
RISK FACTORS OF BREAST CANCER AMONG WOMEN OF REPRODUCTIVE AGE: A LITERATURE REVIEW OF OBSERVATIONAL STUDIES (2021-2026)

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ABSTRACT

Breast cancer is one of the most common cancers affecting women worldwide and remains a major public health concern. Women of reproductive age are an important group because hormonal, reproductive, metabolic, and lifestyle factors during this period may influence the risk of developing breast cancer. This study aimed to identify and summarize the risk factors associated with breast cancer among women of reproductive age based on observational studies published between 2021 and 2026. This research used a literature review approach by collecting relevant scientific articles from several databases, including PubMed, Google Scholar, ScienceDirect, and Scopus. The selected studies consisted of cross-sectional, cohort, and case-control designs. The results show that several factors are associated with an increased risk of breast cancer, including higher body mass index (BMI), elevated triglyceride-glucose levels, early menarche, late age at first pregnancy, family history of breast cancer, hormonal contraceptive use, and obesity. In contrast, higher parity, longer breastfeeding duration, and healthier dietary patterns may reduce the risk of breast cancer.

Keywords: Breast Cancer; Lifestyle Factors; Obesity; Reproductive Factors; Risk Factors

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INTRODUCTION

Breast cancer remains the most commonly diagnosed cancer among women worldwide and represents a major global public health concern. In 2022, more than 2.3 million women were diagnosed with breast cancer, making it the leading cancer among women and one of the primary causes of cancer-related mortality globally (Arnold *et al.*, 2022).

The incidence of breast cancer varies substantially across regions, with higher rates reported in developed regions such as Europe, North America, Australia, and New Zealand compared with developing countries. These differences may be influenced by variations in environmental exposure, lifestyle behaviors, and reproductive patterns among different populations (Cumber *et al.*, 2017).

Several reproductive and hormonal factors have been reported to influence breast cancer risk, including early menarche, age at first pregnancy, duration of breastfeeding, and hormonal exposure throughout a woman's lifetime. In addition, lifestyle-related factors such as alcohol consumption, smoking, obesity, and dietary patterns have also been widely recognized as potential contributors to the development of breast cancer (Golubnitschaja *et al.*, 2016).

Women of reproductive age represent a particularly important population in breast cancer research because they experience unique hormonal and reproductive exposures that may influence cancer risk. Factors such as reproductive history, hormonal contraceptive use, and lifestyle behaviors during this life stage may contribute to variations in breast cancer susceptibility. This

literature review aims to summarize and analyze findings from observational studies published between 2021 and 2026 regarding risk factors associated with breast cancer among women of reproductive age.

MATERIALS AND METHODS

This study was conducted using a literature review approach to identify and analyze risk factors associated with breast cancer among women of reproductive age. Relevant scientific articles were collected from several databases and then reviewed systematically. The selected studies were observational research published in recent years and focused on factors related to breast cancer incidence. The collected literature was then analyzed and summarized to provide an overview of the major risk factors contributing to breast cancer among women.

a. Materials

The materials used in this study were scientific articles related to breast cancer risk factors among women of reproductive age. The articles were obtained from several international scientific databases, including PubMed, Google Scholar, ScienceDirect, and Scopus. The literature included observational studies published between 2021 and 2026. Keywords used in the literature search included “breast cancer,” “risk factors,” “reproductive age women,” “menarche,” “hormonal contraception,” “obesity,” and “lifestyle factors.”

The selected materials consisted of peer-reviewed journal articles written in English or Indonesian that examined factors associated with breast cancer risk. Articles that were not relevant to the research objective, review articles without primary data, or studies published before 2021 were excluded from the analysis.

b. Method

This study used a literature review approach to summarize and analyze findings from previous observational studies regarding risk factors associated with breast cancer among women of reproductive age. The literature search was conducted systematically by identifying relevant articles

using predefined keywords in the selected databases.

The inclusion criteria for the selected articles were: (1) observational studies such as cross-sectional, cohort, or case-control studies, (2) studies involving women of reproductive age or young women, and (3) articles published between 2021 and 2026. Studies that did not focus on breast cancer risk factors or lacked sufficient methodological information were excluded.

After the screening process, relevant articles were selected and analyzed. Data extracted from each article included author name, study design, sample size, variables studied, and main findings. The extracted information was then summarized and presented in tabular form to facilitate comparison between studies. Finally, the results were analyzed descriptively to identify common risk factors associated with breast cancer among women of reproductive age.

RESULT

Table 1. Review of the article entitled “A Cross-Sectional Study of Serum Lipids, Body Mass Index and Age Relationships with Breast Cancer Risk.”

Author	Year	Sample	Variables	Results
Hu & Yang	2025	12,224 women (382 cases, 11,842 control s).	Age, BMI, triglycerides, HDL-C, LDL-C, total cholesterol.	Age ≥ 40 years, higher BMI and triglyceride levels were associated with increased breast cancer risk.

This cross-sectional study by Hu and Yang analyzed the relationship between metabolic factors and breast cancer risk among 12,224 women. The results showed

that age, body mass index (BMI), triglyceride levels, and HDL-C were significantly associated with breast cancer risk (Hu & Yang, 2025). Women diagnosed with breast cancer had higher BMI, LDL-C, and triglyceride levels compared to the control group, while HDL-C and total cholesterol levels were lower. Also, women aged ≥ 40 years were found to have a higher risk of developing breast cancer.

Table 2. Review of the article entitled “Menstrual and Reproductive Factors Associated with Risk of Breast Cancer among Indian Women.”

Author	Year	Sample	Variables	Results
Das et al.	2024	724,115 women aged 15–49 years.	Menarche age, menstrual cycle, parity, contraception, BMI.	Reproductive factors influenced participation in breast cancer screening.

Das *et al.* analyzed reproductive and menstrual factors among 724,115 Indian women. The results showed that delayed menarche, irregular menstrual cycles, delayed age at first childbirth, and oral contraceptive use were associated with increased participation in breast cancer screening. Meanwhile, higher parity and longer breastfeeding duration were associated with lower screening participation (Das *et al.*, 2024).

Table 3. Review of the article entitled “Triglyceride-Glucose Index Is a Risk Factor for Breast Cancer in China.”

Author	Year	Sample	Variables	Results
Wang et al.	2024	9,291 women.	TyG index, BMI, blood	Higher TyG index increase

pressure, lipid profile.	d the risk of breast cancer.
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Wang *et al.* examined the association between the triglyceride-glucose (TyG) index and breast cancer risk among 9,291 women. The study found that higher TyG index values were significantly associated with increased breast cancer risk (Wang *et al.*, 2024). Participants in the highest TyG quartile had a greater likelihood of breast cancer compared to those in the lowest quartile (OR = 1.43; 95% CI: 1.01–2.02).

Table 4. Review of the article entitled “Imaging Patterns in Breast Cancer for Women Under 40 Years.”

Author	Year	Sample	Variables	Results
Alhaidry et al.	2024	120 women with breast cancer under 40 years.	Clinical symptoms, imaging findings, genetic mutation, histopathology.	Most patients presented with a palpable breast mass and luminal B subtype.

Alhaidry *et al.* analyzed clinical and radiological characteristics of breast cancer in 120 women under 40 years old. Most patients were aged 30–40 years and the most common clinical symptom was a palpable breast mass (45.8%) (Alhaidry *et al.*, 2024). Imaging examinations detected tumor masses in 88.3% of cases. Genetic testing showed that 32.9% of patients had mutations related to breast cancer genes, and the most common histopathological subtype identified was luminal B.

Table 5. Review of the article entitled “Risk Factors of Early-Onset Breast Cancer: A Case-Control Study in Eastern Morocco.”

Author	Year	Sample	Variables	Results
Bakloul et al.	2026	140 women (70 cases, 70 controls)	Reproductive factors, genetic history, lifestyle, metabolic factors.	Early menarche, late first pregnancy, and family history increased breast cancer risk.

Bakloul *et al.* conducted a case-control study involving 140 women to identify risk factors for early-onset breast cancer. Early menarche (<12 years) significantly increased breast cancer risk (AOR = 5.70). Late age at first pregnancy (≥ 35 years) also increased the risk (AOR = 5.01). Family history of breast cancer was identified as an independent predictor (Bakloul *et al.*, 2024), while parity showed a protective effect against breast cancer.

Table 6. Review of the article entitled “Breast Cancer Burden among Young Women from 1990 to 2021.”

Author	Year	Sample	Variables	Results
Tang et al.	2025	Global data from 1990–2021.	Incidence, prevalence, mortality, DALYs, SDI.	Breast cancer burden among young women increased globally.

Tang *et al.* analyzed global trends in breast cancer burden among women aged 20–39 years using Global Burden of Disease data from 1990–2021. The study reported an annual increase of 0.82% in breast cancer incidence and 0.87% in prevalence. Mortality and disability-adjusted life years (DALYs) also increased. Higher disease burden was observed in countries with low to middle

socio-demographic index (SDI) (Tang *et al.*, 2025).

Table 7. Review of the article entitled “Hubungan Usia Pasien dengan Tingkat Stadium Kanker Payudara di RS Ibnu Sina Makassar 2018.”

Author	Year	Sample	Variables	Results
Mirsyad et al.	2022	83 breast cancer patients.	Patient age and breast cancer stage.	No significant association between age and cancer stage.

Mirsyad *et al.* analyzed medical record data from 83 breast cancer patients to determine the relationship between patient age and clinical stage of breast cancer. Most patients were aged 46–55 years and the majority were diagnosed at stage III (56.6%) (Mirsyad *et al.*, 2022). Statistical analysis showed that there was no significant relationship between patient age and breast cancer stage ($p = 0.576$).

Table 8. Review of the article entitled “Motherhood Role Concerns in Young Women with Breast Cancer.”

Author	Year	Sample	Variables	Results
Zhang et al.	2025	106 patients (quantitative) and 20 interview participants.	Motherhood role concerns, cancer stage, psychosocial factors.	Young breast cancer patients experienced moderate concerns regarding maternal roles.

Zhang *et al.* examined motherhood role concerns among young women with breast

cancer using a mixed-methods approach. The results showed that participants experienced a moderate level of motherhood role concerns with a mean score of 3.24 ± 0.65 (Zhang *et al.*, 2025).. These concerns were influenced by factors such as cancer stage, children's age, caregiving burden, and social support.

Table 9. Review of the article entitled “*Faktor Risiko Kanker Payudara pada Wanita Muda di RSUD Al Ihsan Tahun 2025.*”

Author	Year	Sample	Variables	Results
Eriantiningrum et al.	2025	68 respondents (34 cases, 34 controls).	Age at menarche, family history of breast cancer, hormonal contraceptive use, obesity.	Family history, hormonal contraceptive use, and obesity were associated with increased breast cancer risk among young women.

Eriantiningrum *et al.* conducted an analytical observational study using a case-control design to identify risk factors associated with breast cancer among young women treated at Al Ihsan Regional Hospital. The study involved 68 respondents consisting of 34 women diagnosed with breast cancer and 34 women without breast cancer as the control group. Several potential risk factors were examined, including age at menarche, family history of breast cancer, hormonal contraceptive use, and obesity. The results showed that family history of breast cancer, hormonal contraceptive use, and obesity were associated with an increased risk of breast cancer among young women (Eriantiningrum *et al.*, 2025).

Table 10. Review of the article entitled “Association between Dietary Factors and

Breast Cancer Risk: A Matched Case-Control Study in Vietnam.”

Author	Year	Sample	Variables	Results
Do et al.		740 women (370 cases, 370 controls).	Dietary intake (vegetables, fruits, soy products, coffee, eggs).	Higher consumption of several food groups was associated with reduced breast cancer risk.

Do *et al.* conducted a matched case-control study to examine the relationship between dietary patterns and breast cancer risk among women in Ho Chi Minh City, Vietnam. The study included 740 participants, consisting of 370 women diagnosed with breast cancer and 370 healthy women as the control group. Various dietary factors were analyzed, including the consumption of vegetables, fruits, soy products, coffee, eggs, and other food items. The results demonstrated that higher consumption of vegetables, fruits, soy products, coffee, and eggs was associated with a lower risk of breast cancer (Do *et al.*, 2024).

DISCUSSION

The study results show that metabolic factors play an important role in increasing the risk of breast cancer. Research by Hu and Yang involving 12,224 women showed that age, body mass index (BMI), triglyceride levels, and HDL-Care significantly associated with the risk of breast cancer. Women diagnosed with breast cancer had higher BMI, LDL-C, and triglyceride levels, while HDL-C and total cholesterol levels were lower compared to the control group. Additionally, an age of ≥ 40 years was found to increase the risk of breast cancer (Hu & Yang, 2025). These findings are supported by a study by Wang et al. involving 9,291 women, where a higher triglyceride-glucose index (TyG) was significantly associated with an increased risk

of breast cancer. Participants in the highest quartile of the TyG index had a higher risk of developing breast cancer compared to those in the lowest quartile (OR = 1.43; 95% CI: 1.01–2.02) (Wang *et al.*, 2024). This indicates that metabolic disorders and insulin resistance may contribute to the development of breast cancer.

In addition to metabolic factors, reproductive factors also play a role in breast cancer risk and prevention behavior. Das *et al.*'s study on 724,115 women in India showed that later menarche, irregular menstrual cycles, older age at first childbirth, and oral contraceptive use are associated with increased participation in breast cancer screening. Conversely, higher parity and longer breastfeeding duration are linked to lower screening participation (Das *et al.*, 2024). Meanwhile, Bakloul *et al.*'s study found that early menarche (<12 years) significantly increased the risk of breast cancer (AOR = 5.70), as does the age of first pregnancy ≥ 35 years (AOR = 5.01). A family history of breast cancer also serves as an independent predictor, while parity has a protective effect against breast cancer (Bakloul *et al.*, 2024). These findings are consistent with the research by Eriantiningrum *et al.*, which shows that a family history of breast cancer, the use of hormonal contraception, and obesity increase the risk of breast cancer in young women (Eriantiningrum *et al.*, 2025).

Age factors and clinical characteristics also play a role in the disease presentation. A study by Alhaidry *et al.* examining 120 women under the age of 40 showed that most patients were in the age range of 30–40 years with the main clinical symptom being a palpable breast mass (45.8%). Imaging examinations detected tumor masses in 88.3% of cases, while 32.9% of patients had genetic mutations associated with breast cancer, with the luminal B histopathological subtype being the most common (Alhaidry *et al.*, 2024). However, Mirsyad *et al.*'s study of 83 patients showed that although most patients were aged 46–55 years and diagnosed at stage III (56.6%), no significant relationship was

found between patient age and the clinical stage of breast cancer ($p = 0.576$) (Mirsyad *et al.*, 2022).

Globally, the burden of breast cancer in young women shows an increasing trend. Analysis by Tang *et al.* using Global Burden of Disease data from 1990–2021 shows an annual increase of 0.82% in the incidence and 0.87% in the prevalence of breast cancer among women aged 20–39 years. Additionally, the mortality rate and disability-adjusted life years (DALYs) have also increased, particularly in countries with low to middle sociodemographic indices (Tang *et al.*, 2025). This increase underscores the importance of early detection and prevention efforts for breast cancer, particularly in younger age groups.

On the other hand, breast cancer also impacts the psychosocial aspects of patients. Zhang *et al.*'s research shows that young women with breast cancer experience a moderate level of concern about their role as mothers, with an average score of 3.24 ± 0.65 . These concerns are influenced by factors such as the stage of cancer, the age of the child, the caregiving burden, and social support (Zhang *et al.*, 2025). This indicates that breast cancer management not only focuses on medical aspects but also requires attention to the psychosocial aspects of the patient.

CONCLUSION

Based on the results of this literature review, breast cancer risk among women of reproductive age is influenced by several factors, including metabolic conditions, reproductive history, genetic factors, and lifestyle. Higher BMI, elevated triglyceride-glucose index, early menarche, late age at first pregnancy, family history of breast cancer, hormonal contraceptive use, and obesity were found to increase the risk of breast cancer. Meanwhile, higher parity, longer breastfeeding duration, and healthier dietary habits may provide protective effects. Therefore, efforts such as increasing awareness, promoting healthy lifestyles, and improving early detection are important to

help reduce the burden of breast cancer among women of reproductive age.

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