**Title: A Study on Demographical, Clinical-Radiological, and Histopathological profile of Bronchial Carcinoma in Bangladesh**

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**INTRODUCTION**

Bronchial carcinoma is a leading cause of malignancy-associated death worldwide. With increasing life expectancy with exposure to etiological agents, bronchial carcinoma now constitutes the majority of all cancer diagnoses globally. It has the worst prognosis with 18% of cancer-associated mortality globally. (1)

The bronchial carcinoma patterns vary with environment, race, and sex. In spite of these discrepancies, smoking and the use of biomass fuel for cooking in an enclosed atmosphere are the main etiological factors for developing bronchial carcinoma. A recent study in Bangladesh suggested that bronchial carcinoma cases have increased by approximately two hundred percent in the 3years.

Bronchial carcinoma is caused by the atypical proliferation of mutated cells and cancer development. Previously, small cell carcinoma and non-small cell carcinoma were the main classifications of bronchial carcinoma. However, this classification is inadequate due to the accessibility of biomarkers-related novel therapeutics now. Therefore, categorizing bronchial carcinoma using its histopathological and genomic arrangement has become a topic of interest. The fundamental basis of targeted therapy or immunotherapy is the identification of the mutation subtype. In terms of the incidence of a morphological variety of bronchial carcinoma, adenocarcinoma is now equal to or surpasses squamous carcinoma worldwide.

There are few epidemiological data on bronchial carcinoma available in Bangladesh. This study was done to explore socio-demographical, clinico-radiological, and histopathological profiles of bronchial carcinoma.

**METHODS**

We conducted this cross-sectional descriptive study between 01/01/2021 to 31/12/2021 in the Respiratory Medicine Department of BSMMU. Either CT-guided biopsy/FNA or bronchoscopic guided biopsy was performed to confirm bronchial carcinoma. Metastatic lung cancer and lymphoma were excluded from this study. Age, sex, smoking history, presenting symptoms, signs, radiological findings, and histological pattern of bronchial carcinoma of the participants were documented in a data sheet. ECOG (Eastern Cooperative Oncology Group) score was used to evaluate the performance status of the participants. One hundred participants were included in this study. Ethical approval was taken from the institutional review board.

**RESULTS**

In our study, the average age of the participants was 59.57±10.41, male predominant (84%) and smoker (80%). Previous history of chronic obstructive pulmonary disease (COPD) and lymphadenopathy was 44% and 10% respectively. 36% and 35% were in scale 2 and 3 ECOG performance status. The baseline profile of the participants was shown in Table 1.

**Table 1: Baseline features of the study subjects (n=100)**

|  |  |  |
| --- | --- | --- |
| **Baseline features** | | **No of the patients (N=100) (%)** |
| **Age in years** | | |
| ≤40 | | 6 (6%) |
| 41-50 | | 14 (14%) |
| 51-60 | | 35 (35%) |
| 61-70 | | 34 (34%) |
| >70 | | 11 (11%) |
| **Mean ± SD** **59.57 ± 10.41** | | |
| **Min-Max 31-88** | | |
| **Sex** | | |
| Male | 86 (86%) | |
| Female | 14 (14%) | |
| **Smoking status** | | |
| Smoker | | 80 (80%) |
| Non-smoker | | 20 (20%) |
| **COPD** | | |
| Yes | | 44 (44%) |
| No | | 56 (56%) |
| **Lymphadenopathy** | | |
| Yes | | 10 (10%) |
| No | | 90 (90%) |
| **ECOG** | | |
| **1** | | 4 (4%) |
| **2** | | 36 (36%) |
| **3** | | 35 (35%) |
| **4** | | 16 (16%) |
| **5** | | 9 (9%) |

In this study, cough (87%), shortness of breath (61%), and chest pain (58%) were the most shared presenting complaints. Hemoptysis was present in only 38 patients. Table 2 showed the presenting complaints during the admission of the participants.

**Table 2: Presenting complaints of the participants during admission (N=100)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Symptoms** | **No. of patients**  **(n=100) (%)** | **Male**  **(n=86)** | **Female**  **(n=14)** |
| Cough | 87 (87.0) | 74 (86.0) | 13 (92.9) |
| Shortness of breath | 61 (61.0) | 53 (61.6) | 8 (57.1) |
| Vena Caval Obstruction | 6 (6.0) | 6 (7.0) | 0 (0.0) |
| Voice change | 14 (14.0) | 13 (15.1) | 1 (7.1) |
| Sputum | 37 (37.0) | 31 (36.0) | 6 (42.9) |
| Hemoptysis | 38 (38.0) | 33 (38.4) | 5 (35.7) |
| Chest pain | 58 (58.0) | 52 (60.5) | 6 (42.9) |

Table 3 showed that mass lesion (83%) was the predominant imaging finding (X-ray/CECT). Collapse and lymphadenopathy were present in only 8% and 3% respectively.

**Table 3: Chest X-ray/CECT finding of the participants**

|  |  |  |
| --- | --- | --- |
| **Radiological lesion** | **No. of patients** | **Percentage (%)** |
| Collapse | 8 | 8.0 |
| Pleural effusion | 6 | 6.0 |
| Mass lesion | 83 | 83.0 |
| Lymphadenopathy | 3 | 3.0 |

CECT: Contrast-enhanced computed tomography

In this present study, adenocarcinoma was the predominant type of bronchial carcinoma (48%) and after that squamous cell carcinoma (35%) (Table & Figure 1). The commonest subtype amongst smokers was adenocarcinoma in 37 out of 80 cases (46.3%), followed by squamous cell carcinoma in 28 out of 80 cases (35%). Among non-smokers, adenocarcinoma was the main type of bronchial carcinoma at 55% (11 out of 20) (Table 5). Among the COPD patient, the percentage of adenocarcinoma and squamous cell carcinoma was the same in 18 out of 44 (40.9%) but in the non-COPD group, adenocarcinoma was more common (53.6%) than squamous cell carcinoma (30.4%) (Table 5).

**Table 4: Distribution of bronchial carcinoma according to histopathologic pattern**

|  |  |  |
| --- | --- | --- |
| **Histopathologic diagnosis** | **Frequency (N)** | **Percentage (%)** |
| Adenocarcinoma | 48 | 48.0 |
| Squamous cell carcinoma | 35 | 35.0 |
| Small cell carcinoma | 16 | 16.0 |
| Undifferentiated carcinoma | 1 | 1.0 |

Figure 1:Bronchial carcinoma according to histological type

**Table 5: Distribution of bronchial carcinoma according to smoking status, COPD and non-COPD**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Histopathologic diagnosis** | **Smoker**  **(N=80)** | **Non-smoker**  **(N=20)** | **COPD**  **(n=44)** | **Non-COPD**  **(n=56)** | **p-value** |
| Adenocarcinoma | 37 (46.3) | 11 (55.0) | 18 (40.9) | 30 (53.6) | 0.654 |
| Squamous cell carcinoma | 28 (35.0) | 7 (35.0) | 18 (40.9) | 17 (30.4) | 0.791 |
| Small cell carcinoma | 14 (17.5) | 2 (10.0) | 7 (15.9) | 9 (16.1) | 0.631 |
| Undifferentiated carcinoma | 1 (1.3) | 0 (0.0) | 1 (2.3) | 0 (0.0) | 0.450 |

Among the COPD patient, the percentage of adenocarcinoma and squamous cell carcinoma was the same in 40.9% (18 out of 44) contrary in the non-COPD group adenocarcinoma was more common (53.6%) than squamous cell carcinoma (30.4%) (Table 5).

When regression analysis was performed to exclude confounding, it showed that the male sex had 1.68 times risk for lung cancer with COPD (OR:5.3690 (CI: 1.040-27.727; p-0.045)

**Discussion**

Bronchial carcinoma has now become the principal cause of malignancy-associated mortality worldwide. However, the patterns of bronchial carcinoma are varied because of demographical variation, socioeconomic status, and gender. In Bangladesh incidence of bronchial carcinoma has risen by almost 200% within just 3 years from January 2015 to December 2017. The demographical, clinical, radiological, and histopathological patterns of bronchial carcinoma have changed all over the world. In Bangladesh, histopathological data are scarce at present. we explored the demographical, clinical, radiological, and histopathological patterns in 100 cases of bronchial carcinoma patients admitted to our Respiratory Medicine Department.

The average age of the participants was 59.57 ± 10.41 and the majority (35%) was within the 51-60 years of age group in this study. A similar age group was found in different studies (2), (3), and (4). Bronchial carcinoma commonly affects those aged in the 6th and 7th decade and the risk of developing bronchial carcinoma increases with aging (5). Out of 100 cases of bronchial carcinoma 86 participants were men and 6:1 man-to-woman ratio. This male predominance in our study is consistent with the finding of others (6), (7), (8), (9).

Among the risk factors of bronchial carcinoma, smoking was the most common risk factor. It is well established that lifetime smokers are at 20-40 times risk to develop bronchial carcinoma than non-smokers and this risk is directly proportional to the period of smoking and the amount of pack year (10), (11). In our study, smokers were 80%, and 4:1 smoker-to-non-smoker ratio. However, this ratio was 1.7:1 to 3.9:1 in Indian studies (12) (13). In our county, women have a lesser frequency of smoking and less pollution exposure than males. In average smoker men, the chance of developing bronchial carcinoma is nearly nine to ten times higher than in non-smokers whereas the risk increased at least 20-fold in the case of heavy smokers (14) (15). Hitherto it is thought that smoking is linked with squamous cell carcinoma but in this survey, both the smokers (46.3%) and non-smokers (55%) had the adenocarcinoma predominant**.**

The utmost frequent presenting complaint was cough (87%), then shortness of breath (61%), and chest pain (58%). Nearly one-third (31%) of participants had hemoptysis (31%) and only 6% had superior vena cava obstruction. This clinical presentation is similar to the study done in India (16) and western studies (17), (18).

In our study, 44 percent of the participants had a history of COPD. The association of histological types with COPD and non-COPD showed 18 out of 44 (40.9%) of COPD and 30 out of 56 (53.6%) non-COPD had adenocarcinoma, and 40.9% and 30.4% had squamous cell respectively (19).

At imaging findings, mass lesions (83 out of 100, 83%) had the primary feature of bronchial carcinoma followed by collapse 8% (8 out of 100) and pleural effusion. Sarfraz *et al*. (3) and Rawat *et al.* (16) observed a similar presentation.

This present study observed that pleural effusion was most frequently found in adenocarcinoma, subsequently small-cell carcinoma. Sarfraz *et al.* (3) also demonstrated identical findings in their study. The mass lesions were found in 44.6% (37 out of 83 patients) of adenocarcinoma, followed by squamous cell carcinoma in 37.3% (31 out of 83 patients).

This study revealed that the predominant histological subtype of bronchial carcinoma was adenocarcinoma (48%). Squamous cell carcinoma accounted for 35%. This finding is analogous to the observations of Albasri *et al.* (20), Gabremariam *et al.* (21), Malik *et al.* (22) Noronha *et al* (23). However, it is contrary to the other Bangladeshi study (24), Indian studies (6) (25), (26), (8) Iran (27), Nepal (28), Malaysia (29), Senegal (30), Saudi Arabia (17), and Turkey (31).

Recently histological patterns of bronchial carcinoma have been shifting to adenocarcinoma probably due to alternation in smoking behaviors. Behera *et al,* (18) observed that small-cell carcinoma was often found in smokers below the age of 40 years and squamous cell carcinoma after 40 years, whereas adenocarcinoma in non-smokers. Mohan *et al.* (2) observed that squamous cell carcinoma was predominated earlier, but at present, adenocarcinoma is the predominant bronchial carcinoma.

At the time of diagnosis, the performance status of the participants had poor 36% on scale 2 and 35% on scale 3. In bronchial carcinoma, Lilenbaum *et al.* (32), Wakelee *et al.* (33), and Noronha *et al.* (23) observed higher poor performance status than Mohan *et al.* (34). This could be because the majority of patients only pursue medical attention once their illness has progressed.

Logistic regression findings in our study showed that males with COPD had a five times more chance to develop bronchial carcinoma than females [ OR:5.369 (CI: 1.040-27.727; p<0.045)]. Smoking is the primary cause of COPD and bronchial carcinoma. The high rate of bronchial carcinoma in COPD might be caused by genetic predispositions, early aging of the lungs, oxidative stress that alters DNA, and an inflammatory process that releases several cytokines linked to the formation of bronchial carcinoma (19) (35).

**Conclusion**

Bronchial carcinoma is the major and principal cause of malignancy-associated mortality worldwide. Adenocarcinoma was the most prevalent variety in our study. The prime causal factor for bronchial carcinoma still smoking. Mass lesion remains the most common radiological presentation.

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