



Risk Factors for Breast Cancer in Pakistani Women: A Review of Current Evidence

Rehana Kouser¹, Madeeha Sadia^{1*}, Sughra Abbasi²

¹Department of Biomedical Engineering, NED University of Engineering & Technology, Karachi, 75270, Pakistan

²Department of Gynae and Obs, Karachi Institute of Medical Sciences, Karachi, Pakistan

*Corresponding Author madeehaoz@neduet.edu.pk



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Review Article

Abstract:

The most reported malignancy in women of Pakistan is breast cancer. About one in nine females suffers from this disease, that contributes largely to mortality. The burden of the disease here is much more than in any other country of South Asia, with such salient features as earlier age of onset and late-stage presentation. This paper aimed to synthesize evidence from recent studies conducted in Pakistan on risk factors for breast cancer. Lifestyle determinants such as obesity, physically inactive or sedentary behavior, and unhealthy dietary patterns prove to be common and strongly associated with high risk. Genetic predisposition, particularly BRCA1 and BRCA2 mutations, plays a key role in increasing susceptibility among high-risk women. Additionally, reproductive factors such as early menarche, late menopause, nulliparity, and limited breastfeeding have been recognized as important contributors. In addition to urban pollution and dietary contaminants, environmental exposure also increases the risk; vitamin D deficiency could compound the disease further. Diagnosis gets late and results get worse due to socioeconomic and cultural barriers, low awareness, stigma, and low access to screening facilities. When compared with the regional population and even the global population, it can be seen that Pakistani women face some unique sociocultural challenges that make them more vulnerable. This review article demonstrates the immediate need for specific public health interventions, better genetic counseling infrastructure, and culturally appropriate mass awareness campaigns to lessen the breast cancer burden at a national level. Identifying key risk factors and leveraging artificial intelligence (AI)-driven technologies can improve prevention strategies and facilitate early detection.

Keywords: Breast cancer; Risk factors; Pakistani women; Obesity; BRCA mutations

1. INTRODUCTION

Breast cancer is the most common cancer in women around the world, and it is also among the leading killers of female patients with cancer. In 2020, over 2.3 million new cases were diagnosed worldwide, increasingly an aggressive burden that low-and middle-income countries have to face (1, 2). In South Asia, Pakistan reports the highest incidence rates, wherein estimates reveal approximately one out of every nine women being diagnosed with breast cancer during their lifetimes (3, 4). An earlier age of onset is a peculiar characteristic of breast cancer in Pakistan. Studies revealed that Pakistani women present nearly a decade earlier than their Western counterparts, with most cases being diagnosed before these women reach 40 years of age (2, 5). Consequently, breast cancer is frequently diagnosed at advanced stages, largely due to the lack of screening programs, limited awareness, and persistent sociocultural barriers (6, 7).

The development of breast cancer is influenced by various risk factors, including lifestyle factors (such as obesity and diet), genetic and familial predispositions, reproductive and hormonal influences, environmental exposures, and socioeconomic and cultural determinants. Understanding these various risk factors is crucial for formulating prevention strategies, developing effective screening programs, and informing health policy. This review synthesizes recent evidence from Pakistan (2024–2025) to identify multifactorial risk factors for breast cancer among Pakistani women, emphasizing context-specific challenges and opportunities for intervention.

2. RISK FACTORS FOR BREAST CANCER

2.1 Lifestyle Factors

Lifestyle choices play a significant role in shaping breast cancer risk. A study in Punjab showed a significant relationship

between obesity and breast cancer, with high body mass index (BMI) associated with increased incidence and progression of the disease (8). Excess body fat alters estrogen metabolism and insulin resistance, thereby promoting the development of carcinogenesis (9). In addition to obesity, dietary habits greatly influence outcomes. The Pakistani diet is often high in saturated fats and refined carbohydrates, while being low in fiber and protective micronutrients. Dyslipidemia and macronutrient imbalance, particularly among postmenopausal women, have been linked to breast cancer development (8). Sedentary lifestyles are increasingly prevalent among women in urban Pakistan, where sociocultural constraints and limited access to recreational facilities significantly restrict physical activity. This inactivity contributes to obesity, hormonal imbalance, and metabolic dysfunction, all of which are recognized contributors to breast cancer risk (8). Additionally, lifestyle-related behaviors such as substance use further aggravate this risk. As illustrated in Figure 1, these factors interact with genetic predisposition, reproductive and hormonal influences, socioeconomic and cultural determinants, as well as environmental and nutritional exposures, collectively shaping the multifactorial risk profile of breast cancer in Pakistani women (8).

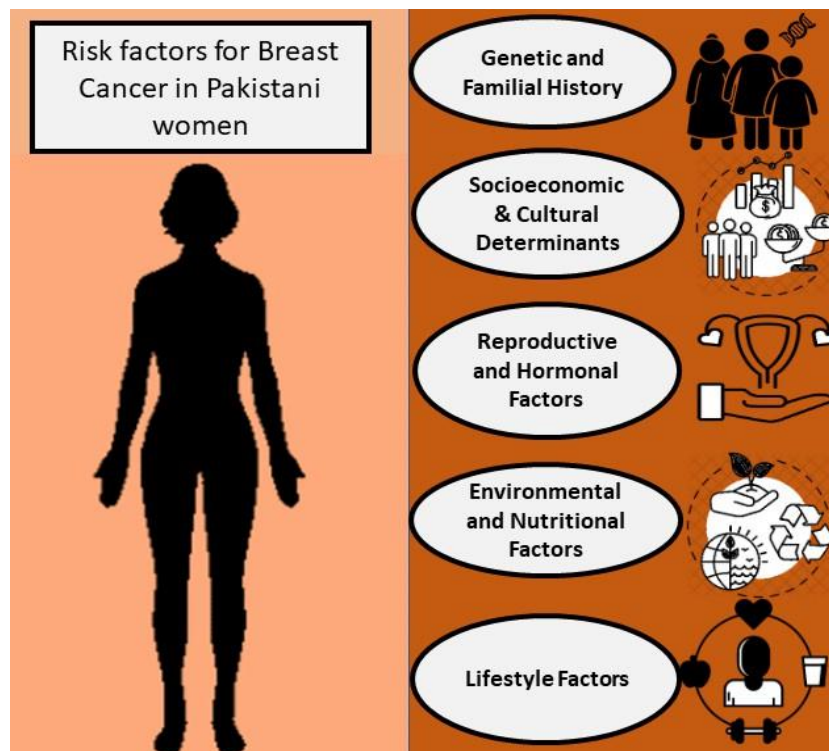


Figure1. Risk factors for breast cancer in Pakistani women, including genetic and familial history, socioeconomic and cultural determinants, reproductive and hormonal factors, environmental and nutritional influences, and lifestyle-related factors.

2.2 Genetic and Familial History

Genetic predisposition, particularly mutations in BRCA1 and BRCA2, is a strong predictor of breast cancer risk. Recent studies in Pakistani women indicate a higher prevalence of these mutations among high-risk groups, especially those with early-onset disease and positive family history. These findings highlight the need for targeted genetic screening in the local population (8, 10). Numerous occurrences of breast cancer occur in families with consanguineous marriages, making family history a reliable risk factor (2, 5). In Pakistani society, consanguinity is common, which raises the possibility that inherited pathogenic mutations would manifest. Research indicates that, in comparison to Western populations, familial clustering of illnesses is more common in Pakistan (10, 2). Genetic testing and counselling are still scarce because of societal stigma, availability, and cost, notwithstanding this evidence. Increasing the availability of genetic testing may be essential for identifying high-risk individuals and putting preventative measures in place.

2.3 Reproductive and Hormonal Factors

Reproductive history has a major impact on breast cancer risk. Early menarche and late menopause increase lifelong estrogen exposure, raising risk (11, 1). Nulliparity and late first pregnancy has also been linked to increased incidence (12, 5). Early pregnancy and extended nursing are both protective factors. Breastfeeding has traditionally been common in Pakistani families, but current urbanization and lifestyle changes are shortening the duration and exclusivity of breastfeeding (1). Several recent studies (11, 5) found a substantial link between not breastfeeding and an increased risk of breast cancer. Hormonal contraception and hormone replacement treatment (HRT) can also increase risk. While the findings are inconsistent, chronic use of these medications tends to increase vulnerability in Pakistani women, which is consistent with global evidence (7).

2.4 Environmental and Nutritional Factors

Environmental exposures are increasingly acknowledged as factors contributing to breast cancer risk. Industrial pollutants, insecticides in food, and home chemicals may all have carcinogenic consequences (3, 5). However, research in this area remains scarce in Pakistan. Vitamin D insufficiency has emerged as an especially important issue. Despite plentiful sunlight, insufficiency rates among Pakistani women approach 60%, owing primarily to cultural dress norms and indoor lifestyles (3). Low vitamin D levels have been linked to decreased immune function and increased cancer risk. Nutritional deficits in antioxidants and key micronutrients increase risk by impairing preventive mechanisms against DNA damage (13).

2.5 Socioeconomic and Cultural Determinants

Sociocultural and economic obstacles have a substantial impact on breast cancer outcomes. Women and healthcare personnel alike are unaware of the signs and risk factors associated with breast cancer. For example, nurses at a prominent tertiary hospital in Lahore lacked understanding of breast cancer risk factors (14). Similarly, a cross-sectional survey revealed widespread misunderstandings about mammography, with many women believing screening is unnecessary unless symptomatic (15, 16).

Stigma and modesty also impede early detection. Many women avoid professional tests because of cultural taboos about the female body (6, 17). In rural places, the reliance on traditional healers and poor healthcare infrastructure exacerbates delays. Economic issues also limit access. Screening and diagnostic services are frequently focused in urban areas, leaving rural women facing financial and logistical challenges (3, 6). These discrepancies contribute to late-stage diagnosis and a bad outcome. However, media initiatives have shown promise. Studies have shown that focused social media interventions can increase knowledge and favorably influence attitudes towards screening and early detection (7).

3. DISCUSSION

Breast cancer in Pakistani women is characterized by a complex interplay of biological, behavioral, and societal factors. In comparison to Western populations, Pakistani women have earlier onset, a larger proportion of aggressive subtypes, and later stage presentation (2, 4). These distinctions emphasize the significance of context-specific risk evaluations.

3.1 Comparison with Other Populations

Obesity, diet, and reproductive history are all considered key risk factors worldwide. However, in Pakistan, cultural behaviors such as consanguineous marriages exacerbate inherited risks (10, 2). Furthermore, urbanization undermines protective practices like breastfeeding, bringing Pakistani patterns in line with worldwide urban populations (1). Unlike in Western countries, where alcohol plays an important role, it has a limited significance in Pakistan. Instead, barriers to healthcare access and stigma have a significant influence in illness progression (6, 7).

3.2 Implications for Public Health

Addressing breast cancer risk in Pakistan necessitates a multifaceted strategy. Public health activities should prioritize awareness campaigns that are customized to the sociocultural environment. Community health professionals can be mobilized to educate women about breast self-examination and screening. Obesity and dietary therapies must be prioritized, especially in metropolitan areas where lifestyle changes are quickly raising disease risk (18, 13). Genetic counselling should be included as part of standard cancer care, especially for women with a significant family history. Healthcare infrastructure must be strengthened to offer equitable access to diagnostic and treatment services in both urban and rural locations. Mobile screening devices and subsidized mammography programmes could help to reduce accessibility hurdles.

3.3 Limitations of Current Evidence

Despite rising research, the majority of studies in Pakistan are hospital-based and have small sample sizes (11, 5). National cancer registries remain inadequate, limiting the ability to conduct extensive epidemiological research. Furthermore, environmental exposures including pollution and food toxins are understudied. Future research should focus on population-based cohorts and longitudinal designs to better capture risk factor changes.

4. CONCLUSION

Breast cancer is a serious health concern for Pakistani women, with incidence rates exceeding those of neighboring countries and death exacerbated by late-stage diagnosis. Obesity, poor diet, sedentary lifestyle, reproductive history, genetic predisposition, and social barriers are all known to increase illness risk. Interventions must consider both biological and cultural variables. Promoting healthy lifestyles, extending breastfeeding practices, raising awareness, and offering accessible screening services are all crucial. Integrating genetic counselling into oncology therapy, as well as addressing vitamin D insufficiency, may help to lower disease burden. Finally, lowering breast cancer incidence and improving survival in Pakistan necessitates collaborative efforts by healthcare professionals, politicians, researchers, and communities. Tailored, culturally sensitive techniques have the potential to significantly improve results for Pakistani

women. By recognizing the main risk factors and applying AI-based tools can strengthen preventive measures and support early diagnosis.

AUTHORSHIP CONTRIBUTION STATEMENT

Rehana Kouser: conceptualization, literature review, writing – original draft; Madeeha Sadia: validation, writing – review & editing; Sughra Abbasi: supervision, methodology.

DATA AVAILABILITY

All data supporting this review are derived from published studies cited in the reference list.

DECLARATION OF COMPETING INTEREST

Authors declare that there is no conflict of interest.

DECLARATION OF GENERATIVE AI

AI-based tools were utilized only to enhance the readability and linguistic quality of selected sentences. The intellectual content, data analysis, and interpretations presented in this manuscript were independently developed by the authors.

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