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Research Article

Risk Factors of Breast Cancer among Patients from Lower Middle Income Country; A Case-Control Study from Nepal

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ABSTRACT

Introduction: *Although breast cancer occurs overwhelmingly in high-income countries, there has been a recent increase in the incidence of breast cancer cases in low and middle-income countries. Reports from hospital-based registries showed that breast cancer is the second most common cancer in Nepali women.*

Aim*: The study aimed to find the risk factors associated with breast cancer among breast cancer patients at a tertiary care hospital in Lalitpur, Nepal.*

Materials and methods: *An institutional-based1:1 unmatched case-control study with a sample of 100 women was conducted at Patan Hospital between May to October 2023.Women aged 20–84 years with histological or cytological confirmed breast cancer within the last 4 years of the interview date were identified retrospectively as study cases. Semi-structured Questionnaire was used for data collection. Multivariate Logistic Regression was done to calculate the adjusted Odds Ratio with 95% CI.*

Results: *The significantly associated risk factors included age (41-50 years: OR 5.03, >50 years: OR 31.11), marital status (married: OR 9.23), age at menarche (13-15 years: OR 3.79), and oral contraception use (OCs user: OR 4.26).*

Conclusion: *Emphasizing regular breast cancer screening programs above 50 years of age and adequate counseling about the risks and benefits of hormonal contraception, among high-risk groups might help to mitigate the risk of breast cancer.*

Plain language summary (PLS; within article): *This study aimed to find out the various risk factors associated with breast cancer in Nepali women. Fifty cases with histology or cytology-confirmed diagnosis of breast cancer and fifty controls were included in this case-control study. The semi-structured questionnaire was used for data collection. The results showed that age, marital status, age at menarche, and use of contraceptive pills were found to be significantly associated with increased risk of breast cancer. Our results demonstrate that it is necessary to conduct regular breast cancer screening programs such as mammograms and clinical breast examinations for early diagnosis, tailor age- age-appropriate education for breast cancer awareness and discuss the potential risks and benefits of hormonal contraception especially those with increased risk.*

Introduction

Breast cancer is the most common cancer diagnosed worldwide posing a substantial burden to public health [1]. According to GLOBOCAN estimates, 45.4% of breast cancer patients were diagnosed in Asia[2]. By 2040, it is anticipated that there will be over 3 million new cases and 1 million deaths of breast cancer [1].The association between modifiable risk factors (parity, body mass index and use of oral contraceptives) and non-modifiable risk factors (family history of breast cancer, age and menopausal status)with breast cancer was found in women in Southeast Asia [3].

Similarly, an unmatched hospital-based case-control study carried out in Selangor, Malaysia from October 2002 to December 2016 found that a lower risk of breast cancer was linked to having been breastfed before, breastfeeding for a longer period of time, consuming more soymilk and soy products, and engaging in more physical activity[4].Furthermore, a meta-analysis comprising 39 studies proposed that certain variables, including family history, hormone replacement therapy (HRT), passive smoking, late-term full-term pregnancy, abortion, consumption of sweets, and genotype Arg/Arg, could raise the likelihood of developing breast cancer. Conversely, late menarche, nulliparity, 13–24 months of breastfeeding, daily exercise, and vegetable consumption were found to have an inverse relationship with the development of breast cancer[5].

The rate of new cases went up by 0.5% every year between 2010 and 2019 in the US [6]. Although breast cancer occurs overwhelmingly in high-income countries, there has been a recent increase in the incidence of breast cancer cases in low and middle-income countries due to the Westernized lifestyle such as diet, demographic, reproductive and lifestyle changes [7][8]. Increased age, early menarche, delayed menopause, nulliparous women with family history were found to be common risk factors in Nepal and Asia [9]. Evidence suggests that breast cancer has several influences, including emotional burden and social stress to the patients[10][11].

Reports from hospital-based registries found that breast cancer is the second most common cancer in Nepali women after Cervix cancer [9][12][13]. In Nepal, cancer treatment services are provided through specific public cancer hospitals and some general public and private hospitals. However, there is a lack of clear guidelines for breast cancer management, national screening programs and comprehensive survival data [14].In addition to this, several challenges such as lack of awareness about the prognosis of diseases result in an increased number of patients with advanced stages of cancer morbidity and mortality, and a lack of trained human resources for early detection diagnosis and treatment exist in Nepal[15].

The cost of cancer treatment is expensive and most Nepali patients rely on out-of-pocket payment for treatment leading to financial catastrophe [16]. In such conditions, it will be very difficult for the health care system of

Nepal to handle the treatment and care of breast cancer patients if the incidence of breast cancer keeps on increasing at the current pace due to inadequate treatment strategies and economic barriers.

Primary prevention and lifestyle modification is one of the cost-effective measures for long-term cancer prevention [17]. About 30% of the breast cancer risk can be reduced by lifestyle modifications such as weight control, exercise and limiting alcohol intake [18]. However, adequate data is not available to validate the lifestyle modification measures, especially in low and middle-income countries[18]. Therefore, it is critical to focus on prevention strategies that involve identification and reduced exposure to the established risk factors. Understanding such risk factors not only aids in the prevention and control of breast cancer but also will pave a pathway for the formulation of strategic plans for reducing the prevalence of breast cancer at the policy level. The studies focusing on risk factors help to identify high-risk groups of the community so that prevention activities can be tailored accordingly. Moreover, there have been limited studies conducted to explore the risk factors associated with breast cancer. Thus, this study aims to examine the risk factors associated with breast cancer among breast cancer patients in a tertiary care hospital in Lalitpur, Nepal.

Materials and Methods

Study Design and Setting

An unmatched case-control study with a ratio of 1:1 was conducted at Patan Academy of Health Sciences from May to October 2023 in Lalitpur, Nepal. The study site has been chosen considering an adequate number of breast cancer patients to fulfill the requirement of minimum sample size as well as the feasibility of the research. The sample size was calculated by using the formula for case-control study, n= $(\frac{r+1}{r})$= $\frac{(P^{-}(1-P^{-})\left(Z\text{ß} + Z\frac{\alpha}{2}\right)^{2})}{(P_1 - P_2)^2}$ withfollowing statistical assumptions: ratio 1:1 for case-control, odds ratio 2.5 or greater, 5% of the level of significance, Z_α=1.96, 80 % power and Z_β 0.84. We considered 45% of the cases and 18.8% of the controls have family history of breast cancer taking reference of study conducted[19].

Women aged 20–84 years with histologically or cytological confirmed breast cancers within the last 4 years of the interview date were identified retrospectively as study cases. Patients who visited other departments or units, particularly surgical outpatient units that treat surgical and post-traumatic diseases, were randomly chosen as controls; obstetrics and gynecology wards were not included. Every eligible control had no cancer-related conditions.

Data Collection Tools & Techniques

All women were interviewed using the semi-structured questionnaire to gather information about age, educational status, family history of breast cancer, age at menarche, parity, past use of the oral contraceptives (OCP), age at first pregnancy, breastfeeding, family history, behavioral characteristics such as smoking, alcoholism, physical activity and food consumption patterns. Questions on socio-demographic factors were compiled from the 2016 NDHS, STEPS survey 2019, and other breast cancer-related risk factors identified in the literature. The questionnaire was developed only after an extensive literature review and has been prepared under the guidance of the supervisor and through consultation with experts to establish the face and content validity of the tool. The tools validated in the Nepali language were used for the study. Questions have been forward translated to Nepali language and then back-translated to English. Back-translated versions of the questions have been compared with the original questions and have been finalized after discussion with the research team so as to establish translation validity.

Data was collected using the Kobo toolbox. In order to maintain the privacy and confidentiality of the participant's information, a unique identifying number was used. Data were kept in password-protected laptops and key and lock systems for both electronic and hard copy records to ensure privacy and confidentiality.

Data Analysis

Data analysis was carried out by using STATA version 15. The baseline characteristics, socio-demographic and clinical profile were analyzed using descriptive statistics. The data was described using frequency and percentage (for categorical data), mean and standard deviation (for continuous data) as required. Inferential statistics was used to show the association between dependent and independent variables. Demographic factors and potential confounding variables were compared between cases and controls using $\chi 2$ tests for categorical variables. Logistic regression models were used to examine the relationship between breast cancer with the risk factors. Odds ratios (ORs) and 95% confidence intervals (CIs) were computed as measures of association from the logistic model. Multivariate Analysis was used to calculate the adjusted Odds Ratio with 95% CI.

Ethical Consideration

This study was conducted in accordance with the declaration of Helsinki. The ethical approval of the study was obtained from the Institutional Review Committee of Patan Academy of Health Sciences (Ref No drs2302031701). Following approval, authorization was obtained from the hospital's administration. Informed written consent was obtained from each participant before data collection, providing information about the

research project's objectives, methodologies, confidentiality guarantees, and questionnaire content. Participants were informed of their right to withdraw from the study or decline to answer specific questions. Confidentiality was maintained, and the data was exclusively used for research purposes.

Results

Socio-demographic Characteristics

A total of 50 female breast cancer cases and 50 unmatched control females were interviewed for the study. The completed age at interview for the cases and controls had a mean of 52.98 (SD=10.86) years and 48.38 (SD= 14.09) years respectively. The results for the comparison of the socio-demographic characteristics across cases and controls are shown in Table 1. There was a significant difference between cases and controls for age ($\chi 2$ 7.53, p=0.02). All the remaining factors, namely marital status (p=0.04), educational level (p=0.23), and income status (p=0.37) were not significantly associated with breast cancer.

Table 1: Table showing socio-demographic characteristics of study participants

Variables	**Cases (n=50)**		**Controls (n=50)**		**p-value**
	n	% (95% CI)	n	% (95% CI)	
Age (in years)					**0.02[b]**
<40	7	14 (5.8-26.7)	18	36 (22.9-50.8)	
41-50	15	30 (17.9-44.6)	15	30 (17.9-44.6)	
>50	28	56 (41.3-71.0)	17	34 (21.2-48.8)	
Marital Status					**0.04[c]**
Married	48	96 (86.3-99.5)	41	82 (68.6-91.4)	
Single	2	4 (0.5-13.7)	9	18 (8.6-31.4)	
Educational Level					0.23[b]
No Formal Edu.	20	40 (26.4-54.8)	26	52 (37.4-66.3)	
Formal Education	30	60 (45.2-73.6)	24	48 (33.7-62.6)	
Income categories (NRs.)					0.37[b]
≤14550	20	40 (26.4-54.8)	27	54 (39.3-68.2)	
14551 to 48750	22	44 (30.0-58.7)	17	34 (21.2-48.8)	
>48750	8	16 (7.2-29.1)	6	12 (4.5-24.3)	

Frequency and percentage were calculated through cross-tabulation. 95% CI calculated using Clopper-Pearson method.
Legend: n=number of samples in the categories and percentage; *χ2* chi square
$\chi 2$ was calculated by using Fisher's exact and Pearson chi square test
[a] *p*-value was calculated by using Pearson's chi square test
[b] *p*-value was calculated by using Fisher's exact chi square test,
p-value < 0.05 is significant (bold)

Reproductive Characteristics

Table 2 depicts the comparison of the reproductive characteristics of study participants. The mean age (SD) at menarche was 14.16(1.49) years for cases and 13.96(2.02) years for controls. There were significant differences between cases and controls with respect to ongoing menstruation ($\chi 2$ =5.93, p=0.01) and breastfeeding duration ($\chi 2$ = 7.48, p=0.006). However, no statistically significant differences were observed for family history of breast cancer (p=0.12), age at menarche (p=0.22), age at 1st pregnancy (p=0.41), parity(p=0.1), and ever had miscarriage/abortion (p=0.66) and use of contraceptive pills (p=0.08).

Table 2: Table showing reproductive characteristics of study participants

Variables	**Cases (n=50)**		**Controls (n=50)**		**p-value**
	n	% (95% CI)	n	% (95% CI)	
Family History of Breast Cancer					0.12[b]
Yes	4	8 (2.2-19.2)	0	0	
No	46	92 (80.8-97.8)	50	100	
Age at menarche (in years)					0.22[a]
≤13	7	14 (5.8-26.7)	13	26 (14.6-40.3)	
13-15	36	72 (57.5-83.8)	28	56 (41.3-70.0)	
>15	7	14 (5.8-26.7)	9	18 (8.6-31.4)	
Age at 1st pregnancy (n=94)					0.41[b]
<20	12	27.3 (15.0-42.8)	18	36 (22.9-42.8)	
20-30	26	59.1 (43.2-73.7)	29	58 (43.2-71.8)	
>30	6	13.6 (5.2-27.4)	3	6 (1.3-16.5)	
Current menstruation status					**0.01[a]**
Ongoing	35	70 (55.4-82.1)	23	46 (31.8-60.7)	
Stopped	15	30 (17.9-44.6)	27	54 (39.3-68.2)	
Parity					0.1[b]
Nulliparous	3	6 (1.3-16.5)	5	10 (3.3-21.8)	
1-2	33	66 (51.2-78.8)	22	44 (30.0-58.7)	
≥3	14	28 (16.2-42.5)	23	46 (31.8-60.7)	
Ever had miscarriage/abortion					0.66[a]
Yes	17	34 (21.2-48.8)	15	30 (17.9-44.6)	
No	33	66 (51.2-78.8)	35	70 (55.4-78.8)	
Ever used contraception					0.08[a]
Yes	14	28 (16.2-42.5)	7	14 (5.8-26.7)	
No	36	72 (57.5-83.8)	43	86 (73.3-94.2)	
Breastfeeding duration (n=80) in months					**0.006[a]**
≤24	30	83.3 (67.2-93.6)	24	54.5 (38.8-	

				69.6)	
>24	6	16.7 (6.4-32.8)	20	45.5 (30.4-61.2)	
Frequency and percentage were calculated through cross-tabulation. 95% CI calculated using Clopper-Pearson method. Legend: n=number of samples in the categories and percentage; χ2 chi square, χ2 was calculated by using Fisher's exact and Pearson chi square test, [a] p-value was calculated by using Pearson's chi square test, [b] p-value was calculated by using Fisher's exact chi square test, , p-value < 0.05 is significant					

Behavioral Characteristics

The mean ± SD BMI of cases and controls was 25.32 ± 4.98 kg/m^2 and 26.66± 4.71 kg/m^2, respectively. There were no significant differences observed between cases and controls with regard to all behavioral factors (BMI, smoking, alcohol consumption, physical exercise, and food consumption) as shown in Table 3.

Table 3: Table showing behavioral characteristics of the participants

Variables	**Cases (N=50)**			**Controls (N=50)**	
	N	% (95% CI)	n	% (95% CI)	
BMI group (in kg/m^2)					0.41[b]
Underweight	3	6 (1.3-16.5)	2	4 (0.5-13.7)	
Normal	23	46 (31.8-60.7)	16	32 (19.5-46.7)	
Pre-Obese	18	36 (22.9-50.8)	22	44 (30.0-58.7)	
Obese	6	12 (4.5-24.3)	10	20 (10.0-33.7)	
Smoking					0.63[a]
Yes	10	20 (10.0-33.7)	12	24(13.1-38.2)	
No	40	80 (66.3-90.0)	38	76 (61.8-86.9)	
Alcohol consumption					0.12[a]
Yes	12	24 (13.1-38.2)	6	12 (4.5-24.3)	
No	38	76 (61.8-86.9)	44	88 (75.7-95.5)	
Physical Exercise					0.4[a]
Yes	41	82 (68.6-91.4)	44	88 (75.7-95.5)	
No	9	18 (8.6-31.4)	6	12 (4.5-24.3)	
Food consumption					0.68[a]
Healthy	21	42 (28.2-56.8)	23	46 (31.8-60.7)	
Unhealthy	29	58 (43.2-71.8)	27	54 (39.3-68.2)	
Frequency and percentage were calculated through cross-tabulation. 95% CI calculated using Clopper-Pearson method.Legend: n=number of samples in the categories and percentage; χ2 was calculated by using Fisher's exact and Pearson chi square test, [a] p-value was calculated by using Pearson's chi square test, [b] p-value was calculated by using Fisher's exact chi square test,					

In the multivariate analysis in Table 4, those factors that were found to carry a significant association with breast cancer or factors with a p-value in the initial bivariate analysis were included. The final model indicated that age (41 to 50 years: OR 5.03, 95% CI 1.01-24.98 [P = 0.04], >50 years: OR 31.11, 95% CI 2.80-346.08[P = 0.01]); married: (OR 9.23, 95% CI 1.36-62.68 [P = 0.02]), age at menarche (age between 13 and 15 years: OR 3.79, 95% CI 1.02-14.26 [P = 0.04]), and use of contraception (contraception user: OR 4.26, 95% CI 1.09-16.63 [p=0.04]) were significantly associated with breast cancer, and that educational level, food consumption, physical exercise, BMI, and having a family history of cancer were not significant risk factors for breast cancer.

Table 4: Table showing multivariable logistic regression analysis of risk factors associated

Variables	**Unadjusted**		**Adjusted**	
	OR (95% CI)	**p-value**	**OR (95% CI)**	**p-value**
Age (in years)				
<40	Ref		Ref	
41 to 50	2.57 (0.83-7.95)	0.1	5.03 (1.01-24.98)	**0.04***
>50	4.24 (1.47-12.23)	**0.01***	31.11 (2.80-346.08)	**0.01***
Marital Status				
Single	Ref		Ref	
Married	5.27 (1.08-25.78)	**0.04***	9.23(1.36-62.68)	**0.02***
Educational Level				
No Formal Education	Ref		Ref	
Formal Education	1.62 (0.74-3.59)	0.23	1.63(0.43-6.22)	0.47
Income categories (in NRs.)				
≤14550	0.56 (0.17-1.86)	0.34	-	-
14551 to 48750	0.97(0.28-3.33)	0.96	-	-
>48750	Ref			
Family History of Breast Cancer				
Yes	-	-	-	-
No	Ref	-	-	-
Age at menarche (in years)				
≤13	Ref		Ref	
13 to 15	2.39(0.84-6.78)	0.10	3.79(1.02-14.26)	**0.04***
>15	1.44 (0.37-5.57)	0.59	2.48 (0.42-14.69)	0.32
Current menstruation status				
Ongoing	Ref	Ref	Ref	Ref
Stopped	2.74 (1.20-6.23)	**0.01***	1.21 (0.21-6.99)	0.32
Parity				
Nulliparous	Ref	Ref	Ref	Ref

1 to 2	2.50 (0.54-11.54)	0.24	0.83 (0.09-7.45)	0.87
≥3	1.01(0.21-4.92)	0.99	0.3 (0.03-3.44)	0.33
Ever had miscarriage/abortion				
Yes	1.20 (0.52-2.79)	0.67	-	-
No	Ref		-	-
Ever used contraception				
Yes	2.39 (0.87-6.56)	0.09	4.26 (1.09-16.63)	**0.04***
No	Ref		Ref	
BMI group (in kg/m^2)				
Underweight	1.04 (0.16-6.97)	0.96	-	-
Normal	Ref	-	-	-
Pre-Obese	0.57(0.23-1.39)	0.22	-	-
Obese	0.42(0.13-1.38)	0.15	-	-
Smoking				
Yes	0.79 (0.31-2.05)	0.63	-	-
No	Ref		-	-
Alcohol consumption				
Yes	2.32 (0.79-6.76)	0.11	3.80 (0.95-15.26)	0.06
No	Ref		Ref	
Physical Exercise				
Yes	0.62(0.20-1.90)	0.40	-	-
No	Ref		-	-
Food consumption				
Healthy	0.85 (0.39-1.87)	0.68	-	-
Unhealthy	Ref	-	-	-

*Statistically significant at 0.05 level of significance

Discussion

The purpose of the study was to identify the breast cancer risk factors among female patients at the Lalitpur district's tertiary care hospital. This study indicated that there was a strong association between age, marital status, age at menarche, and contraceptive use. However, it does not reveal any significant associations between breast cancer and other highlighted predictors of the diseases such as educational level, income, family history, parity, abortion, BMI, smoking, alcohol and food consumption and physical activity.

The result of our study suggests that age was a significant risk factor for developing breast cancer. The risk of getting breast cancer increases with increasing age with the highest likelihood over the age of 50 years. Siegel et.al showed that breast cancer ranks second as a leading cause of death in women over 50 years[20]. A study conducted in Poland indicated that breast cancer was more frequently diagnosed around menopause than

women under 45 years of age[21]. The Tamoxifen and Exemestane Adjuvant Multinational (TEAM) trial study by Derks et.al also stated that mortality and risk of breast cancer increase with increasing age[22]. The luminal cells tend to adapt to the characteristics of myoepithelial cells, a process influenced by the microenvironment surrounding those cells. The increased risk of breast cancer with ageing may be caused by these age-related alterations in the activity of breast cells[23].

The present study showed that the risk of breast cancer increases among married women compared to single women. These results correlate with a study conducted in Bangui (2017) and India(2013) which showed a higher risk of breast cancer among married women[24][25]. However, some authors showed no significant relationship between breast cancer and marriage.[26]. Other studies showed that marriage tends to have protective effects on breast cancer outcomes[27][28][29].

Therefore, it is extremely important to interpret these findings in the light of the quality of the marital status, especially before and after the diagnosis. Given that age is a known risk factor for breast cancer, married women in our study tended to be older than single women on average. The greater incidence of breast cancer among married women in our sample may be explained by this age difference. Moreover, marriage may be detrimental to a woman's well-being and health status if her spouse does not provide her with moral support. In contrast, those who receive assistance from friends and family may experience better health results than those who receive support from their spouses.

Most of the risk factors related to breast cancer in women are related to the reproductive life of the women: early menarche (before age 12 years) has the highest risk of breast cancer[30]. The present study found that women who had early menarche (13 and 15 years) had 3.7 times higher odds of getting breast cancer than their counterparts. These findings are consistent with studies conducted in Ethiopia [31], Morocco [32], Palestine [33],Vietnam [34], Afghanistan [26] and USA [35]. The increased production of steroid hormones during the start of menstruation is directly associated with a high risk of breast cancer [36]. High estrogen levels are linked to early menarche and the start of the menstrual cycle. The complex interaction between elevated estrogen and lower androgen which in turn causes hormonal imbalance, may contribute to increased risk of breast cancer [37]. Similarly, another study showed that the prolonged exposure of breast epithelial cells to estrogen due to early menarche might be the reason behind the increased risk of breast cancer [38].In addition to this, some studies also indicated that the increased risk of breast cancer was found mostly in obese post-menopausal women due to an associated increase of estrogen, mainly bioavailable estradiol[39]. Since, the beginning of the reproductive age varies in women, initiating breast cancer prevention strategies early will have a greater effect[40].

Our research findings state that women who used Oral contraceptives regularly were at higher risk of breast cancer than compared to women who had never used them.Surprisingly, the risk was not increased by the duration of OCs usage. These findings were consistent with the study conducted in Jordan [41]. Data from UK-basedcase-control studies further supported these findings by demonstrating the slightly increased risk of breast cancer among women using different types of hormonal contraceptives including oral combined, oral progestogen-only, injected progestogen and progestogen-releasing intrauterine devices (IUDs) [42]. However, the degree of breast cancer risk is affected by various factors.The duration of use (>5 years), formulation and structure, estrogen dosage and progestin component of hormonal contraceptives were found to have different impacts on breast cancer pathology [43]. A meta-analysis by Ji *et al.* found that the risk of breast cancer increases with an additional year of age at which women first use oral contraceptives[44].Various hypotheses have been put up over the years in order to investigate the underlying mechanisms behind the use of OCs and breast cancer risk. The first hypothesis states that using oral contraceptives raises the estrogen levels in the body which in turn increases the risk of breast cancer [35][45][46]. Another assumption is that the use of contraceptive pills can cause weight gain which in turn increases the women's risk of becoming obese[41][42]. Several studies have demonstrated the link between obesity and breast cancer[47] [29]. After menopause, the adipose tissues become the main source of estrogen which can promote the growth of cancer cells, thereby increasing women's risk of getting breast cancer[48].

The potential impact of oral contraceptives on breast cancer is still nuanced. A systematic review and meta-analysis from 2009-2020 indicated that oral contraceptive pills are related to the modest slightly significant increase in risk of Breast Cancer and further studies are needed to validate the findings [45]. Similarly, another systematic review with meta-analysis including premenopausal women suggested that the risk of breast cancer among premenopausal women varies by molecular subtype [49]. The OCs are mainly associated with an increased risk of luminal A and TN breast cancer than with the risk of H2E tumors. [50]A study by Karlsson*et al*. suggested that the observed increased risk of breast cancer after discontinuing oral contraceptives reflects the shorter latency period for women who have used these contraceptives[51]. This implies that the overall lifetime risk doesn't appear to be significantly higher compared to women who never used them[51]. Therefore, the evidence on the use of OCs and the risk of breast cancer is not conclusive and cannot determine how much OCs contribute to the risk of breast cancer. Therefore, further studies are needed in order to validate the findings.

The study has some limitations. First of all, it is a hospital-based study rather than a multicenter one so the results might not be representative of all Nepali women with breast cancer. In future, longitudinal

multicenterstudies should be conducted to validate our study findings which can be used to identify the high-risk women, who can be kept on regular follow-ups and offered early treatment options as well. Similarly, recall bias for example, age of menarche, age of menopause and duration of OCs use may be reported due to the design of the study. The sample size was small in our study therefore,furthermulticenter studies with large sample size might help to further validate our study findings.

Conclusion

In conclusion, factors such as age, marital status, age at menarche, and contraceptive use were found to cause increased risk of breast cancer among women. Therefore, conducting regular breast cancer screening programs such as mammograms and clinical breast examinations for early diagnosis, tailoring age-appropriate education for breast cancer awareness and discussing the potential risks and benefits of hormonal contraception especially those with increased risk might help to reduce the incidence of breast cancer among women.

- **Future Perspective**

The future perspective for the application of the risk factors may lead to advancements in clinical decision-making, risk assessment in specific populations, cancer prevention, and mammography screening. It is recommended to do additional research using large sample sizes and comprehensive study methods to gain a deeper understanding of the regional risk factors connected to breast cancer.

Summary Points

- Older age over 50 years (OR = 31.11) was associated with high risk of breast cancer.
- Age at menarche between 13- 15 years (OR= 3.79) was associated with a high risk of breast cancer.
- Use of oral contraceptive pills () was associated with high breast cancer risk.
- Being married (9.23) was associated with high breast cancer risk.
- The results suggested that age-appropriate education for breast cancer awareness and discussing the potential risks and benefits of hormonal contraception among women using them might help to reduce the incidence of breast cancer.

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