



RESEARCH ARTICLE

Reproductive Risk Factors and Their Association with Breast Cancer in Women of Central India

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ABSTRACT

Background: Breast cancer is the most common malignancy among women worldwide and represents a major public health challenge in India. Reproductive factors influence cumulative estrogen exposure and may significantly affect breast cancer risk. Understanding these associations is important for identifying high-risk women and developing preventive strategies.

Aim: To evaluate reproductive risk factors and their association with breast cancer among women attending a tertiary care center in Central India.

Methods: A prospective observational study was conducted at Bundelkhand Medical College, Sagar, over 18 months. A total of 170 women were enrolled, including 85 histopathologically confirmed breast cancer cases and 85 age-matched controls without breast malignancy. Data regarding age at menarche, age at first childbirth, parity, breastfeeding duration, menopausal status, age at menopause, and family history were collected and analyzed.

Results: Early menarche (<12 years), late age at first childbirth (>30 years), nulliparity, shorter duration of breastfeeding (<12 months), and late menopause (>50 years) were significantly associated with breast cancer ($p < 0.05$). Women with a family history of breast cancer had a significantly higher risk of disease ($OR = 3.2$, $p = 0.002$). Multivariate analysis identified late age at first childbirth and short breastfeeding duration as independent predictors of breast cancer.

Conclusion: Several reproductive factors are significantly associated with breast cancer risk among women in Central India. Promotion of breastfeeding and identification of women with adverse reproductive profiles may facilitate early screening and risk reduction strategies.

Keywords: Breast cancer, Reproductive factors, Menarche, Parity, Breastfeeding, Menopause.

Indian J. Pharm. Biol. Res. (2026): <https://doi.org/10.30750/ijpbr.14.3.29>

INTRODUCTION

As the most common disease among women, breast cancer has become a leading source of cancer-related morbidity and mortality globally. Approximately one-fourth of all malignancies diagnosed in women are breast cancers, according to latest global cancer data. Over the past 20 years, there has been a steady increase in the prevalence of breast cancer in India, especially among urban and semi-urban populations. Effective prevention, early detection, and better clinical results all depend on the early identification of risk factors. Breast cancer has a complex aetiology that includes hormonal, reproductive, environmental, and genetic factors. The duration and intensity of exposure to endogenous oestrogens and progesterone, which have a major impact on breast tissue growth and carcinogenesis, are determined by reproductive variables[1]

Breast cancer development has been linked to a number of reproductive traits. The length of reproductive life is increased by early menarche and late menopause, which prolongs exposure to ovarian hormones. Similarly,

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How to cite this article: Jain S, Arjariya R, Saxena SK, Gour S. Reproductive Risk Factors and Their Association with Breast Cancer in Women of Central India. Indian J. Pharm. Biol. Res. 2026;14(3):173-176.

Source of support: Nil

Conflict of interest: None.

Received: 22/05/2026 **Revised:** 08/06/2026 **Accepted:** 18/06/2026

Published: 24/07/2026

extended exposure of undifferentiated breast epithelium to hormonal stimulation has been linked to an increased risk of breast cancer in nulliparity and delayed first childbirth. On the other hand, because they decrease the number of ovulatory cycles and encourage final differentiation of breast tissue, numerous pregnancies and extended breastfeeding are typically regarded as protective. As a possibly modifiable protective factor, breastfeeding has garnered a lot of interest. Extended lactation may aid in the removal of DNA-damaged cells and lower cumulative oestrogen exposure. Women who breastfeed for longer periods of time had a lower risk of breast cancer, according to several epidemiological research[2].

Another significant risk factor is a family history of breast cancer. Due to shared genetic and environmental factors, women who have afflicted first-degree relatives are significantly more likely to get breast cancer. Data from Central India is still scarce, despite the fact that several studies have examined reproductive risk factors in Western communities. Regional variations in sociocultural practices, fertility patterns, breastfeeding habits, and reproductive traits may have distinct effects on disease risk. Thus, the current study was conducted to assess the relationship between reproductive risk factors and breast cancer in women who visit a Central Indian tertiary care hospital and to pinpoint factors that can considerably increase the incidence of the illness in this demographic[3].

MATERIALS AND METHODS

Study Design

Prospective observational case-control study.

Study Setting

Department of Surgery and Department of Radiotherapy, Bundelkhand Medical College, Sagar, Madhya Pradesh.

Study Duration

18 months.

Sample Size

170 women.

- Breast Cancer Cases: 85
- Controls: 85

Inclusion Criteria

Cases

- Histopathologically confirmed breast cancer.
- Age ≥ 20 years.

Controls

- Women attending outpatient clinics without breast malignancy.
- Age-matched to cases.

Exclusion Criteria

- Recurrent breast cancer.
- Previous malignancy.
- Incomplete reproductive history.

Data Collection

Information recorded:

- Age
- Age at menarche
- Age at first childbirth
- Parity
- Breastfeeding duration
- Menopausal status
- Age at menopause
- Family history of breast cancer

Statistical Analysis

- Chi-square test.
 - Student's t-test.
 - Odds ratio calculation.
 - Logistic regression analysis.
- $p < 0.05$ considered statistically significant.

RESULTS

The mean age of participants was comparable between groups. Postmenopausal status and positive family history were significantly more common among breast cancer patients.

Table 1: Baseline Characteristics

Variable	Cases (n=85)	Controls (n=85)	p-value
Mean Age (years)	49.8 $\pm$ 10.4	48.6 $\pm$ 9.8	0.46
Postmenopausal (%)	58 (68.2%)	43 (50.6%)	0.021
Family History (%)	18 (21.2%)	7 (8.2%)	0.018

Early menarche, delayed first childbirth, nulliparity, shorter breastfeeding duration, and late menopause were significantly associated with breast cancer occurrence.

Short breastfeeding duration and delayed first childbirth emerged as the strongest independent predictors of breast cancer.

Table 2: Association of Reproductive Risk Factors

<i>Risk Factor</i>	<i>Cases (%)</i>	<i>Controls (%)</i>	<i>p-value</i>
Menarche <12 years	29 (34.1)	13 (15.3)	0.005
First Childbirth >30 years	24 (28.2)	9 (10.6)	0.004
Nulliparity	16 (18.8)	5 (5.9)	0.011
Breastfeeding <12 months	42 (49.4)	20 (23.5)	0.001
Menopause >50 years	36 (42.4)	18 (21.2)	0.003

Table 3: Multivariate Logistic Regression

<i>Variable</i>	<i>Odds Ratio</i>	<i>95% CI</i>	<i>p-value</i>
Menarche <12 years	1.9	1.1–3.6	0.028
First Childbirth >30 years	2.8	1.4–5.4	0.003
Nulliparity	2.2	1.1–4.8	0.019
Breastfeeding <12 months	3.1	1.6–5.9	<0.001
Menopause >50 years	2.4	1.3–4.7	0.008

DISCUSSION

The current prospective observational study assessed the relationship between breast cancer and reproductive risk variables in women who visited a Central Indian tertiary care facility. The results show that a number of reproductive traits are strongly linked to the risk of breast cancer, including early menarche, delayed first childbirth, nulliparity, shorter breastfeeding duration, and late menopause. The current study's mean age of breast cancer patients was roughly fifty years old, which is in line with the age distribution found in a number of Indian research. Prolonged hormonal exposure may lead to carcinogenesis, as evidenced by the much increased percentage of postmenopausal patients with breast cancer. The importance of genetic predisposition in the development of breast cancer is further supported by the higher frequency of positive family history among cases[4].

The substantial correlation between early menarche and breast cancer was one of the key discoveries. The risk of breast cancer was almost doubled for women who reached menarche before the age of twelve. Early menarche lengthens the time that ovarian hormones are exposed, which enhances the cumulative stimulation of breast tissue by oestrogen. Numerous epidemiological investigations involving various populations have produced similar findings[5]. Another important risk factor found in the current investigation was delayed first childbirth. Compared to women who gave birth earlier, those who gave birth after the age of thirty were almost three times as likely to get

breast cancer. Breast epithelial cells undergo differentiation during pregnancy, which lessens their vulnerability to malignant transformation. Therefore, a delayed exposure to this protective effect may raise the risk of cancer[6].

Additionally, there was a strong correlation between nulliparity and breast cancer. Compared to parous women, women who had never given birth showed a risk that was more than twice as high. The protective function of pregnancy in lowering cumulative hormonal exposure and encouraging breast tissue maturation is supported by this finding. The study found that the duration of breastfeeding had the biggest correlation. The risk of breast cancer was around three times higher for women who breastfed for less than a year. By inhibiting ovulation, reducing lifetime oestrogen exposure, and encouraging the shedding of potentially genetically damaged breast epithelial cells, breastfeeding is thought to minimise the risk of breast cancer. The results highlight breastfeeding's significance as a modifiable protective factor[7].

Another important factor influencing the risk of breast cancer was late menopause. Due to extended exposure to endogenous oestrogens, women who went through menopause after the age of 50 had a markedly increased risk of breast cancer. This finding aligns with well-established hormonal theories of breast cancer development. Short nursing length and delayed first childbirth were found to be the strongest independent predictors of breast cancer in the study population, according to multivariate analysis.

These results imply that reproductive behaviour patterns may have a major impact on Central Indian women's risk of breast cancer[8].

The study's prospective data collection and assessment of many reproductive factors are among its many strong points. It is important to recognise some limitations, though. Lifestyle factors like food, obesity, physical activity, and genetic alterations were not evaluated in this single-center investigation. Certain replies may also have been influenced by reproductive history recall bias. Notwithstanding these drawbacks, the study offers crucial information about the reproductive factors that contribute to breast cancer in Central India. The results emphasise the necessity of risk-based screening techniques, breastfeeding promotion, and focused awareness campaigns for women with unfavourable reproductive characteristics[9].

CONCLUSION

The current study shows that among women in Central India, reproductive variables significantly contribute to the development of breast cancer. There was a strong correlation found between an increased risk of breast cancer and early menarche, delayed first childbirth, nulliparity, shorter breastfeeding duration, and late menopause. Short breastfeeding length and delayed first childbirth age were found to be the most powerful independent predictors of breast cancer among the variables examined. These results lend credence to the idea that extended exposure to endogenous ovarian hormones plays a significant role in the development of breast cancer.

The study emphasises how crucial it is to get thorough reproductive histories for clinical evaluation and breast cancer screening initiatives. Early surveillance and prompt intervention may be made possible by identifying women with high-risk reproductive characteristics. One significant and perhaps adjustable tactic for lowering the risk of breast cancer may be the promotion of breastfeeding. To better understand breast cancer risk patterns in Indian women

and to establish comprehensive preventative measures, more multicentric research including larger populations and include genetic, environmental, and lifestyle factors are advised.

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