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Original Research Article

BREAST CANCER RISK ASSESSMENT IN KASHMIRI FEMALE POPULATION USING GAIL MODEL

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ABSTRACT

Breast cancer, one of the most prevalent cancers among women is a significant cause of illness and death globally,[1] accounting for about a quarter (23 %) of all cancers in women.[2] The aim of this study was to assess the 5 year and lifetime breast cancer risk in female population of Kashmir using Gail model and screen high risk patients with clinical examination and/or imaging. This was a cross sectional observational study conducted from March 2022 to August 2024. The data was collected from 500 women whose age fell in the interval of 35-70 years and visited Outpatient department of SKIMS Soura during this time period. The data was collected in a questionnaire form and projected breast cancer risk (calculated risk) was determined using the Gail model. The questionnaire form obtained information about the factors related to breast cancer as age of menarche and first childbirth, having a family history of breast cancer, and having a biopsy. Breast cancer risk was calculated using the National Cancer Institute's on-line Breast Cancer Risk Assessment Tool (BCRA) or the Gail Risk Assessment Tool (Available at http://www.cancer.gov/bcrisktool/Default.aspx). The assessment of breast cancer risk among the Kashmiri female population revealed that 10% of participants (n=50) were categorized as high risk based on a higher mean five-year risk of ≥1.7. Additionally, 1.6% of the participants (n=8) were classified as high risk due to a higher mean lifetime risk of ≥20. The mean five-year risk of breast cancer among participants was 0.94%, with a standard deviation of 0.54%, ranging from a minimum of 0.2% to a maximum of 3.5%. For lifetime risk, the mean was 9.43%, with a standard deviation of 3.52%, and ranged from 3.3% to 27.7%. The findings indicate a significant proportion of the Kashmiri female population is at an elevated risk for breast cancer. These results underscore the presence of considerable risk within the population that warrants attention.

INTRODUCTION

Breast cancer, one of the most prevalent cancers among women is a significant cause of illness and death globally,[1] accounting for about a quarter (23 %) of all cancers in women.[2] It is estimated that more than one million women are diagnosed with breast cancer every year, and more than 4,10,000 die from breast cancer.[3,4] By 2030, the global incidence of breast cancer is expected to surpass 2 million cases with major share from developing countries.[5] According to Globocan 2020 data, breast cancer in India constituted 13.5% of all cancer diagnosis with 10.6% of all cancer related deaths with cumulative risk of 2.81.[6]

In Kashmir, breast cancer is the most prevalent malignancy among women that accounts for about 17 % of all cancers.[4] Although the disease is mainly postmenopausal in western population, but the picture in Kashmir is no different than the rest of the country where the burden of breast cancer due to early onset cases is increasing at an alarming rate.[7]

The occurrence of breast cancer among women in Kashmir has risen considerably over the years. With its incidence showing an increasing tendency over the last couple of decades, breast cancer has emerged as a major concern among the female population of the Kashmir Valley. However there is no actual database available, yet preliminary indications point towards a rise. Women in Kashmir are generally diagnosed at a later, more advanced stage with poor prognosis.[8]

Early detection of breast cancer in asymptomatic women through screening is an important strategy in reducing the burden of breast cancer. It is well established that the greatest benefit from breast cancer prevention strategies comes from treating women who are at high risk of the disease.[9] Mammographic screening programs have decreased mortality for screened women and reduced the intensity of breast cancer treatment and associated sequelae.[10] However, breast screening also confers potential harms such as over diagnosis leading to the treatment of tumors that would not have progressed to symptomatic disease within a person's lifetime, and false positive screening tests, associated with adverse psychological effects and possible reduced screening reattendance.[11] A number of risk assessment tools have been developed for early detection of breast cancer.

Although research has identified a concerning rise in breast cancer cases among Kashmiri women, with earlier menstruation emerging as a possible risk factor, there's a critical gap in the availability of a risk assessment tool specifically designed for this population. The current study, titled "Breast cancer risk assessment in Kashmiri female population using Gail model," addresses this crucial need. It delves into the applicability of the Gail Model, a widely recognized risk assessment tool, for Kashmiri women. The Gail Model factors in well-established risk determinants like age, family history, and menstrual history. However, its accuracy might be limited when applied to populations with distinct characteristics, such as the Kashmiri female population. By investigating the model's effectiveness in this specific context, this study holds immense potential to refine breast cancer detection and prevention strategies in Kashmir.

MATERIAL AND METHODS

This was a cross sectional observational study conducted from March 2022 to August 2024. The data was collected from 500 women whose age fell in the interval of 35-70 years and visited Outpatient department of SKIMS Soura during this time period. The women were given information about the study and their verbal consent to participate was obtained. The data was collected in a questionnaire form and projected breast cancer risk (calculated risk) was determined using the Gail model. The questionnaire form obtained information about the factors related to breast cancer as age of menarche and first childbirth, having a family history of breast cancer and having a biopsy. Breast cancer risk was calculated using the National Cancer Institute's on-line Breast Cancer Risk Assessment Tool (BCRA) or the Gail Risk Assessment Tool (Available at http://www.cancer.gov/bcrisktool/Default.aspx).

Breast cancer risk factors assessed using the Gail model were 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. 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.

RESULTS

The assessment of breast cancer risk among the Kashmiri female population revealed that 10% of participants (n=50) were categorized as high risk based on a higher mean five-year risk of ≥1.7. Additionally, 1.6% of the participants (n=8) were classified as high risk due to a higher mean lifetime risk of ≥20. [Table 1]. The screening mammography was advised to all high-risk female participants. Out of the 58 participants, 14 returned with mammography results. Fortunately, none of these mammograms indicated the presence of any high-risk breast lesions.

The analysis of risk values using the BRCA tool for the study population revealed the following mean risk values: The mean five-year risk of breast cancer among participants was 0.94%, with a standard deviation of 0.54%, ranging from a minimum of 0.2% to a maximum of 3.5%. For lifetime risk, the mean was 9.43%, with a standard deviation of 3.52%, and ranged from 3.3%to 27.7%. These values provide an overview of both short-term and lifetime breast cancer risk estimates for the study group. [Table 2]

Table 1: Patients at high risk of developing a breast cancer

Risk	Frequency	Percentage
Mean five year risk ≥1.7 (High risk)	50	10
Mean lifetime risk ≥20 (High risk)	8	1.6

Table 2: Mean Risk values-Five year risk and Mean risk values upto age 90 years of study patients according to the BRCA Tool (n=500)

Risk	Mean	Standard deviation	Minimum Risk	Maximum Risk
Mean five year risk of participants	0.94	0.54	0.2	3.5
Mean lifetime risk of the participants	9.43	3.52	3.3	27.7

DISCUSSION

The mean five-year risk of breast cancer in the study population was 0.94%, with a standard deviation of 0.54% While Erbil et al, (2016),[12] found that the mean five-year breast cancer risk for all women was 0.88±0.91% (range 0.2±8%). This indicates that, on average, the short-term risk of developing breast cancer within the next five years is relatively low for the majority of participants. The range of 0.2% to 3.5% suggests some variability in short-term risk among individuals, but overall, the risk is modest.

The mean lifetime risk of breast cancer was 9.43%, with a standard deviation of 3.52%. This lifetime risk estimate falls within a range typical for the general population but reflects a broader spectrum of individual risk. The range of 3.3% to 27.7% indicates significant variability in lifetime risk, influenced by various factors such as family history, reproductive history, and other risk factors. Results from the study of Erbil et al, (2016)12 indicated that the average lifetime breast cancer risk (up to age 90 years) was 9.3±5.2% (range 2.2±50.5%).

The findings indicate a significant proportion of the Kashmiri female population is at elevated risk for breast cancer. Specifically, 10% of participants were identified as high risk based on a higher mean five-year risk score of ≥1.7, while 1.6% were considered high risk due to a higher mean lifetime risk score of ≥20. These results underscore the presence of considerable risk within the population that warrants attention.

The higher mean five-year risk score highlights a substantial short-term risk for breast cancer, suggesting that a notable fraction of the population may benefit from increased surveillance and preventive measures. This is in line with findings from studies such as Nickson et al. [2018],[13] who observed variability in the Gail model's performance across different populations, and Pastor-Barriuso et al. [2013],[14] who noted discrepancies in risk prediction accuracy across diverse cohorts.

The mean lifetime risk of 9.43% is slightly below the average lifetime risk of breast cancer for women in many developed countries, which is often cited as around 12-13%. This lower mean lifetime risk in the study population may be attributed to the demographic and health characteristics of the participants, as well as the relatively low prevalence of known risk factors. A similar study reported the magnitude of risk to be 6.4% (Sayednoori et al., 2012),[15] another study reported it to be 11.6% (Abu-Rustum, &Herbolsheimer, 2001).[16]

CONCLUSION

In conclusion, breast cancer continues to be a major health problem for women. The breast cancer risk assessment can help in the clinical management of patients seeking advice concerning screening and prevention. The findings underscore the importance of targeted screening and preventive measures, particularly in younger women and those with early menarche or hyperplasia. While the overall breast cancer risk in this population appears modest, the presence of specific high risk subgroups suggests the need for individualized risk assessment and management strategies. These results can guide future public health interventions and policies aimed at reducing breast cancer incidence and improving early detection in the Kashmiri female population.

Ethics

The ethical approval was obtained from the Institutional Review Board of Sher-I-Kashmir Institute of Medical Sciences (approval no: 231/2022, dated: 29.10.2022).

Conflict of Interest

The authors declared that there were no conflicts of interest.

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