RESEARCH ARTICLE

Breast Cancer Risk Assessment Using the Gail Model: a Turkish Study

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Abstract

Purpose: This study was conducted to determine risk of developing of breast cancer among Turkish women. Materials and Methods: Using a descriptive and cross-sectional approach, data were collected from 231 women. Breast cancer risk was calculated using the National Cancer Institute's on-line verson of called as the Breast Cancer Risk Assessment Tool or the Gail Risk Assesment Tool. Results: The average age of women was 45.0±8.06 years. It was revealed that 6.1% of participants reported having first degree relatives who had had breast cancer, with only four women having more than one first-degree relative affected (1.7%). The mean five-year breast cancer risk for all women was 0.88±0.91%, and 7.4% of women had a five-year breast cancer risk >1.66% in this study. Mean lifetime breast cancer risk up to age 90 years was 9.3±5.2%. Conclusions: The breast cancer risk assessment tool can help in the clinical management of patient seeking advice concerning screening and prevention. Healthcare providers in Turkey can use this approach to estimate an individual's probability of developing breast cancer.

Keywords: Breast cancer - risk assessment - Gail method - Turkish women

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Introduction

Breast cancer is the most common cancer in women both in the developed and less developed world (WHO, 2014). Breast cancer is responsible for 33% of all cancers and 20% of cancer-related deaths among women (Kocak et al., 2011). The rate of breast cancer in Turkey is 40,6 per 100,000 women, and it is ranked first among the types of cancer occurring in women (Ministry of Health, 2009).

Risk factors of breast cancer are reported as being a woman, aging, an mutations in the BRCA1 or BRCA2 breast cancer genes, a family history of breast cancer, personal history of breast cancer, race and etnicity, dense breast tissue, certain beningn breast conditions, younger age at first period (before age 12), older age at menopause (age 55 or older), hyperplasia or lobular carcinoma in situ, exposure to large amounts of radiation at a young age, hormone replacement therapy, smoking, exposure to low-dose radiation, and obesity in postmenopausal women, being overweight or obese, not breastfeeding, excessive alcohol use and lack of physical activity (American Cancer Society, 2014).

Systematic screening for breast cancer is effective for early detection and reducing mortality. Early detection of breast cancer is improved by a follow-up screening for "high-risk" individuals. Therefore, it is important to define what is meant by "high-risk" individuals.

For women aged 35 and older, a risk assessment tool is available to identify those who are at increased risk for breast cancer (Bevers et al., 2009). Over the past two decades, a number of statistical models have been designed and validated to assess breast cancer risk in both populations and individuals (Amir et al., 2010). The individual evaluation of breast cancer risk includes community-based models as the Gail model (GM) (Tahan, 2009). The modified GM assesses the risk for invasive breast cancer as a function of age, menarche, age at first live birth or nulliparity, number of first-degree relatives with breast cancer, number of previous benign breast biopsies, atypical hyperplasia in a previous breast biopsy, and race (Bevers at al., 2009). The model calculates and prints 5-year and lifetime projected probabilities of developing invasive breast cancer and can be used to identify individuals at increased risk (Bevers at al., 2009). In women aged 35 years or older with a 5-year risk of 1.7% or greater, clinical breast examinations every 6 to 12 months and annual mammography are recommended. Breast awareness is also encouraged. For women with a greater than 20% lifetime risk for developing breast cancer based on models largely dependent on family history, clinical breast examinations every 6 to 12 months and annual mammography are recommended and breast awareness is encouraged (Bevers et al., 2009).

The aim of this study was to investigate the breast

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cancer risk in women who had applied to the Maternity and Gynecology and Children's Hospital, in Ordu, Turkey.

Materials and Methods

Design and Sample

This study used a descriptive and cross-sectional design, and the data were collected from 231 women who had applied to the Maternity and Gynecology and Children's Hospital located in Ordu, a city in northern Turkey. The participants were recruited using the convenience sampling method. Participant inclusion criteia included being 35 years or older (as in the Gail model). The women were given information about the study and their verbal consent to participate was obtained. The researchers guaranteed participants that their identitites and answers would be kept confidential. Written permission to conduct the study was obtained from the responsible hospital agency. The study conformed to the principles of the Declaration of Helsinki.

Instruments

The data were collected a questionnaire form and projected beast cancer risk (calculated risk) was determined using the modified GM. The questionnaire form obtained information about the women's sociodemographic characteristics age, education level, occupation, social security, family income, mar ital status, place of residance, woman's husband education level and occupation and other factors related to breast cancer as ages of menarche and first childbirth, having a family history of breast cancer, having a biopsy (Yilmaz et al., 2011; Erbil and Bolukbas 2012; Ceber at al., 2012; Seyednoori et al., 2012).

Breast cancer risk assessment tool

Breast cancer risk was calculated using the National Cancer Institute's on-line Breast Cancer Risk Assessment Tool (BCRA) or the Gail Risk Assesment Tool (Available at http://www.cancer.gov/bcrisktool/Default.aspx). Developed by Gail, this model provides the five-year and lifetime (up to age 90) breast cancer empiric risk for women ≥35 years (Gail et al., 1989). It is based on data from the Breast Cancer Detection and Demonstration Project, a mammography screening project conducted with over 280,000 women between 1973 and 1980. Breast cancer risk factors using the Gail model are as follows: current age, age of menarche, previous breast biopsies, including the number and presence of atypical hyperplasia, age of first live birth, family history of breast cancer in first-degrees, and race/ethnicity (National Cancer Institude, 2014). According to the Gail model, women with the breast cancer risk of >1.66% were considered as high-risk according to the estimated 5-year breast-cancer-risk assessment. The Gail Risk Assesment Tool is useful to guess the approximate number of women with a lifetime risk of ≥20% in the general population (Graubard et al., 2010).

Analysis of the data used descriptive statistics including the mean, median, standard deviation, frequency distributions, and percentage.

Results

The average age of women in our study was 45.04±8.06 years (range 35-77 years). It was determined that 34.6% of the women had completed primary school, 62.7% of them were housewives, 97.4% of them had social security, 51.9% of them had "middle level" family income, 96.1% of them were married and 65.8% of them lived in the city (see Table 1). Additional study results

Table 1. Distrubution of Women According to and Socio-demographic Characteristics and Risk Factors Using the BRCA Tool (n=231)

Socio-demographic characteristics of women	n	%
Education level		
Primary school	80	34.6
Secondary school	39	16.9
High school	55	23.8
University	43	18.6
Illiterate	14	6.1
Occupation		
Housewife	144	62.3
Civil servant	68	29.5
Worker	13	5.6
Self employment	6	2.6
Husband's education level		
Primary school	55	24.4
Secondary school	37	16.5
High school	76	33.8
University	54	24.0
Illiterate	3	1.3
Family income		
High	102	44.2
Middle	120	51.9
Low	9	3.9
Marital Status		
Married	222	96.1
Single	9	3.9
Place of residence		
Village	41	17.7
District	38	16.5
City	152	65.8
Risk Factors the BRCA Tool of women		
Age (years)		
≤45	141	61.0
46-55	62	26.9
≥55	28	12.1
Age at menarche (years)		
Unknown	23	10.0
7-11	14	6.1
12-13	129	55.8
≥14	65	28.1
Age at first live birth (years)		
No children	6	2.6
≤20	87	37.7
20-24	121	52.4
≥30	17	7.3
Number of first-degree relatives with breast cancer		
Unknown	39	16.9
Zero relatives	174	75.3
One relative	14	6.1
More than one	4	1.7
Biopsy		
Unknown	6	2.6
Yes	13	5.6
No	212	91.8

Table 2. Mean Risk values five-year Risk and Mean Risk values up to age 90 years of Participants According to the BRCA Tool (n=231)

Risk	Mean (%)	Standard deviation	Minimum risk	Maximum risk
Mean five-year risk of participants	0.88	0.91	0.2	8
Mean five-year risk for women of the same age without risk factors	1	0.75	0.3	7
Mean risk of participants up to age 90 years	9.37	5.26	2.2	50.5
Mean risk up to age 90 years for women of the same age without risk factors	11.6	1.33	4.2	16.2

revealed that 55,8% of the participants reported their menarche at age 12 to 13; 52,4% of women experienced their first live birth between the ages of 20 and 24 years of age; 6.1% of participants reported having first degree relatives who had had breast cancer. Only four women reported more than one first-degree relative with breast cancer (1.7%), and 5.6% of participants had undergone prior breast biopsies. Participants did not report having atypical hyperplasia (see Table 1).

Our study also determined that the mean five-year breast cancer risk for all women was 0.88±0.91% (range 0.2±8%), and 7.4% of women had a five-year breast cancer risk >1.66%. The mean lifetime breast cancer risk up to age 90 years was 9.37±5.26% (range 2.2±50.5%) (see Table 2).

Discussion

In this study, we used the BCRA t ool to calculate risk estimates for Turkish women. Using the Gail model for our study, we found that the mean five-year breast cancer risk for all women was 0.88±0.91% (range 0.2±8%), and 7.4% of women had a five-year breast cancer risk >1.66%. The study of Ceber et al. (2013) determined the 5-year breast cancer risk rate as 17.6% among the women over the age of 50, while the Mermer and Meseri (2011) study found the risk rate at 18.1% among women over the age of 40. Pan et al. (2013) indicated that the risk of breast cancer increased with age, OR1=2.759 (95%CI: 1.837-4.144, 56-60 *vs* 40-45), OR2=2.047 (95%CI: 1.394-3.077, 51-55 *vs* 40-45), OR3=1.668 (95%CI: 1.145-2.431). Yilmaz et al. (2011) reported that the risk of breast cancer was higher in academic women than housewives, both lifetime and five-year risk calculated using Gail model. Also, the average lifetime and five-year risk both for academic women and housewife was less than 15% for lifetime risk and 1.7% for five-year risk (Yilmaz et al., 2011). This rate was 5.1% among the women aged 35-81 in Seyednoori et al.'s study and 2.5% among the women aged 35-60 in Abu-Rustum and Herbolsheimer 's study (Abu-Rustum & Herbolsheimer, 2001; Mermer and Meseri, 2011; Seyednoori et al., 2012; Ceber et al., 2013).

The average lifetime risk assessment can help in the clinical management of patients seeking advice concerning screening and prevention (Beckman et al., 2007). Our study results indicated that the average lifetime breast cancer risk (up to age 90 years) was 9.3±5.2% (range 2.2±50.5%). Seyednoori et al. (2012) reported the risk increased from 1.5 to 49.4%, with a mean of 9%; Davis, Steward and Bloom (2004) found an increase from 2% to 46%, with a mean of 9%. Characteristics such as history of fertility, socioeconomic status, reproductive, lifestyle and behavioral factors may affect breast cancer risk (Yilmaz et al., 2011)

Healthcare providers can use risk assesment tools to estimate an individual's probability of developing breast cancer. Based on the latest recommendations, they will likely encourage patients to obtain clinical breast examinations and annual mammograms starting at age 40. Women at higher risk should explore additional screening methods such as magnetic resonance imaging, and they might also consider initiating screening at an earlier age and at more frequent intervals (Katapodi et al., 2009).

A much higher risk for breast cancer was found in women who had experienced early menarche, a previous breast biopsy, and a first live birth after 30 years of age (Chay et al., 2012). Results of this present study found that 52.4% of women had their first live birth between 20 to 24 years of age; 55.8% of the women reported menarche at ages 12 to 13; 6.1% of the study participants reported having first degree relatives who had had breast cancer. Only four women reported more than one first-degree relative with breast cancer (1.7%). No instances of atypical hyperplasia were reported.

This study determined that 52.4% of the women had their first live birth between 20-24 years of age. Pregnancy at a young age is associated with a markedly reduced risk for breast cancer (Vogel, 2000). Nulliparity and first live birth at older than 30 years of age are associated with an increased risk of subsequent breast cancer. Women who have never given birth or who have given birth to their first child after age 30 are at high risk for breast cancer (Sakorafas et al., 2002). In this study, women were not at high risk for breast cancer because they had their first birth at an early age.

In the current study, 6.1% of women reported having first-degree relatives who had had breast cancer; only four women reported more than one first-degree relative with breast cancer (1.7%). Participants did not report any occurrences of atypical hyperplasia. Ceber et al. (2013) found that 7.4% of the women had a history of breast cancer in their relatives, 73% of whom were 1st degree relatives and 27% of whom were 2nd degree relatives. Nevertheless, a family history of breast cancer and the presence of cancer risk were not found to have a significant influence on the practice of women's mammogram screening. After controlling for age, the greatest increase in risk has generally been associated with a family history of breast and/or ovarian cancer but the number, type, and age at onset of affected relatives are important in determining the magnitude of risk (Ferrer et al., 2005). In the present study, 5.6% of women had prior breast biopsies. While

a similar study reported the magnitude of risk to be 6.4% (Sayednoori et al., 2012), another study reported it to be 11.6% (Abu-Rustum, & Herbolsheimer, 2001). The differences could be related to a lack of appropriate comparison to women of the same age with no risk factors for those of Turkish ethnicity.

In conclusion, breast cancer continues to be a major health problem for women. We found that 7.4% of women had a five-year breast cancer risk >1.66%. The breast cancer risk assessment can help in the clinical management of patients seeking advice concerning screening and prevention. Therefore, it is very important to emphasize the importance of healthcare providers' knowledge of breast cancer risk factors and the use of risk assessment tools to estimate an individual's probability of developing this disease.

This study had some limitations. The researchers only ascertained risk from women at one institution, and the sample for this study was recruited with the convenience method. These issues are limitations of this research and findings can generalize only to this sample.

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