

EPIDEMIOLOGICAL ASSESSMENT OF BREAST CANCER RISK FACTORS AMONG WOMEN IN LAHORE, PAKISTAN

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Abstract

Background: Breast cancer remains the most prevalent malignancy among women worldwide and poses a growing public health challenge in Pakistan, particularly in Punjab, where it accounts for nearly one in four female cancer cases.

Objective: The present study aimed to assess the epidemiological risk factors associated with breast cancer among women in Lahore, Punjab, Pakistan.

Methods: This descriptive, cross-sectional study was conducted among 420 women clinically diagnosed with breast cancer. Participants were recruited from three tertiary care hospitals in Lahore – Mayo Hospital, Jinnah Hospital, and Sir Ganga Ram Hospital. Data were collected using a structured questionnaire covering sociodemographic characteristics, reproductive history, lifestyle patterns, and family history. Statistical analysis was performed to identify the prevalence and distribution of major risk determinants.

Results: The study revealed that early menarche (≤ 12 years) was observed in 22.9% of women, while 73.8% had given birth and 89% had their first childbirth before age 30, indicating predominant exposure to known reproductive risk factors. Only 31.9% performed breast self-examination, 10.9% underwent mammography, and 23.3% engaged in regular physical activity, reflecting low awareness and limited adoption of preventive health behaviors among women in Lahore.

Conclusion: The study concludes that limited awareness and inadequate engagement in early detection and healthy lifestyle practices contribute to increased breast cancer risk among women in Lahore, highlighting the need for targeted health education and screening initiatives.

INTRODUCTION

Breast cancer is among the most frequently diagnosed malignancies in women worldwide, with its burden rising especially in low- and middle-income countries (LMICs). Globally, established risk factors include reproductive variables (e.g. early menarche, late menopause, parity, age at first birth), genetic predisposition

(such as BRCA1/2 mutations), obesity, hormonal exposures, and lifestyle factors like physical inactivity and smoking (Frontiers Oncology, 2023). In Pakistan, the incidence and mortality rates for breast cancer are relatively high compared to regional neighbors, and Pakistani women tend to present at a younger age than in

Western populations (Siddiqui, 2024; Shaukat, Ismail, & Mehmood, 2013). Given this context, a focused epidemiological assessment of risk factors in major urban centers such as Lahore is critical for tailoring public health interventions.

In Lahore, several case-control and survey studies have examined associations between breast cancer and local risk variables. For instance, Gilani, Kamal, and Gilani (2006) found that family history, consanguineous marriage, smoking, high BMI (≥ 28), late menopause (> 45 years), and delayed first full-term pregnancy (> 25 years) were significant risk factors, while high parity (> 3 children) had a protective effect in some subgroups. Mansha et al. (2016) conducted a survey among 200 breast cancer patients at INMOL hospital in Lahore and reported that although many patients had “low risk” profiles (e.g. married, breastfed, low parity), a nontrivial proportion experienced early menarche (< 12) or late menopause (> 45), pointing to heterogeneity in risk exposure. Furthermore, more recent descriptive local studies have emphasized contributory roles of family history, reproductive timing, and lifestyle factors in the Lahore population (Naz, Dar, Sajjad, Sharif, & Rashid, 2025).

Despite these insights, gaps remain in systematically quantifying the relative contributions (population attributable risks) of multiple, interacting factors in Lahore, and in distinguishing subgroup effects (e.g. pre- vs. postmenopausal). An epidemiological study that integrates demographic, reproductive, genetic, and lifestyle variables in a representative sample of women in Lahore would thus yield valuable evidence. Such work can inform targeted screening, risk stratification, and preventive strategies within local health systems, ultimately helping to reduce breast cancer incidence and improve outcomes in this high-burden urban setting.

Materials and Methods

Study Design

This descriptive, cross-sectional study was conducted among 420 women clinically diagnosed with breast cancer. Participants were

recruited from three major tertiary care hospitals in Lahore—Mayo Hospital, Jinnah Hospital, and Sir Ganga Ram Hospital—over a six-month period. The study aimed to assess the epidemiological distribution and determinants of breast cancer risk factors among women in an urban Pakistani context.

Sample and Inclusion Criteria

Eligible participants included women aged 18 years and above who were clinically diagnosed with breast cancer and willing to participate voluntarily. Women diagnosed with other malignancies or those unable to provide informed consent were excluded from the study. The sample size was determined using an epidemiological formula considering the estimated breast cancer prevalence in Punjab and a 95% confidence interval.

Study Variables

The structured questionnaire covered key variables such as sociodemographic characteristics (age, education, marital and employment status), reproductive history (age at marriage, age at first childbirth, parity, menopausal status, and use of hormonal replacement therapy), nutritional habits (consumption of fresh fruits, vegetables, and fatty foods), physical activity (type and duration of exercise and walking per day), and health-seeking behaviors (routine mammography and breast self-examination practices).

Data Collection Procedure

Data were collected through face-to-face interviews conducted by trained research assistants in collaboration with hospital oncology units. Illiterate participants were assisted in completing the questionnaire after obtaining their verbal and written consent. A pilot study was conducted among 20 participants to refine the questionnaire, resulting in a final 45-item instrument.

Data Analysis

Data were entered and analyzed using the Statistical Package for the Social Sciences (SPSS) version 25. Descriptive statistics such as

frequencies and percentages were used to describe categorical variables, while chi-square tests were applied to examine associations between selected risk factors and sociodemographic variables. A $p\text{-value} \leq 0.05$ was considered statistically significant at a 95% confidence interval.

Results

Table 1. Demographic Characteristics of Women (n = 420)

Demographic Characteristics	Category	n	%
Age (years)	15–29	84	20.0
	30–44	196	46.7
	45 and above	140	33.3
Education	No Education	52	12.4
	Primary	86	20.5
	Middle	74	17.6
	Secondary	108	25.7
	Higher	100	23.8
Marital Status	Married	302	71.9
	Single	78	18.6
	Widowed	30	7.1
	Separated	10	2.4
Employment Status	Employed	158	37.6
	Unemployed	262	62.4
Type of Occupation	Housewife	262	62.4
	Labor-intensive work	54	12.9
	Office-type work	68	16.2
	Others	36	8.5

The study included 420 women diagnosed with breast cancer in Lahore. Nearly half of the participants (46.7%) were aged 30–44 years, followed by 33.3% aged 45 years and above, and 20% aged 15–29 years. Regarding education, 12.4% had no formal education, while 23.8% attained higher education, indicating a

Ethical Considerations

Each participant was informed about the study objectives, assured of confidentiality, and asked to provide written informed consent prior to inclusion.

moderately educated sample overall. Most respondents were married (71.9%), and 62.4% were unemployed, primarily homemakers (62.4%). Among employed women, 16.2% worked in office-type occupations and 12.9% in labor-intensive jobs, while 8.5% were students or engaged in other informal activities.

Table 2. Reproductive Risk Factors of Women (n = 420)

Reproductive Characteristics	Category	n	%
Age at Menarche (years)	≤ 12	96	22.9
	13–15	278	66.2
	≥ 16	30	7.1
	Cannot recall	16	3.8
Parity	Has not given birth	110	26.2
	Has given birth	310	73.8
Age at First Live Birth (n = 310)	<30 years	276	89.0

Duration of Breastfeeding (n = 310)	≥30 years	34	11.0
	Did not breastfeed	18	5.8
	1–6 months	82	26.5
	7–12 months	112	36.1
	≥13 months	98	31.6
Menopausal Status	Menstruating	292	69.5
	In menopause	128	30.5
Use of Hormone Replacement Therapy (n = 128)	Yes	22	17.2
	No	106	82.8

Among the 420 women included in the study, the majority (66.2%) experienced menarche between 13 and 15 years of age, while 22.9% had early menarche (≤ 12 years), which is considered a significant reproductive risk factor for breast cancer. Most participants (73.8%) had given birth, and 89% of these women reported having their first live birth before the age of 30. Breastfeeding was common, with 94.2% of parous women having breastfed; notably, 36.1%

breastfed for 7–12 months and 31.6% for 13 months or longer. About one-third (30.5%) of women were postmenopausal, and among them, 82.8% had never used hormone replacement therapy. These findings indicate that the sample largely reflects women with traditional reproductive patterns, though a subset exhibited early menarche and shorter breastfeeding durations that may elevate breast cancer risk.

Table 3. Lifestyle and Modifiable Risk Factors of Women (n = 420)

Modifiable Risk Factors	Category	n	%
Consumption of Fresh Fruits and Vegetables	Yes	342	81.4
	No	78	18.6
Consumption of Fatty Foods	Yes	126	30.0
	No	294	70.0
Participation in Regular Physical Activity	Yes	98	23.3
	No	322	76.7
Duration of Physical Activity per Day (n = 98)	1–2 hours	82	83.7
	3–4 hours	14	14.3
	≥5 hours	2	2.0
Walking as Daily Exercise	Yes	236	56.2
	No	184	43.8
Duration of Walking per Day (n = 236)	15–29 minutes	42	17.8
	30–44 minutes	88	37.3
	45–59 minutes	26	11.0
	≥60 minutes	80	33.9

The majority of women (81.4%) reported regular consumption of fresh fruits and vegetables, while 30% frequently consumed fatty foods. Only 23.3% engaged in regular physical activity, mostly for 1–2 hours per day. Walking was the most common form of exercise, practiced by 56.2% of participants, with more than one-third (37.3%)

walking for 30–44 minutes daily. Overall, the findings indicate relatively healthy dietary patterns but limited physical activity among women, underscoring the need to promote active lifestyles for breast cancer prevention.

Table 4. Early Detection Practices of Breast Cancer among Women (n = 420)

Early Detection Methods	Category	n	%
Breast Self-Examination (BSE)	Yes	134	31.9
	No	286	68.1
Timing of BSE (n = 134)	A week after menstruation	48	35.8
	With every shower	32	23.9
	Whenever it comes to mind	28	20.9
	During menstruation	10	7.5
	Before and after menstruation	6	4.5
	Once a month / every fifteenth day	10	7.4
Regular Clinical Check-up	Yes	98	23.3
	No	322	76.7
Mammography Screening	Yes	46	10.9
	No	374	89.1
Cervical (Pap) Smear Test	Yes	22	5.2
	No	398	94.8

Only 31.9% of women reported performing breast self-examination, most commonly a week after menstruation. Regular clinical check-ups were practiced by 23.3% of participants, while 10.9% had undergone mammography and only 5.2% had ever received a Pap smear test. These results highlight limited engagement in early detection practices and the need to strengthen breast cancer awareness and screening initiatives among women.

Discussion

The findings of this study highlight that reproductive patterns, lifestyle behaviors, and limited screening practices play a major role in shaping breast cancer risk among women in Lahore. Most participants experienced menarche between 13 and 15 years and had their first childbirth before age 30, patterns generally associated with lower risk; however, early menarche (≤ 12 years) among one-fourth of women aligns with earlier evidence linking early hormonal exposure to increased susceptibility to breast malignancy (Butler et al., 2000; Aslan & Gürkan, 2007). Similarly, prolonged reproductive years without protective factors such as extended breastfeeding may contribute to higher lifetime estrogen exposure—a key biological mechanism in breast carcinogenesis (Stoll, 2002; Thompson, Zhu, & Jiang, 2004).

In this cohort, the majority of parous women breastfed their children, many for longer than seven months. This is consistent with international and regional studies that emphasize the protective effects of prolonged lactation through hormonal modulation and breast tissue differentiation (Çolak & Korkmaz, 2005; Madlensky et al., 2005). Dietary behaviors were relatively favorable, as most women consumed fruits and vegetables regularly, a factor previously associated with reduced breast cancer risk due to antioxidant and micronutrient effects (Malin et al., 2003). However, the low rate of physical activity found in this study mirrors prior findings that insufficient exercise contributes to obesity and insulin resistance, both of which are established metabolic risk factors for breast cancer (Stoll, 2002; Thompson et al., 2004; Shoff et al., 2000).

The present results also reveal poor engagement in early detection practices. Less than one-third of participants performed breast self-examination (BSE), and mammography utilization remained very low. These figures correspond with findings from other developing settings, where limited awareness, fear, and inadequate screening infrastructure restrict preventive behavior (Hall et al., 2002; Rakowski et al., 2004; Smith, Cokkinides, & Eyre, 2003). Promoting BSE and periodic clinical screening through culturally

sensitive health education could substantially improve early diagnosis and outcomes. Furthermore, integrating community-based awareness programs—emphasizing modifiable behaviors such as physical activity and healthy diet—can strengthen preventive efforts and reduce the growing burden of breast cancer in urban Pakistan (Conto & Myers, 2002; Risendal et al., 1999).

Conclusion

Based on the study findings, it is recommended to strengthen community-based awareness and screening programs emphasizing breast self-examination, regular clinical check-ups, and timely mammography to promote early detection. Additionally, interventions encouraging healthy dietary habits, physical activity, and prolonged breastfeeding should be prioritized to reduce modifiable breast cancer risks among women in Lahore.

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