the scale as a 3-item form in 1991 to measure the effect of BC anxiety on daily activities and mood. Later, this form was made applicable to all types of cancer by increasing the number of questions and was renamed the Cancer Worry Scale (10). Timur Taşhan et al. (11) modified the 6-question form for BC to Turkish and conducted a validity and reliability study (Cronbach $\alpha = 0.78$). The BCWS is a 5-point Likert-type scale, and the total score is in the range of 0-24. A total score of 12 and above indicates high BC anxiety.

Breast Cancer Prevention Behaviors Identification Scale

Khazae-Pool et al. (12) developed in the BCPBIS in 2016 to determine the factors affecting women's BC prevention behavior. The Turkish validity and reliability study was undertaken by Turan and Yiğit (13) in 2019. The BCPBIS consists of 33 items with seven sub-dimensions: attitude; motivation; self-efficacy; supportive systems; information seeking; self-care; and stress management. The BCPBIS is a 5-point Likert type scale. Items 1, 2, 3, 18, 19, 21, 22, and 23 are reverse scored. A total of 33 to 165 points can be obtained from the scale, and a higher score from the relevant dimension indicates that more positive behavior is displayed in that direction (13).

Mammography Processes of Change Scale

The validity and reliability study of the MPCS, which was created to evaluate the mammography behavior change process, was conducted by Pruitt et al. in 2010 (14, 15). The Turkish validity and reliability study was conducted by Sezen (16) in 2017. The MPCS consists of four sub-dimensions which include 22 items, and these sub-dimensions are: Information sharing and communication; consistency of regular screening; avoidance of contact with the health care system; and process of regular screening. A total of 43-100 points can be obtained from the 5-point Likert-type scale.

Statistical Analysis

SPSS, version 25 was used for statistical analysis (IBM Inc., Armonk, NY, USA). Descriptive data on the sociodemographic information of the participants are given as frequency tables. Parametric tests were used in the study since the number of participants was over 200 (17). The Pearson correlation analysis, a parametric test, was used to investigate the relationship between the scale and subscale scores. In addition, the Independent Samples t-test and One-Way ANOVA test, which are also parametric tests, were used to investigate if there was a significant difference between the scale and subscales and the sociodemographic data of the participants. In case of a significant difference between the groups, the Least Significant Difference test, a Post-hoc tests, was used to determine between which groups the significant difference occurred. A $p < 0.05$ was considered statistically significant.

Results

This study was conducted with 271 women, aged between 18 and 65 with a mean of 38.59 ± 12.22 years. More than three-quarters (78.2%, $n = 212$) did not have regular gynecological examinations and 85.2% (231) did not have regular clinical BE. A majority, 69.0% ($n = 187$), stated that they have never had a mammographic imaging. In those who had mammography, the mean age of having the first mammographic imaging was 43.95 ± 5.91 years and this ranged from 30 to 57 years of age. The sociodemographic, medical, and BC screening characteristics of the participants are presented in Table 1.

Table 1. Sociodemographic and screening behavior characteristics of the participants

Variables	n	%	
Age	18–40 years	151	55.7
	41–65 years	120	44.3
Education level	Middle school and low	118	43.5
	High school	55	20.3
	University	98	36.2
Marital status	Single	87	32.1
	Married	184	67.9
Income level	Low	101	37.3
	Middle	151	55.7
	High	19	7.0
Regular gynecological examination	Yes	59	21.8
	No	212	78.2
Had information about BC screening	Yes	154	56.8
	No	117	43.2
Regular clinic BE	Yes	40	14.8
	No	231	85.2
	Never	59	21.8
Self BE	Sometimes	164	60.5
	Regularly	48	17.7
History of mammographic imaging	Yes	84	31.0
	No	187	69.0
Mammographic imaging results (n=82)	Normal	79	96.3
	Abnormal	3	3.7

Data presented as n (%) of the participants, BC: breast cancer; BE: breast examination

The mean scores obtained from the scales were: 8.43 ± 3.36 for BCWS; 119 ± 15.26 for BCPBIS, and 82.38 ± 12.81 for MPCS. The mean score obtained from the BCWS suggested that BC worry levels were low in this cohort. Descriptive statistics regarding the total and sub-dimension scores of the scales used in the study are given in Table 2.

Table 3 shows the correlation analysis between the scores obtained from the scales and subscales. A significant positive correlation was found between the BCWS total score and the MPCS total score ($r = 0.452$; $p < 0.001$) and the BCWS and the BCPBIS total score ($r = 0.340$; $p < 0.001$). There was also a significant positive correlation between the MPCS total score and the BCPBIS total score ($r = 0.613$; $p < 0.001$).

Table 4 presents the comparison of the total scores of the scales according to the various characteristics of the participants. The BCWS total score was significant different between women who did and did not have information about BC and screening tests ($p = 0.005$) and having regular clinical BE ($p < 0.001$). The BCWS total score, indicating greater worry concerning BC, was found to be higher in those who had knowledge about BC and screening tests and those with regular clinical BE. Similarly, the MPCS score

Table 2. Descriptive statistics of the total and sub-dimension scores of the scales

	Min-Max	Mean \pm SD
BCWS score	1.00–19.00	8.43 ± 3.36
MPCS total score	39.00–108.00	82.38 ± 12.81
Information sharing and communication	12.00–50.00	37.49 ± 7.06
Consistency of regular screening	7.00–25.00	17.38 ± 3.90
Avoidance of getting in contact with the health care system	3.00–15.00	10.65 ± 2.74
Process of regular screening	8.00–20.00	16.84 ± 2.59
BCPBIS total score	65.00–158.00	119.19 ± 15.26
Supportive systems	4.00–20.00	13.01 ± 3.69
Motivation	8.00–20.00	16.22 ± 2.37
Attitude	17.00–40.00	32.32 ± 4.81
Self-efficacy	5.00–20.00	15.24 ± 2.82
Self-care	6.00–30.00	17.33 ± 4.06
Stress management	3.00–15.00	11.13 ± 2.21
Information seeking	4.00–20.00	13.91 ± 2.84

Data presented as Min-Max, Mean \pm SD, BCPBIS: Breast Cancer Prevention Behaviors Identification Scale; BCWS: Breast Cancer Worry Scale; MPCS: Mammography Processes of Change Scale; Min: minimum; Max: maximum; SD: standard deviation

was significantly higher in those who had knowledge of BC and screening tests ($p = 0.004$), those who had regular clinical BE ($p < 0.001$), who had regular gynecological examinations ($p = 0.08$), and had a history of mammographic imaging ($p = 0.011$). Finally, the BCPBIS total score was significantly higher in the over 40-year age group ($p = 0.002$). There was a statistically significant difference in BCPBIS total score between women who did or did not get information about BC and screening tests ($p < 0.001$), did or did not have regular clinical BE ($p = 0.002$), did or did not perform self-BE ($p < 0.001$), and did or did not have a history of mammographic imaging ($p < 0.001$) (Table 4).

Discussion and Conclusion

In the present study, in which the effect of women's worry levels about BC and the effect this had on their BC prevention behavior was examined, the participants generally reported low levels of worry about BC and also exhibited positive behavior for prevention of BC. Those who were more worried about BC reported more positive behavior towards BC prevention. Those who had knowledge of BC and BC screening tests and those who had regular BE had higher levels of anxiety about BC. More positive behaviors toward BC prevention were observed in older women (aged 41–65 years), who knew about BC and screening tests, who had regular BE, and who had previous mammographic imaging.

Studies have shown that patients with BC have higher anxiety and depression levels than healthy individuals (18). These findings are more marked in the pre-treatment phase than post-treatment phase (19).

Table 3. Correlation between the scores obtained from the scales and subscales

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
1- BCWS score	r	1													
	p														
2- MPCS total score	r	0.452**	1												
	p	<0.001													
3- MPCS-ISC	r	0.366**	0.909**	1											
	p	<0.001	<0.001												
4- MPCS-CRS	r	0.461**	0.776**	0.552**	1										
	p	<0.001	<0.001	<0.001											
5- MPCS-AGCH	r	0.229**	0.502**	0.296**	0.259**	1									
	p	<0.001	<0.001	<0.001	<0.001										
6- MPCS-PRS	r	0.299**	0.765**	0.626**	0.555**	0.227**	1								
	p	<0.001	<0.001	<0.001	<0.001	<0.001									
7- BCPBIS total score	r	0.340**	0.613**	0.525**	0.547**	0.252**	0.510**	1							
	p	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001								
8- BCPBIS-SS	r	0.345**	0.471**	0.417**	0.451**	0.111	0.394**	0.677**	1						
	p	<0.001	<0.001	<0.001	<0.001	0.067	<0.001	<0.001							
9- BCPBIS-MOT	r	0.333**	0.503**	0.431**	0.461**	0.217**	0.388**	0.660**	0.471**	1					
	p	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001						
10-BCPBIS-A	r	0.016	0.241**	0.132*	0.279**	0.164**	0.238**	0.598**	0.219**	0.169**	1				
	p	0.794	<0.001	0.030	<0.001	0.007	<0.001	<0.001	<0.001	<0.001	0.005				
11-BCPBIS-SE	r	0.301**	0.443**	0.400**	0.374**	0.148*	0.381**	0.722**	0.381**	0.481**	0.306**	1			
	p	<0.001	<0.001	<0.001	<0.001	0.015	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001			
12- BCPBIS-SC	r	0.300**	0.482**	0.449**	0.410**	0.189**	0.342**	0.738**	0.397**	0.424**	0.217**	0.500**	1		
	p	<0.001	<0.001	<0.001	<0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		
13- BCPBIS-SM	r	0.118	0.278**	0.227**	0.210**	0.164**	0.267**	0.557**	0.267**	0.331**	0.268**	0.328**	0.352**	1	
	p	0.053	<0.001	<0.001	<0.001	0.007	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	
14- BCPBIS-IS	r	0.253**	0.504**	0.476**	0.371**	0.203**	0.422**	0.719**	0.416**	0.468**	0.268**	0.495**	0.522**	0.307**	1
	p	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	

*The correlation is significant at the 0.05 level (Pearson correlation test), **The correlation is significant at the 0.01 level (Pearson correlation test), A: attitude, AGCH: avoidance of getting in contact with the health care system; BCPBIS: Breast Cancer Prevention Behaviors Identification Scale; BCWS: Breast Cancer Worry Scale; CRS: consistency of regular screening; IS: information seeking, ISC: information sharing and communication; MPCS: Mammography Processes of Change Scale; MOT: motivation; PRS: process of regular screening; SC: self-care; SE: self-efficacy; SM: stress management; SS: supportive systems

Similar to people who have been diagnosed with BC, people who do not have BC may still worry about BC. Although the worry about BC may have an effect on adopting a healthy lifestyle, it may have a negative effect on prevention behavior for BC. Nacar (20) investigated the relationship between BC anxiety level and attendance for early diagnosis behavior in

healthy women. In the study by Nacar (20), 75.7% of the participants had low BC anxiety, while the rate of self-BE was higher (39.7%) and mammographic imaging rate was lower (15.8%) compared to clinical BE (18.3%). Gözüyeşil et al. (21) observed that 69.6% of their participants had low BC anxiety. Nevertheless, the rates of clinical

Table 4. Comparison of the total scores of the scales, by a number of the sociodemographic variables examined

Variables	BCWS total score	MPCS Total score	BCPBIS Total score
Age	Mean ± SD	Mean ± SD	Mean ± SD
18–40 years	8.49±3.60	82.89±12.45	116.60±15.35
41–65 years	8.37±3.06	81.74±13.30	122.46±14.59
p=	0.765	0.466	0.002
Education level	Mean ± SD	Mean ± SD	Mean ± SD
1) Middle school and low	8.28±2.99	80.98±13.41	119.69±14.67
2) High school	8.47±3.48	83.25±12.50	120.36±14.68
3) University	8.60±3.73	83.57±12.22	117.94±16.32
p=	0.780	0.287	0.575
Income level	Mean ± SD	Mean ± SD	Mean ± SD
1) Low	9.02±3.57	81.91±13.30	118.69±15.83
2) Middle	8.18±3.09	82.89±12.52	119.46±15.00
3) High	7.37±3.93	80.79±13.05	119.79±15.07
p=	0.054	0.717	0.913
Regular gynecological examination	Mean ± SD	Mean ± SD	Mean ± SD
Yes	9.07±3.44	86.29±13.71	122.29±15.70
No	8.26±3.33	81.29±12.38	118.33±15.07
p=	0.103	0.008	0.079
Getting information about screening	Mean ± SD	Mean ± SD	Mean ± SD
Yes	8.93±3.45	84.31±12.31	123.31±15.08
No	7.79±3.15	79.84±13.08	113.78±13.80
p=	0.005	0.004	<0.001
Clinical BE	Mean ± SD	Mean ± SD	Mean ± SD
Yes	10.68±2.79	91.15±11.71	127.35±17.51
No	8.05±3.31	80.86±12.41	117.78±14.43
p=	<0.001	<0.001	0.002
Self BE	Mean ± SD	Mean ± SD	Mean ± SD
1) Never	7.80±3.24	79.86±13.62	113.56±15.29
2) Sometimes	8.40±3.14	82.51±12.47	119.14±14.41
3) Regularly	9.33±4.09	85.04±12.68	126.31±15.46
p=	0.062	0.113	<0.001
Post-hoc tests=			1-2&3, 2-3
Having mammographic imaging	Mean ± SD	Mean ± SD	Mean ± SD
Yes	8.92±2.97	85.33±12.28	124.76±15.46
No	8.22±3.51	81.05±12.87	116.70±14.54
p=	0.115	0.011	<0.001

Data presented as Mean ± SD, Independent Samples t-test, ANOVA test, Post-hoc; LSD test, LSD: Least Significant Difference; BC: breast cancer; BCWS: Breast Cancer Worry Scale; BCPBIS: Breast Cancer Prevention Behaviors Identification Scale; BE: breast examination; MPCS: Mammography Processes of Change Scale

and self-BE were only 7.1%–21.9%, and the rate of mammographic imaging was 14.1%. According to another study conducted with the participation of 2000 women, 49.1% of women had concerns about BC. The rate of anxiety about BC was higher in women who had experienced mammographic imaging (22). In keeping with these earlier studies, the BC anxiety levels of the women who participated in the present study were low, based on BCWS scores. The rate of clinical BE was 14.8%, the rate of self-BE was 17.7%, and the rate of having mammographic imaging was 31%. Although the rate of having mammographic imaging was higher than in these earlier studies, because both the general participation rates in screenings and the level of concern about BC were low, it suggests that women with low socio-cultural level, who made up the majority of the study population of the present study, also had low awareness of BC.

In the study in which the validity and reliability of the BCPBIS were examined, the participants' BC prevention behaviors were evaluated as moderately positive (13). In Bostancı's (23) thesis study in which female health professionals examined the relationship between BC fear and BC prevention behaviors, BC prevention behaviors were found to be moderately positive. Similarly, the attitudes of the present study population in terms of BC prevention behaviors were moderately positive. With appropriate interventions, women should be encouraged to adopt behaviors to prevent BC, although it should be noted that the etiology of preventative behavior adoption or avoidance is multifactorial.

Previously, it was predicted that MPCS would be successful in identifying women who were considering or not considering having a mammographic imaging in the next two years, and the total MPCS score was higher in women considering a mammographic imaging within two years. The total MPCS scores of those who had mammographic imaging before were lower (16). Özmen et al. (24) previously reported that women aged between 40 and 49 years, who were most likely to have had mammographic imaging within the last two years were characterized by a higher educational level, periodic gynecologic examinations, and a first or second degree family history of BC. In contrast, women aged between 50 and 69 years were more likely to have undergone mammographic imaging within the previous 2 years if they had also undergone periodic gynecologic examinations (24). In the present study, those who had mammographic imaging at any point in their lives had higher MPCS scores. When the relationship between mammographic imaging status and the sub-dimensions of MPCS (information sharing and communication, regular screening stability, and regular screening behavior) were compared, although there was a significant difference, no significant difference was found with avoidance of health care services when compared to women who had never had mammography. While trust in physicians and health services positively affects participation in BC screening, previous negative mammographic imaging experience, low rate of referral of doctors to mammographic imaging, and negative beliefs about mammographic imaging prevented BC screening behavior.

BC incidence and BC-related death rates increase with increasing age (25). In previous studies, it was striking that different relationships have been detected between age and BC anxiety. Nacar (20) reported BC anxiety was higher in women younger than 40 years of age, whereas in the study of Gözüyeşil et al. (21), BC anxiety was higher at older ages. Although protective behaviors against BC were not significantly associated with age, in the study of Çuhadar (26), it was shown that women exhibited more positive BC prevention behavior as age

increased. Similarly, in the present study, no significant correlation was found between the age of the women, anxiety about BC and the total MPCS score. In contrast to the earlier literature, the BCPBIS total score was higher between the ages of 18–40 years rather than in the older age group. There will likely be an increase in awareness of a range of diseases with advancing age. This may be associated with an increase in anxiety about having BC. Although advanced age is accepted as an important risk factor in the development of BC, it was thought that the observation of positive behaviors to prevent BC at younger ages might be due to the higher awareness and knowledge level of young people about BC and health behaviors.

Although increased education level has a positive effect on women's awareness of health, no relationship has been reported in the literature in association with anxiety about BC (21, 27, 28). However, as the level of knowledge about BC increases, women's anxiety levels about BC may decrease (29). In fact, Dinçel et al. (30) showed that, despite their low education level, women who were made aware of BC had a decreased fear level of BC. In the present study, and similar to earlier reports, no significant relationship was found between BC anxiety and education level. However, BC anxiety was higher in those who had previously received information about BC and screening tests. The high level of knowledge and awareness of the participants about BC may lead to the fear of being diagnosed with cancer and may lead to avoidance of screening programs. One remedy for this unwanted association would be to stress the importance and effectiveness of early diagnosis.

In contrast, in a study investigating women's level of knowledge about BC, mammographic imaging rates increased in the last two years in direct proportion to the increase in education level. It was found that university-graduate women had undergone more mammographic imaging (31). The level of confidence in the benefits of self-BE and mammographic imaging behavior was higher among women with higher education levels (32). In the present study, no significant association was found between the level of education and the total score of BCPBIS and MPCS. This may be related to the fact that adopting health behaviors to prevent BC and increasing women's awareness, and awareness in participating in screening programs play a more important role compared to women's current education levels.

Nacar (20) reported that 0.4 times more BC anxiety was found in those who had clinical BE, but no significant relationship was found between self-BE and mammographic imaging and BC anxiety. In another study, the BC anxiety level of those who performed self-BE was approximately three times higher than those who did not (27). In the study of Bostancı (23), female health professionals examining the relationship between BC fear and BC prevention behaviors, BCPBIS scores were found to be higher in those who had BE and those who had mammographic imaging. In the present study, while BC anxiety was higher in those with regular clinical BE, no significant relationship was found between self-BE and mammographic imaging and BC anxiety. High levels of anxiety toward BC positively affected participants' attitudes and behaviors toward BC prevention and mammographic imaging. In line with the findings of Bostancı (23), the BCPBIS score was higher in those with regular BE and those who had mammographic imaging. The results we obtained suggest that the importance of self-BE and mammographic imaging is not sufficiently known. Being examined by a physician may be perceived by patients as a more important or effective behavior than self-examination.

However, it was thought that the information given to the patients during the examination might increase the level of anxiety, as stated above. Concerns about BC should be addressed, and awareness should be raised about BC and screening methods.

The present study has some limitations. Since our study was conducted in a single center, the results obtained cannot be generalized beyond the study population. Also, women may have avoided giving honest answers to some questions for fear of being exposed to social pressure.

In conclusion, this study showed that worry levels about BC were generally found to be low. Knowing about BC and screening tests and having regular BE were factors that increased anxiety about BC. Those with higher anxiety about BC, those aged between 41 and 65 years, those who had previously received information about BC and screening tests, and those who had regular BE and had had mammographic imaging previously reported more positive behavior towards BC prevention. Although it will increase the level of concern, participation in BC screening programs should be increased by providing the necessary information about BC screening methods.

Ethics Committee Approval: The study was performed with the approval of the local ethics committee (date: 22.12.2021, no: 396 - Gaziosmanpaşa Training and Research Hospital Clinical Research Ethics Committee).

Informed Consent: After the participants were informed in detail about the study, their verbal and written consent was obtained.

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References

1. WHO Breast Cancer (2022). <https://www.who.int/news-room/fact-sheets/detail/breast-cancer> (Access date: 01.10.2022) [Crossref]
2. Milosevic M, Jankovic D, Milenkovic A, Stojanov D. Early diagnosis and detection of breast cancer. *Technol Health Care* 2018; 26: 729-759. (PMID: 30124455) [Crossref]
3. Coleman C. Early detection and screening for breast cancer. *Semin Oncol Nurs* 2017; 33: 141-155. (PMID: 28365057) [Crossref]
4. Aksoy YE, Turfan EÇ, Sert E, Mermer G. Barriers on breast cancer early detection methods. *J Breast Health* 2015; 11: 26-30. (PMID:28331686) [Crossref]
5. Taylan S, Küçükakça Çelik G. Breast cancer diagnosis behaviors in women with and without a family history of breast cancer. *Cukurova Med J* 2020; 45: 1467-1475. [Crossref]
6. Erdoğan E, Tuzcu A. Comparison of mammography behaviors, health beliefs, and fear levels of women with and without familial breast cancer history. *Women Health* 2020; 60: 776-791. (PMID: 32252615) [Crossref]
7. Alyami M, Al-Sharef A, Al-Aseri M, Henning M. Mammography Self-efficacy Scale and Breast Cancer Fear Scale: Psychometric properties of the Arabic versions among Saudi women. *Cancer Nurs* 2021; 44: 163-170. (31652134) [Crossref]
8. Welch HG, Prorok PC, O'Malley AJ, Kramer BS. Breast-cancer tumor size, overdiagnosis, and mammography screening effectiveness. *N Engl J Med* 2016; 375: 1438-1447. (PMID: 27732805) [Crossref]
9. Miller BC, Bowers JM, Payne JB, Moyer A. Barriers to mammography screening among racial and ethnic minority women. *Soc Sci Med* 2019; 239: 112494. (PMID: 31513931) [Crossref]
10. Lerman C, Trock B, Rimer BK, Jepson C, Brody D, Boyce A. Psychological side effects of breast cancer screening. *Health Psychol* 1991; 10: 259-267. (PMID: 1915212) [Crossref]
11. Timur Taşhan S, Uçar T, Aksoy Derya Y, Nacar G, Erci B. Validity and Reliability of the Turkish Version of the Modified Breast Cancer Worry Scale. *Iran J Public Health* 2018; 47: 1681-1687. (PMID: 30581784) [Crossref]
12. Khazae-Pool M, Majlessi F, Montazeri A, Pashaei T, Gholami A, Ponnet K. Development and psychometric testing of a new instrument to measure factors influencing women's breast cancer prevention behaviors (ASSISTS). *BMC Womens Health* 2016; 16: 40. (PMID: 27444675) [Crossref]
13. Turan Z, Yiğit F. Validity and Reliability Study of the Scale of Factors Affecting Women's Breast Cancer Prevention Behaviors. *Kocaeli Med J* 2021; 10: 407-420. [Crossref]
14. Prochaska JO, DiClemente CC. Transtheoretical therapy: Toward a more integrative model of change. *Psychol Psychother* 1982; 19: 276-288. [Crossref]
15. Pruitt SL, McQueen A, Tiro JA, Rakowski W, DiClemente CC, Vernon SW. Construct validity of a mammography processes of change scale and invariance by stage of change. *J Health Psychol* 2010; 15: 64-74. (PMID: 20064885) [Crossref]
16. Sezen S. Mamografi Davranış Değişim Süreci Ölçeği'nin (MDDSÖ) Geçerlik ve Güvenirlik Çalışması. *Halk Sağlığı Hemşireliği Anabilim Dalı, Yüksek Lisans Tezi*. 2017. [Crossref]
17. Tabachnick BG, Fidell LS. *Using Multivariate Statistics* (4th ed.). Needham Heights, MA: Allyn and Bacon; 2001. [Crossref]
18. İzci F, Sarsanov D, Erdogan Zİ, İlgün AS, Çelebi E, Alço G, et al. Impact of personality traits, anxiety, depression and hopelessness levels on quality of life in the patients with breast cancer. *Eur J Breast Health* 2018; 14: 105-111. (PMID: 29774319) [Crossref]
19. İzci F, Özdem G, İlgün AS, Ağaçaayak F, Duymaz T, Erdoğan Z, et al. Pre-treatment and post-treatment anxiety, depression, sleep and sexual function levels in patients with breast cancer. *Eur J Breast Health* 2020; 16: 219-225. (PMID: 32656524) [Crossref]
20. Nacar G. The Relationship Between Breast Cancer Anxiety Level and Early Diagnosis Screening Behavior in Women. *Journal of Inonu University Health Services Vocational School* 2018; 6: 44-53. [Crossref]
21. Gözüyeşil E, Filiz T, Düzgün A. Factors affecting breast cancer worry and healthy lifestyle behaviors in women aged 15-49 years. *Cukurova Med J* 2019; 44: 1215-1225. [Crossref]
22. Abelson J, Tripp L, Brouwers MC, Pond G, Sussman J. Uncertain times: A survey of Canadian women's perspectives toward mammography screening. *Prev Med* 2018; 112: 209-215. (PMID: 29678617) [Crossref]
23. Bostancı Ş. Kadın Sağlık Profesyonellerinin Meme Kanseri Korkusu İle Meme Kanseri Önleme Davranışları Arasındaki İlişki. *Düzce Üniversitesi Lisansüstü Eğitim Enstitüsü, Yüksek Lisans Tezi*. 2022 [Crossref]
24. Ozmen V, Nilufer Ozaydin A, Cabioglu N, Gulluoglu BM, Unalan PC, Gorpe S, et al. Survey on a mammographic screening program in Istanbul, Turkey. *Breast J* 2011; 17: 260-267. (PMID: 21450016) [Crossref]

25. Winters S, Martin C, Murphy D, Shokar NK. Breast cancer epidemiology, prevention, and screening. *Prog Mol Biol Transl Sci* 2017; 151: 1-32. (PMID: 29096890) [\[Crossref\]](#)
26. Çuhadar E. 15-49 Yaş Grubu Kadınların Meme Kanseri Önleme Davranışlarını Etkileyen Faktörler ve Sağlık Okuryazarlığı. Maltepe Üniversitesi Lisansüstü Eğitim Enstitüsü, Yüksek Lisans Tezi. 2022. [\[Crossref\]](#)
27. Bakır N, Demir C. Relationship between nurses' breast cancer concern level and early diagnosis application behaviors. *ADYÜ Sağlık Bilimleri Derg* 2020; 6: 216-222. [\[Crossref\]](#)
28. Karaca Bıçakçı N, Karakaş D, Aydın Avcı İ. Fear of breast cancer and assessment of the efficiency of mammography scanning in working women. *Eur J Breast Health* 2023; 19: 70-75. (PMID: 36605474) [\[Crossref\]](#)
29. Chirico A, Lucidi F, Mallia L, D'Aiuto M, Merluzzi TV. Indicators of distress in newly diagnosed breast cancer patients. *PeerJ* 2015; 3: e1107. (PMID: 26244115) [\[Crossref\]](#)
30. Dinçel O, Başak F, Pektaş B, Kınacı E. Breast Cancer Risk Assessment and Level of Knowledge in Women With Low Levels of Education. *J Kartal TR* 2014; 25: 181-186. [\[Crossref\]](#)
31. Demir Yıldırım A, Özyayın AN. Sources of breast cancer knowledge of women living in Moda / İstanbul and their attendance to breast cancer screening. *J Breast Health* 2014; 10: 47-56. [\[Crossref\]](#)
32. Fouladi N, Pourfarzi F, Mazaheri E, Asl HA, Rezaie M, Amani F, et al. Beliefs and behaviors of breast cancer screening in women referring to health care centers in northwest Iran according to the champion health belief model scale. *Asian Pac J Cancer Prev* 2013; 14: 6857-6862. (PMID: 24377617) [\[Crossref\]](#)