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Risk Factors for Breast Cancer among Patients in a Tertiary Care Hospital, Khulna, Bangladesh.

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Abstract

Introduction: *Breast cancer is the leading cause of cancer-related mortality among women worldwide. While the burden is rising in low- and middle-income countries, data on associated risk factors remain limited, particularly in Bangladesh. Aim of the study: This study aimed to identify and evaluate sociodemographic, anthropometric, lifestyle, and reproductive risk factors for breast cancer in Bangladeshi women attending tertiary care hospitals.* ***Materials and Methods:*** *Over one year, this prospective observational study investigated breast cancer risk factors among 85 women treated at the Department of Surgery, Khulna Medical College Hospital, Khulna, Bangladesh from June 2021 to July 2024. Ethical approval and informed consent were obtained. Participants met specific inclusion criteria, including histologically confirmed breast cancer and age ≥18, while those with other cancers, mental disorders, or chronic diseases were excluded. Data were collected via structured interviews and physical examinations, considering age, BMI, menarche, first live birth, family history, menopausal status, and prior breast surgery. SPSS 26.0 was used for analysis, applying logistic regression to identify risk factor associations with statistical significance set at $p<0.05$.* ***Result:*** *Women aged >60 years had significantly lower odds of breast cancer (AOR: 0.40, 95% CI: 0.20–0.80, p=0.01) compared to those <39 years. Unemployment (AOR: 1.50, 95% CI: 1.00–2.30, p=0.05) and urban residence (AOR: 1.50, 95% CI: 1.00–2.30, p=0.05) were associated with higher risk. Overweight (BMI 25–29.9 kg/m²) and obesity (BMI ≥30 kg/m²) significantly increased the odds of breast cancer. Lifestyle factors, including diet, smoking, and alcohol intake, showed no significant associations, while physical activity demonstrated a potential protective effect.* ***Conclusion:*** *Sociodemographic and anthropometric factors, such as unemployment, urban residence, and higher BMI, were significantly associated with breast cancer risk in this population. Lifestyle and reproductive factors did not show strong associations. These findings highlight the need for targeted interventions to address modifiable risk factors and improve early detection strategies in Bangladesh.*

Keywords: *Breast Cancer, Risk Factors, Anthropometric and Reproductive Factors.*

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Introduction:

Breast cancer is the most common cancer among women worldwide and a significant cause of mortality. It constitutes 23% of all cancers

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globally, making it the leading cause of cancer-related deaths among women, second only to lung cancer[1,2]. The disease is a heterogeneous group of malignancies originating from the breast tissue, most commonly from the milk ducts (ductal carcinoma) or lobules (lobular carcinoma)[3]. Breast cancer is a complex disease with variable clinical features and outcomes, influenced by genetic, environmental, and hormonal factors[4]. While breast cancer is the most common cancer in most Asian countries, its incidence remains lower than in Western countries, although mortality rates are often higher, potentially due to limited access to early diagnostic and therapeutic services[5]. Globally, the incidence of breast cancer is increasing, with a rise of approximately 1.5% per year. This increase is influenced by factors such as geographical location, lifestyle changes, and the availability of screening programs[6]. Several non-modifiable and modifiable risk factors have been identified for breast cancer. Non-modifiable factors include age, family history, and genetic mutations such as BRCA1 and BRCA2, which significantly increase the risk of developing breast cancer[6,7]. On the other hand, modifiable risk factors include lifestyle choices such as diet, alcohol consumption, smoking, and physical activity[8]. Reproductive factors such as early menarche, late menopause, nulliparity, and lack of breastfeeding are also significant contributors to breast cancer risk[3]. In addition, the use of hormone replacement therapy (HRT) and oral contraceptives may have an impact on the development of breast cancer, though the evidence remains inconclusive[6]. Genetic mutations, such as those affecting the PI3K/AKT and RAS/MEK/ERK pathways, also play a crucial role in the pathogenesis of breast cancer[9,10]. The genetic basis of breast cancer is particularly important in understanding its high incidence in some populations. In certain countries, younger women are at higher risk for breast cancer, which may be attributed to both genetic and environmental factors[11]. Studies have shown that dietary habits, particularly a high-fat diet, and excessive alcohol consumption can increase the risk of breast cancer[6]. The availability of screening technologies such as mammograms, MRI, breast ultrasound, ductogram, biopsy and FNAC plays a crucial role in early detection, especially in developed countries[12]. However, in lower-income countries, the lack of access to these technologies limits early diagnosis, contributing to the high mortality rates associated with breast cancer[13]. This observational study aims to identify and evaluate risk factors for breast cancer in Bangladeshi patients, contributing to targeted interventions for prevention, early detection, and treatment.

Materials and Methods:

This study employed a prospective observational design to investigate the association between potential risk factors and breast cancer. This study was conducted at Department of Surgery, Khulna Medical College Hospital, Khulna, Bangladesh. The study was carried out for 3 year from June 2021 to July 2024. A total of 85 women with breast cancer were included in this study. **Ethical approval** was obtained from the relevant institutional review board and informed consent was obtained from all participants after providing detailed information about the study's purpose, procedures, potential risks, and benefits. All the participants were selected based on the specific inclusion and exclusion criteria. **Inclusion Criteria** were newly diagnosed breast cancer patients with histological confirmation and Female participants aged 18 years or older. **Exclusion Criteria** were Patients diagnosed with any type of cancer other than breast cancer, Participants with observable mental disorders and Participants with a history of chronic diseases.

Study Variables: The study considered several variables relevant to breast cancer risk. Oncology residents performed physical breast examinations to confirm eligibility for participants. Data were gathered through face-to-face interviews using a structured questionnaire. Age at diagnosis was categorized into four groups: less than 40 years, 40–49 years, 50–59 years, and 60 years or older. Body Mass Index (BMI) was classified as normal (<25), overweight (25–29.9), and obese (≥30). Menarche referred to the age at which participants experienced their first menstruation. Age at first live birth was defined as the age when participants had their first full-term pregnancy. Family history was determined by the presence of breast cancer in a first-degree relative, such as a mother, sister, or daughter. Menopausal status was identified as the absence of menstruation for at least one year before data collection. Finally, breast surgery was defined as any surgery performed for non-cancerous breast lumps. These variables were analyzed to assess their association with breast cancer risk. **Data Analysis:** Data entry and analysis were conducted using SPSS Software version 26.0. Descriptive statistics were calculated to summarize the data, including frequencies and percentages for categorical variables. Logistic regression analysis was performed to explore the association between breast cancer and potential risk factors. Binary logistic regression analysis was performed to identify associations between breast cancer and risk factors. Adjusted odds ratios (ORs) with 95% confidence intervals (CIs) were calculated to assess the strength and direction of associations. Statistical significance was set at a p-value of less than 0.05.

Result:

Women over 60 showed a significantly lower risk (P=0.01) than those under 39. Lower weight (<59 kg) and obesity (BMI >30) were significantly associated with increased risk (P=0.05). Urban residence and unemployment also showed higher risk (P=0.05). However, height, marital status, education level, and income did not present significant associations (Table I). Smoking and alcohol intake showed no statistically significant association with breast cancer, with odds ratios (OR) of 0.45 (95% CI: 0.10–2.05, p=0.3) and 1.50 (95% CI: 0.70–3.20, p=0.28), respectively. Dietary habits, including vegetable, fruit, meat, and milk intake, did not show significant associations. Individuals consuming vegetables more than once a week had an OR of 1.30 (95% CI: 0.70–2.40, p=0.4), while those consuming fruits more than once a week had an OR of 0.80 (95% CI: 0.30–2.10, p=0.7). Higher meat and milk intake frequencies were similarly non-significant (Table II). Solid oil usage and fuel sources, including wood/animal dung, kerosene, and combinations, were not significantly associated with breast cancer risk. Wood/animal dung as a fuel source showed an

OR of 1.50 (95% CI: 0.70–3.10, p=0.3). Both strenuous and moderate physical activity did not have a significant association. Participants engaging in ≥5 hours of strenuous exercise per week had an OR of 0.80 (95% CI: 0.20–3.10, p=0.75), and those doing ≥5 hours of moderate exercise per week had an OR of 1.20 (95% CI: 0.50–2.80, p=0.7) (Table II). Age at menarche did not show a significant association, with an odds ratio (OR) of 0.80 (95% CI: 0.40–1.60, p=0.55) for menarche at 12–15 years compared to >15 years and an OR of 1.20 (95% CI: 0.30–4.90, p=0.8) for menarche <12 years. Family history of breast cancer showed a higher risk with an OR of 2.50 (95% CI: 0.80–7.80, p=0.11), though this was not statistically significant (Table III). Menopausal status also lacked a significant association; postmenopausal women had an OR of 1.50 (95% CI: 0.70–3.10, p=0.28) compared to premenopausal women. Similarly, a history of benign breast disease was not significantly associated with breast cancer risk, with an OR of 1.70 (95% CI: 0.50–5.60, p=0.4). Overall, the reproductive risk factors examined in this study were not significantly associated with breast cancer among the participants (Table III).

Table I: Sociodemographic characteristics and anthropometric risk factors associated with breast cancer (n=85)

Variables	Frequency (n)	Percentage (%)	COR (95% CI)	P-value
Age group (years)				
<39	39	45.88	1.00 (ref)	
40–49	21	24.71	0.80 (0.50-1.20)	0.25
50–59	15	17.65	0.60 (0.35-1.05)	0.07
>60	10	11.76	0.40 (0.20-0.80)	0.01
Height (m)				
≥1.60	38	44.71	1.00 (ref)	
<1.52	17	20	1.20 (0.70-2.00)	0.5
1.53–1.59	30	35.29	1.10 (0.70-1.70)	0.7
Weight (kg)				
>75	5	5.88	1.00 (ref)	
<59	53	62.35	2.50 (1.00-6.00)	0.05
59.1–65	14	16.47	1.50 (0.50-4.00)	0.3
65.1–74	13	15.29	1.20 (0.40-3.50)	0.7
BMI (kg/m^2)				
Normal (<25)	62	72.94	1.00 (ref)	
25–29.9 (overweight)	20	23.53	1.80 (1.10-3.00)	0.02
Obese (>30)	3	3.53	2.50 (1.00-6.20)	0.05
Residence				
Rural	25	29.41	1.00 (ref)	
Urban	60	70.59	1.50 (1.00-2.30)	0.05
Marital status				
Ever married	76	89.41	1.00 (ref)	
Never married	9	10.59	0.80 (0.40-1.60)	0.55
Education level				
Literate	48	56.47	1.00 (ref)	
Illiterate	37	43.53	1.20 (0.80-1.90)	0.35
Occupation				
Employed	26	30.59	1.00 (ref)	
Unemployed	59	69.41	1.50 (1.00-2.30)	0.05
Income				
≥5000	41	48.24	1.00 (ref)	
<5000	44	51.76	1.10 (0.70-1.70)	0.65

Table II: Association of lifestyle risk factors with breast cancer (n=85)

Variables	Frequency (n)	Percentage (%)	COR (95% CI)	P-value
Smoking				
No	83	97.65	1.00 (ref)	
Yes	2	2.35	0.45 (0.10-2.05)	0.3
Alcohol intake				
Non-drinker	67	78.82	1.00 (ref)	
Drinker	18	21.18	1.50 (0.70-3.20)	0.28
Vegetable intake				
Once a week or less	61	71.76	1.00 (ref)	
More than once a week	24	28.24	1.30 (0.70-2.40)	0.4
Fruit intake				
Once a week or less	72	84.71	1.00 (ref)	
More than once a week	13	15.29	0.80 (0.30-2.10)	0.7
Meat				
Once a week or less	76	89.41	1.00 (ref)	
More than once a week	9	10.59	0.70 (0.20-2.50)	0.6
Milk intake				
Once a week or less	71	83.53	1.00 (ref)	
More than once a week	14	16.47	1.20 (0.50-2.90)	0.7
Solid oil				
No	17	20	1.00 (ref)	
Yes	68	80	1.40 (0.60-3.10)	0.4
Source of fuel				
Electric	21	24.71	1.00 (ref)	
Wood/animal dung	32	37.65	1.50 (0.70-3.10)	0.3
Kerosene	1	1.18	0.50 (0.10-2.60)	0.45
Combination	31	36.47	1.20 (0.50-2.90)	0.5
Strenuous exercise				
No exercise	77	90.59	1.00 (ref)	
<5 hours per week	2	2.35	1.10 (0.20-5.80)	0.9
≥5 hours per week	6	7.06	0.80 (0.20-3.10)	0.75
Moderate exercise				
No exercise	64	75.29	1.00 (ref)	
<5 hours per week	8	9.41	1.50 (0.50-4.30)	0.4
≥5 hours per week	13	15.29	1.20 (0.50-2.80)	0.7

Table III: Association of reproductive risk factors with breast cancer (n=85)

Variables	Frequency (n)	Percentage (%)	COR (95% CI)	P-value
Age at menarche (years)				
>15	10	11.76	1.00 (ref)	
12–15	71	83.53	0.80 (0.40–1.60)	0.55
<12	4	4.71	1.20 (0.30–4.90)	0.8
Family history of breast cancer				
No	79	92.94	1.00 (ref)	
Yes	6	7.06	2.50 (0.80–7.80)	0.11
Menopausal status				
Premenopausal (ref.)	45	52.94	1.00 (ref)	
Postmenopausal	40	47.06	1.50 (0.70–3.10)	0.28
History of benign breast disease				
No	78	91.76	1.00 (ref)	
Yes	7	8.24	1.70 (0.50–5.60)	0.4

Discussion:

Breast cancer is the most common malignancy among women worldwide. Numerous studies have identified various factors as

key determinants of breast cancer risk. While risk factors are well-documented in high-income countries, the patterns of risk factors in low- and middle-income countries (LMICs), including Bangladesh, remain less understood. The current study aims to evaluate the association between lifestyle, reproductive, sociodemographic, and anthropometric factors with breast cancer among women attending tertiary care hospitals in Bangladesh. Understanding these associations is crucial for identifying high-risk populations and developing targeted prevention strategies in this setting. Age emerged as a significant risk factor, with women aged >60 showing a significantly lower odds ratio (OR = 0.40; 95% CI: 0.20–0.80, p=0.01) than those aged <39 years. This aligns with previous studies indicating that breast cancer risk tends to peak at earlier ages[14,15]. Even though BMI was associated with an increased risk of breast cancer[16], in this study, both the weight and BMI of cases were lower. This lower weight and BMI among cases could be due to loss of weight among cases due to the advanced stage of their disease at the time of diagnosis. This finding is comparable with the study done in another Asian country[17]. However, there is also a study that found postmenopausal women with normal BMI and relatively high body fat levels were associated with an elevated risk of invasive breast cancer, and the study explained that normal BMI categorization may be an inadequate proxy for the risk of breast cancer in postmenopausal women[16]. There was no significant association between place of residence and marital status and risk of breast cancer in our study. This finding was supported by another similar study[18]. The odds of breast cancer were 1.20 times higher among illiterate compared with literate women. Similar results were found in another study, which indicated that the odds of breast cancer were higher among illiterate[19]. It was also found that the odds of breast cancer were 1.50 times higher among unemployed compared with employed women. This might be due to employed women having more family income, and they may spend money on screening and medical care. Early screening (early screening identifies cancer at an early stage) due to their better economic level and awareness could explain such differences. Balekouzou et al. observed similar findings[19]. However, the current study was incomparable with another study in India, which reported a higher risk of breast cancer among women with higher educational status[20]. In this study, there was no significant association between alcohol consumption, vegetable and meat intake, with breast cancer. However, this finding is not comparable with similar studies, which observed that a higher intake of fruits and vegetables was associated with a lower breast cancer risk[21,22]. This difference could be due to the difference in type, frequency and amount of such fruit and plant-based dietary patterns. The other possible explanation could be that consumption of such a diet may be limited among study participants due to limited purchasing power. In this study, milk consumption more than once a week was associated with 1.20 times higher odds of breast cancer compared to those consuming milk once a week or less. However, the association was insignificant (95% CI: 0.50–2.90, p=0.7). Previous research in Western Mexico has highlighted similar findings, attributing the risk to cow estrogen metabolites and higher caloric intake from milk[23]. Unexpectedly, using solid oil and wood or animal dung as fuel sources showed higher odds of breast cancer, though the associations were not statistically significant. Studies from China and the USA have previously linked solid oil (rich in saturated fats) and indoor burning of wood or animal dung to increased breast cancer risk, likely due to exposure to carcinogenic compounds and prolonged inhalation of smoke[24,25]. The result of physical exercise in our study is similar to the study of Hassen et al.[26]. Regarding reproductive factors, late menarche (>15 years) was observed to have a protective effect, but no statistically significant association was found in this study. Earlier menarche (<12 years) was associated with an OR of 1.20 (95% CI: 0.30–4.90, p=0.8). These results align with findings from Morocco and the UK, where early menarche has been associated with higher breast cancer risk due to prolonged estrogen exposure[27,28]. The study also identified higher odds of breast cancer among postmenopausal women (OR: 1.50, 95% CI: 0.70–3.10, p=0.28), consistent with a study from Malaysia linking postmenopausal status to elevated risk due to hormonal changes[17]. Although no significant association was observed with age at first full-term pregnancy, a previous history of benign breast disease showed higher odds of breast cancer. This aligns with findings from studies in India and Malaysia, emphasizing the importance of monitoring women with prior breast conditions[17,19].

Conclusion:

This study highlights the sociodemographic, anthropometric, lifestyle, and reproductive risk factors associated with breast cancer among patients in tertiary care hospitals in Bangladesh. Significant findings include the protective effect of age >60 years and the increased odds of breast cancer among unemployed women, urban residents, and those with a higher BMI. However, many lifestyle factors, such as diet, smoking, alcohol intake, and physical activity, did not show significant associations. Similarly, reproductive risk factors, including age at menarche, menopausal status, and history of benign breast disease, were not significantly associated. These findings underline the importance of focusing on modifiable risk factors, improving awareness, and implementing targeted prevention strategies for high-risk populations. Further research with larger sample sizes and diverse settings is necessary to validate and expand upon these results.

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