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Exploring Cancer Epidemiology and Associated Risk Factors in Chattogram, Bangladesh

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Abstract

Background: The prevalence of various cancers is rising steadily in our country.To tackle the catastrophe of cancer related disease burden, identifying individuals at risk is essential. The objectives of this study were to investigate the sociodemographic features of cancer patients as well as to explore the probable risk factors to organize targeted awareness campaigns.

Materials and methods: This cross-sectional study was conducted among 200 patients attending the Oncology Outpatient Departments of the two largest tertiary care hospitals of Chattogram division from September 2022 to October 2022. Data was collected by face-to-face interview with a semi-structured pretested questionnaire and patients' record, and analyzed by SPSS Version 23.0 and STATA/IC1. Chi-squared test was used to analyze qualitative data and p-value was considered significant if it was <0.05 at 95% level of confidence.

Results: Cancer wasmost prevalent (44%)among the age group of 41-60 yrs. In women the most prevalent type of cancer was breast cancer (33.93%) followed by cervical cancer (13.39%), and ovarian cancer (9.93%) while in men the most prevalent cancer was lung cancer (29.55%). Patients taking contraceptives had a significantly increased risk of suffering from breast cancer and cervical cancer ($p<0.05$). Highly significant association of smoking with lung cancer ($p<0.01$), laryngeal cancer ($p<0.01$) head-neck cancer ($p<0.01$) and esophagus cancer ($p<0.05$)were revealed from this study.

Conclusion: Significant differences in cancer types and risk factors between various demographic groups are highlighted by the study. These highlights the necessity for focused cancer preventive initiatives, such as improved regional public awareness campaigns, educating on modifiable risk factors, and early detection programs.

Key words: Breast Cancer; Cancer; Pattern; Risk factors.

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Introduction

Cancer, globally the leading cause of death, claimed almost a million lives in 2020.[1] It arises from genetic alterations within cells, disrupting the balance between proliferation and apoptosis.[2] This malignancy progresses through initiation, promotion and progression stages.[3] Carcinogenic exposure often precedes neoplastic transformation, with multiple genetic mutations occurring during a latent period. Lifestyle, host factors, infections, and the environment contribute to oncogenesis, alongside inherited genetic alterations.[4] Recognizing cancer's etiology aids in identifying high-risk populations for targeted screening, leading to early detection and improved treatment outcomes.

Lower and lower middle-income countries experience about 30% of cancer cases linked to infections like hepatitis and Human Papilloma Virus (HPV). In 2020, the most common site of cancer worldwide was breast with 2.26 million cases followed bylung with 2.21 million cases; some other frequent sites were colon and rectum; prostate, non-melanoma skin and stomach. Surprisingly regarding cancer deaths, the most common causes were lung (1.80 million mortality) colon and rectum (916 thousand mortality) liver (830 thousand mortality) stomach (769 thousand mortality) and breast (685 thousand mortality). Variations in cancer prevalence are influenced by geography, local habits and lifestyles.[5,6]

In Bangladesh, approximately 156 thousand new cancer cases were diagnosed in 2020, with esophageal cancer (13.9%) lip/oral cavity cancer (8.9%) breast cancer (8.3%) lung cancer (8.3%) and cervical cancer (5.3%) being the most prevalent.[1,7] Among males, esophageal cancer (16.1%) was most common, followed by lung cancer (11.1%) and lip/oral cavity cancer (10.6%). Among females, breast cancer (19%) predominated, followed by uterine/cervical cancer (12%) and esophageal cancer (11.1%). Modifiable risk factors, pivotal in cancer causation, warrant lifestyle changes, particularly among high-risk

populations.[8] This study aimed to gauge cancer prevalence, demographic variations and associated risk factors within the Bangladeshi population.

Materials and methods

This descriptive cross-sectional study was conducted in the One Health Institute, Chattogram Veterinary and Animal Sciences University, Chattogram, Bangladesh. Data collection was conducted at Oncology Outpatient Departments of two tertiary care hospitals of Chattogram city equipped with cancer related treatment modalities, Chittagong Medical College Hospital (CMCH) and Chattagram Maa Shishu-O-General Hospital (CMSOGH) Chattogram. Approval was issued from ethical review committees of both Chattagram Maa-O-Shishu Hospital Medical College and Chittagong Medical College. Following this, for data collection permission was attained from both CMSOGH and CMCH. A total of 200 subjects were selected from Oncology OPD of the mentioned institutes according to enrollment criteria. The study was completed between the period of September 2022 to October 2022.

People of Bangladeshi nationality and aged 10 years and above of both genders were included in the study having histopathologically confirmed diagnosis of cancer. Age was recorded according to NID/birth certificate. Patients who were severely ill or mentally retarded or provisionally diagnosed patients with no confirmatory evidence were excluded from the study.

After considering the inclusion and exclusion criteria patients from the Outpatient Departments of the afore mentioned hospitals were asked to participate in the study. Patients who provided their consents were interviewed in an isolated place using pre-tested semi-structured questionnaire. Anonymity was maintained and each case was labelled with a specific identification number. The patients were given freedom to take themselves out any time from the study if they desired and as well was ensured regarding their treatment continuation irrespective of participation in the study. Following the above criteria and obtaining proper consent of the patient, data were collected from a total of 200 respondents.

Initially the collected data was compiled in Microsoft excel and finally analyzed using SPSS Version 23.0 and STATA/IC1. To analyze qualitative data Chi-squared test was used where p value <0.05 was considered to be significant.

Results

Among the respondents 57.50% (n=115) were from CMCH while the remaining 42.50% (n=85) werefrom the CMOSH. Table I shows the socio-demographic features of the respondents. The ratio of male: female was 1: 1.27. The age group of 41 to 60 had the most frequent percentage of cancer cases (44%). Majority of the patients (84.5%) had no family history of malignancy. Respondents were from the districts of Chattogram, Rangamati, Bandarban, Khagrachari, Cox's Bazar, Feni, Noakhli and Cumilla. Respondents who resided within City Corporation or municipality area were considered to belong to urban areas and they comprised 35.5% of the respondents and the remaining 65.5% were from rural areas.

Table I Distribution of the respondents by demographic characteristics (n=200)

Variables	Category	Frequency (%)
Sex	Male	88 (44%)
	Female	112 (56%)
Age (In years)	10-40	55 (27.5%)
	41-60	88 (44%)
	61-Above	57 (28.5%)
Education	Uneducated	81 (41.5%)
	Can read and write	90 (45%)
	Educated	29 (14.5%)
Occupation	Employed	101 (50.5%)
	Unemployed	99 (49.5%)
Marital status	Single	12 (6%)
	Married	184 (92%)
	Widowed	3 (1.5%)
	Divorced	1 (0.5%)
Socioeconomic status (income in BDT)	<10,000/month	107 (53.5%)
	10,000-50,000/ month	83 (41.5%)
	>50,000/month	10 (5%)
Family History of Cancer	Yes	27 (13.5%)
	No	173 (86.5%)
Demographic area	Urban	69 (34.5%)
	Rural	131 (65.5%)

Different types of carcinomas were recorded and those varied in frequency at two centers (Table II). More than one-third respondents had breast cancer (19.5%). Lung cancer (15.0%), head-neck and oral cavity cancer (12.0%), cervical cancer (7.5%) and laryngeal cancer (6.5%) were highly frequent among the respondents (Table II).

Table II Distribution of respondentsat CMCH and CMOSH according to the diagnosis (n=200)

Types of Cancer	CMCH n (%)	CMOSH n (%)	Total n (%)
Breast cancer	20 (17.54)	19 (22.09)	39 (19.5)
Lung cancer	13 (11.40)	17 (19.77)	30 (15.0)
Head, neck and oral-cavity cancer	20 (17.54)	4 (4.65)	24 (12.0)
Cervical cancer	12 (10.53)	3 (3.49)	15 (7.5)
Laryngeal cancer	11 (9.65)	2 (2.33)	13 (6.5)
Rectal cancer	6 (5.26)	5 (5.81)	11 (5.5)
Ovary cancer	6 (5.26)	4 (4.65)	10 (5.0)
Stomach /duodenal cancer	5 (4.39)	5 (5.81)	10 (5.0)
Esophageal cancer	5 (4.39)	3 (3.49)	8 (4.0)
Blood cancer	1 (0.88)	6 (4.71)	7 (3.5)
Hepatic cancer	2 (1.75)	4 (4.65)	6 (3.0)
Colon cancer	2 (1.75)	4 (4.65)	6 (3.0)
Sarcoma	2 (1.75)	3 (3.49)	5 (2.5)
Prostate cancer	1 (0.88)	3 (3.49)	4 (2.0)
Carcinoma of unknown origin	0 (0.0)	3 (3.49)	3 (1.5)
Immature teratoma	2 (1.75)	0 (0.0)	2 (1.0)
Gall bladder cancer	1 (0.88)	1 (1.16)	2 (1.0)
Papillary urothelial cancer	1 (0.88)	0 (0.0)	1 (0.5)
Ocular retinoblastoma	1 (0.88)	0 (0.0)	1 (0.5)
Endometrium cancer	1 (0.88)	0 (0.0)	1 (0.5)
Cancer astrocytoma	1 (0.88)	0 (0.0)	1 (0.5)
Anal cancer	1 (0.88)	0 (0.0)	1 (0.5)
Total	114 (100)	86 (100)	200 (100)

Association between outdoor pollution and specific types of cancer prevalent among the exposed to outdoor pollution participants (Lung cancer, hepatocellular cancer, laryngeal cancer and head-neck & oral cavity cancer) is shown in table III. Lung cancer and hepatocellular cancer were prevalent in people experiencing outdoor pollution with a percentage of 31.58% and 15.79% respectively. And the associations were statistically significant ($p<0.05$).

Table III Association of outdoor pollution with lung cancer, hepatocellular cancer, laryngeal cancer, head-neck cancer

Outdoor Pollution Status	Lung Cancer n (%)		Hepatocellular Cancer n (%)		Laryngeal cancer n (%)		Head-neck Cancer n (%)	
	Yes	No	Yes	No	Yes	No	Yes	No
Exposed (n=19)	6 (31.58)	13 (68.42)	3 (15.79)	16 (84.21)	2 (10.53)	17 (89.47)	2 (10.53)	17 (89.47)
Unexposed (n=181)	24 (13.26)	157 (86.74)	3 (1.66)	178 (98.34)	11 (6.08)	170 (93.92)	16 (8.84)	165 (91.16)
p-value	0.03	0.00	0.45	0.80				

This study's findings revealed highly significant association of smoking with lung cancer ($p<0.01$), laryngeal cancer ($p<0.01$), head-neck cancer ($p<0.01$) and esophagus cancer ($p<0.05$) (Table IV).

Table IV Prevalence of lung cancer, laryngeal cancer, head-neck cancer and oesophageal cancer among smokers and non-smokers

Smoking status	Lung Cancer (n=30) n (%)		Laryngeal Cancer (n=13) n (%)		Head-neck Cancer (n=18) n (%)		Oesophagus Cancer (n=8) n (%)	
	Yes	No	Yes	No	Yes	No	Yes	No
Smoker (n=67)	24 (35.82)	43 (64.18)	10 (14.92)	57 (85.08)	13 (19.40)	54 (80.60)	6 (8.95)	61 (91.05)
Non-smoker (n=133)	6 (4.51)	127 (95.49)	3 (2.26)	130 (97.74)	5 (3.76)	128 (96.24)	2 (1.50)	131 (98.50)
p-value	0.00		0.00		0.00		0.01	

N.B.: Pearson's chi square test was done.

Association between contraceptive usage (Orally or through injection) and specific types of cancer (Breast cancer, cervical cancer, ovarian cancer) is shown in Table V. Study findings revealedhighly significant association ofcontraception with breast cancer ($p<0.01$) and cervical cancer ($p<0.01$) (Table V).

Table V Association of contraceptive usage with breast, cervical, ovarian cancers

Contraception status	Breast Cancer (n=38) n (%)		Cervical Cancer (n=15) n (%)		Ovarian Cancer (n=8) n (%)	
	Yes	No	Yes	No	Yes	No
Contraceptive user (n=29)	19 (65.52)	10 (34.48)	6 (20.67)	23 (79.31)	3 (10.34)	26 (89.66)
Contraceptive non-user (n=171)	19 (11.11)	152 (88.89)	9 (5.27)	162 (94.74)	5 (2.92)	166 (97.08)
p-value	0.00		0.00		0.06	

Discussion

Different types of cancer frequency among Bangladeshi population are not same with those of other population groups globally. Genetic predisposition, ethnicity, life style, socio-economic status even environmental pollution and some other risk factors contributeto the distribution which is also obvious from the findings of a number of other studies. This comprehensive study describes the cancer case distribution experienced in the southeastern region of Bangladesh. It reveals significant epidemiological facts for conducting clinical practices as well as scientific activities for the planning of cancer control.

This study discovered that maximum respondents were (44%) observed in the age group of 41 to 60 years. In a study at National Institute of Cancer

Research of Bangladesh, only 3.9% patients were of pediatric age group (i.e. 0-15 yrs) and about 19.1% from older age group that is majority of the patients were in middle age group.[9] Bangladesh Cancer Registry Report presented that cancer patients were prevalent in age range from 30 to 65 years comprising around 66%.[10] According to Majhi et. al. the most afflicted age groups were 41-50 years followed by 51-60 years with 29.86% and 27.98% prevalence respectively. They reported the occurrence to be morecommon in the middle age groups.[11] Female had preponderance of cases, cervical or breast cancer were more common among them;higher prevalence rates in the middle age group resulted from being typically diagnosed in the pre- or post-menopausal stages.

In the existing study, among the patients, the proportion of female (56%) was higher than that of male (44%). Comparable Bangladeshi studies also showed male: female ratio ranges like 1.4-1.8:1.[9,12] Number of male patients was much lower than females, notably due to huge numbers of cervical carcinoma and breast carcinoma patients.[12] An Indian study from Madhya Pradesh and Uttar Pradesh illustrated thatin both states relative prevalence of all sortof carcinomas was noticeably high among females.[13] Several other studies from India have depicted greater female prevalence.[11] When compared to males, the cancer prevalence was frighteningly higher in females in West Bengal and while analyzing the trend, data showed that the overall cancer rates are growing with greater upsurge among females.[14]

In existing study, breast cancer is the commonest (19.5%) to occur, followed by lung cancer (15%) and cervical cancer (7.5%). Study shows that among the cancer patients of CMCH, breast cancer and head-neck cancer were the most happening cancers. Cancer in lung, cervix and larynx occurred as the 2nd, 3rd and 4th highest respectively. In addition to Bangladesh, in other low- and middle-income countries it is projected that lung cancer and breast cancer continue to be among the most common diagnoses and forms of cancer-related mortalities. Cancers of cervix, stomach and liver also topped in prevalence.[15]

As stated by 2020's world cancer report, 2.3 million women were found with diagnosed breast cancer and 685000 deaths, worldwide. It was world's most prevalent cancer by the end of 2020, as there were 7.8 million alive women with breast cancer, diagnosed in the last five years.[16] This matched with the previous findings from India where carcinoma breast was the most common cancer (23.51% prevalence) followed by cervical cancer (25.34%) head-neck cancer (14.59%).[11] Cancer of the breast and cervix comprised the highest sufferer also in the eastern Indian population.[14] This high prevalence of breast cancer might have been caused by low level of KAP (Knowledge, Awareness and Practice) regarding breast cancer and limited access to health care facilities.[17] People are getting more conscious of getting diagnosed as breast cancer is one of the curable cancers if detected in initial phase.In relation to high number of cancer patients there are inadequate or ineffective control programs to reduce its morbidity.[18] In present study cervical cancer and ovarian cancer represents as the fourth and seventh frequentcancers respectively but among the female, these are the 2nd (13.39%) and 3rd (8.93%) most frequent cancers. our findings is consistent with global data where cervical cancer is the fourth most frequent cancer among women.[19]

It was apparent that tobacco related cancers were common among males and breast and cervical cancer were common among females.[10] Globally 1.6 million deaths were estimated in 2012 due to lung cancer as it was the most frequent one with more than 1.8 million new cases. In India alone, it accounted for 3.9% of global incidence and 4% of predicted global mortality.[20] Alterations in cigarette components and environmental factors resulted in increased prevalence of adenocarcinoma which in turn explained the riseinlung cancer cases, specifically in Asia.[21,22] Globally laryngeal cancer is relatively infrequent in women and is not within leading ten common cancers for men.[20] Head-neck and oral cavity cancer was stated as the third most frequently occurring cancer (9%) in our study. Yet, in parts of India, prevalence rate of laryngeal cancer is 30-40% which is very shockingly.[23] Oropharynx and oral cavity mostly constitute the major burden of

total cancer. Using tobacco and drinking alcohol have cytotoxic and mutagenic effects, making those main risk factors for head-neck carcinoma.[24,25] In Bangladesh, overall prevalence of smoking was 20.5% while chewing tobacco was common in 20.6%, gul (i.e. Tobacco dust) was used by 1.8%. Current smoking (42.2% vs. 2.3%) and gul usage (2.2% vs. 1.5%) were significantly higher in males than females.[26] May be these contributed for higher percentage of lung cancer. Effective tobacco control is crucial and an inexpensive way to reduce lung cancer patients.

It is evident from this study that contraceptive users are more susceptible to develop breast cancer. Contraceptive users were almost six times at more risk to develop breast cancer than the non-contraceptive users. Numerous studies have testified contraception/ hormonal treatment to bethe risk factor for the development of breast cancer.[17] Conversely, it was depicted from alongitudinal study that prolong hormonal contraception usage has not been found to be related with any increase in total cancer risk.[27] The same result is also presented in other studies as well.[28]

Apart from active or passive smoking people suffer from outdoor air pollution and quality of air is unsatisfactory in other cities too.[29] Outdoor pollution is also believed to be linkedto increased risk of lung cancer, bladder cancer and breast cancer, and results in disappointing cancer survival rate.[30] However, governing authorities should focus to diminish community's exposures to outdoor pollution as much as achievable.

Limitations

The study was conducted in a particular area with very short time. Sample size was relatively small and ethnic groups were not included. Association for some risk factors could not be analyzed because of small sample size. But a well-designed case-control study may exclude the effect of confounding factors.

Conclusion

Significant differences in cancer types and risk factors between various demographic groups are highlighted by the study. Cancer was most prevalent among the middle-aged group. Women were more prevalent with breast cancer while men were with lung cancer. Patients taking contraceptives had a significantly higher risk of breast cancer and cervical cancer development. Lung cancer and hepatocellular cancer were prevalent in people exposed to outdoor pollution. The prevalence of various cancers is rising steadily in our country.The results highlight the pressing need for improved public health initiatives, such as the creation of an extensive cancer registry to precisely track and manage the cancer burden. Furthermore, to lessen the personal, societal and financial effects of cancer in the area, focused awareness campaigns and early detection programs are essential. Reducing death rates and improving cancer outcomes would require fortifying the healthcare system and guaranteeing fair access to cancer care services, especially for marginalized groups.

Recommendation

Subsequent studies ought to concentrate on more extensive and varied sample sizes, encompassing ethnic and unique communities like the Rohingya refugees. Validating results and creating a strong cancer care delivery strategy require multicenter research. Evaluating the preparedness and accessibility of cancer treatment facilities at various healthcare levels will yield information for maximizing the distribution of resources and developing public policy.

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Contribution of authors

SA-Conception, acquisition of data, interpretation of data, drafting & final approval.

MRP-Interpretation of data, critical revision & final approval.

MRA-Design, data analysis, critical revision & final approval.

Disclosure

All the authors declared no competing interests.

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