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Increased risk of pulmonary malignancy after second and on ward COVID attack with pleural effusion in South-West zone of Bangladesh

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Abstract

Background: The coronavirus disease (COVID-19) poses an unprecedented challenge to health and epidemic prevention system, especially the healthcare of patients with cancer. We sought to study the impact of COVID-19 on lung cancer patients in our center.

Aim of the study: The aim of this study was to investigate the potential increased risk of pulmonary malignancy in individuals who have experienced multiple COVID-19 infections, with a particular focus on cases complicated by pleural effusion.

Methods: This was a retrospective cohort study conducted at the Department of Respiratory Medicine in Khulna Medical College and Hospital, Khulna, Bangladesh. A total of 122 patients with respiratory symptoms were enrolled and analyzed. Study time was January 2022 to December 2022.

Result: Among those experiencing their first COVID-19 attack, 32.00% had malignancies. For those with a second attack, the proportion with malignancies increased dramatically to 71.43%, whereas all individuals experiencing a third COVID-19 attack had malignancies. A minority of the patients, 17.65% (6 individuals), had COPD, while a significant majority, 82.35% (28 individuals), suffered from non-COPD lung diseases. Other comorbidities included obesity (5.88%), hypertension (29.41%), congestive heart failure (20.59%), and diabetes mellitus (17.65%).

Conclusion: Although pleural effusion was uncommon in patients with COVID-19, patients with pleural effusion might have severe inflammation and a poor prognosis. We proposed that pleural effusion should be used as a potential predictor for the progression to severe or critical condition in COVID-19 patients.

Keywords: Pulmonary Malignancy, pleural effusion, COVID-19

Introduction

The global spread of coronavirus disease 2019 (COVID-19), caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), was declared a global pandemic by the World Health Organization on March 11, 2020, significantly impacting healthcare systems worldwide [1, 2]. By December 18, 2022, the global tally of confirmed COVID-19 cases surpassed 649 million, with over 6.6 million deaths reported [3]. Currently, there is no effective treatment for COVID-19. Clinical management primarily focuses on alleviating symptoms, with intensive care and organ support provided for critically ill patients [4]. SARS-CoV-2, the virus responsible for COVID-19, is diagnosed through a combination of factors including contact history, clinical symptoms, imaging results, and RT-PCR test outcomes [5]. Several studies have outlined the clinical symptoms and imaging features of COVID-19. In contrast to non-COVID-19 pneumonia patients, those with COVID-19 are less prone to showing pleural effusions. However, severe and critical COVID-19 cases may present pleural effusions more frequently compared to moderate cases. Additionally, the presence of pleural effusion in patients with community-acquired pneumonia is linked to higher mortality rates and longer hospital stays [6]. The likelihood of having a malignancy was higher in severe cases (50.0%) compared to non-severe cases (15.6%) [7]. A retrospective analysis revealed that the risk of contracting the new coronavirus among cancer patients in the outbreak city was 2.31 times higher than that of the general population [8]. A case study documented a 72-year-old patient with a history of lung cancer who developed pleural effusion as a consequence of COVID-19 infection [9].

Lung cancer, or pulmonary malignancy, continues to be the primary cause of cancer-related mortality among both men and women globally, with over 2 million cases reported [10]. The key factor in improving the prognosis of lung cancer patients is quick and early diagnosis, along with timely access to treatment [11]. This particular demographic of patients experienced a disproportionate impact from the COVID-19 pandemic, affecting the delivery of cancer care, leading to adverse treatment outcomes, and even disrupting cancer research efforts [12]. The primary focus is often on the direct consequences of COVID-19, such as illness and fatalities. However, the indirect impact, including restricted access to healthcare for individuals with lung cancer, is frequently underestimated [10]. Government and hospital administration's implementation of security measures compelled physicians to confront challenging ethical dilemmas aimed at mitigating the risk of SARS-CoV infection. These decisions frequently resulted in delays in both diagnosis and treatment [13]. Moreover, pleural effusions have the potential to induce chronic inflammation and lung scarring, which is associated with the development of lung cancer [9]. In general, individuals with tumors and other underlying complications experienced a poorer prognosis following COVID-19 infection compared to the general population [7]. In conclusion, the relationship between COVID-19, pleural effusions, and pulmonary malignancies is complex and multifaceted. The primary aim of this study was to investigate the potential increased risk of pulmonary malignancy in individuals who have experienced multiple COVID-19 infections, with a particular focus on cases complicated by pleural effusion.

Methodology and Materials

This was a retrospective cohort study conducted at the Department of Respiratory Medicine in Khulna Medical College and Hospital, Khulna, Bangladesh. A total of 122 patients with respiratory symptoms were enrolled and analyzed. Study time was January 2022 to December 2022. All data were presented in a suitable table or graph according to their affinity. A description of each table and graph was given to understand them clearly. All statistical analyses were performed using the statistical package for the social science (SPSS) program and Windows. Continuous parameters were expressed as Mean±SD and categorical parameters as frequency and percentage. Comparisons between groups (continuous parameters) were made using the Student's t-test. Categorical parameters compared by Chi-Square test. The significance of the results, as determined by a 95.0% confidence interval and a value of $P<0.05$, was considered statistically significant.

Result

The study population consisted of 122 individuals from the south-west zone of Bangladesh. The mean age of the participants was 60 years, with a standard deviation of 15 years. Gender distribution revealed a higher proportion of males (61.48%) compared to females (38.52%) (Table 1). TB was the most prevalent clinical feature, affecting 40 individuals (48.8%), followed by COVID (41.48%). Cardiac conditions, bacterial pneumonia, and metastatic conditions were identified in 19.52%, 21.96% and 9.76%, respectively (Table 2). Out of the study population, 23.18% (19 individuals) were classified as non-malignant, while 18.3% (15 individuals) were identified as having malignant conditions. Age is a critical factor in the study, with 18.3% (15 individuals) being below 50 years and 23.18% (19 individuals) being above 50 years. Among those experiencing their first COVID-19 attack, 32.00% had malignancies. For those with a second attack, the proportion with malignancies increased dramatically to 71.43%, whereas all individuals experiencing a third COVID-19 attack had malignancies (Table 3). A minority of the patients, 17.65% (6 individuals), had COPD, while a significant majority, 82.35% (28 individuals), suffered from non-COPD lung diseases. Other comorbidities included obesity (5.88%), hypertension (29.41%), congestive heart failure (20.59%), and diabetes mellitus (17.65%) (Table 4). Figure 1 shows that 73.53% needed hospitalization and 26.47% of patients were referred to other hospitals.

Table 1: Age and gender distribution of the study population (N=122)

Variables	Frequency (n)	Percentage (%)
Age (in years)		
Mean±SD	60±15	
Gender		
Male	75	61.48
Female	57	38.52

Table 2: Clinical Features of the study population

Variables	Frequency (n)	Percentage (%)
TB	40	48.8
Cardiac	16	19.52
Bacterial Pneumonia	18	21.96
Metastatic	8	9.76
Covid	34	41.48

Table 3: COVID with pleural effusion of the study population

Variables	Frequency (n)	Percentage (%)
Malignancy		
Non-Malignant	19	23.18
Malignant	15	18.3
Age Level		
Bellow Age 50 years	15	18.3
Above Age 50 years	19	23.18
Covid Attack Malignant		
Frist (25)	8	32.00
2nd (7)	5	71.43
3rd (2)	2	100.00

Table 4: Comorbidities of the study population

Variables	Frequency (n)	Percentage (%)
COPD	6	17.65
Non-COPD lung disease	28	82.35
Obesity	2	5.88
Hypertension	10	29.41
Congestive heart failure	7	20.59
Diabetes mellitus	6	17.65

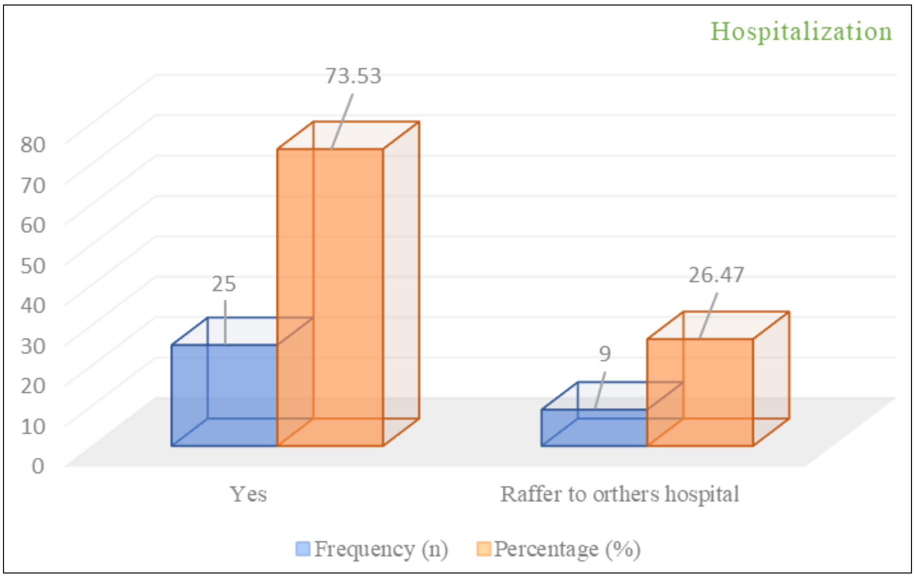

Fig 1: Clinical outcome of the patients with lung cancer.

Discussion

COVID-19, caused by SARS-CoV-2, was declared a global pandemic profoundly affecting healthcare systems worldwide. Unlike patients with non-COVID-19 pneumonia, those with COVID-19 are less likely to develop pleural effusions. There is a likelihood of having malignancy in those patients. The connection among COVID-19, pleural effusions, and pulmonary malignancies is intricate and has many aspects to consider. This study investigated the risk of pulmonary malignancy among 122 individuals from the south-west zone of Bangladesh who experienced repeated COVID-19 infections accompanied by pleural effusion. The mean age of the study population was 60 years, with a standard deviation of 15 years, indicating a predominantly older cohort? According to our study, men are at higher risk for severe complications from COVID-19 and plural effusion than women. Our results align with existing knowledge that older adults and male are more susceptible to severe COVID-19 and plural effusion outcomes [15, 16]. The clinical profile of the study population with plural effusion reveals a high burden of other diseased conditions, with tuberculosis being the most prevalent, followed by significant rates of cardiac conditions, bacterial pneumonia, and metastatic disease. A significant number of patients with plural effusion had Covid. Various studies presented the association of plural effusion with tuberculosis, cardiac conditions, bacterial pneumonia, metastatic disease and covid [6, 17-20]. The study found a significant presence of malignancy among the patients with COVID-19 and pleural effusion. The division between malignant and non-malignant cases underscores the potential association between COVID-19 and the exacerbation or emergence of malignancies. There was a noticeable age-related trend, with older individuals more frequently affected. This aligns with the broader understanding that age is a significant risk factor for severe COVID-19 outcomes and related complications, including pleural effusion and malignancies. The data suggest that both younger and older age groups are represented, with a slightly higher prevalence in the older age group. Patients experiencing their first COVID-19 attack had a lower prevalence of malignancy compared to those with second and third attacks. This escalating trend indicates that repeated COVID-19 infections may significantly elevate the risk of developing malignancies, possibly due to the cumulative impact on the immune system and overall health deterioration. Several comorbidities were found in this present observation. These comorbidities significantly complicate the management of COVID-19 with plural effusion due to their impact on overall health and disease outcomes. The presence of both COPD and non-COPD lung diseases highlights the respiratory challenges faced by these patients, while hypertension and congestive heart failure indicate the substantial cardiovascular burden. Obesity and diabetes further exacerbate the risk of severe COVID-19 outcomes, necessitating comprehensive and multidisciplinary care strategies. Similar comorbidities were also observed in the study by Wei *et al*., underscoring the widespread impact of these health conditions on COVID-19 severity and treatment complexity [6]. Figure 1 reveals that a substantial majority of the study population, 73.53%, required hospitalization due to the severity of their condition. The need for hospitalization in such a large proportion of patients highlights the serious nature of their respiratory and overall health status, reflecting the complexity and severity of their clinical presentations. Additionally, 26.47% of patients were referred to other hospitals, indicating that their care required specialized services or resources not available at the initial treating facility. Wei *et al*. reported almost similar results [6]. About one-third of patients experienced a milder outpatient course, two thirds needed hospitalization, and one-quarter of patients died. The course of SARS-CoV-2 infection in lung cancer was longer and more severe than that reported in the general US population [21-23].

Limitations of the study

Every hospital-based study has some limitations, and the present study undertaken is no exception. The limitations of the present study are mentioned. Therefore, the results of the present study may not be representative of the whole country or the world at large. The number of patients included in the present study was less compared to other studies. Because the trial was short, it was difficult to remark on complications and mortality.

Conclusion and Recommendations

This is the first study to investigate the impact of COVID-19 on non-COVID-19 lung cancer patients during the pandemic. The study demonstrates the significant impact of the COVID-19 crisis on oncological care, indicating the need for appropriate change of treatment decisions and continued follow-up and psycho-oncological support during this pandemic.

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Conflict of interest: None declared.

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