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## **Prevalence of Modifiable & Non-modifiable Risk Factor in Nepalese**

### **Breast Cancer Patients at BPKMCH**

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## ***Abstract***

*Background: Modifiable and non-modifiable risk factors in Nepalese Breast cancer patients to study and modify awareness campaigns in (low Middle country) Nepal*

*Method: Data collection from Nepalese Breast cancer patients receiving surgical treatment in the Breast unit of surgical Oncology department at B.P. Koirala Memorial Cancer Hospital.*

*Results: Modifiable and non-modifiable risk factors have varied results in comparison to western countries. Increasing age and female sex are more dependent risk factors.*

*Conclusion: Modifiable and non-modifiable risk factors in breast cancer patients can exhibit a wide range of variations. It's crucial to emphasize that having a risk factor does not guarantee that an individual will develop breast cancer. However, a comprehensive understanding of these risk factors is invaluable for the early detection of breast cancer.*

*Keywords: Breast cancer, modifiable, non-modifiable, risk factors, Nepalese*

## **Introduction**

In low middle-income countries like Nepal, crucial healthcare management challenges exist when it comes to providing treatment to breast cancer patients, despite government policies aimed at assisting these patients. Financial burden is very high among individuals diagnosed with breast cancer in Nepal due to poor breast cancer awareness and a lack of understanding of risk factors among Nepalese women.

Breast cancer is a leading health concern among women due to its high mortality and morbidity rate. The five-year survival rate in metastatic breast cancer is less than 30%, even with adjuvant chemotherapy(1).

In 2020, there were 2.3 million women diagnosed with breast cancer and 685 000 deaths globally. As of the end of 2020, there were 7.8 million women alive who were diagnosed with breast cancer in the past 5 years, making it the world's most prevalent cancer. Breast cancer occurs in every country of the world in women at any age after puberty but with increasing rates in later life.( World Health Organization, 2020)(2)

Breast cancer is both the most commonly occurring cancer and the commonest cause of cancer death among

women. Available data suggest that incidence and mortality in high-resource countries has been declining whereas incidence and mortality in low-resource countries has been increasing .(3)

In developing countries, the main reasons for high breast cancer incidence and mortality are lack of proper awareness or knowledge of the disease, inappropriate screening programs, delayed diagnosis, and insufficient medical facilities.(1)

Breast cancer patients have a higher mortality rate in developing countries than in developed ones and the awareness of breast cancer risk factors plays a crucial role in breast cancer prevention(4).

## **Material & Method:**

Identified risk factors for BC may be non-modifiable such as sex, age, genetic characteristics including family or personal history of BC, ethnicity, and early menarche or menopause. Modifiable risk factors, usually associated with lifestyle factors, can include alcohol consumption, excess weight or obesity, physical inactivity, parity, and use of some medications, such as oral contraceptives (American Cancer Society, 2016; World Health Organization, 2016). Despite these associations, women with risk factors for BC may never go on to develop BC and many women with BC have no known risk factors.(5)

## **Study design:**

Patients admitted to the breast surgery unit of the surgical oncology department at tertiary cancer center following breast cancer surgery were questioned individually to analyze attributable risk factors among Nepalese women with breast cancer. Details on, Age, Ethnicity, Age at Menarche, Parity, Age at First Birth, Changing Reproductive Pattern, Breast feeding, Age at Menopause, BMI, Family History of Breast Cancer, Alcohol, Tobacco, Use of OCP, Use of Menopausal Hormones, Dietary, Environment

## **Study Population:**

Patient undergone surgery for Breast cancer and admitted to breast surgery unit of surgical oncology department in B.P. Koirala Memorial Cancer Hospital.

## **Inclusion & Exclusion Criteria:**

All Nepalese female patients diagnosed with breast cancer and admitted to the breast ward following breast cancer surgery (MRM, BCS, Mastectomy).

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Male patients and Other Nationality female breast cancer patients were excluded from the study.

### **Risk Factor associated with Breast Cancer:**

The crucial role of risk factors in influencing the occurrence of breast cancer and their incorporation into tools for assessing an individual woman's breast cancer risk represent the initial and vital stages in advancing precision prevention. Risk factors are divided in-between modifiable and non-modifiable groups.

### **Modifiable risk factors:**

#### **Obesity BMI>30:**

Obesity seems to have a protective effect in development of premenopausal breast cancer, however, is linked to increased breast cancer development after menopause (3). This is likely explained by higher levels of circulating estrogen released from adipose tissue in elderly women with elevated BMI. Obesity and type 2 diabetes are associated with macrophage infiltration into adipose tissue, and increased production of pro-inflammatory cytokines and chemokines(6).

#### **Lifestyle:**

Higher levels of physical activity have been consistently linked with decreases in breast cancer risk (7). Less physical activity resulted in a higher risk of having breast cancer (8). Modern lifestyles such as excessive alcohol consumption and too much dietary fat intake can increase the risk of breast cancer(9)

#### **Dietary:**

Dietary factors associated with increased breast cancer risk lower levels of manganese, aluminum, iron, vitamin D deficiency or insufficiency, and high intake of salt, sugar, meat, and saturated fat and oils (5). Higher heme-iron intake and plasma iron levels may increase risk (7).

#### **Parity:**

Each additional birth decreases the risk of breast cancer by 10% (9). In India, women with BC, had a higher age at last childbirth and higher number of abortions compared to women who did not have breast cancer(5). High parity (>3 children) was a significant protective factor(10).

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**Breast feeding:**

Breastfeeding for 1 or more years reduces a woman's overall risk of breast cancer (reduced by 4% for every 12 months of breastfeeding) (3). In India, women with BC had lower mean duration of breastfeeding compared to women who did not have BC (5).

The risk of breast cancer in women is hypothesized to be reduced by breastfeeding which involves two primary mechanisms: (1) differentiation of breast cells where they are modified to generate milk post pregnancy, thus diminishing the vulnerability of the breast tissues towards carcinogenic effects (estrogens), and (2) breastfeeding causes reduction in the lifetime exposure towards the mitogenic effect of estrogens, thus obstructing the process of ovulation (11).

**Changing Reproductive Pattern:**

Women are having fewer children (and often later in life), which also increases the breast cancer risk. Childbearing prior to 35 years of age provides longer-term protection against breast cancer, with the age of first birth being particularly important. If aged <20 years, the longer-term RR is reduced by 70% compared with nulliparous women. Women who begin childbearing after age 35 years, the risk of breast cancer is higher than for nulliparous women.(12)

**Age at First childbirth:**

Older age at first birth is most common among highly educated women (12). the younger age at which a woman has her first child further reduces breast cancer risk independent of parity (7) .

**Use of OCP:**

Oral contraceptives (OC) among the most widely used methods are effective and reversible family planning(13). Regarding hormonal contraceptives, there is a general increased risk associated with earlier age at onset of use and higher estrogen formulations(3).

Use of oral contraceptives increases breast cancer risk for up to 10 years after stopping use. a clinical trial did not observe increases in risk with estrogen only use (7). Oral contraceptives do not increase the risk of breast cancer in women who stop using them for more than 10 years(9).

**Use of Menopausal Hormones:**

Combined estrogen and progestin therapy increases the risk of developing breast cancer(3). The risk of breast cancer has been shown to significantly decrease after two years of stopping HRT(9).

**Tobacco use:**

Active or passive smoking (5). Smokers had a higher risk of breast cancer(8). Smoking prior to menopause increases breast cancer risk(3).

**Alcohol:**

Drinking alcohol was identified as a risk factor (8). Alcohol consumption can elevate the level of estrogen-related hormones in the blood and trigger the estrogen receptor pathways; intake of 35-44 grams of alcohol per day can increase the risk of breast cancer by 32%(9).

**Radiation Exposure:**

Exposure to therapeutic chest radiation (for example, for treatment of Hodgkin disease, Radiotherapy) (12).

**Non-modifiable risk factors:**

**Age:**

Aging is one of the most important risk factors of breast cancer, because the incidence of breast cancer is highly related to the increasing age.(9)

In India breast cancer is more common in the younger population and has poor prognosis compared to the Western world and The survival rate is very poor due to the detection of disease at advanced stage. (1)

Women who are diagnosed with breast cancer at an earlier age generally have worse disease outcomes, with a higher risk of recurrence and death.(14)

**Sex:**

Gender plays a notable role as a risk factor for breast cancer, with a considerably higher prevalence of the disease among women compared to men.

**Ethnicity:**

American white, African American (age<45 years), Ashkenazi Jew, Parsi in Indian population are at more risk for developing breast cancer.

**Family History of Breast Cancer:**

Female relatives of breast cancer patients present two fold risk of developing the disease as compared to the

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general population(10). A study in Nepal showed that family history of breast cancer was evident in a higher proportion of women who developed breast cancer aged less than 40 years (3%) compared with those aged 40 years or over(0.3%) (5). A first-degree family history of breast cancer, a non locational breast problem, and breast trauma were associated with increased risk(6).

### **History of Breast Cancer:**

Women with a history of breast cancer are at higher risk of developing the disease again, especially if the initial age at diagnosis was less than 40 years of age.(3)

### **Genetic predisposition:**

5-10 % of all breast cancers are hereditary: BRCA1 and BRCA2 mutations account for up to 70% of hereditary breast cancer.

### **Early menarche (<12 Years):**

Since the mid nineteenth century, the average menarcheal age has decreased from 17 to 12 years of age. The relative risk (RR) of breast cancer increases by 5% for each year younger a woman is at menarche. (12)

Breast cancer risk is approximately 20% higher among girls that begin menstruating before age 11 compared to those that begin at age 13(3). Older age at menarche was consistently associated with a moderately decreased risk (15) . Each 1-year delay in menarche decreases the risk of breast cancer by 5% (9).

### **Late Menopause (>55 Years):**

Older age at menopause is associated with increased breast cancer risk, potentially reflecting the number of ovulatory cycles over a woman's lifetime and estrogen exposure (7). women who experience menopause at age 55 or older have about a 12% higher risk compared to those who do so between ages 50–54 (3).

Menopause timing is affected by socioeconomic status, parity, use of the oral contraceptive pill and smoking (12). Each 1-year delay in menopause increases the risk of breast cancer by 3% (9).

### **High-risk breast lesion:**

Proliferative condition without atypia, Complex fibroadenoma, Papillomatosis, Proliferative breast disease with atypia, atypical ductal/lobular hyperplasia, lobular carcinoma in situ.

### **Environment:**

Exposure to secondhand smoke has been suggestively associated with increases in breast cancer risk (7).

**Other risk factors for breast cancer:**

Increased breast cancer risk was associated with insulin use for 3 or more years and women diagnosed with polycystic ovary syndrome (5).

Diethylstilbestrol (DES) has been found to increase breast cancer risk among women who took the drug during pregnancy(7).

Association between breast cancer and thyroid gland function has been reported as early as 1896 and It has been shown that hypothyroidism may result in hypersensitization of the mammary glandular epithelium to prolactin and estrogen, thus promoting breast cancer growth (16).

**Discussion**

The development of breast cancer is shaped by a range of exposures that occur throughout one's lifetime, encompassing factors from early childhood and adolescence that can impact the risk of the disease in adulthood.

In this study conducted at a tertiary cancer center in Nepal, a total of 150 Nepalese women who had been diagnosed with breast cancer and were undergoing surgical treatment were included.

**Modifiable risk factors:****Obesity BMI>30:**

BMI was determined by applying the formula  $BMI = \text{weight (kg)} / (\text{height (m)} * \text{height (m)})$ . The patient distribution based on weight categories is as follows: 46.6% fell into the normal weight category, 40% into the overweight category, and 13.3% into the obese category.

**Lifestyle:**

In Nepal, a predominantly agrarian nation, the patient demographics were as follows: 48% of patients engaged in strenuous agricultural labor in the fields, 43% of female patients were homemakers responsible for daily household chores, 6% were involved in business activities with limited daily physical activity, 2%

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were in the teaching profession with minimal physical activity, and 1% worked in office settings with limited physical activity.

**Dietary:**

Assessing dietary habits presented some challenges, particularly in determining the exact consumption of non-vegetarian food. In our study, we focused on patients who consumed non-vegetarian items as opposed to those following a vegetarian diet. Among the participants, 92% were non-vegetarians, regularly consuming meat or fish at least once a week, while the remaining 8% adhered to a pure vegetarian diet.

**Parity:**

Among the participants, 3.33% were nulliparous, 53.33% had three or more children, and 43.33% had fewer than three children.

**Breastfeeding:**

The data on breastfeeding pertained to the duration of breastfeeding. Among the patients, 86.66% breastfed their children for more than 12 months, 10% breastfed for less than 12 months, and 3.33% of patients never breastfed.

**Age at first childbirth:**

Among the patients, 93.33% had their first childbirth before the age of 25, while 3.33% had their first child after the age of 35.

**Use of HRT (Use of OCP/Menopausal Hormones):**

Among the patients, 93.33% acknowledged using oral contraceptive pills (OCP) at some point during their reproductive years. However, the maximum duration of continuous OCP use among them did not exceed 5 years, while the shortest duration of use was 3 months. Additionally, 6.66% of patients stated that they had never used OCP. Notably, none of the patients had received postmenopausal hormone replacement therapy (HRT).

**Tobacco use:**

Among the patients, 10% admitted to smoking for over 20 years, with an average daily consumption of 5 cigarettes.

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**Alcohol consumption:**

Among the participants, 20% acknowledged frequent alcohol consumption, although the specific concentration and quality of alcohol were not specified. On average, they reported consuming 250ml of alcohol per week for a duration exceeding 15 years.

**Radiation exposure:**

A small percentage (2%) of patients had a history of radiation exposure as part of their breast cancer treatment.

**Education:**

Among the patients, 53.33% had no formal education, 33.33% had attended middle school, and 13.33% had completed high school education.

**Non-modifiable risk factors:****Age & Sex:**

The youngest patient diagnosed with breast cancer was 26 years old, while the oldest patient was 75 years old. It's important to note that all the patients with breast cancer in this particular dataset were female.

**Ethnicity:**

Nepal is a country known for its diverse ethnicity, and our data indicates the distribution of breast cancer cases among various ethnic groups as follows:

Tharu: 24%, Madheshi: 22%, Chhetri: 14%, Brahmin: 10.66%, Magar: 9.33%, Kami: 4.66%,

Muslim: 4%, Gurung: 4%, Tamang: 2.66%, Rai: 2.66%, Newar: 2%, Damai: 0.66%, Kami: 0.66%. This data reflects the representation of different ethnicities among breast cancer patients in Nepal.

**Family history of Breast cancer:**

Among the patients, 93.33% did not have a family history of breast cancer, while 4% had a family history of breast cancer, and 2.66% had a family history of cervical cancer.

**Genetic predisposition:**

Genetic testing can be costly, and as a result, many patients and their families may face challenges in

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accessing these tests. Therefore, genetic predisposition data could not be obtained in this study due to these cost-related barriers.

**Early menarche (<12 Years):**

In the study, 33.33% of patients reported having their first periods after the age of 12, while 66.66% of patients were unable to recall or provide information about the age at which they experienced menarche.

**Late Menopause (>55 Years):**

Among the female patients, 22% were aged 55 or above, and all of them had already gone through menopause. It was observed that there was no significant correlation with late menopause in this group.

**Other risk factors for breast cancer:**

Other potential risk factors associated with breast cancer could not be determined in this study due to a lack of patient awareness regarding certain medical treatments and medication histories. Specifically, information regarding diabetes treatment with insulin, hypothyroidism treatment, and DES (Diethylstilbestrol) medication history could not be established, as none of the patients were aware of these medications or treatments.

**Conclusion**

Modifiable and non-modifiable risk factors in breast cancer patients can exhibit a wide range of variations. It's crucial to emphasize that having a risk factor does not guarantee that an individual will develop breast cancer. However, a comprehensive understanding of these risk factors is invaluable for the early detection of breast cancer.

Our study underscores education as one of the most modifiable risk factors. Educating individuals about breast cancer, including the importance of regular self-breast examinations, can significantly contribute to the early detection of breast cancer cases. The delayed diagnosis of breast cancer is influenced by factors such as socioeconomic status, educational attainment, marital status, and place of residence.

The implementation of a comprehensive breast cancer awareness program is of paramount importance. Such a program would aim to educate individuals about breast cancer risk factor, clinical breast examinations is

an effective means of detecting breast cancer in its early stages.

Furthermore, raising awareness and educating women about breast cancer, including the practice of breast self-examination, could offer a simple, cost-effective, and motivating approach to disease prevention.

## Future Direction

Despite advancements in early detection and treatment that have lowered breast cancer mortality rates, breast cancer remains the most prevalent form of cancer among women. Moreover, its incidence is expected to rise in the coming decades. In Nepali women, breast cancer incidence is on the rise, with patients often presenting at a younger age compared to Western countries. This underscores the urgent requirement for the implementation of comprehensive national-level screening programs aimed at early case detection. Such programs would not only facilitate timely treatment but also lead to improved outcomes and prognosis for these patients.

## References:

- 1.Kashyap D, Pal D, Sharma R, Garg VK, Goel N, Koundal D, et al. Global Increase in Breast Cancer Incidence: Risk Factors and Preventive Measures. Teekaraman Y, editor. *BioMed Res Int*. 2022 Apr 18;2022:1–16.
- 2.W.H.O. WHO. Home/Newsroom/Fact sheets/Detail/Breast cancer. Available from: <https://www.who.int/news-room/fact-sheets/detail/breast-cancer#:~:text=In%202020%2C%20there%20were%202.3,the%20world's%20most%20prevalent%20cancer>.
- 3.Winters S, Martin C, Murphy D, Shokar NK. Breast Cancer Epidemiology, Prevention, and Screening. In: *Progress in Molecular Biology and Translational Science* [Internet]. Elsevier; 2017 [cited 2023 Sep 20]. p. 1–32. Available from: <https://linkinghub.elsevier.com/retrieve/pii/S1877117317301126>
- 4.Abbas M, Baig M. Knowledge and Practice Concerning Breast Cancer Risk Factors and Screening among Females in UAE. *Asian Pac J Cancer Prev*. 2023 Feb 1;24(2):479–87.
- 5.Youn HJ, Han W. A Review of the Epidemiology of Breast Cancer in Asia: Focus on Risk Factors. *Asian Pac J Cancer Prev*. 2020 Apr 1;21(4):867–80.

- 6.Schairer C, Hablas A, Eldein IAS, Gaafar R, Rais H, Mezlini A, et al. Risk factors for inflammatory and non-inflammatory breast cancer in North Africa. *Breast Cancer Res Treat.* 2020 Nov;184(2):543–58.
- 7.Houghton SC, Hankinson SE. Cancer Progress and Priorities: Breast Cancer. *Cancer Epidemiol Biomarkers Prev.* 2021 May 1;30(5):822–44.
- 8.Lee SM, Park JH, Park HJ. Breast cancer risk factors in Korean women: a literature review. *Int Nurs Rev.* 2008 Sep;55(3):355–9.
- 9.Sun YS, Zhao Z, Yang ZN, Xu F, Lu HJ, Zhu ZY, et al. Risk Factors and Preventions of Breast Cancer. *Int J Biol Sci.* 2017;13(11):1387–97.
- 10.Shaukat U, Ismail M, Mehmood N. Epidemiology, Major Risk Factors and Genetic Predisposition for Breast Cancer in the Pakistani Population. *Asian Pac J Cancer Prev.* 2013 Oct 30;14(10):5625–9.
- 11.Qiu R, Zhong Y, Hu M, Wu B. Breastfeeding and Reduced Risk of Breast Cancer: A Systematic Review and Meta-Analysis. Khalaf OI, editor. *Comput Math Methods Med.* 2022 Jan 28;2022:1–9.
- 12.Britt KL, Cuzick J, Phillips KA. Key steps for effective breast cancer prevention. *Nat Rev Cancer.* 2020 Aug;20(8):417–36.
- 13.Kanadys W, Barańska A, Malm M, Błaszczuk A, Polz-Dacewicz M, Janiszewska M, et al. Use of Oral Contraceptives as a Potential Risk Factor for Breast Cancer: A Systematic Review and Meta-Analysis of Case-Control Studies Up to 2010. *Int J Environ Res Public Health.* 2021 Apr 27;18(9):4638.
- 14.Micaily I, Hackbart H, Butryn M, Abu-Khalaf MM. Obesity in early onset breast cancer in African American patients. *Breast J.* 2021 Jul;27(7):603–7.
- 15.Barnard ME, Boeke CE, Tamimi RM. Established breast cancer risk factors and risk of intrinsic tumor subtypes. *Biochim Biophys Acta BBA - Rev Cancer.* 2015 Aug;1856(1):73–85.
- 16.Angelousi AG, Anagnostou VK, Stamatakis MK, Georgiopoulos GA, Kontzoglou KC. MECHANISMS IN ENDOCRINOLOGY: Primary HT and risk for breast cancer: a systematic review and meta-analysis. *Eur J Endocrinol.* 2012 Mar;166(3):373–81.

