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Research Article

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Prevalence of Pulmonary Artery Hypertension and its Correlation with Severity of Bronchiectasis in a Tertiary care Hospital

Dr. Md. Mostafa Kamal[1],Dr.Anirudha Sardar[2], Dr.Mst. Nazneen Nahar[3]

[1]Assistant Professor, Department of Cardiology, Khulna Medical College Hospital, Khulna, Bangladesh;[2]Resident Surgeon, Department of Surgery, Khulna Medical College Hospital, Khulna, Bangladesh;[3]Pathologist, Department ofPathology, Khulna Medical College Hospital, Khulna, Bangladesh.

ABSTRACT

Background: Pulmonary arterial hypertension (PAH) is a complication of chronic obstructive pulmonary disease (COPD) in advanced stages, and its presence indicates a poor prognosis.
Aim of the study: The study aimed to find out the Prevalence of Pulmonary Artery Hypertension and its Correlation with the Severity of Bronchiectasis in a Tertiary Care Hospital.
Methods: In this observational cross-sectional study we enrolled and analyzed 34 patients. The study was considered at the department of Cardiology, at Khulna Medical College and Hospital, Khulna, Bangladesh. The analysis was performed on patients who were admitted with chronic lung disease and the study duration was one year from June 2021 to July 2022.
Result: The prevalence and severity of pulmonary hypertension; more than 60% of patients had pulmonary hypertension, and 40% had no complications (Table 2). According to comorbidities, 34 patients have diabetes, and 24 suffer from hypertension (Table 3). The echo findings of the study population are based on Pulmonary artery pressure (N=13), TAPSE (N=8) and FAC (N=13).
Conclusion: It is essential to evaluate the cardiac status of bronchiectasis patients at the time of diagnosis as cardiac manifestations are one of the dreadful complications.

Key Words: *Chronic lung diseases, PAH, Cardiac evaluation*

***Corresponding Author**
Dr. Md. Mostafa Kamal
Assistant Professor, Department of Cardiology, Khulna Medical College Hospital, Khulna, Bangladesh,
Email: drkamal26cardio [at] gmail.com

INTRODUCTION

Pulmonary hypertension (PH) is a rare lung disorder in which the arteries carrying blood from the heart to the lungs become narrowed, making it difficult for blood to flow through the vessels. The features of PH develop if >50% reduction of pulmonary vascular bed (or) >2/3 of lung destruction is present. The most contribution (78.7%) for the development of PH is left heart diseases, while 9.7% (second most common) contribution is due to lung pathologies. In lung disorders, more than 50% of cases of PAH come from chronic obstructive pulmonary disease (COPD). The abnormally high pressure strains the heart's right ventricle, causing it to expand in size. An overworked and enlarged right ventricle gradually becomes weaker and loses its ability to pump enough blood to the lungs, leading to right heart failure. PH has been defined as an increase in mean pulmonary arterial pressure (MPAP) >25 mmHg at rest or >30 mmHg on exercise [1,2]. Bronchiectasis refers to the dilatation of bronchial walls resulting from chronic airway infection, which leads to structural damage of lung tissue [3]. Bronchiectasis manifests as a repetitive productive cough and is occasionally associated with hemoptysis [4-6]. Pulmonary hypertension (PH) is a severe complication of bronchiectasis [3,7,8]. The prevalence of PH, defined by a systolic pulmonary arterial pressure (PAP) of at least 36 mmHg on Doppler echocardiography, ranged from 33%-48% in recent bronchiectasis studies [3,8]. Information regarding the hemodynamic profile of PH in bronchiectasis is limited. Data regarding the effect of pulmonary arterial hypertension (PAH) target therapies, such as phosphodiesterase type-5 (PDE-5) inhibitors, endothelin receptor antagonists (ERAs), and prostacyclin derivatives, are also lacking. The study aimed to determine the Prevalence of Pulmonary Artery Hypertension and its Correlation with the Severity of Bronchiectasis in a Tertiary care Hospital.

METHODOLOGY & MATERIALS

In this observational cross-sectional study we enrolled and analyzed 34 patients. The study was considered at the department of Cardiology, at Khulna Medical College and Hospital, Khulna, Bangladesh. The analysis was performed on patients who were admitted with chronic lung disease and the study duration was one year from June 2021 to July 2022.

- **Inclusion criteria:**

Patients who came with chronic lung disease were included in the study.

- **Exclusion criteria:**

Patients who had the following were not included in the study, chest deformities, poor echo window, and pericardial effusion on transthoracic echocardiography, active PTB, obstructive sleep apnea, pregnancy, critically ill patients in the ICU were excluded from the study.

All studies that fulfilled the criteria underwent detailed history, clinical examination, BMI, PFT, chest radiography, HRCT, ECG and transthoracic echocardiography. Assessment of the degree of airflow limitation was evaluated by spirometry and the six minutes' walk test among all patients based on the ATS guidelines. Statistical analysis was performed using the statistical package for social science (SPSS). Results were expressed as mean±SD Qualitative data were tabulated in frequencies and percentages. Quantitative data were given in mean and standard deviation. The correlation between PH and the number of segments involved among Bronchiectasis patients was analyzed using Pearson chi-squared test and a $p<0.05$ was considered to be significant. The important findings in our study were as follows.

RESULT

This is an observational cross-sectional study; 34 patients were enrolled and analyzed in this study. Table 1 shows the age distribution of the study population; half of the study population were aged more than 40 years, 13(38.24%) patients were from the age group 20-40 years and 4(11.76%) patients were aged less than 20 years. The number of female patients is more than male; the male patients were 44.12%, and the female patients were 55.88% (Figure 1). The prevalence and severity of pulmonary hypertension; more than 60% of patients had pulmonary hypertension, and 40% had no complications (Table 2). According to comorbidities, 34 patients have diabetes, and 24 suffer from hypertension (Table 3). The echo findings of the study population are based on Pulmonary artery pressure (N=13), TAPSE (N=8) and FAC (N=13) (Table 5). Table 6 shows the correlation between the number of segments involved in bronchiectasis and pulmonary hypertension, where both bronchiectasis and pulmonary hypertension had the same number of patient segments involved less than five. Under the segment of 0-5, 9(26.47%) patients had bronchiectasis and 24(70.58%) patients were suffering from pulmonary hypertension (Table 6).

Table 1: Age distribution of the study population (N=34).

Age range (Years)	Frequency	Percentage
<20	4	11.76
20-40	13	38.24
>40	17	50.00
Total	34	100.00

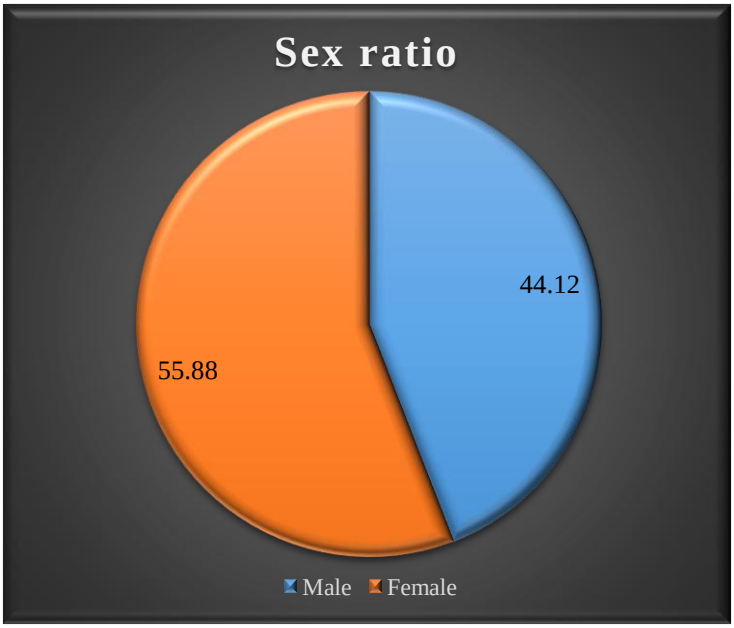

Figure 1: Sex ratio of demographic population.

Table 2: Prevalence and severity of pulmonary hypertension.

Outcome	Frequency	Percentage
Normal (no pulmonary hypertension)	13	38.24
Pulmonary hypertension	21	61.76
Mild	11	32.35
Moderate	6	17.65
Severe	4	11.76

Table 3: Study population and comorbidities.

Comorbidities	Diabetes (N=34)		Hypertension (24)	
Sex	N	%	N	%
Male	22	64.71	14	41.18
Female	12	35.29	10	29.41

Table 4: Disease involvement among the demographic population.

Sex	Unilateral Disease		Bilateral Disease		<5 segments		>5 segments		Total	
	N	%	N	%	N	%	N	%	N	%
Male	2	13.33	5	33.33	5	33.33	3	20.00	15	44.12
Female	3	15.79	6	31.58	6	31.58	4	21.05	19	55.88
Total	5	14.71	11	32.35	11	32.35	7	20.59	34	100.00

Table 5: The echo findings (Pulmonary artery pressure, TAPSE and FAC) among the study population.

Sex	Pulmonary artery pressure (N=13)		TAPSE (N=8)		FAC (N=13)	
	N	%	N	%	N	%
Male	7	46.67	3	20.00	5	33.33
Female	6	31.58	5	26.32	8	42.11

Table 6: Correlation between the number of segments involved in bronchiectasis and pulmonary hypertension.

Variables	Segment involved					
	0-5		>5		Total	
	N	%	N	%	N	%
Bronchiectasis	9	26.47	10	29.41	19	55.88
Pulmonary hypertension	24	70.58	10	29.41	34	100.00

DISCUSSION

Bronchiectasis is a heterogeneous condition with a long clinical history and many predisposing factors. HRCT has become the investigation of choice in bronchiectasis. Bronchial dilatation and bronchial wall thickening are diagnostic of bronchiectasis [9]. Due to chronic hypoxia and destruction of the vascular bed in the lung parenchyma, pulmonary hypertension frequently complicates bronchiectasis [10]. A total of 27 study subjects who fulfilled the inclusion criteria were recruited in our study after obtaining informed consent. All the study subjects have initially undergone detailed history taking and thorough clinical examination. Most of the study subjects complained of shortness of breath, and 5 were smokers. All the study subjects were subjected to HRCT, and several segments affected were identified and divided into <5 and > five, respectively. It was found that 19 (70.3%) had less than five segments involved, and 8 (29.6%) had more than five segments involved. It is widely used to measure functional status, as well as a predictor of prognosis [11]. With the clinical application suggesting that simple measurement reflected on the pulmonary and functional status of patients with bronchiectasis, the 6-minute walk test evaluation in the population has been limited. A study by Lee et al. on clinical determinants of the 6-minute walk test in bronchiectasis provides valuable information on the functional status of patients with mild to moderate bronchiectasis. It indicates that dynamic hyperinflation and increased work of breathing are responsible for disease [11,12]. Later all were subjected to echocardiography, and it was found that subjects who had more than five segments involved of them had pulmonary hypertension. The mean pulmonary artery pressure was 34.48±18.06 mmHg, with the lowest value of PAH of 17 mmHg and the highest PAH of 67 mmHg. In analyzing this study, it was found that there is a significant correlation (r=0.67) between the number of segments involved and the incidence of pulmonary hypertension. As the number of segments involved, there was an increased incidence of pulmonary hypertension with $p<0.5$, which was statistically significant. This was similar to Deva raj et al.'s study that compared CT findings with pulmonary hypertension and concluded that it showed a highly prognostic indicator in evaluating patients with bronchiectasis [13]. A study done by Ashamed et al. also concluded similarly [14].

Limitations of the study: *Every hospital-based study has some limitations and the present study undertaken is no exception to this fact. The limitations of the present study are mentioned. Therefore, the results of the present study may*

not be representative of the whole of the 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

Among the extra-pulmonary systemic comorbidities, cardiac manifestations are one of the most common complications. Cardiovascular disease is the major cause of morbidity and mortality in chronic lung diseases. It is essential to evaluate the cardiac status of such patients at the time of diagnosis. The need for recommendations regarding long-term follow-up of these patients and interventions to prevent their progress to pulmonary hypertension should be taken at the earliest. Therefore, it is desirable to develop useful and reliable tools to obtain an early diagnosis and to monitor and follow upon this condition, while new insights into the therapeutic approach are explored. Addressing this comorbidity can improve overall survival and quality of life.

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