Pak. J. Chest Med. 2023;29(04)

Original Article

journal homepage: https:/www.pjcm.net/

Pakistan Journal of Chest Medicine

Official journal of Pakistan Chest Society

Prevalence of Pulmonary Hypertension among the Patients diagnosed of Interstitial Lung Disease

Masood Alam[1], Muhammad Imran Sharif Ansari[2], Azhar Shahzad[1], Muhammad Imran Shehzad[3], Muhammad Ramzan[2], Muhammad Azam Mushtaq[1]✉

[1]Department of Pulmonology, Choudhry Pervez Elahi Institute of Cardiology, Multan – Pakistan [2]Department of Pulmonology, Nishtar Medical University, Multan - Pakistan [3]Multan Medical & Dental College, Multan - Pakistan

Corresponding Author:
Muhammad Azam Mushtaq
Department of Pulmonology,
Nishtar Medical University,
Multan - Pakistan
Email: azammushtaq7@gmail.com

Article History:

Received:	Jun 20, 2023
Revised:	Oct 23, 2023
Accepted:	Nov 15, 2023
Available Online:	Dec 02, 2023

Author Contributions:
MAM conceived idea, MA MIS AS drafted the study, MA AS MAM collected data, MR MAM did statistical analysis and interpretation of data, MA MR MISA critical reviewed manuscript. All approved final version to be published.

Declaration of conflicting interests:
The authors declare that there is no conflict of interest.

How to cite this article:
Alam M, Ansari MIS, Shahzad A, Shehzad MI, Ramzan M, Mushtaq MA. Prevalence of Pulmonary Hypertension among the Patients diagnosed of Interstitial Lung Disease. Pak J Chest Med. 2023; 29(04):457-461.

ABSTRACT

Background: Exploring the prevalence of pulmonary hypertension (PH) among patients diagnosed with Interstitial Lung Disease (ILD). ILD includes diverse lung disorders characterized by inflammation and fibrosis. PH adds complexity to ILD, affecting severity. Understanding PH frequency in ILD patients is crucial for tailored management.

Objective: To observe the Prevalence of pulmonary hypertension among the patients diagnosed of interstitial lung disease.

Methodology: This cross-sectional study conducted at Nishtar Hospital Multan and Choudhry Pervez Elahi Institute of Cardiology (October 1st, 2019, to March 31st, 2020), ILD was identified in 90 participants through HRCT. Patient data, including age, gender, ILD diagnosis date, body mass index, smoking and hypertension history, and presence of pulmonary hypertension, were recorded. Mean and standard deviation computed for continuous data, while numbers and percentages for nominal data. Chi-square test analyzed the data, classified by gender and hypertension history.

Results: Hypertension was present in 21 (23.3 %) of all the patients and 14 (15.6 %) of the included patients were smokers. Pulmonary hypertension was present in 18 (20.0 %) of the patients. On gender distribution, 6 (14.6%) males while 12 (24.50%) females had PH (p=0.244). Among the hypertensive patients, 3 (14.3%) had PH while among normotensive patients, 15 (21.7%) patients had PH (p=0.455).

Conclusion: Those who suffer from interstitial lung disease frequently have symptoms of pulmonary hypertension. It is necessary to do clinical research in order to figure out how to treat pulmonary hypertension because having both interstitial lung disease and pulmonary hypertension is associated with a negative prognosis.

Keywords: Interstitial Lung Disease (ILD); Pulmonary Hypertension (PH); Prevalence

Introduction

The interstitium is a network of connective tissue that surrounds the bronchi and blood arteries, as well as the interlobular septae and pleura (sub pleural) and alveolar and capillary basement membranes (parenchymal).[1,2] Chromosomes are affected by diseases of the interstitial space known as interstitial lung diseases (ILD).[3,4] This syndrome results in the replac-ement of poor capillaries, alveoli, and interstitial tissue as well as the thickening of interstitial tissue.[5] Because of the similarities in their symptoms, signs, causes, and effects, rheumatoid arthritis, scleroderma, and lupus are grouped together. These illnesses are widespread because they are brought on by anomalies that either directly affect the lung parenchyma or act as a starting point for involvement of other organs.[6] A high resolution computed tomography (HRCT) scan and a biopsy are typically utilised to diagnose ILD. Several lung function tests, including the diffusion capacity of carbon monoxide (DLCO) and spirometry, are used to determine the severity of ILD.[6]
Pulmonary hypertension is defined as an increase in resting mean pulmonary arterial pressure (PAPm) of 25 mmHg or more (PH). When persons with ILD acquire PH, it may have an impact on their ability to breathe, particularly if their PAPm is greater than the severe PH threshold of 35 mmHg.[7,8] Interstitial lung disease and pulmonary fibrosis are two signs of PH that a doctor can identify. Similar to COPD in terms of clinical history, PH has a low survival rate and a limited capacity for exercise.[9-14] The most accurate method of PH diagnosis is a tight heart catheterization. Previous studies have demonstrated that respiratory failure [15, 16] is the primary cause of death in ILD patients and that PH is a risk factor for early mortality.[15-17]
The exploration of ILD-induced pulmonary hypertension is moving slowly forward (PH). PH in ILD, individuals with sarcoidosis or ILD associated with scleroderma has primarily been studied in IPF patients awaiting lung transplants.[4,6] The data display a wide range of values for frequency. It has been demonstrated, however, that PH has an impact on the prognosis of people with IPF and ILD due to scleroderma.[7] However, tertiary care clinics treat a wide variety of ILD patients, including uncommon ones.[8] There are few statistics on the prevalence of PH and how it affects these patients' prognoses, especially those with ILD. This is due to the lack of local information on the occurrence of PH with ILD, despite the grim prognosis associated with this illness. This study aims to determine the prevalence of PH in ILD patients.

Objective

This study was conducted with the aim to observe the Prevalence of pulmonary hypertension among the patients diagnosed of interstitial lung disease.

Methodology

At the Choudhry Pervez Elahi Institute of Cardiology and the Pulmonology and Medicine Departments at Nishtar Hospital Multan from October 1, 2019 to March 31, 2020. 90% of the study participants had ILD, which was detected by high-resolution computed tomography (HRCT). "Successive sampling" was used to select patients at random. Admission was denied to patients with pleural disease, congenital heart disease, left heart failure, chronic thromboembolism, lung cancer, chronic respiratory diseases (such as bronchial asthma, COPD, and bronchitis), and other heart, lung, liver, and blood vessel conditions. HIV infection or a history of thoracic surgery were additional exclusion criteria for this study. The hospital's ethics committee approved the study in this instance. Every trial participant acknowledged their understanding of the situation by signing a form.
The diagnostic standards were taken from the 2015 ESC and European Respiratory Society (ESC/ERS) Guidelines for the Diagnosis and Management of PH. By using right cardiac catheterization to measure PAPm 25 mmHg (PASP 40 mmHg) at rest, PH was identified (RHC). In particular, patients with PH as a result of ILD (ESC/ERS Group 3.2 in 2015) were the focus of this investigation. Patients with advanced lung disease cannot be diagnosed with PH using echocardiography. However, it remains the most reliable method for PH diagnosis [18, 19]. Doppler echocardiography can now be performed using a method from an earlier study [8]. A signal indicating the presence of tricuspid pressure regurgitation was obtained as the peak rate of tricuspid regurgitation was promptly checked (TR). The gold standard for PH diagnosis was screening for RHC at a TR greater than 40 mmHg (a sterile catheter was used for each patient).
Each patient's age, gender, ILD diagnosis date, body mass index, smoking and hypertension histories, and pulmonary hypertension status were recorded on a standard form. All of the data was entered and analysed using SPSS version 23. For continuous data, we estimated the mean and standard deviation, and for nominal data, we calculated the number and perce-ntage. After categorising the data by gender and history of hypertension, the chi-square test was applied. The threshold for statistical significance was set at $P \leq 0.05$.

Results

Mean age of all the patients included in the study was 48.60 ± 6.95 years, and this study group included 41 males and 49 females. Duration of disease was 5.78 ± 2.33 months on average. Mean body mass index of the

Table 1. Demographic Characteristics of study cases

Variable	Value
Age, years	48.60 ± 6.95
Gender, male / female	41 / 49
Duration of disease, months	5.78 ± 2.33
Body Mass Index	25.07 ± 3.39
Hypertension	21 (23.3 %)
Smoking	14 (15.6 %)
Pulmonary hypertension	18 (20.0 %)

Data is entered as mean ± S.D or number (percentage).

study group was 25.07 ± 3.39 kg/m^2. Hypertension was present in 21 (23.3%) of all the patients and 14 (15.6%) of the included patients were smokers. Pulmonary hypertension was present in 18 (20.0%) of the patients (Table 1).

On gender distribution, 6 (14.6%) males had PH, while 12 (24.50%) females had PH; and there was no statistically significant difference between both genders (p=0.244). Among the hypertensive patients, 3 (14.3%) had PH while among normotensive patients, 15 (21.7%) patients had PH. The difference was of no statistical significance (p=0.455) (Table 2).

Discussion

Around 200 different diseases and syndromes fall under the broad definition "interstitial lung disease." These have the worst results, and there is no established reason why. Many begin with progressive pulmonary fibrosis, a lung scarring condition that develops over time. The consequences of idiopathic pulmonary fibrosis (IPF) are among the worst of any illness. Traditional estimates of this disease's life expectancy ranged between 3 and 5 years; however, the advent of anti-fibrotic medications,[12,21] has increased the proportion of patients still alive after diagnosis.[11,18] The results of randomized controlled trials are eagerly awaited, despite pre-clinical investigations suggesting that anti-fibrotic medication may be advantageous. This is because other fibrotic lung illnesses that are worsening,[19] like chronic hypersensitivity pneumonitis and rheumatoid arthritis-associated interstitial lung disease, have equally poor prognoses. Consider obtaining a lung transplant if you have IPF and pulmonary hypertension, both of which are signs of a poor prognosis.[14] This is because pulmonary fibrosis significantly reduces both quality of life and life

Table 2. Crosstabulation of PH with Gender and history of Hypertension

Effect modifier		Pulmonary hypertension		P value
		Yes	No	
Gender	Male (N=41)	6 (14.6)	35 (85.4)	0.244
	Female (N=49)	12 (24.50)	37 (75.5)	
HTN	Yes (N=21)	3 (14.3)	18 (21.7)	0.455
	No (N=69)	15 (21.7)	54 (78.3)	

Data is entered as number (percentage).

expectancy.[6]

As a result of a complex chain of circumstances involving hypoxic vasoconstriction, endothelial failure, genetic vulnerability, and immunological dysfunction, patients with interstitial lung disease develop pulmonary hypertension. Pulmonary hypertension brought on by interstitial lung disease is notoriously difficult to treat due to the condition's complexity (ILD-PH). These and other elements seem to affect individuals differently. There are significant individual differences in the degree to which pulmonary vasculopathy is clinically evident in a group of IPF patients whom all have the typical interstitial pneumonia histological findings. People have long believed that vascular dysfunction is a secondary element to epithelial degradation as the major cause of pulmonary fibrosis. The vasculature, however, may be involved in the onset and development of IPF and other progressive fibrotic lung illnesses, according to a fresh theory.

This study found that 20% of people have PH. Both the PH and hypertension levels did not differ significantly by gender. To ascertain the prevalence of pulmonary hypertension (PH) in ILD patients and whether there is a link between ILD-related PH and pulmonary function, a study enrolled individuals with a range of ILDs. It was discovered that 25% of persons have PH, with 6.4% having severe PH.[22] The two research findings were similar.

Between research groups, there were differences in the population with PH. 14% of the 212 individuals with different ILDs that Anderson et al. investigated had PH, they found.[6] In a study carried out in a tertiary facility, Nadrous et al. found that the mean PASP for 88 people with IPF whose PASP was measured by transthoracic echocardiography ranged from 28 to 116 mmHg.[23] The Nadrous et al. study did not include RHC, which would have been used to assess the existence and severity of PH. (5.7%) of 246 Japanese sarcoidosis patients showed PH (classified as PASP 40 mmHg) during Doppler echocardiography.[24] Large amounts of RHC data from patients in the ultrasonography lung transplant registry were evaluated in separate research. One percent of IPF patients awaiting lung transplants had PH.[25] To receive a lung transplant, 454 IPF patients enrolled with the United Network for Organ Sharing in 2004 and 2005. Pulmonary hypertension was discovered in 36 percent of the 376 individuals who had RHC.[26]

Conclusion

Interstitial lung disease and pulmonary hypertension are two conditions that co-occur in an extraordinarily high percentage of patients. Trials of therapy for PH are required because patients who suffer from both interstitial lung disease and pulmonary hypertension have a negative outlook on their health.

References

1. Verschakelen JA, De Wever W. Basic anatomy and CT of the normal lung. In Computed Tomography of the Lung. Springer, Berlin Heidelberg, 2018; 3–19.
2. Zhang G, Zheng X. Practical reviews on the anatomy of the chest. Pract Rev. 2018;33–54
3. Antoniou KM, Margaritopoulos GA, Tomassetti S, Bonella F, Costabel U, Poletti V. Interstitial lung disease. European Respiratory Review. 2014 Mar 1;23(131):40-54.
4. Burchell RK: Interstitial Lung Diseases. Chapter 32. Gram DW, Milner RJ, Lobetti R (eds.), 2017.
5. Sisson TH, Mendez M, Choi K, Subbotina N, Courey A, Cunningham A et al. Targeted injury of type II alveolar epithelial cells induces pulmonary fibrosis. Am J Respir Crit Care Med. 2010;181: 254–63.
6. Hodnett PA, Naidich DP. Fibrosing interstitial lung disease. A practical high-resolution computed tomography–based approach to diagnosis and management and a review of the literature. Am J Respir Crit Care Med. 2013;188(2):141-9.
7. Caminati A, Cassandro R, Harari S. Pulmonary hypertension in chronic in- terstitial lung diseases. Eur Respir Rev. 2013; 22: 292–301.
8. Andersen CU, Mellemkjær S, Hilberg O, Nielsen-Kudsk JE, Simonsen U, Bendstrup E. Pulmonary hypertension in interstitial lung disease: Prevalence, prognosis and 6 min walk test. Respir Med. 2012; 106: 875–82.
9. Cottin V, Le Pavec J, Prévot G, Mal H, Humbert M, Simonneau G, Cordier JF. Pulmonary hypertension in patients with combined pulmonary fibrosis and emphysema syndrome. Eur Respir J. 2010; 35(1): 105–11.
10. Cottin V, Harari S, Humbert M, Mal H, Dorfmüller P, Jaïs X, R et al. Pulmonary hypertension in lymphang-ioleiomyomatosis: characteristics in 20 patients. Eur Respir J. 2012; 40: 630–40.
11. Le Pavec J, Lorillon G, Jaïs X, Tcherakian C, Feuillet S, Dorfmüller P, et al. Pulmonary Langerhans cell histiocytosis- associated pulmonary hypertension: Clinical characteristics and impact of pulmonary arterial hypertension therapies. Chest. 2012; 142: 1150–57.
12. Nathan SD, Cottin V. Pulmonary hypertension in patients with idiopathic pulmonary fibrosis. Eur Respir Monogr. 2012; 57: 148–60.

13. Shlobin OA, Nathan SD. Management of end-stage sarcoidosis: Pulmonary hypertension and lung transplantation. Eur Respir J. 2012; 39: 1520–33.

14. Cottin V. Treatment of pulmonary hypertension in interstitial lung dis- ease: Do not throw out the baby with the bath water. Eur Respir J, 2013; 41: 781–83.

15. Margaritopoulos GA, Antoniou KM, Wells AU. Comorbidities in interstitial lung diseases. Eur Respir Rev. 2017; 26: 160027.

16. Habash F, Gurram P, Almomani A, Duarte A, Hakeem A, Vallurupalli S, et al. Correlation between echocardio- graphic pulmonary artery pressure estimates and right heart catheteriza- tion measurement in liver transplant candidates. J Cardiovasc Imaging. 2018; 26: 75–84.

17. Shorr AF, Wainright JL, Cors CS, Lettieri CJ, Nathan SD. Pulmonary hypertension in patients with pulmonary fibrosis awaiting lung transplant. Eur Respir J. 2007; 30(4): 715–21.

18. Fisher MR, Forfia PR, Chamera E, Housten-Harris T, Champion HC, Girgis RE, et al. Accuracy of Doppler echocardiog- raphy in the hemodynamic assessment of pulmonary hypertension. Am J Respir Crit Care Med. 2009; 179: 615–21.

19. Nathan SD, Shlobin OA, Barnett SD, Saggar R, Belperio JA, Ross DJ. Right ventricular systolic pressure by echocardiography as a predictor of pulmonary hypertension in idiopathic pulmonary fibrosis. Respir Med. 2008; 102: 1305–10.

20. Nunez B, Sauleda J, Antó JM, Julia MR, Orozco M, Monso E, et al. Anti-tissue antibodies are related to lung function in chronic obstructive pulmonary disease. Am J Respir Crit Care Med. 2011; 183: 1025–31.

21. Medford ARL. Interstitial lung disease and antinuclear antibody: Consider nonspecific interst-itial pneumonia histology and newer antibodies. Chest, 2012; 141: 1360–61.

22. Lv H, Liu J, Pan Q, Cai R, Zhang J. Clinical Retrospective Analysis of Interstitial Lung Disease Patients Associated with Pulmonary Hypertension. Med Sci Mon Int Med J Exp Clin Res. 2019;25:7763-69.

23. Nadrous HF, Pellikka PA, Krowka MJ, Swanson KL, Chaowalit N, Decker PA. Pulmonary hypertension in pa- tients with idiopathic pulmonary fibrosis. Chest. 2005; 128: 2393–99.

24. Handa T, Nagai S, Miki S, Fushimi Y, Ohta K, Mishima M. Incidence of pulmonary hypertension and its clinical relevance in patients with sarcoidosis. Chest. 2006; 129: 1246–52.

25. Shorr AF, Wainright JL, Cors CS, Lettieri CJ, Nathan SD. Pulmonary hypertension in patients with pulmonary fibrosis awaiting lung transplant. Eur Respir J, 2007; 30: 715–21.

26. Lederer DJ, Arcasoy SM, Wilt JS, D'Ovidio F, Sonett JR, Kawut SM. Six-minute-walk distance predicts waiting list survival in idiopathic pulmonary fibrosis. Am J Respir Crit Care Med. 2006; 174: 659–64 29.

27. Nadrous HF, Pellikka PA, Krowka MJ, Swanson KL. The impact of pulmonary hypertension on survival in patients with idiopathic pulmonary fibro- sis. Chest. 2005; 128: 616–17.