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Anxiety and screening attitudes in breast cancer patients and their first-degree relatives: A comparative pilot study

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ABSTRACT

Objective: Breast cancer is the most common type of cancer in women. Identifying women at risk of breast cancer and ensuring their participation in cancer screening programs have been shown to reduce mortality rates. Therefore, it is important to identify the determinants of attitudes toward breast cancer screening, among which anxiety may play a significant role. This study aimed to explore the screening attitudes and anxiety levels of women with breast cancer and those of their female first-degree relatives within a patient-relative dyadic framework.

Material and Methods: Breast cancer patients and their female first-degree relatives between the ages of 18-65 were included in this cross-sectional study as a patient-relative dyad. The patients were administered a socio-demographic questionnaire, the breast cancer worry scale, and the attitude towards cancer screening scale.

Results: A total of 37 dyads participated in the study. The median age of the entire cohort was 47. Screening participation was reported in 37.1% (13/35) of patients pre-diagnosis and in 29.1% (7/24) of eligible relatives. A negative correlation was found between patients' anxiety and their relatives' screening attitudes (r=-0.395, p=0.016 Spearman's correlation), whereas a positive correlation was found between patients' attitudes and their relatives' attitudes (r=0.501, p=0.002 Spearman's correlation).

Conclusion: Higher levels of anxiety in breast cancer patients were associated with less favorable screening attitudes among their relatives, whereas screening attitudes were positively correlated within patient-relative dyads. These findings suggest that anxiety and screening attitudes may cluster within patient-relative dyads. Further research is required to determine the clinical implications.

Keywords: Breast cancer, screening tests, anxiety

INTRODUCTION

Breast cancer is the most common cancer in women and one of the leading causes of cancer-related deaths (1,2). Early detection through screening remains the primary strategy for mortality reduction (3). The World Health Organization recommends mammography for screening purposes, while clinical and self-breast examinations are emphasized primarily for breast awareness (4). Türkiye's current screening policy includes biannual mammography and clinical breast examinations for individuals aged 40 to 69 (5).

Identifying the population's risk factors is an essential step in the decision-making process for screening policies. Key risk factors for breast cancer include aging, reproductive factors such as early menarche, late menopause, and late pregnancy and hormone replacement therapy (6). Family history, an unmodifiable risk factor that necessitates earlier screening, is present in 5-10% of breast cancer cases (7). A woman who has a relative with breast cancer has a higher risk of developing the disease than the general population (8). Screening for these high-risk groups is important not only for reducing mortality and morbidity but also for ensuring cost-effectiveness (9).

The attitudes of high-risk women toward screening programs are important for early detection of breast cancer. Given the importance of screening for breast cancer, it is essential to examine the factors that may negatively influence attitudes

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toward screenings. Several factors that adversely affect screening attitudes include low socio-economic status, lack of private health insurance, medical mistrust, insufficient health information, and anxiety, which is a significant contributing factor. Anxiety in breast cancer patients also leads to depressive symptoms and decreased quality of life and is linked to a higher risk of mortality (10,11). Considering that anxiety can significantly influence screening attitudes, particularly in family systems where illness experiences are shared, this study aimed to explore associations between anxiety and screening attitudes in patient-relative dyads.

MATERIAL and METHODS

Study Design

After obtaining ethical approval, this cross-sectional study was conducted among female patients with breast cancer aged 18 to 65 who visited a medical oncology clinic in a tertiary facility serving over eighty thousand cancer patients annually and who were accompanied by a female relative. Those who agreed to participate were included in the sample as patient-relative pairs. Informed consent was obtained from all participants and the entire study was conducted in accordance with the Declaration of Helsinki. All participant data were anonymized prior to analysis to ensure confidentiality. The primary outcome was to identify differences between patients and at-risk relatives in worry about breast cancer and attitudes toward breast cancer screening.

Ethical approval was obtained from the Marmara University Faculty of Medicine Clinical Research Ethics Committee (approval number: 09.2023.111, date: 20.01.2023). This study was conducted per the Declaration of Helsinki and the Research and Publication Ethics, and patient data were anonymized before analysis.

Participants

Patients presenting to the medical oncology outpatient clinic aged 18 to 65 and diagnosed with breast cancer, together with their first-degree female relatives, were included in the study as dyads. First-degree relatives are defined as parents, children, and siblings. Individuals facing medical or social barriers to completing the surveys, male breast cancer patients, and female relatives with a history of breast cancer were excluded from the study. Data were collected through face-to-face surveys conducted with patients and their relatives on various weekdays at the clinic. This descriptive study did not use systematic sampling; instead, a convenience sample was employed, which we acknowledge as a limitation with regard to generalizability. The sample size was calculated to be 70 using the publicly available statistical software OpenEpi, version 3. The analysis was performed with a 95% confidence interval, 80% power, a mean difference of 2.7, and a standard deviation of 4 for each group.

Data Collection

After providing informed consent, each participant was asked to complete questionnaires to collect socio-demographic data. The socio-demographic questions were developed based on a literature review and assessed participants' ages, economic status, educational background, and family structure. Additionally, factors that may affect cancer risk, such as age at menopause, age at first menstruation, use of hormone replacement therapy, and smoking history, were included. Furthermore, the breast cancer risk among relatives aged 35 to 65 was calculated using the NCI breast cancer risk calculator in an exploratory, hypothesis-generating subanalysis (12). The NCI Breast Cancer Risk Assessment Tool estimates both the 5-year and lifetime absolute risks of developing invasive breast cancer based on age, reproductive history, family history in first-degree relatives, and selected clinical factors. In this study, lifetime risk projections were used to better characterize participants' long-term susceptibility. Risk calculations were performed for first-degree relatives aged 35-65 years in accordance with the eligibility criteria of the NCI tool. Relatives younger than 35 years of age or those with missing required variables were excluded from this analysis. As a result, NCI-based risk estimation was feasible in 16 relatives, and this subgroup was analyzed separately.

The breast cancer worry Breast Cancer Worry Scale (BCWS), developed by Lerman et al. (13) was used to assess concerns regarding breast cancer. The validity and reliability of the BCWS have been confirmed both in its original version and in Turkish (14). The instrument comprises six questions on a 5-point Likert scale, with responses ranging from 0 to 4. Total scores range from 0 to 24, with lower scores reflecting lower cancer-related worry and higher scores reflecting higher cancer-related worry.

The Attitude Towards Cancer Screening Scale (ATCS), developed by Yıldırım Öztürk et al. (15), was used to evaluate knowledge and attitudes related to breast cancer screening tests and the validity and reliability have been previously demonstrated, with a Cronbach's α coefficient of 0.95 in prior studies. The ATCS comprises 15 items rated on a five-point Likert scale, yielding total scores between 15 and 75. Although no formal cutoff values have been defined, scores closer to 15 reflect a negative attitude toward cancer screening, whereas scores approaching 75 indicate a positive attitude (15).

In this study, screening participation was defined differently for breast cancer patients and their first-degree relatives. For relatives, participation was assessed according to risk-adapted screening recommendations. Several international guidelines propose earlier initiation of breast cancer screening for women at increased risk due to family history, with variations in the recommended starting age and screening modality depending on risk stratification models and healthcare settings (16-18).

In the present study, we adopted the National Comprehensive Cancer Network recommendations, which advise initiating screening earlier than for the average-risk population—approximately at 30 years of age—for women with a first-degree relative diagnosed with breast cancer. Accordingly, first-degree relatives aged ≥30 years who had undergone mammography and/or breast magnetic resonance imaging in line with high-risk screening recommendations were classified as screening participants. For patients, screening-related attitudes were evaluated based on screening experiences of prior to diagnosis and general perspectives toward screening, as they were no longer eligible for routine population-based screening following a breast cancer diagnosis.

Following completion of the anxiety survey, relatives of patients were provided with brief educational information regarding breast cancer risk and screening practices. Screening appointments were arranged after survey completion for eligible participants who explicitly requested them.

Statistical Analysis

Data were analyzed using IBM SPSS 26.0 (IBM SPSS Statistics for Windows, version 26.0. Armonk, NY: IBM Corp). Categorical variables were compared using the chi-square test, and Fisher's exact test was applied when expected cell counts were small. To control for Type I error due to multiple comparisons, the Bonferroni correction was applied. Continuous variables were analyzed using the Mann-Whitney U and Kruskal-Wallis H tests. Non-parametric Spearman correlation was used, and a p-value of <0.05 was deemed statistically significant.

RESULTS

The study involved 37 dyads. The median age of the entire cohort was 47 years [interquartile range (IQR) 32-58], with 34 (45.9%) having attained higher education. Among them, 43 (58.1%) were married, and 27 (36.4%) were employed. Most participants (75.7%) reported income that matched their expenditures. Table 1 presents socio-demographic data in pairs. Their relatives were, on average, 22 years younger than the patients (p=0.001, Mann-Whitney U test). Patients and their relatives were comparable in terms of education, employment, and income level.

Breast cancer risk factors and screening characteristics are presented in Table 2. The frequency of postmenopausal women was higher in the patient group than in the relatives group (p=0.001, chi-square test). Menopausal age, age at menarche, smoking habits, and alcohol consumption were similar between the two groups. Regarding screening participation, 35 patients were eligible for screening prior to diagnosis, of whom 13 (37.1%) had participated, compared to 7 of the 24 eligible relatives (29.1%). Screening participation rates were similar between patients and relatives (p=0.585, chi-square test).

The median total scores for ATCS and BCWS among all participants were 71 (IQR 61-75) and 15 (IQR 10.75-21), respectively. There were no statistically significant differences in attitude and anxiety scores between patients and their relatives (Table 3). The NCI breast cancer risk was calculated for 16 eligible relatives, revealing a median risk percentage of 17.6% for life-time risk developing breast cancer among them. In the analysis of anxiety and attitude scores relative to socio-demographic factors,

Table 1. Socio-demographic characteristics of the study population

	Patients (n=37)	Relatives (n=37)	p
Age (years)	54 (48-62)	32 (21-45)	0.001
Education level			
High school or lower	24 (64.9)	16 (43.2)	
University or higher	13 (35.1)	21 (56.8)	0.064
Marital status			
Married	26 (70.3)	17 (45.9)	
Single/divorced/widowed	11 (29.7)	20 (54.1)	0.035
Employment			
Currently employed	14 (37.8)	13 (35.1)	
Unemployed	23 (62.2)	24 (64.9)	0.810
Income level			
Less than expenditure	5 (13.5)	3 (8.1)	
Equal to expenditure	28 (75.7)	30 (81.1)	
Higher than expenditure	4 (10.8)	4 (10.8)	0.619

Data were presented as median (interquartile range) or as frequencies and percentages. Categorical variables were compared using the chi-square and Fisher's exact tests, and continuous variables were analyzed using the Mann-Whitney U test.

Table 2. Breast cancer risk factors and screening characteristics of the study population			
	Patients (n=37)	**Relatives (n=37)**	**p**
Menopause status			
Premenopausal	6 (16.2)	28 (75.7)	
Postmenopausal	31 (83.8)	9 (24.3)	0.001
Menopause age (yr)			
<45	9 (29.0)	4 (44.5)	
45-48	11 (35.5)	1 (11.1)	
49-52	7 (22.6)	3 (33.3)	
53+	4 (12.9)	1 (11.1)	0.52
HRT	5 (13.5)	1 (2.7)	
Age of menarche (yr)			
7-11	9 (24.3)	4 (10.8)	
12-13	19 (51.4)	26 (70.3)	
14+	9 (24.3)	7 (18.9)	0.195
Number of children			
0	7 (18.9)	19 (51.4)	
1-3	20 (54.1)	14 (37.8)	
4+	10 (27.0)	4 (10.8)	0.01
Smoking	4 (10.8)	5 (13.5)	0.724
Alcohol consumption	0 (0.0)	3 (8.1)	0.239
Screening participation (of eligible)	13 (of 35)	7 (of 24)	0.585
Data were presented as frequencies and percentages. Categorical variables were compared using the chi-square and Fisher's exact tests.			

Table 3. Anxiety, attitude, and risk scores of the study population			
	Patients (n=37)	**Relatives (n=37)**	**p**
Attitude	73 (57-75)	69 (62.5-75)	0.399
Anxiety	14 (10-18.5)	15 (11.5-20.5)	0.423
Risk (%)	-	17.6 (15.5-18)	-
Data were presented as median (interquartile range). Risk identifies the lifetime percentage risk of developing breast cancer for relatives, as calculated by NCI scores, only for 16 eligible relatives aged 35-65. Continuous variables were analyzed using the Mann-Whitney U test.			

cancer risk, and screening characteristics, married relatives showed higher anxiety scores (median 20 versus 12.5, p=0.03, Mann-Whitney U test). Additionally, patients experiencing earlier onset of menopause had higher attitude scores (medians: 75, 71, 62, 70.5; p=0.05, Kruskal-Wallis H test), while relatives with at least one child exhibited higher anxiety scores (18.5 compared to 13; p=0.01, Mann-Whitney U test). These are adjusted p-values after Bonferroni correction.

The correlation analysis revealed a moderate positive association between patients' attitudes and those of their relatives (r=0.501, p=0.002, Spearman's correlation). In addition, a moderate negative correlation was found between patients' anxiety and their relatives' attitude (r=-0.395, p=0.016, Spearman's correlation). As relatives' risk of breast cancer increased, their anxiety scores increased, indicating a moderate positive correlation (r=0.576, p=0.02, Spearman's correlation, Figure 1).

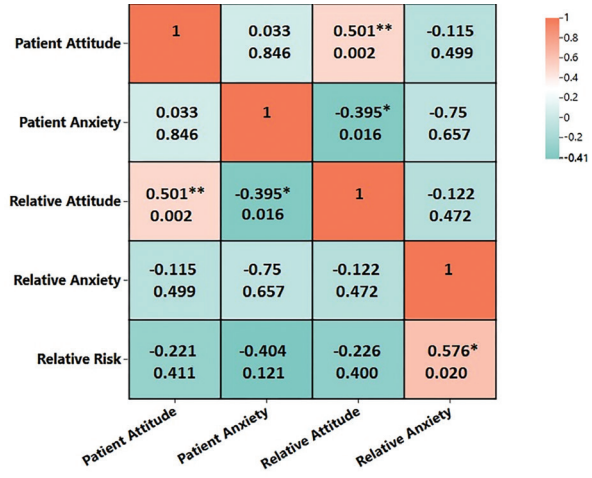

Figure 1. Correlation heatmap between anxiety and attitude scores of patients and their relatives. The data in each cell represents the correlation coefficient (top) and p-values (bottom).

DISCUSSION

Breast cancer remains the most prevalent malignancy among women, and screening has been shown to reduce mortality, underscoring the importance of understanding factors that shape women's attitudes toward screening, particularly in high-risk -groups such as those with a family history. Anxiety is a -well-recognized determinant of screening behavior; however, within the familial context, this influence becomes more complex. First-degree relatives not only face heightened genetic risk, which may intensify their screening-related anxiety, but they also frequently assume caregiving roles, making their psychosocial status a pivotal factor in shaping both their own and the patient's attitudes toward screening (19). Consequently, this study aimed to explore the relationship between breast cancer-related anxiety and attitudes toward screening tests among patients and their relatives, and to assess whether patients' attitudes and anxiety were associated with those of their relatives. Our findings demonstrated a positive correlation between patients and their relatives in their attitudes toward screening. In contrast, a negative correlation was noted between patients' anxiety and the relatives' attitudes toward screening.

Positive attitudes toward screening programs are considered an important prerequisite for participation and adherence, given their established health benefits. Unfortunately, compliance rates are low in Türkiye. While many different figures exist for compliance with these programs in Türkiye, some studies indicate that mammography rates range from 15.8% to 54.1% (20-22). According to the recent nationwide data, screening participation is largely driven by socio-demographic factors; i.e.; age, being married, higher education, and social support from a spouse are significant predictors of increased participation, whereas lack of regular contact with family physicians is a barrier (22). However, this nationwide study did not account for family history. Strikingly, despite their elevated risk profile, which necessitates greater vigilance, the participation rate among eligible relatives was 29.1%, lower than that of the general population. This discrepancy underscores the critical need to identify factors that influence attitudes toward screening, particularly among high-risk groups who stand to benefit most from early detection.

Women with a family history of breast cancer are at a higher risk of developing the disease than the general population, making attitudes toward screening programs essential for them (8). Several factors influence screening attitudes, including fear of cancer, lack of knowledge about screening and mammography procedures, privacy concerns, and access to screening (23). Anxiety plays a significant role in screening attitudes, and the literature presents conflicting results on this issue. A review published in 2023, which analyzed 74 articles related to anticipatory anxiety and cancer screenings—specifically for colon, breast, cervical, lung, and prostate cancers—found that anticipatory anxiety regarding a cancer diagnosis was associated with a greater likelihood of attending screenings and an increased intention to undergo them (24). Conversely, a study of breast cancer survivors found that higher levels of anticipatory anxiety were linked to lower participation in mammography (25). Anticipatory anxiety may differentially influence participation in screening programs.

In our study, the median BCWS value was nearly twice that found in a Turkish validation study involving 610 women without breast cancer (14). Based on these results, we hypothesize that both breast cancer patients and their relatives experience higher levels of anxiety than the general population, and that the two groups exhibit similar anxiety levels, as we have demonstrated. Although our results show that patients and their relatives have similar median BCWS scores, we found a negative correlation between patient anxiety and their relatives' screening attitudes: As patient anxiety increased, relatives' attitudes toward screening diminished. This may be due to observing their relatives with cancer being affected by the process and worrying about receiving a negative screening result, which supports the concept of anticipatory anxiety. Thus, our findings suggest an inverse relationship between patient anxiety and the screening attitudes of their relatives, highlighting a potential psychological impact in this high-risk cohort.

The effect of family history on attitudes towards breast cancer screening programs remains unclear. In Türkiye in 2022, a study involving 248 women examined their attitudes towards cancer screening using the ATCS short form questionnaire; the mean cancer screening attitude score was 65, and scores did not differ between women with and without a family history of cancer (26). In contrast, another study conducted in Türkiye found that women with a family history of breast cancer exhibited a more positive attitude. The median screening scale score in our study was 69, which was comparable to scores reported in the literature (26). Scores similar to those reported in the literature and comparable scores between patients and relatives in our study indicate that there is no significant difference among relatives of breast cancer patients, breast cancer patients, and the general population. We have demonstrated a moderate positive correlation between patients and their relatives in scores on the breast cancer screening scale. The patient's and the relative's attitudes are similar; as the patient's attitude increases, the relative's attitude also increases. Lastly, in a subgroup of relatives with available NCI scores, we have also demonstrated a moderate positive correlation between anxiety scores and the lifetime risk of breast cancer. In contrast, no correlation was found between breast cancer risk and attitudes toward breast cancer screening, which is concerning, given that these patients

have increased risk and anxiety without a comparable increase in risk perception. That supports the hypothesis that anticipatory anxiety may be associated with less favorable screening attitudes in this high-risk subgroup. Overall, these results indicate that a structured intervention may be beneficial for relatives of breast cancer patients, a high-risk group, in reducing their anxiety and improving their attitudes toward screening.

Study Limitations

Our study had several limitations. Although the patient population was relatively small, the sample size was determined through power analysis, and participants were recruited and analyzed as patient-relative pairs. Additionally, the use of convenience sampling and the absence of a comparison group from the general population without a family history of breast cancer limit the representativeness of the findings; therefore, they should be viewed as exploratory and hypothesis-generating. Importantly, restricting enrollment to patients accompanied by a relative introduces selection bias toward patients with greater social support and, potentially, more engaged families. Furthermore, although we restricted our screening participation analysis to eligible relatives aged 30 years or older to prevent artificially lowering the observed rates, the inclusion of younger relatives (aged 18-29) in the overall cohort may still introduce structural confounding in risk perception and screening attitudes. In addition, the large age difference between patients and their relatives (median 54 vs. 32 years) could confound screening behaviors and risk perception, yet age adjustment was not feasible given the sample size. We also did not account for the treatment stage, although most patients were in remission, and did not collect data on prior education or knowledge about breast cancer screening, which may be confounding factors for breast cancer anxiety and screening attitudes.

CONCLUSION

We have demonstrated a potential shared dynamic between breast cancer patients and their relatives: Specifically, positive patient attitudes correlate with better screening engagement among relatives, whereas elevated patient anxiety is associated with less favorable attitudes among relatives. Moreover, in a subgroup of first-degree relatives, higher NCI breast cancer risk scores were associated with greater anxiety, whereas no corresponding association was observed between risk and favorable screening attitudes, suggesting a potential mismatch between perceived risk and preventive screening behaviors in this high-risk group. These findings are exploratory and hypothesis-generating, given the limited sample size and methodological constraints; therefore, they should be confirmed by multicenter studies with larger sample sizes. Given that first-degree relatives frequently serve as primary caregivers throughout the diagnostic and surgical trajectory, the perioperative setting may present a unique opportunity not only to identify anxiety but also to integrate family-centered screening and counseling; future research should validate such approaches through evidence-based interventions.

Ethics

Ethics Committee Approval: Ethical approval was obtained from the Marmara University Faculty of Medicine Clinical Research Ethics Committee (approval number: 09.2023.111, date: 20.01.2023). This study was conducted per the Declaration of Helsinki and the Research and Publication Ethics, and patient data were anonymized before analysis.

Informed Consent: Informed consent was obtained from all participants and the entire study was conducted in accordance with the Declaration of Helsinki.

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During the preparation of this manuscript, the authors used Gemini (Gemini 3.1 Pro, Google, March 2026), solely for the purpose of language editing to improve the clarity and grammatical accuracy. The use of AI complies with ethical standards regarding confidentiality and data protection. Following the use of this tool, the authors critically reviewed, edited, and validated all content to ensure its accuracy and integrity. The authors take full responsibility for the final content of the manuscript and confirm that no AI tool was used for data collection, statistical analysis, or text generating. An abstract of this study was presented at the European Congress of Internal Medicine (ECIM) 2026 in Vienna, Austria. This presentation was supported by the TÜBİTAK Türkiye through the 2224A-International Scientific Events Participation Support Program.

Footnotes

Author Contributions

Concept - B.K., S.T.D., E.B.S., R.S., A.B.U., N.S., I.V.B., S.H., G.T.; Design - B.K., S.T.D., E.B.S., R.S., A.B.U., N.S., I.V.B., S.H., G.T.; Data Collection or Processing - B.K., S.T.D., E.B.S., R.S., A.B.U., N.S., I.V.B., S.H., G.T.; Analysis or Interpretation - B.K., S.T.D., E.B.S., R.S., A.B.U., N.S., I.V.B., S.H., G.T.; Literature Search - B.K., S.T.D., E.B.S., R.S., A.B.U., N.S., I.V.B., S.H., G.T.; Writing - B.K., S.T.D., E.B.S., R.S., A.B.U., N.S., I.V.B., S.H., G.T.

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