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Different modalities of treatment and patient compliance among the treating individuals in an advanced cancer center in Dhaka, Bangladesh

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Abstract
This descriptive cross-sectional study was conducted at Ahsania Mission Cancer and General Hospital, a specialized tertiary care center in North Dhaka, Bangladesh. The study period extended from January 2020 to March 2020. The research aimed to understand the epidemiological profile, treatment approaches, and factors influencing patient outcomes in a developing nation context. The study revealed significant demographic patterns, with the majority of patients (27.83%) falling within the 51-60 age group and a slight male predominance (53.17%). Notably, 59.03% of patients were illiterate, and 55.61% belonged to lower socioeconomic classes, highlighting the social determinants influencing cancer care access. The research identified a concerning trend of late-stage presentations, with 46.67% of patients diagnosed at stage 4 and 26.67% at stage 3, suggesting significant delays in seeking medical attention. Analysis of cancer types showed reproductive system cancers including carcinoma breasts as the most prevalent (34.78%), followed by head and neck cancers (20.87%). The study found that 76.59% of patients had one or more risk factors, with tobacco use (36.59%) and betel nut chewing (26.83%) being predominant. Treatment patterns revealed a preference for combination therapy, with 34.35% of patients receiving radiotherapy plus chemotherapy, while 23.91% underwent a triple combination of radiotherapy, chemotherapy, and surgery. The findings underscore the critical need for enhanced early detection programs, improved cancer awareness, and better accessibility to comprehensive cancer care services in Bangladesh. This study contributes valuable insights for healthcare planning and resource allocation, particularly in addressing the challenges of cancer care delivery in resource-limited settings. The results emphasize the importance of developing targeted interventions to address modifiable risk factors and improve early cancer detection rates.

Keywords: Cancer Epidemiology, Treatment Modalities, Patient Compliance, Bangladesh, Cancer Staging, Risk Factors, Healthcare Access

Introduction
Cancer remains one of the most significant public health challenges worldwide. As a group of diseases characterized by abnormal cell growth, invasive potential, and eventual mortality if left untreated, cancer accounts for approximately 12% of global deaths. In developed nations, it represents the second leading cause of mortality at 21% of deaths, while in developing countries it ranks third, contributing to 9.5% of total mortality [1, 2]. The global cancer burden has reached alarming proportions with 14.1 million new cases annually, projected to escalate to 22 million within the next two decades [1]. This increasing trend is particularly concerning for low and middle-income countries, where over 60% of the world's total cases occur, accounting for 70% of global cancer deaths. The situation is further complicated by limited access to early detection services and treatment facilities [3,4]. In Bangladesh, cancer ranks as the sixth leading cause of death, responsible for 10% of all mortalities. According to hospital-based cancer registries, approximately 66% of cancer patients are between 30-65 years of age, representing the country's primary workforce [5]. The most prevalent cancers in Bangladesh include breast, esophageal, and cervical cancers, with the highest mortality rates attributed to esophageal, lung, and pharyngeal malignancies. Projections indicate that cancer cases in Bangladesh will surge from 136,719 in 2015 to 250,726 in 2035 [5].

Several risk factors contribute to cancer development in Bangladesh, including tobacco use, with 48.3% of men being smokers [5]. While breast cancer remains the most common malignancy among women, primary preventive services are not universally available at the primary healthcare level. The country faces significant challenges in cancer care delivery due to a severe shortage of healthcare providers and facilities [5,6]. The Bangladeshi government, in collaboration with WHO, established the "National Cancer Control Strategy and Plan of Action" in 2007 to address these challenges [14]. This initiative focuses on fundamental preventive measures, including education, vaccination, and tobacco control. Early detection programs primarily target oral, breast, and cervical cancers, with emphasis on awareness about warning signs [5]. Despite rapid advances in cancer therapy development, improvements in patient survival have been marginal, particularly among young adults. Various factors contribute to poor prognoses, including delayed diagnosis, poor treatment adherence, limited access to specialized care, inconsistent treatment protocols, and biological variations in malignant disease behavior [6]. This complex landscape necessitates a comprehensive understanding of treatment modalities and patient compliance patterns to improve cancer care outcomes in Bangladesh.

Materials and Methods

Study Design and Setting

This descriptive cross-sectional study was conducted at Ahsania Mission Cancer and General Hospital, a specialized tertiary care center in North Dhaka, Bangladesh. The study period extended from January 2020 to March 2020.

Study Population and Sample Size

The study population comprised patients diagnosed with cancer and registered for oncological management at the hospital. The sample size was calculated using the formula: $n = z^2pq/d^2$ Where: z = 1.96 at 95% confidence interval p = 0.10 (prevalence) q = 1-p = 0.90 d = tolerance level of error 2% (0.02) The calculated sample size was 865, however due to time constraints and limited study scope, 230 cancer patients were ultimately included in the study.

Inclusion and Exclusion Criteria

Inclusion criteria encompassed

- Confirmed cancer diagnosis
- Verbal consent to participate
- Active consultation with an oncologist regarding treatment

Patients under palliative supervision who were unable to respond were excluded from the study.

Sampling Technique

A purposive sampling method was employed to select participants. This non-probability sampling technique focused on the specific characteristics of the population relevant to the study objectives [26].

Data Collection Tools and Procedure

Data was collected through two primary methods:

1. Review of hospital records accessed through the facility's software system
2. Face-to-face interviews using semi-structured questionnaires

The questionnaire gathered information about

- Socio-demographic characteristics
- Disease investigation details
- Lifestyle factors
- Treatment delay factors
- Previous treatment history

Quality Control Measures To ensure data quality and reliability

1. Standard research protocols from the Department of Public Health, NSU were followed
2. Pre-tested structured questionnaires were used
3. Quality control checks were performed on a percentage of data
4. Double-entry data systems were implemented
5. Each respondent was assigned a unique code to maintain confidentiality.

Data Management and Analysis

The collected data was verified for completeness and consistency before being entered into a master sheet. Analysis was performed using SPSS software version 21. The data was presented using:

- Frequency distributions
- Cross-tabulations
- Appropriate statistical methods
- Visual representations (tables, graphs, charts, and bars)

Descriptive statistics were utilized for interpretation of findings.

Ethical Considerations

The study adhered to ethical guidelines including

1. Obtaining permission from NSU and Ahsania Mission Cancer and General Hospital authorities
2. Securing informed consent from participants
3. Maintaining participant confidentiality
4. Providing participants the right to withdraw from the study
5. Written consent documentation

Study Limitations the study acknowledged several limitations

1. Single-center study design limiting generalizability to the entire country
2. Relatively small sample size compared to the calculated requirement
3. Time constraints affecting comprehensive data collection

Results

Demographic Characteristics

Among the 230 cancer patients studied, the age distribution showed predominance in the 51-60 years age group (27.83%, n=64), followed by 41-50 years (20.87%, n=48) and 61-70 years (20%, n=46). The mean age was 53.85 ± 12.01 years.

Table 1: Age Distribution of Study Patients (N=230)

Age Group (years)	n	%
≤21-30	22	9.57
31-40	34	14.78
41-50	48	20.87
51-60	64	27.83
61-70	46	20.00
≥71	16	6.96
Mean ± SD	53.85 ± 12.01	

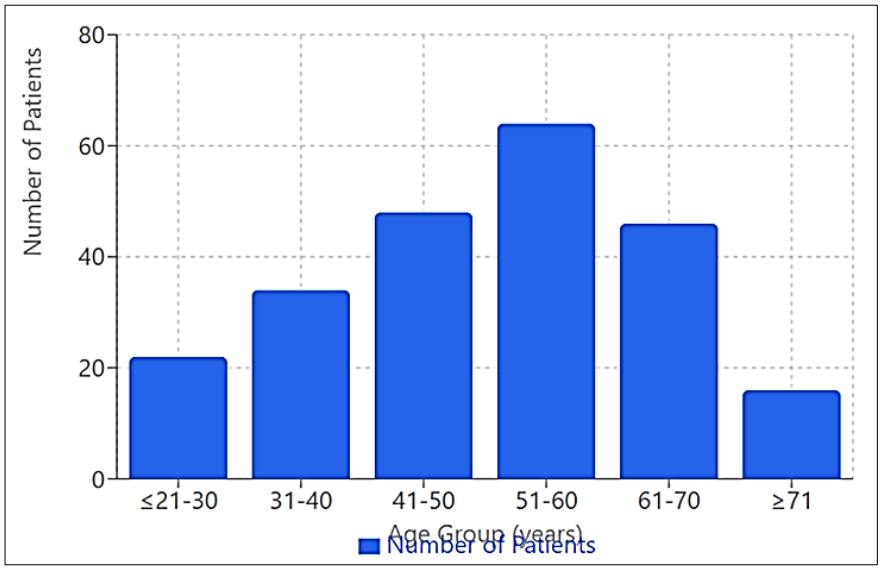

Fig 1: Age Distribution of Cancer Patients (N=230)

Gender distribution revealed a slight male predominance with 122 (53.17%) male patients compared to 108 (46.83%) female patients, yielding a gender ratio of 1:1.11.

Socioeconomic and Educational Status

Educational analysis revealed that the majority of patients (59.03%, n=136) were illiterate, while only 1.95% (n=4) had completed graduate studies. The socioeconomic distribution showed that most patients (55.61%, n=128) belonged to the lower class, followed by lower middle class (23.9%, n=55).

Table 2: Educational Status Distribution (N=230)

Education Level	n	%
Illiterate	136	59.03
Primary	58	25.37
Secondary	20	8.78
Higher Secondary	11	4.88
Graduate	4	1.95

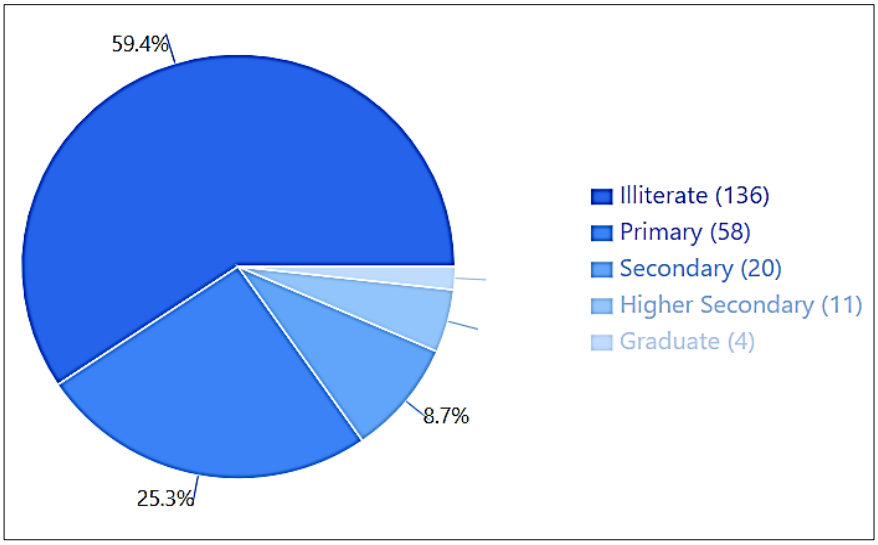

Fig2: Educational Status Distribution of Cancer Patients (N=230)

Risk Factors and Comorbidities

A significant proportion of patients (76.59%, n=176) presented with one or more cancer risk factors. The most common risk factors included:

- Tobacco chewing (36.59%, n=84)
- Smoking (32.20%, n=74)
- Betel nut chewing (26.83%, n=62)
- Alcohol consumption (15.61%, n=36)

Table 3: Distribution of Cancer Risk Factors (N=230)

Risk Factor	n	%
Smoking	74	32.20
Tobacco chewing	84	36.59
Betel nut chewing	62	26.83
Alcohol consumption	36	15.61
No risk factors	54	23.41

Cancer Types and Distribution

The study revealed various types of cancers, with reproductive system cancers being the most prevalent (34.78%, n=80), followed by head and neck cancers (20.87%, n=48) and respiratory system cancers (16.96%, n=39).

Table 4: Distribution of Cancer Types by Gender (N=230)

Cancer Type	Male	Female	Total
	n (%)	n (%)	n (%)
Reproductive System	42 (18.45)	38 (16.33)	80 (34.78)
Head & Neck	25 (11.07)	23 (9.80)	48 (20.87)
Respiratory System	21 (8.99)	18 (7.96)	39 (16.96)
GIT	18 (7.61)	15 (6.74)	33 (14.35)
Sarcoma	7 (3.00)	6 (2.65)	13 (5.65)
Hematology	5 (2.08)	4 (1.84)	9 (3.91)
Renal system	3 (1.38)	3 (1.22)	6 (2.61)
Glands	1 (0.46)	1 (0.41)	2 (0.87)

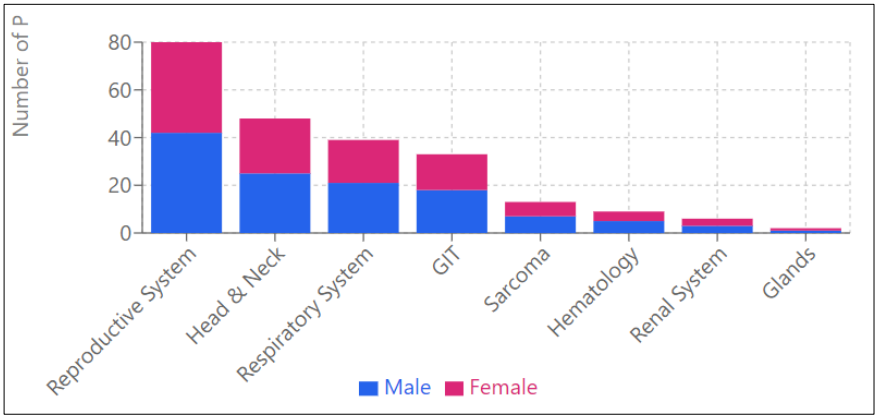

Fig 3: Distribution of Cancer Types by Gender (N=230)

Treatment Modalities

Analysis of treatment patterns showed that combination therapy was the most common approach. The majority of Patients (34.35%, n=79) received radiotherapy plus chemotherapy, while 23.91% (n=55) underwent a triple combination of radiotherapy, chemotherapy, and surgery.

Table 5: Distribution of Treatment Modalities (N=230)

Treatment Modality	n	%
Surgery alone	3	1.30
Chemotherapy alone	24	10.43
Radiotherapy alone	30	13.04
Radiotherapy + Surgery	17	7.39
Radiotherapy + Chemotherapy	79	34.35
Chemotherapy + Surgery	22	9.57
Radiotherapy + Chemotherapy + Surgery	55	23.91

Disease Staging

The majority of patients presented at advanced stages of disease, with 46.67% (n=107) diagnosed at stage 4 and 26.67% (n=61) at stage 3. Only 13.33% (n=31) each were diagnosed at stages 1 and 2.

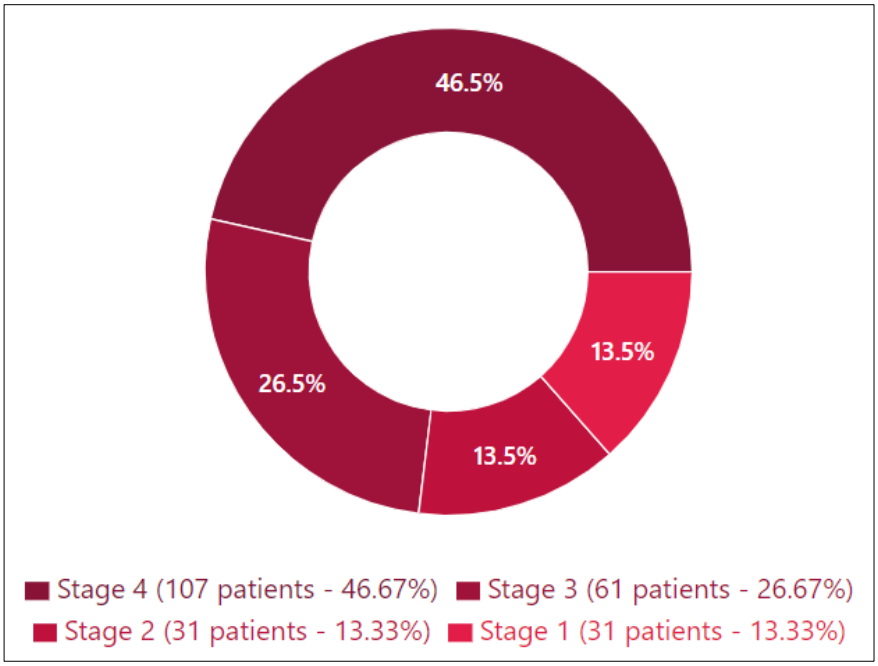

Fig 4: Distribution of Cancer Stages at Diagnosis (N=230)

These findings highlight the predominance of late-stage presentations and the significant burden of modifiable risk factors in the study population, emphasizing the need for enhanced early detection and preventive measures.

Discussion:

The present study provides significant insights into the epidemiological profile and treatment patterns of cancer patients in Bangladesh. Our findings reveal several important patterns that both align with and differ from previous research.

Age and Gender Distribution

The study found that the majority of cancer patients (27.83%) belonged to the 51-60 age group, followed by 41-50 years (20.87%). This age distribution pattern differs somewhat from a study by Das *et al*., which reported the highest prevalence in the 40-49 age group (31%) [7]. However, our findings align with research by Puri *et al*., which identified a predominance of cancer cases in patients above 60 years [8]. The higher prevalence in the productive age group represents a significant public health concern for Bangladesh's workforce.

Our study revealed a slight male predominance (53.17%) with a gender ratio of 1:1.11. This contrasts with findings from Puri *et al*., where females accounted for 60.9% of cases [8]. The variation might be attributed to differences in regional healthcare-seeking behavior and socio-cultural factors influencing medical consultation patterns.

Socioeconomic and Educational Status

The predominance of illiterate patients (59.03%) in our study corresponds with findings from earlier research by Puri *et al*., where 42.7% of patients were illiterate [8]. Similarly, Giri *et al*. reported 30.91% illiteracy among cancer patients [9]. The high proportion of patients from lower socioeconomic classes (55.61%) in our study mirrors findings from previous research where 46.6% belonged to lower economic strata [10,11]. These findings underscore the relationship between social determinants and cancer burden.

Risk Factors

Our study found that 76.59% of patients had one or more risk factors for cancer development, with tobacco chewing (36.59%) and smoking (32.20%) being the most prevalent. These findings align with research by McGuire *et al*., which emphasized tobacco use as a major controllable risk factor [12]. Similar conclusions emerged from studies by Giri *et al*. and Murthy *et al*., identifying smoking, betel nut chewing, alcohol consumption, and dietary patterns as primary risk factors [9].

Cancer Types and Distribution

The predominance of reproductive system cancers (34.78%) [13] followed by head and neck cancers (20.87%) in our study differs somewhat from regional patterns. Research in Kashmir by Rasool *et al*. found gastric and esophageal cancers to be more prevalent [14,15]. This variation might reflect regional differences in risk factors and genetic predisposition. The high prevalence of cervical cancer (19.57%) in our female patients aligns with national statistics showing it as the second most common cancer among Bangladeshi women [15].

Disease Staging and Treatment

A concerning finding was that 46.67% of patients presented at stage 4, with an additional 26.67% at stage 3. This late presentation pattern has been observed in other developing countries and is often attributed to limited awareness, poor healthcare access, and socioeconomic constraints [5]. Our treatment pattern analysis showed a preference for combination therapy, with 34.35% receiving radiotherapy plus chemotherapy. This differs from findings by Das *et al*., where 78% received conservative treatment alone [16].

The high proportion of patients requiring multimodal therapy reflects the advanced stage at presentation and underscores the need for earlier detection. Lambert *et al*. noted that late-stage diagnosis, particularly in oral cancers, consistently leads to poor prognosis [17]. Our findings regarding treatment modalities align with global trends showing increasing use of combination therapy in advanced cancers.

The epidemiological profile emerging from our study highlights several critical areas requiring intervention:

1. The need for enhanced early detection programs, particularly given the high proportion of late-stage presentations
2. The importance of addressing modifiable risk factors through public health interventions
3. The necessity of improving access to comprehensive cancer care, especially for socioeconomically disadvantaged populations
4. The crucial role of education and awareness in cancer prevention and early detection

These findings provide valuable insights for healthcare planning and resource allocation in Bangladesh's evolving cancer care landscape.

Conclusion

This epidemiological study of cancer patients at an advanced cancer center in Dhaka provides crucial insights into the current state of cancer care in Bangladesh and highlights several key findings that demand attention from healthcare providers and policymakers.

Our analysis reveals a concerning pattern of late-stage cancer presentation, with over 73% of patients diagnosed at stages 3 or 4. This late presentation significantly impacts treatment outcomes and survival rates. The predominance of patients from lower socioeconomic backgrounds and high illiteracy rates (59.03%) underscores the critical role of social determinants in cancer care access and outcomes.

The high prevalence of modifiable risk factors, particularly tobacco use and betel nut chewing, indicates an urgent need for strengthened preventive measures. The burden of reproductive system cancers, especially cervical cancer among women, calls for enhanced screening programs and improved access to early detection services.

Treatment patterns demonstrate a reliance on combination therapy, with radiotherapy plus chemotherapy being the most common approach (34.35%). This reflects both the advanced stage at presentation and the complexity of cancer care required for our patient population.

Based on these findings, we recommend

1. Implementation of comprehensive cancer awareness programs, especially targeting rural and underserved populations
2. Strengthening of primary healthcare services to facilitate early detection and timely referrals
3. Development of targeted interventions to address modifiable risk factors
4. Enhancement of cancer screening programs, particularly for common cancers like cervical and breast cancer
5. Improvement of healthcare infrastructure to support multi-modal cancer treatment
6. Introduction of patient navigation programs to improve treatment compliance and follow-up care

These findings serve as a valuable resource for healthcare planning and policy development in Bangladesh. Future research should focus on identifying barriers to early presentation and developing interventions to promote timely cancer detection and treatment. The results underscore the urgent need for a comprehensive national strategy to address the growing cancer burden in Bangladesh, with particular emphasis on preventive measures and early detection programs.

The study's limitations, including its single-center design and relatively small sample size, suggest the need for larger, multi-center studies to provide a more comprehensive picture of cancer patterns across Bangladesh. Nevertheless, these findings provide important baseline data for future research and healthcare planning initiatives.

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Author's Contribution
Not available

Conflict of Interest
Not available

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