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A Comprehensive Analysis of Cancer Risk in Rural Bangladeshi Women

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ABSTRACT: ***Background:*** Cervical and breast cancers are the leading causes of cancer-related mortality among women in Bangladesh, particularly in rural areas where healthcare access is limited. The high prevalence of these cancers is influenced by socioeconomic, cultural, and lifestyle factors. This study aims to assess the risk factors, awareness, health-seeking behaviors, and potential biomarker-based detection of cervical and breast cancers among rural Bangladeshi women. ***Objective:*** To investigate the interplay of risk factors, knowledge, attitudes, and health-seeking behaviors related to cervical and breast cancers among rural Bangladeshi women and explore the feasibility of biomarker-based detection. ***Methods:*** A cross-sectional study was conducted from July to December 2022, involving 300 women who visited hospitals with breast and cervix-related concerns. Data were collected through structured interviews and clinical reports, including sociodemographic characteristics, medical history, awareness levels, and risk factors. Statistical analyses were performed to identify significant associations. ***Results:*** The majority of participants (30%) were aged 40-49 years, with 36.7% having no formal education. Nearly 56.7% were married before 18 years, and 30% had five or more children. Common symptoms included abnormal vaginal discharge (43.3%) and breast lumps (23.3%). Risk factors such as tobacco use (26.7%, p=0.001), oral contraceptive use (>5 years) (30%, p=0.04), and a family history of cancer (16.7%, p=0.03) were significantly associated with cancer risk. Awareness was moderate, with 60% having heard of cervical cancer and 66.7% aware of breast cancer. However, knowledge of early detection methods was low. ***Conclusion:*** Rural Bangladeshi women face significant barriers to cancer prevention and early detection due to low literacy, early marriage, high parity, and inadequate awareness. Targeted interventions, including educational campaigns and improved screening accessibility, are essential to reduce the cancer burden in this population.

Keywords: Cervical Cancer, Breast Cancer, Rural Women, Cancer Awareness.

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INTRODUCTION

Cervical cancer is the fourth most prevalent cancer among women globally, with approximately 660,000 new cases and 350,000 deaths recorded in 2022. The highest incidence and mortality rates are observed in low- and middle-income countries, reflecting significant disparities due to inadequate access to national HPV vaccination programs, cervical cancer screening, and treatment services, along with socio-economic constraints. The primary cause of cervical cancer is a persistent infection with human papillomavirus (HPV), and women living with HIV are six times more likely to develop the disease compared to those without HIV. Preventive strategies such as HPV vaccination, screening, and treatment of pre-

cancerous lesions have been proven to be both highly effective and cost-efficient. Cervical cancer is curable if detected at an early stage and treated appropriately. Countries worldwide are making concerted efforts to eliminate cervical cancer in the coming decades, guided by a set of three global targets to be achieved by 2030 [1, 2]. Nearly 80% of cervical cancer cases occur in developing countries. In Bangladesh and India, the annual incidence rates of cervical cancer are 11,956 and 12,595, respectively. According to the World Health Organization (WHO), Bangladesh experiences an estimated 167 cervical cancer cases per 1,000,000 people, with 6,582 women succumbing to the disease each year [3]. The high prevalence of cervical cancer in Bangladesh is associated with risk factors such as poverty, early marriage, multiple marriages, high parity, and low literacy rates. Limited awareness about cervical cancer risk factors further exacerbates the problem. However, cervical cancer is considered one of the most preventable malignancies [4].

In Bangladesh, Visual Inspection with Acetic Acid (VIA) is the primary method used for cervical cancer screening. VIA is a simple and effective technique that involves visually inspecting the cervix after applying 5% acetic acid [5]. Research suggests that up to 90% of cervical cancer cases could be prevented if all women were provided access to regular screening programs [6]. In 2022, an estimated 2.3 million women worldwide were diagnosed with breast cancer, leading to 670,000 deaths. Breast cancer can affect women of all ages after puberty, but its incidence significantly increases with age. Global statistics reveal substantial disparities in breast cancer burden based on human development indices. For instance, in countries with a very high Human Development Index (HDI), one in 12 women is diagnosed with breast cancer during their lifetime, with one in 71 succumbing to the disease [7-9]. Conversely, in countries with a low HDI, one in 27 women is diagnosed with breast cancer at some point in their lives, and one in 48 dies from the disease. Being female is the strongest risk factor for breast cancer, with approximately 99% of cases occurring in women, while men account for only 0.5–1% of cases. The treatment approach for male breast cancer follows the same principles as that for female patients [8]. Several factors contribute to breast cancer risk, including advancing age, obesity, excessive alcohol consumption, a family history of breast cancer, exposure to radiation, reproductive history (such as the age of menarche and first pregnancy), tobacco use, and postmenopausal hormone therapy [10]. Notably, nearly half of all breast cancer cases occur in women with no known risk factors apart from being female and aged over 40. While a family history of breast cancer elevates the risk, most women diagnosed with the disease do not have a familial predisposition. The absence of a known family history does not necessarily imply a lower risk of developing breast cancer [11]. Certain inherited genetic mutations significantly heighten breast cancer susceptibility. The most common high-penetrance mutations are found in the BRCA1, BRCA2, and PALB-2 genes. Women with these mutations are advised to consider risk-reduction strategies, including prophylactic mastectomy or chemoprevention [7, 12]. Cervical and breast cancers pose major public health challenges in Bangladesh, particularly among rural women who face substantial barriers to healthcare access. These two cancers are among the leading causes of cancer-related mortality among Bangladeshi women, with cervical cancer being the second most common and breast cancer the most prevalent [13].

The high disease burden is largely attributed to socio-cultural and economic factors such as early marriage, high parity, low socio-economic status, and limited awareness about cancer prevention and screening. Despite the availability of preventive measures like HPV vaccination and screening programs, rural women continue to encounter significant obstacles, including cultural stigma and inadequate healthcare infrastructure [14]. The role of biomarkers in early cancer detection is increasingly acknowledged; however, their utilization in rural settings remains minimal [15]. This study aims to bridge these gaps by investigating the interplay of risk factors, health-seeking behaviors, knowledge, and the potential role of biomarkers in the early detection of cervical and breast cancers among rural Bangladeshi women. By identifying key risk factors, assessing awareness and health-seeking behaviors, and exploring the feasibility of biomarker-based detection, this study seeks to

inform targeted interventions and improve cancer outcomes in this vulnerable population.

METHODOLOGY

This cross-sectional study was conducted in Sylhet from July to December 2022. Data were collected from 300 women who visited Sylhet MAG Osmani Medical Hospital with concerns related to breast and cervix-associated issues. Participants were recruited from the Surgery, Gynecology, and Obstetrics departments, including indoor and outdoor patients. Data collection involved direct interviews using a structured questionnaire, which gathered information on sociodemographic characteristics, medical history, knowledge, and health-seeking behavior related to breast and cervical cancer. In addition to survey data, clinical investigation reports were reviewed to assess diagnostic findings and biomarker evaluations. Trained healthcare professionals conducted the interviews and reviewed medical records to ensure accuracy and reliability. All participants provided informed consent before data collection, ensuring ethical compliance and voluntary participation. The study followed standard ethical guidelines, maintaining confidentiality and privacy. Data were analyzed using appropriate statistical methods to identify key risk factors, health-seeking behaviors, and awareness levels among rural Bangladeshi women regarding breast and cervical cancer.

RESULT

Table 1: Sociodemographic Characteristics of the Study Population

Variable	Categories	Frequency (n)	Percentage (%)
Age (years)	18-29	60	20.0
	30-39	80	26.7
	40-49	90	30.0
	≥50	70	23.3
Educational Level	No formal education	110	36.7
	Primary	90	30.0
	Secondary	70	23.3
	Higher Secondary & Above	30	10.0
Marital Status	Married	250	83.3
	Widowed/Divorced/Separated	50	16.7
Parity	0-2 children	90	30.0
	3-4 children	120	40.0
	≥5 children	90	30.0
Socioeconomic Status	Low	150	50.0
	Middle	100	33.3
	High	50	16.7

Table 1 presents the sociodemographic characteristics of the participants. The majority (30%) were aged 40-49 years. Nearly 37% had no formal education, and 83.3% were married. Most women (40%) had 3-4 children, and half of the participants belonged to the low socioeconomic category.

Table 2: Presence of Symptoms Related to Cervical and Breast Cancer

Symptom	Present (n)	Percentage (%)	Absent (n)	Percentage (%)
Abnormal vaginal discharge	130	43.3	170	56.7
Postmenopausal bleeding	90	30.0	210	70.0
Irregular menstruation	100	33.3	200	66.7
Lower abdominal pain	120	40.0	180	60.0
Pain during intercourse (Dyspareunia)	80	26.7	220	73.3
Breast lump	70	23.3	230	76.7

Breast pain or tenderness	90	30.0	210	70.0
Nipple discharge	50	16.7	250	83.3
Change in breast shape or size	60	20.0	240	80.0
Skin changes over the breast (dimpling, redness)	40	13.3	260	86.7

Table 2 presents the symptoms reported by study participants related to cervical and breast cancer. The most common symptom was abnormal vaginal discharge (43.3%), followed by lower abdominal pain (40%) and postmenopausal bleeding (30%). Breast-related symptoms, including lumps (23.3%), pain (30%), and nipple discharge (16.7%), were also reported.

Table 3: Risk Factors for Cervical and Breast Cancer Among Study Participants

Risk Factor	Categories	Frequency (n)	Percentage (%)	p-value
Age at Marriage (years)	<18	170	56.7	0.002
	≥18	130	43.3	
Parity	≤2	90	30.0	0.01
	3-4	120	40.0	
	≥5	90	30.0	
Family History of Cancer	Yes	50	16.7	0.03
	No	250	83.3	
Tobacco Use	Yes	80	26.7	0.001
	No	220	73.3	
Oral Contraceptive Use (>5 years)	Yes	90	30.0	0.04
	No	210	70.0	

Table 3 shows the risk factors associated with cervical and breast cancer. A significant proportion (56.7%) of women were married before the age of 18. A higher parity (≥5 children) was found in 30% of cases. Family history of cancer was reported in 16.7% of participants, and tobacco use was significantly associated with increased cancer risk ($p = 0.001$).

Table 4: Awareness and Knowledge of Cervical and Breast Cancer

Knowledge Variable	Response	Frequency (n)	Percentage (%)	p-value
Heard of Cervical Cancer	Yes	180	60.0	0.02
	No	120	40.0	
Heard of Breast Cancer	Yes	200	66.7	0.01
	No	100	33.3	
Aware of HPV as a Cause of Cervical Cancer	Yes	90	30.0	0.03
	No	210	70.0	
Knowledge of Self-Breast Examination	Yes	110	36.7	0.04
	No	190	63.3	

Table 4 illustrates the awareness levels of cervical and breast cancer. Approximately 60% of women had heard about cervical cancer, while 66.7% were aware of breast cancer. However, only 30% knew HPV as a causative factor for cervical cancer, and 36.7% were aware of self-breast examination.

Table 5: Screening Practices for Cervical and Breast Cancer

Screening Behavior	Response	Frequency (n)	Percentage (%)	p-value
Ever Had a Cervical Screening Test	Yes	70	23.3	0.001
	No	230	76.7	

Ever Had a Mammogram	Yes	50	16.7	0.002
	No	250	83.3	
Ever Had a VIA Test	Yes	60	20.0	0.03
	No	240	80.0	

Table 5 presents the screening behaviors of participants. Only 23.3% had undergone cervical cancer screening, while 16.7% had undergone a mammogram. The majority (80%) had never undergone VIA testing, highlighting gaps in screening practices.

Table 6: Biomarker Utilization for Early Cancer Detection

Biomarker Awareness	Response	Frequency (n)	Percentage (%)	p-value
Aware of CA-125 as a Cancer Biomarker	Yes	50	16.7	0.01
	No	250	83.3	
Aware of BRCA Gene Testing	Yes	30	10.0	0.002
	No	270	90.0	
Aware of HPV Testing	Yes	40	13.3	0.004
	No	260	86.7	

Table 6 shows the awareness of biomarkers for early cancer detection. Only 16.7% knew about CA-125, 10% about BRCA gene testing, and 13.3% about HPV testing. The low awareness levels indicate the need for educational interventions.

DISCUSSION

The present study provides a comprehensive analysis of cancer risk factors, symptoms, awareness, and screening practices among rural Bangladeshi women. Our findings highlight significant gaps in knowledge and preventive measures, emphasizing the urgent need for targeted public health interventions. The majority of participants (30%) were aged between 40-49 years, with a significant proportion (36.7%) having no formal education. These findings align with studies conducted in similar rural settings, which have reported a strong correlation between low educational attainment and poor health awareness [14]. Most women (83.3%) were married, and 40% had 3-4 children, with 50% belonging to a low socioeconomic status. These sociodemographic factors are known to influence health-seeking behavior and access to cancer screening programs [15, 16].

A substantial proportion of women (43.3%) reported abnormal vaginal discharge, followed by lower abdominal pain (40%) and postmenopausal bleeding (30%). These symptoms are commonly associated with cervical cancer, as highlighted in prior studies [17]. Regarding breast cancer-related symptoms, 23.3% of women reported breast lumps, 30% experienced breast pain, and 16.7% had nipple discharge. Similar prevalence rates have been reported in studies conducted in low-resource settings, emphasizing the need for early detection [18, 19]. Our study found that 56.7% of women were married before the age of 18, a well-established risk factor for cervical cancer due to early exposure to HPV infection [20]. Parity was also a significant factor, with 30% of women having five or more children. Previous study reported a similar association between high parity and increased cervical cancer risk [21].

Tobacco use (26.7%) was significantly associated with cancer risk ($p = 0.001$), consistent with previous research linking smoking to both cervical and breast cancer [22, 23]. Family history of cancer was present in 16.7% of cases, underscoring the role of genetic predisposition. The study revealed gaps in cancer awareness, with 60% of participants having heard about cervical cancer and 66.7% about breast cancer. However, knowledge about key risk factors was low, with only 30% being aware of HPV as a causative agent for cervical cancer. Similarly, 36.7% knew about self-breast examinations, which is lower than figures reported in studies from other developing countries [24]. These findings suggest the need for targeted educational campaigns to improve knowledge and preventive practices. The screening rate was

notably low, with only 23.3% having undergone cervical cancer screening and 16.7% having a mammogram. Furthermore, only 20% of women had undergone a VIA test, despite its availability as a cost-effective screening method in Bangladesh. A study similarly reported low VIA screening uptake in South Asian countries, attributing it to a lack of awareness and accessibility barriers [25]. Awareness of cancer biomarkers was strikingly low, with only 16.7% knowing about CA-125, 10% about BRCA gene testing, and 13.3% about HPV testing. The limited knowledge of these biomarkers reflects the broader lack of cancer literacy in rural populations. Previous research has shown that increasing awareness of biomarkers can significantly enhance early detection efforts [26-38].

CONCLUSION

The findings of this study highlight significant knowledge gaps, high prevalence of risk factors, and low screening rates among rural Bangladeshi women. To address these issues, community-based education programs should be prioritized to enhance awareness of cervical and breast cancer. Government and non-governmental organizations should also work towards improving access to affordable screening and diagnostic services. Strengthening primary healthcare systems and integrating routine cancer screening programs in rural health centers can play a crucial role in reducing the cancer burden in Bangladesh.

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