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| RESEARCH ARTICLE

Evaluation of Breast Cancer Risk, Fear and Knowledge Levels and their Effect on Examination Behaviors

SELMAN EMIROGLU
Breast Surgery Service, Department of General Surgery, Istanbul Faculty of Medicine, Istanbul University, Istanbul, Turkey
Corresponding Author: SELMAN EMIROGLU, **E-mail**: selman.emirikci.82@istanbul.edu.tr

| ABSTRACT
This study is aimed to evaluate the risk of breast cancer (BC) by using the Gail risk model (GRM), assess the fear of BC, determine the knowledge level of BC and show how they affect examination behaviors. This study is a descriptive cross-sectional study carried out at the Istanbul Faculty of Medicine. Survey forms were filled out by 241 women who were 35 years or older. Survey forms include general information about the participant, the BC fear scale (BCFS) to assess the fear of BC, GRM-related questions to evaluate BC risk and the comprehensive breast cancer knowledge level test (CBCKLT) to determine the knowledge level of BC. According to the GRM score, 79 (33%) of the participants were found to have a high 5-year risk of BC. There was no statistically significant correlation between the GRM score and the BC fear or knowledge level of the participants ($p>0.05$). According to BCFS classification, the fear level of 47 (20%) participants was low, 51 (21%) moderate, and 143 (59%) high, and as the knowledge level of the participants increased, their fear of BC statistically significantly increased (r=0.139; $p=0.031$). The total score of CBCKLT was 7.39±1.75, the general knowledge sub-dimension score was 5.63±1.60, treatability sub-dimension score was 13.02±2.52. As the education level of the participants increased, their BC knowledge level increased ($p=0.003$). Moreover, participants who had clinical breast examination (CBE) were statistically significant and had higher BC knowledge levels than those who did not ($p=0.030$). In this study, there was no statistically significant correlation between the GRM score and BC fear levels or BC knowledge levels. Additionally, as the BC knowledge level of the participants increased, their fear of BC increased. Moreover, as it is expected, as the education level of the participants increased, their BC knowledge level increased, and the knowledge levels of BC have a role in increasing CBE.

| KEYWORDS

Breast cancer, Breast cancer Fear Scale, Gail Risk Model, comprehensive breast cancer knowledge level test, Examination Behaviors

| ARTICLE INFORMATION

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1. Introduction

Breast cancer (BC) represents a significant global health challenge, as it is the most prevalent cancer in women. In 2020, 2.3 million women were diagnosed with BC, and 685,000 deaths were reported worldwide (Sung, 2021). Early diagnosis considers to be a life-saver during the treatment and follow ups of BC patients. Assessment of BC risk in women, determination of risk groups, high-risk groups monitoring, informing individuals with risk factors, and extending screening and reachable treatment programs in every society is a necessity not only for early diagnosis but also for effective treatment. Thereby reducing the mortality of BC (Yip et al. 2008). Breast self examination (BSE), mammography and clinical breast examination (CBE) are accepted as the most important screening methods in the early diagnosis of BC (Yip, 2008).

Fear of BC is associated with BC screening behaviors. It is still unclear whether fear acts as a barrier or motivator of cancer screening (Secginli, 2012). Champion et al. (2004) made a conceptualization of fear specific to the threat of breast cancer and developed the breast cancer fear scale (BCFS) to measure the physiological arousal and subjective aspects of the fear construct. The scale includes

items related to the emotional and physiological responses to the threat of breast cancer. Also, this scale has a Turkish version that was developed by Secginli in 2012 (Secginli, 2012).

Many risk factors play a role in the etiology of breast cancer that, include the patient's advanced age, genetic predisposition, family history of breast cancer or other cancers, breast biopsy detection of precancerous signs, early menarche (<12 years), late menopause (>55 years), late labor (>30 yr), induced abortion, hormone replacement therapy, oral contraceptive use for more than five years, obesity, sedentary lifestyle and alcohol consumption (Koçak et al., 2011).

Gail Risk Model (GRM), also known as the Breast Cancer Risk Assessment tool, is one of the several models developed by Gail et al. at the National Cancer Institute to calculate 5-year and lifetime invasive breast cancer risk (Gail, 1989). It is only used in women aged 35 yr or more and cannot be applied to those with a history of breast cancer and lobular or ductal carcinoma in situ. The model uses primarily nongenetic risk factors such as age, age of menarche, age at first-term birth, First-degree relatives with BC, breast biopsy with atypical hyperplasia and race to predict BC risk for women with no personal history of BC (Gail, 1989; Breast, n.d).

This study is aimed to assess the fear of BC, evaluate the risk of BC by using GRM and determine the knowledge level of BC in women who come to Breast surgery and disease policlinic at Istanbul University's Istanbul Faculty of Medicine.

2. Methods

2.1 Study design and sampling

This study is a descriptive cross-sectional study carried out at the Istanbul Faculty of Medicine, Department of General Surgery, Breast Surgery Clinic. Survey forms were filled out by 241 women who were 35 years or older. This study has been approved by Istanbul University's Istanbul Faculty of Medicine (file no. 2023/196). The study conformed to the principles of the Declaration of Helsinki. All participants were informed about the study's purpose, content, and intervention, and their oral and written consents were obtained.

2.2 Data Collection Forms

The survey form includes general information about the participant, GRM-related questions to evaluate BC risk and BCFS to assess the fear of BC.

2.2.1 General information about the participants

This form was prepared by the researchers in line with the literature information (Kayan et al. 2019). The form includes questions about women's socio-demographic characteristics, BC early screening and diagnosis practices. The age, marital status, education level, working status, place of residence, income status, menopausal status, oral conceptive use, family history of BC, the frequency of BSE and CBE and the frequency of mammography and MRI of women were evaluated.

2.2.2 Breast Cancer Fear Scale

It was developed by Champion et al. in 2004. The eight-item scale determines the relationship between BC, mammography behavior, and women's emotional responses and is a Likert-type scale scored from 1 to 5. The scale scoring is listed as "strongly disagree" 1 point, "disagree" 2 points, "undecided" 3 points, "agree" 4 points, and "strongly agree" 5 points. The highest score to be obtained from the scale is 40, and the lowest score is 8.

In the evaluation of the scores obtained from the BC fear scale, 8-15 points indicate low-level fear, 16-23 points indicate moderate fear and 24-40 points indicate high-level fear. The Cronbach Alpha coefficient of the original scale was specified as 0.91 (Champion, 2004). The scale was adapted into Turkish by Seçginli, and the Cronbach Alpha coefficient of the scale was found to be 0.85 (Secginli, 2012).

The Cronbach Alpha (α) coefficient of the BCFS for this study was 0.94, and this calculated coefficient level was highly reliable**.**

2.2.3 Gail Risk Assessment Tool

Women with 5-year GRM scores >1.67% are accepted as "at risk" (Yüksel et al. 2007). In some studies, the lifetime BC risk, according to GRM, was classified as "usual = low (30%)" (20). In this study, the GRM score of women was calculated with a computer program developed by scientists at the National Cancer Institute and National Surgical Adjuvant Breast and Bowel Project by researchers and their calculated risks were as low, moderate, and high (21).

2.2.4 Breast cancer knowledge level of the participants.

The Comprehensive Breast Cancer Knowledge Level Test (CBCKLT) was applied to determine the knowledge level about BC, as it was described by Stager in 1993 (Stager, 1993). A total of 20 information questions were included in the scale that should be answered as True or False. 8 questions were correct, and 12 were incorrect. There were two dimensions in the test, general

knowledge and treatability. Questions 1 to 12 were general information about BC, and questions 13 to 20 contained information about the treatability of BC.

2.3 Statistical Analysis

SPSS (Statistical Package for the Social Sciences) version 25.0 (IBM Corp., Armonk, NY, USA) program has been used for the statistical analysis. The Kolmogorov-Smirnov test was used to test the normality of the scores obtained from a continuous variable with the statistical method. Cronbach Alpha reliability coefficients were used to measure the reliability of the scales. In addition to descriptive statistical methods (number, percentage, mean, standard deviation, etc.), comparisons between two groups in quantitative data were made with the Mann-Whitney U test; More than two group comparisons were made with the Kruskal Wallis-H test. Bonferroni test was used to determine from which groups the difference determined by the Kruskal Wallis-H test originated. The level of relationship between two continuous variables was evaluated with the Spearman correlation test. Multivariate Linear Regression modeling was used to measure the effect of independent variables on the dependent (breast cancer knowledge) variable. Significant results in the 95% confidence interval will be evaluated under $p<0.05$.

3. Results

3.1 Participants characteristics

The study included 241 women with a mean age of 47.9±7.9 (range: 35-70) years, 150 (62%) under 50 years old, and 91 (38%) older. 119 (49%) participants were primary school graduates, 58 (24%) were high school graduates, and 64 (27%) were university graduates. 189 participants (78%) were married, 154 (64%) did not work actively, 181 (75%) lived in *provinces* for the longest period of their life, and 70 (29%) income did not cover their expenses.

When the sociodemographic risk factors of BC 'outside the GRM classification' of the participants were examined, It was observed that 84 (35%) first and second degree relatives were diagnosed with BC, 113 (47%) were in the postmenopausal period, only 6 (2.5%) were using oral contraceptives. During the evaluation of BC prevention and early detection behaviors of the participants, 194 (81%) had regular BSE, 176 (73%) had regular CBE, 202 (84%) had at least one mammogram, and 100 (42%) had MRI (Table 1 and Table 2).

3.2 Breast cancer risk level of participants by GRM

The mean BC relative risk level of the participants was 2.55%(±SD:1.69), and the mean 5-year BC risk was 1.52% (±SD:1.08). According to the GRM score, 79 (33%) of the participants were found to have a high 5-year risk of BC. There was no statistically significant correlation between the GRM score and the BC fear or knowledge level of the participants ($p>0.05$) (Table 1 and Table 2).

3.3 Participants' fear of BC

The mean of BCFS of the participants was calculated as 24.85±9.39. According to the scale classification, the fear level of 47 (20%) participants was low, 51 (21%) moderate, and 143 (59%) high. In the statistical analysis, it was determined that the only variable related to the BC fear level of the participants was the BC knowledge level of the participants. It was determined that as the knowledge level of the participants increased, their fear of BC statistically significantly increased (r=0.139; $p=0.031$) (Table 1 and Table 2).

3.4 Participants' knowledge level of BC

In the evaluation of the total and sub-dimension scores of the participants, It was determined that the total score of CBCKLT was 7.39±1.75, the general knowledge sub-dimension score was 5.63±1.60, the treatability sub-dimension score was 13.02±2.52. When the knowledge level of BC was examined according to the descriptive characteristics of the participants, It was determined that as the education level of the participants increased, their BC knowledge level increased ($p=0.003$).

The BC knowledge level of the participants who were not actively working ($p=0.002$) and whose income was insufficient to meet their expenses ($p=0.031$); It was determined that the BC knowledge levels of the participants who went to CBE were statistically significantly higher than those who did not ($p=0.030$) (Table 2). While it was determined that the BC knowledge levels of the participants who were not actively working ($p=0.002$) and whose income was insufficient to meet their expenses ($p=0.031$) were lower. Also, it was determined that the BC knowledge levels of the participants who went to CBE were statistically significantly higher than those who did not ($p=0.030$).

3.5 Analysis of different independent factors related to the BC knowledge level of the participants

In the univariate analysis results, a multivariate linear regression model analysis was applied with the enter method in order to determine the independent variables related to the BC knowledge level of the participants by using the statistically significant variables (education, employment status, income level, CBE and BC fear level) ($F(5\text{-}235)=6.186$, $p<0.001$; $R2=0.12$).

The model did not have multicolliearity and autocorrelation problems (DW=1.888; VIF=<10). When the relationship between the independent and dependent variables of the model was examined, the independent variables associated with the BC knowledge

level of the participants were education level [B=0.51 (95%CI=0.14; 0.89)); pr2=0.17; p=0.008] and actively working at a job [B=0.76 (95%CI=0.11; 0.1.42); pr2=0.15; p=0.023] (Table 3).

4. Dıscussıon

This study was conducted on 241 women who were 35 years old and over. The GRM, fear and knowledge levels of BC were evaluated, and the relationship between these levels and examination behaviors among women was investigated. As a result of the study, 79 (33%) participants had a high 5-year risk of BC, and 143 (59%) participants had a high fear level of BC. There was no statistically significant correlation between the GRM score and the BC fear or knowledge level of the participants. Additionally, as the knowledge level of the participants increased, their fear of BC statistically significantly increased, and as it is expected, as the education level of the participants increased, their BC knowledge level increased. Charkazi et al. (2013) reported that Turkmen women had low knowledge, low perceived susceptibility, firm fatalistic belief, and low screening levels of BC.

However, there was no correlation between mammography screening behavior and the fear of BC. This result aligns with findings by Emami et al. (2011) in Iran women and by Abraido-Lanza et al. (2015) in Latin American women. Moreover, our results showed that BC diagnosis behaviors of women (BSE, 80%; CBE, 73%; mammography, 84%) were high in general, and participants who went to CBE were statistically significantly had higher BC knowledge levels than those who did not. In Kutlu and Bicer's study (2017), they found that the risk of developing BC was low and BSE rates were insufficient, and they showed that educational status was effective on BC examination behaviors.

5. Conclusıon

In sum, it was found that 33% of the participants have a high 5-year risk of BC that was assessed by the gail model. It was determined 59% of the participants had high BC fear levels, and as the knowledge level of the participants increased, their fear of BC increased. In addition, it was shown that there is no correlation between the GRM score and the BC fear or knowledge level of the participants. Moreover, as the education level increased, the BC knowledge level increased, which has a role in increasing CBE.

Limitations: Findings obtained from this research are confined to women who came to the Istanbul Faculty of Medicine, Breast Surgery Clinic and who agreed to participate in this study. We suggested doing this study in much larger samples with multi-institutional analysis

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ORCID ID: Selman Emiroglu (0000-0001-9333-6926)

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Informed Consent: All participants were informed about the study's purpose, content, and intervention, and their oral and written consents were obtained.

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Table 1: Level of relationship between study continuous variables

No.	Variables	Mean (SD)	1	2	3	4	5
1	Age	47.92(7.85)	NA				
2	BCFC	24.85(9.39)	-0.047				
3	CBCKLT-Total	7.39(1.75)	-0.018	**0.139***			
4	General Information	5.63(1.60)	0.026	0.068	**0.782****		
5	Treatability	13.02(2.52)	-0.077	**0.129***	**0.697****	**0.128***	
6	GRM score	1.52(1.08)	**0.565****	-0.017	0.082	0.101	-0.009

:p<0.01; *:p<0.05, Spearman correlation test, **SD: Standard Deviation, **BCFC:** Breast Cancer Fear Scale, **CBCKLT:** Comprehensıve Breast Cancer Knowledge Level Test, **GRM:** Gail Risk Model, **NA:** Not Available

Table 2: BCFC and CBCKLT score averages according to participants' characteristics

Variables (N=241)	Category	n(%)	BCFC			CBCKLT		
			Mean (SD)	Test value	*p*	Mean (SD)	Test value	*p*
Age	<50	150(62.2)	25.38(9.27)	-1.177[a]	0.239	13.15(2.45)	-0.640[a]	0.522
	≥50	91(37.8)	23.97(9.57)			12.81(2.62)		
Education level	Elementary [1]	119(49.4)	24.59(9.79)	0.388[b]	0.824	12.5582.43)	**11.957[b]**	**0.003***
	High school [2]	58(24.1)	25.29(10.20)			12.97(2.46)	*Difference[**]=1<3*	
	University [3]	64(26.6)	24.92(7.87)			13.97(2.51)		
Marital status	Married	189(78.4)	24.71(9.69)	-0.088[a]	0.930	12.97(2.43)	-0.691[a]	0.489
	Single	52(21.6)	25.33(8.25)			13.23(2.83)		
Working status	Yes	87(36.1)	25.62(9.28)	-0.879[a]	0.379	13.70(2.60)	**-3.108[a]**	**0.002***
	No	154(63.9)	24.41(9.45)			12.64(2.40)		
Place of Residence	Village/Town	10(4.1)	20.90(10.10)	2.908[b]	0.234	11.40(2.41)	3.963[b]	0.138
	District	50(20.7)	26.44(8.64)			12.90(2.28)		
	Province	181(75.1)	24.62(9.51)			13.15(2.57)		
Income	less than expense	70(29.0)	23.84(9.53)	-1.148[a]	0.251	12.44(2.29)	**-2.155[a]**	**0.031***
	Equal to/more than expense	171(71)	25.26(9.33)			13.26(2.57)		
Menopausal status	Yes	113(46.9)	24.19(9.62)	-1.016[a]	0.310	12.93(2.70)	-0.487[a]	0.626
	No	128(53.1)	25.43(9.17)			13.11(2.35)		
Oral contraceptive use	Yes	6(2.5)	23.67(10.05)	-0.427[a]	0.669	14.50(3.02)	-1.066[a]	0.286
	No	235(97.5)	24.88(9.39)			12.99(2.50)		
Family history of BC	Yes	84(34.9)	24.32(9.10)	-0.736[a]	0.462	13.20(2.46)	-0.982[a]	0.326
	No	157(65.1)	25.13(9.56)			12.93(2.55)		
BSE	Yes	194(80.5)	25.09(9.25)	-0.549[a]	0.583	12.96(2.43)	-0.897[a]	0.370
	No	47(19.5)	23.85(10.00)			13.30(2.88)		
CBE	Yes	176(73.0)	25.52(9.11)	-1.551[a]	0.121	13.24(2.54)	**-2.167[a]**	**0.030***
	No	65(27.0)	23.03(9.96)			12.45(2.39)		
MG	Yes	202(83.8)	24.92(9.37)	-0.306[a]	0.759	13.10(2.55)	-1.124[a]	0.261
	No	39(16.2)	24.46(9.62)			12.64(2.33)		
MRI	Yes	100(41.5)	25.13(9.62)	-0.429[a]	0.668	12.83(2.58)	-0.778[a]	0.436
	No	141(58.5)	24.65(9.25)			13.16(2.47)		
GRM score	Low(<1.67)	162(67.2)	24.39(9.51)	-0.987[a]	0.324	12.97(2.41)	-1.011[a]	0.312
	High(≥1.67)	79(32.8)	25.78(9.12)			13.14(2.74)		

p<0.05, a: Mann-Whitney U test, b: Kruskal Wallis-H test, **: Bonferroni test, **SD:** Standard deviation, **BSE:** Breast Self Examination, **CBE:** Clinical Breast Examination, **MG:** Mammography, **MRI:** Magnetic Resonance Imaging, **GRM:** Gail Risk Model.

Table 3: Independent factors associated with comprehensive breast cancer knowledge level

Variables	Unstandardized Coefficients		95.0% Confidence Interval for B		*t*	*p*	pr^2	VIF
	B	SD	Down	Up				
Constant	9.624	0.767	8.114	11.135	12.554	<0.001		
Education level	0.512	0.191	0.136	0.888	2.680	**0.008***	0.172	1.086
Working status (1=yes. 0=no)	0.762	0.333	0.107	1.417	2.292	**0.023***	0.148	1.074
Income (1= Equal to/more than expense. 0=less than expense)	0.601	0.343	-0.074	1.276	1.754	0.081	0.114	1.019

Regular clinical examination (1=yes. 0=no)	0.567	0.352	-0.126	1.261	1.611	0.109	0.105	1.028
Breast cancer fear level	0.031	0.017	-0.001	0.064	1.880	0.061	0.122	1.021
Model Summary	R^2		0.116					
	$F_{(5\text{-}235)}$		6.186					
	p		<0.001					
	Method		Enter					
	DW		1.888					

***:p<0.05**; ; Multivariate linear regression analysis, **SD:** Standard Deviation, **pr^2**=Partial correlation square, **Dependent variable:** Comprehensive breast cancer knowledge level, **VIF:** Variance Inflation Factor, **DW**: Durbin Watson test