https://doi.org/10.36570/jduhs.2025.1.2465

JDUHS

ORIGINAL ARTICLE

# Frequency of Breast Cancer in Women Under 40 Years at Ghulam Muhammad Mahar Medical College: A Cross-Sectional Study

**Sadia Saher Memon, Shahid Hussain Mirani, Ghulam Fatima Komal Masood, Khalil Ahmed Channa, Halar Habibullah, Anam Rafique**

Department of Surgery, Ghulam Muhammad Mahar Medical College, Sukkur, Pakistan.

**Correspondence Author:** Dr. Sadia Sehar Memon, Email: sadiamemon776@gmail.com, ORCiD: 0009-0004-8970-465X

## ABSTRACT

**Objective:** To assess the frequency of breast cancer in women under the age of 40 and identify associated risk factors.

**Methods:** A hospital-based cross-sectional study was carried out in the Department of Surgery at Ghulam Muhammad Mahar Medical College, Sukkur, Pakistan between August 2024 and January 2025. Women aged 15 to 39 years presenting with a palpable breast lump were included in the study. Breast cancer diagnosis was confirmed through histopathological examination, characterized by nuclear pleomorphism, tubular formation, and mitotic activity. Various risk factors, such as age, body mass index, marital status, smoking habits, family history of breast cancer, and duration of symptoms were recorded and analyzed to determine their association with breast cancer in this age group.

**Results:** Among 199 women, the mean age was 37.50 ±2.34 years. Histopathological examination confirmed malignant lesions in 21 (10.5%) participants. The risk of malignancy was significantly higher among women who smoked (adjusted odds ratio [aOR] 8.04; 95% CI: 1.20–53.97; p-value 0.032) and those with a family history of breast cancer (aOR 11.84; 95% CI: 2.01–69.72; p-value 0.006). Conversely, women aged 36 years or younger had a markedly lower risk of malignancy compared to those over 36 years (aOR 0.04; 95% CI: 0.12–0.16; p-value < 0.001)

**Conclusion:** A notable burden of breast cancer was found among women under 40, with a frequency of 10.5% in those presenting with palpable breast lumps. Smoking and a positive family history significantly increased the odds of malignancy.

**Keywords:** Breast Neoplasms, Family History, Histopathology, Risk Factors, Young Adult.



## INTRODUCTION

Breast cancer remains the most frequently diagnosed malignancy among women globally, accounting for approximately 23% of all female cancers, making it a major public health concern.[1,2] Breast cancer incidence rates show considerable variation across the globe, with the highest occurrences documented in Australia and New Zealand (95.5 cases per 100,000 individuals) and Western Europe (90.7 per 100,000), while South-Central Asia (26.2 per 100,000) and Middle and Eastern Africa (33.3 per 100,000) report the lowest rates.[3] Over the years, the global incidence of breast cancer has surged, rising from 39.2 to 45.9 per 100,000 between 1990 and 2017, with a more pronounced increase observed in developing nations.[4]

Younger women diagnosed with breast cancer often present with more aggressive tumor characteristics, including advanced-stage disease at diagnosis, higher recurrence rates, and a higher occurrence of triple-negative and HER2-overexpressing tumors.[5] The incidence of breast cancer among young women has increased at a faster rate compared to other age groups, though data regarding specific histological subtypes remains limited.[6]

The overall cancer burden is rising globally across all age groups.[2] In multiple Western nations, including the United States, Europe, and Australia, breast cancer incidence has consistently increased over the last three decades.[7,8] This trend is particularly concerning in young women, as their tumors are often more aggressive compared to those in older women.[9]

In Pakistan, breast cancer constitutes 14.5% of all malignancies, with 25,928 reported cases in 2020 and a mortality rate of 11.7% (13,725 deaths).[10] The risk of developing breast cancer is increasing, with an

estimated one in nine Pakistani women at risk of a lifetime diagnosis.[11] Additionally, Pakistan has the highest age-standardized incidence rate for breast cancer among Asian countries.[10]

The rationale of the study was that despite its increasing incidence, data on risk factors of breast cancer in young women, particularly in developing countries like Pakistan, remain scarce. Identifying key risk factors, such as smoking and genetic predisposition, is essential for targeted screening and prevention. This study aims to address this gap, providing critical insights into early detection strategies, high-risk populations, and optimized treatment approaches to improve survival and public health interventions.

## METHODS

This hospital-based cross-sectional study was carried out at the Department of Surgery, Ghulam Muhammad Mahar Medical College, Sukkur, Pakistan from August 2024 to January 2025. Ethical approval was obtained from the Institutional Ethical Review Committee and the College of Physicians and Surgeons Pakistan (CPSP) (Ref no. SGR-2022-230-13730). Informed consent was obtained from all individuals who met the inclusion criteria.

Sample size estimation was conducted using the WHO sample size calculator, based on a previously reported breast cancer frequency of 15.2%[12] in women under 40, a 5% margin of error, and a 95% confidence interval. The estimated sample size was 199. Women aged 15-39 years with a clinically palpable breast lump were included using non-probability consecutive sampling. Women who declined participation, had a history of breast trauma, were previously diagnosed with breast cancer, or were pregnant were excluded.

Breast cancer was defined based on histopathological confirmation, characterized by nuclear pleomorphism, tubular formation, and mitotic activity. All participants underwent histopathological screening, and those diagnosed with breast cancer were managed according to institutional protocols.

Demographic and clinical data were collected, including age, place of residence, marital status, and monthly family income. Anthropometric measurements were obtained using standardized equipment: Height was recorded in centimeters using a wall-mounted stadiometer, while weight was measured in kilograms with a digital scale. Body mass index (BMI) was calculated in kg/m$^2$. Smoking status was defined as the daily consumption of at least five cigarettes for a duration of one year or more. Additionally, hereditary predisposition to breast malignancy and the duration of symptoms were documented.

For women diagnosed with breast cancer, tumor characteristics were documented. Tumor size was measured in centimeters, and classification included parenchymal and intraductal types. The anatomical tumor location was categorized as the upper outer quadrant (UOQ), lower outer quadrant (LOQ), lower inner quadrant (LIQ), upper inner quadrant (UIQ), or retroareolar region. Laterality, identifying whether the left or right breast was affected, was also noted.

Data were entered and analyzed using Statistical Package for Social Sciences (SPSS) version 20.0. Quantitative variables such as age, weight, height, and BMI were summarized as mean ± SD, while categorical variables, including marital status, residence, smoking status, family history of breast cancer, and tumor characteristics, were reported as frequencies and percentages. Inferential analysis was conducted using the Chi-square/Fisher exact test and Independent t-test to assess associations between demographic/clinical characteristics and breast cancer. A p-value of ≤0.05 was considered statistically significant. Additionally, binary logistic regression was performed on significant variables identified in contingency tables. Univariable and multivariable logistic regression analyses were carried out to determine independent risk factors for breast cancer, and results were reported as crude and adjusted odds ratios (ORs) with 95% confidence intervals (CIs).

## RESULTS

Of the 199 women included in the study, the mean age was 37.50 ±2.34 years, mean weight was 67.21 ±11.19 kg, mean height was 156.10 ±7.01 cm, and the mean BMI was 26.33 ±4.63 kg/m$^2$. A total of 129 (64.8%) participants were married, while 70 (35.2%) were single or divorced. The majority of women 130 (65.3%) resided in urban areas, and 152 (76.4%) had a monthly income of forty thousand PKR or less. Most participants 187 (92.5%) were non-smokers, and 121 (60.8%) reported no family history of breast cancer. The average duration of symptoms was 3.68 ±1.63 months.

Histopathological examination revealed malignant lesions in 21 (10.5%) women, while the remaining 178 (89.5%) had benign breast lesions. Table 1 presents the tumor characteristics among women diagnosed with malignant breast disease. The mean tumor size in these women was 5.47 ±1.47 cm. Most malignancies were located in the right breast 13 (61.9%) and were of parenchymal type 17 (81.0%). The most frequently

| Table 1: Distribution of tumor characteristics in breast cancer patients (n=21) | |
|---|---|
| **Characteristics** | **Mean ±SD** |
| **Size of Tumor (cm)** | 5.47 ±1.47 |
| | **n (%)** |
| **Side of Breast** | |
| Left | 8 (38.1) |
| Right | 13 (61.9) |
| **Type of Tumor** | |
| Parenchymal | 17 (81.0) |
| Intraductal | 4 (19.0) |
| **Location of Tumor** | |
| UOQ | 10 (47.6) |
| LOQ | 3 (14.3) |
| LIQ | 1 (4.8) |
| UIQ | 4 (19.0) |
| Retroareolar | 3 (14.3) |

UQQ: Upper outer quadrant, LOQ: Lower outer quadrant, LIQ: Lower inner quadrant, UIQ: Upper inner quadrant, SD: Standard deviation, CM: Centimeter

involved quadrant was the UOQ in 10 cases (47.6%), followed by the UIQ in 4 (19.0%), the LOQ and retroareolar region in 3 (14.3%) each, and the LIQ in 1 case (4.8%).

The frequency of malignant breast lesions was significantly higher among women aged >36 years compared to those aged ≤36 years, i.e., 17 out of 43 (39.5%) vs. 4 out of 156 (2.6%) (p-value <0.001). Malignancy was also significantly more common among women residing in urban areas (p -value 0.038), those who were married (p-value 0.034), smokers (p-value <0.001), and women with a positive family history of breast cancer (p-value <0.001), as shown in Table 2.

Table 3 presents the binary logistic regression analysis for predictors of malignant breast disease. In univariable analysis, all variables presented in Table 2 were significantly associated with malignancy. Multivariable logistic regression showed that women who smoked had an eightfold increased risk of malignancy (aOR 8.04; 95% CI: 1.20-53.97; p-value 0.032), and those with a family history of breast cancer had an elevenfold increased risk (aOR 11.84; 95% CI: 2.01–69.72; p-value 0.006). In contrast, women aged ≤36 years had a significantly lower risk of malignancy compared to those over 36 years, with a 96% reduction in odds (aOR 0.04; 95% CI: 0.12–0.16; p-value <0.001).

## DISCUSSION

This study aimed to assess the frequency of malignant breast lesions among women under 40 years of age and to identify associated risk factors. Histopathological findings revealed malignancy in approximately one-tenth of participants, with significantly higher occurrence in women aged over 36 years, smokers, urban residents, married individuals, and those with a family history of breast cancer.

Breast cancer remains a global health challenge, especially in younger women, where it is often associated with more aggressive clinical and pathological features and a poorer prognosis compared to older patients.[13,14] Previous studies have reported comparable prevalence rates among younger women. For instance, Siregar *et al*. reported a malignancy rate of 15% in women under 40,[12] while another study noted an incidence of 8%.[15] Similarly, several studies from Pakistan involving women of various age groups have shown disproportionately higher rates of malignancy in younger cohorts.[16,17]

The increasing trend of breast malignancies in younger women has been well documented. Abdullah et al. attributed this rise to improved diagnostic capabilities and possibly unidentified contributing factors.[18] Daly *et al*. highlighted the role of hormonal and lifestyle influences-particularly smoking and family history-which are consistent with our study findings.[19]

The significant association between smoking and malignancy observed in our study aligns with prior research. Nelson *et al*. demonstrated that smoking notably increases breast cancer risk in younger women, underlining the relevance of modifiable behavioral risk factors.[20] Similarly, our findings support those of Reiner et al. who reported that a first-degree family history of breast cancer substantially elevates the likelihood of developing the disease, emphasizing the role of genetic predisposition.[21]

**Table 2: Comparison of breast cancer with demographic and clinical characteristics of the women (n = 199)**

| | Total | Breast Cancer | | p-value |
|---|---|---|---|---|
| | | Malignant (n= 21) | Benign (n= 178) | |
| **Age (years)** | 37.50 ±2.34 | 37.52 ±1.07 | 33.60 ±2.75 | <0.001$* |
| ≤36 | 156 | 4 (2.6) | 152 (97.4) | <0.001~* |
| >36 | 43 | 17 (39.5) | 26 (60.5) | |
| **Weight (kg)** | 67.21 ±11.19 | 68.38 ±10.39 | 67.07 ±11.30 | 0.612$ |
| **Height (cm)** | 156.10 ± 7.01 | 157.02 ± 7.62 | 155.75 ± 7.01 | 0.524$ |
| **BMI (kg/m²)** | 26.33 ±4.63 | 26.61 ±4.22 | 26.30 ±4.69 | 0.770$ |
| **Marital Status** | | | | |
| Single/Divorced | 70 | 3 (4.3) | 67 (95.7) | 0.034^* |
| Married | 129 | 18 (14.0) | 111 (86.0) | |
| **Residence** | | | | |
| Rural | 69 | 3 (4.3) | 66 (95.7) | 0.038^* |
| Urban | 130 | 18 (13.8) | 112 (86.2) | |
| **Monthly Income (Pakistani rupees)** | | | | |
| ≤40,000 | 152 | 15 (9.9) | 137 (90.1) | 0.572~ |
| >40,000 | 47 | 6 (12.8) | 41 (87.2) | |
| **Duration Symptoms (months)** | 3.68 ±1.63 | 4.33 ±1.85 | 3.61 ±1.59 | 0.055$ |
| ≤3 | 91 | 83 (91.2) | 8 (8.8) | 0.458^ |
| >3 | 108 | 95 (88.0) | 13 (12.0) | |
| **Smoking** | | | | |
| Yes | 12 | 7 (58.3) | 5 (41.7) | <0.001~* |
| No | 187 | 14 (7.5) | 173 (92.5) | |
| **Family History of Breast Cancer** | | | | |
| Yes | 78 | 18 (23.1) | 60 (76.9) | <0.001^* |
| No | 121 | 3 (2.5) | 118 (97.5) | |

-Quantitative variables described by mean ±SD, Categorical variables described by frequencies (percentages), * p-value ≤ 0.05 (^Chi-Square/~Fisher Exact test and $Independent Sample t-test)

**Table 3: Binary logistic regression analysis for predicting breast cancer among women age less than 40 years (n = 199)**

| Variables | Univariable analysis | | Multivariable analysis | |
|---|---|---|---|---|
| | cOR (95% CI) | p-value | aOR (95% CI) | p-value |
| **Age (years)** | | | | |
| ≤36 | 0.04 (0.01 to 0.12) | <0.001* | 0.04 (0.01 to 0.16) | <0.001* |
| >36 | 1 | | 1 | |
| **Marital Status** | | | | |
| Single/Divorced | 0.27 (0.07 to 0.97) | 0.045* | | |
| Married | 1 | | | |
| **Residence** | | | | |
| Rural | 0.28 (0.08 to 0.99) | 0.049* | 0.50 (0.08 to 3.03) | 0.455 |
| Urban | 1 | | 1 | |
| **Smoking** | | | | |
| Yes | 17.30 (4.85 to 61.62) | <0.001* | 8.04 (1.20 to 53.97) | 0.032* |
| No | 1 | | 1 | |
| **Family History of Breast Cancer** | | | | |
| Yes | 11.80 (3.34 to 41.64) | <0.001* | 11.84 (2.01 to 69.72) | 0.006* |
| No | 1 | | 1 | |

-Marital status was initially included in the multivariable logistic regression but was excluded due to extreme odds ratios and inconsistent estimates. cOR: Crude odds ratio, aOR: Adjusted odds ratio, CI: confidence interval, *p value ≤ 0.05

Regarding tumor characteristics, our study found the UOQ to be the most commonly affected anatomical site-consistent with existing literature indicating a typical distribution pattern of breast tumors.[22] Furthermore, younger women are frequently reported to have a higher prevalence of invasive ductal carcinoma, reinforcing the tendency toward more aggressive disease in this age group.[15]

A major strength of this study is the use of histopathological confirmation for diagnosis, which enhances the validity of the findings. Stratified analysis was employed to control for potential confounding, and consecutive sampling reduced selection bias. However, the study has several limitations. As a single-center study, generalizability to the broader population may be limited. The cross-sectional design restricts the ability to infer causality. Additionally, the use of self-reported data for smoking and family history introduces the possibility of recall bias.

Future studies should include large-scale, multicenter longitudinal designs to explore causal relationships between identified risk factors and early-onset malignancy. Genetic and molecular research is also warranted to uncover underlying mutations and biomarkers that may facilitate early diagnosis and personalized screening strategies. Finally, evaluating the effectiveness of preventive lifestyle interventions-such as smoking cessation, physical activity promotion, and dietary modifications-may contribute to reducing burden of modifiable risk factors in younger women.

## CONCLUSION

Malignant breast lesions were identified in 10.5% of women under 40 presenting with palpable breast lumps. The prevalence was significantly higher among those aged over 36 years, residing in urban areas, married, smokers, and individuals with a family history of breast cancer. Smoking and a positive family history emerged as the strongest independent predictors, markedly increasing the risk of malignancy. In contrast, younger age was associated with a significantly lower likelihood of malignancy. These findings highlight the need for risk-based screening, early diagnostic evaluation, and preventive strategies focused on high-risk groups to improve breast health outcomes in young women.

**ETHICAL APPROVAL:** This study was approved by the Ethical Committee of the Ghulam Muhammad Mahar Medical College, Sukkur (Ref No. SGR-2022-230-13730, dated: 07-Aug, 2024).

**AUTHORS' CONTRIBUTIONS:** SSM, SHM, GFKM, KAC: Substantial contributions to the conception or design of the work. SSM, SHM, GFKM, HH: Acquisition, analysis, and interpretation of data; methodology. SSM, SHM, AR, HH: Drafting the manuscript or revising it critically for important intellectual content. SSM, SHM, KAC, AR, GFKM: Provided supervision and / or project administration, including oversight of the research activity planning and execution. All authors approved the final version of the manuscript to be published.

**CONFLICT OF INTEREST:** The authors declare no conflict of interest.

**FUNDING:** No Funding.

Received: February 12, 2025
Accepted: April 10, 2025

## REFERENCES

1. Lukasiewicz S, Czeczelewski M, Forma A, Baj J, Sitarz R, Stanisławek A. Breast cancer-epidemiology, risk factors, classification, prognostic markers, and current treatment strategies-An Updated Review. Cancers (Basel) 2021; 13:4287. doi:10.3390/cancers13174287
2. Sung H, Ferlay J, Siegel RL, Laversanne M, Soerjomataram I, Jemal A. Global cancer statistics 2020: globocan estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Cancer J Clin 2021; 71:209-49. doi:10.3322/caac.21660
3. Kim J, Harper A, McCormack V, Sung H, Houssami N, Morgan E, et al. Global patterns and trends in breast cancer incidence and mortality across 185 countries. Nat Med 2025; 24:1-9 doi:10.1038/s41591-025-03502-3
4. Chen Z, Xu L, Shi W, Zeng F, Zhuo R, Hao X, et al. Trends of female and male breast cancer incidence at the global, regional, and national levels, 1990-2017. Breast Cancer Res Treat 2020; 180:481-90. doi:10.1007/s10549-020-05561-1
5. Anders CK, Hsu DS, Broadwater G, Acharya CR, Foekens JA, Zhang Y, et al. Young age at diagnosis correlates with worse prognosis and defines a subset of breast cancers with shared patterns of gene expression. J Clin Oncol 2008; 26:3324-30. doi:10.1200/jco.2007.14.2471
6. Cowppli A, Colonna M, Ligier K, Jooste V, Defossez G, Monnereau A. Descriptive epidemiology of cancer in metropolitan France: Incidence, survival and prevalence. Bulletin du cancer 2019; 106:617-34. doi:10.1016/j.bulcan.2018.11.016
7. Ahmad A. Breast cancer statistics: recent trends. Adv Exp Med Biol 2019; 1152:1-7. doi: 10.1007/978-3-030-20301-6_1
8. Heer E, Harper A, Escandor N, Sung H, McCormack V,

Fidler-Benaoudia MM. Global burden and trends in premenopausal and postmenopausal breast cancer: a population-based study. Lancet Glob Health 2020; 8:e1027-37. doi:10.1016/s2214-109x(20)30215-1

9. Fredholm H, Eaker S, Frisell J, Holmberg L, Fredriksson I, Lindman H. Breast cancer in young women: poor survival despite intensive treatment. PloS one 2009; 4:e7695. doi:10.1371/journal.pone.0007695
10. Global Cancer Observatory. Pakistan - Global Cancer Observatory [Internet]. Lyon, France: International Agency for Research on Cancer; 2023 [cited 2023 Sep 3]. Available from: https://gco.iarc.fr/today/data/factsheets/populations/586-pakistan-fact-sheets.pdf
11. Sharma R. Examination of incidence, mortality and disability-adjusted life years and risk factors of breast cancer in 49 Asian countries, 1990-2019: estimates from Global Burden of Disease Study 2019. Jpn J Clin Oncol 2021; 51:826-35. doi: 10.1093/jjco/hyab004
12. Siregar DR, Christoper A. Prevalence and characteristics of breast cancer in young women. Sumatera Med J 2020;3(2). doi:10.32734/sumej.v3i2.2919
13. Fabiano V, Mandó P, Rizzo M, Ponce C, Coló F, Loza M, et al. Breast cancer in young women presents with more aggressive pathologic characteristics: retrospective analysis from an argentine national database. JCO Glob Oncol 2020; 6:639-46. doi:10.1200/JGO.19.00228.
14. Zhu JW, Charkhchi P, Adekunte S, Akbari MR. What is known about breast cancer in young women? Cancers (Basel) 2023; 15:1917. doi:10.3390/cancers15061917
15. Dia JM, Toure M, Yao I, Bohoussou E, Saki C, Oyelade M, et al. Breast cancers in young woman under 40 years in sub-Saharan Africa: Experience of the Gynecology Department of the University and Hospital Center of Treichville (Abidjan-Cote d'Ivoire). J Cancer Ther 2017; 8:714-25. doi:10.4236/jct.2017.88062
16. Zeeshan S, Ali B, Ahmad K, Chagpar AB, Sattar AK. Clinicopathological Features of Young Versus Older Patients With Breast Cancer at a Single Pakistani Institution and a Comparison With a National US Database. J Glob Oncol 2019; 5:1-6. doi:10.1200/JGO.18.00208
17. Rahim A, Sattar A, Adil SO, Khan SA. Positive predictive value of Birads IV Lesions on mammogram in detection of breast carcinoma. J Pak Med Assoc 2022; 72:1750-4. doi: 10.47391/JPMA.3957
18. Abdullah NY. Prevalence study of breast cancer in female's age 20y to 30y (below 40) with female patients aged above 40 years. Int J Surg 2022; 6:87-90. doi:10.33545/surgery.2022.v6.i1b.826
19. Daly AA, Rolph R, Cutress RI, Copson ER. A review of modifiable risk factors in young women for the prevention of breast cancer. Breast Cancer (Dove Med Press) 2021; 13:241-57. doi: 10.2147/BCTT.S268401
20. Nelson H, Zakher B, Cantor A, Fu R, Griffin J, Meara E, et al. Risk factors for breast cancer for women aged 40 to 49 years: a systematic review and meta-analysis. *Ann Intern Med* 2012; 156:635-48. doi:10.7326/0003-4819-156-9-201205010-00006
21. Reiner AS, Sisti J, John EM, Lynch CF, Brooks JD, Mellemkjær L et al. Breast cancer family history and contralateral breast cancer risk in young women: an update from the women's environmental cancer and radiation epidemiology study. J Clin Oncol 2018; 36:1513-20. doi: 10.1200/JCO.2017.77.3424
22. Leclere B, Molinie F, Tretarre B, Stracci F, Daubisse-Marliac L, Colonna M. Trends in incidence of breast cancer among women under 40 in seven European countries: a GRELL cooperative study. *Cancer Epidemiol* 2013; 37:544-9. doi:10.1016/j.canep.2013.05.001