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FREQUENCY OF PULMONARY HYPERTENSION USING ECHOCARDIOGRAPHY IN PATIENTS OF IDIOPATHIC PULMONARY FIBROSIS AT A TERTIARY CARE HOSPITAL

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ABSTRACT

Objective: To determine the frequency of pulmonary hypertension among patients with idiopathic pulmonary fibrosis using echocardiography, presenting to the Pulmonology Department of a tertiary care hospital.

Methodology: This cross-sectional study was conducted on a sample size of 130 patients (aged 50-80 years) with idiopathic pulmonary fibrosis presented to the Department of Pulmonology, Jinnah Hospital Lahore from September 2018 to March 2019. Mean pulmonary artery pressure (mPAP) 25 mmHg at rest was regarded to be pulmonary hypertension, whilst mPAP of 25–40 mmHg at rest was deemed to be moderate pulmonary hypertension, and mPAP >40 mmHg at rest was considered to be a serious disease. Data was analyzed using SPSS v.17.0. Numerical variables were summarized as mean and standard deviation. Chi-square test was used as a test of significance and a p-value < 0.05 was considered as significant.

Results: Mean age was 64.5+8.7 years with 67 (51.5%) male and 63 (48.5%) female. The mean duration of the disease since diagnosis of Idiopathic Pulmonary Fibrosis was 13.6+6.4 months. After doing echocardiography, pulmonary hypertension was found in 19 (14.6%) patients with moderate pulmonary hypertension in 14 (10.7%) while 5 (3.8%) had severe disease. Mean mPAP was 19.2+9.2 mmHg (mPAP 10-50 mmHg).

Conclusion: Pulmonary Hypertension is not an uncommon finding in patients with Idiopathic Interstitial Fibrosis. Prevalence of pulmonary hypertension had no association with the finding of this study. Moreover, no association of age, sex, or duration of disease with the prevalence of pulmonary hypertension was seen.

Keywords: Idiopathic Pulmonary Fibrosis; Pulmonary Hypertension; Mean Pulmonary Artery Pressure (mPAP).

INTRODUCTION

A progressive, chronic fibrosing interstitial pneumonia with etiology unknown, Idiopathic Pulmonary Fibrosis is confined to the lungs having the appearance of usual interstitial pneumonia on radiology and histopathology.[1] With the incidence of up to 16 per 100,000 cases and prevalence of up to 43 per 100,000, Idiopathic Pulmonary Fibrosis has an estimated life expectancy of up to 5 years after diagnosis.[2,3] Gold standard for diagnosis of pulmonary artery hypertension is a measurement of right heart pressures in cardiac catheterization studies. However, it is an invasive procedure due to which patients are generally reluctant. Echocardiography, a non-invasive and readily available bedside procedure, also helps to measure mean Pulmonary Artery Pressure (mPAP) and is widely preferred. Pulmonary hypertension has been linked with interstitial pulmonary fibrosis and its presence increases the risk of death approximately 3-fold.[4] However, the existing literature has shown considerable variation in its frequency among this population.

Anderson et al.[5] reported a frequency of PH as 14% among patients with IPF while Rivera-Lebron et al.[6] reported a frequency of 29%. However, Castria et al.[7] and Papakosta et al.[8] found even a higher frequency of PH among patients with IPF at 39.7% and 55% respectively. Moreover, no local study is available so far to give an idea of its magnitude according to our local prevalence of interstitial pulmonary fibrosis. Pulmonary hypertension is associated with considerable mortality and morbidity among patients with interstitial pulmonary fibrosis. However, the existing literature shows considerable variation in a frequency ranging from 14%[5] to 55%[8] with no local study available so far according to the local prevalence of disease and risk factors. Thus, this study aimed to help in bridging this gap. The objective of the present study was to determine the frequency of pulmonary hypertension using

echocardiography among patients of idiopathic pulmonary fibrosis at the pulmonology unit of Jinnah Hospital Lahore to help aid in giving insight to the clinicians regarding the magnitude of the problem in these patients and to develop screening guidelines in these patients for early diagnosis and management of pulmonary hypertension using echocardiography which is a non-invasive and readily available bed-side procedure.

METHODOLOGY

This cross-sectional study was conducted at the Department of Pulmonology, Jinnah Hospital Lahore from September 2018 to March 2019. A sample size of 130 was required with a confidence level of 95% and a margin of error of 6%, using an expected percentage of pulmonary hypertension in interstitial fibrosis at 14%.[5] Idiopathic pulmonary fibrosis was diagnosed as the presence of dyspnea on exertion of >5 min for at least 3 months, bilateral basilar inspiratory crepitations on chest auscultation, FEV1/FVC ratio >80% on spirometry and presence of bibasilar reticular abnormalities with minimal ground-glass opacities seen on high-resolution CT scan. mPAP ≥25 mmHg at rest on echocardiography is considered as Pulmonary hypertension.[9] Moderate pulmonary hypertension was defined as mPAP 25-40 mmHg at rest while severe disease was defined by mPAP >40 mmHg at rest.[9]

Using non-probability consecutive sampling, 130 patients with idiopathic interstitial fibrosis of both sexes aged 50 to 80 years were enrolled in the study. Patients with drug toxicities due to chemotherapy drugs (bleomycin, methotrexate, cyclophosphamide), with known connective tissue disorder, with chronic obstructive pulmonary diseases, and with pulmonary embolism determined on history and medical records were excluded. After taking informed consent, demographic information was noted. All the patients underwent echocardiography to the determination of pulmonary hypertension and mPAP was noted. Confidentiality of the data was ensured. Patients with pulmonary hypertension were managed as per hospital protocol. Data stratification for age, gender, and duration of idiopathic pulmonary fibrosis to control effect modifier was done, and a chi-square test was applied was entered and analyzed using SPSS 17.0. taking p-value <0.05 significant.

RESULTS

The mean age of the patients was 64.5±8.7 years. Of the 130 patients enrolled 63 (48.5%) were female and 67 (51.5%) male. The mean duration of the disease since diagnosis of Idiopathic Pulmonary Fibrosis was 13.6±6.4 months. After doing echocardiography, pulmonary hypertension was found in 19 (14.6%) patients. Mean mPAP was 19.2±9.2 mmHg with minimum mPAP 10 mmHg and maximum mPAP 50 mmHg. Moderate pulmonary hypertension was seen in 14 (10.7%) patients while 5 (3.8%) had severe disease. Stratification of outcome (pulmonary hypertension) done with regards to demographic variables is shown in Table 1.

DISCUSSION

The clinical features of pulmonary hypertension are non-specific and include dyspnea on exertion, fatigue, and lethargy. Due to this pulmonary hypertension is difficult to recognize as these features are commonly ascribed to age, de-conditioning, or a co-morbid disease.[10] Therefore, most patients only present when the exertional dyspnea has worsened severely or with complications, such as chest pain on exertion, peripheral edema, or angina. Anderson et al.[5] reported a frequency of PH as 14% among patients with IPF while Rivera-Lebron et al.[6] reported a frequency of 29%. However, Castria et al.[7] and Papakosta et al.[8] found even a higher frequency of PH among patients with IPF at 39.7% and 55% respectively. The six-minute walking test distance, WHO functional class, and hemodynamic measurements all improve with treatment. [11] Additionally, epoprostenol treatment has shown better survival when compared to historical controls in multiple uncontrolled trials and one controlled trial. One study, for instance, showed that patients receiving epoprostenol had higher survival rates than historical controls after one year 85% vs 58%), three years 63% vs 33%, and five years 55% vs 28%. [12] The medication reduced mortality by 1.5% vs 3.8%, RR 0.57, 95% CI 0.35 - 0.92) when compared to controls, according to the meta-analysis evaluation of 21 randomized trials involving 3140 participants. [11]

The objective of the present research was to determine the frequency of "pulmonary hypertension among patients with idiopathic pulmonary fibrosis presenting to the Pulmonology Department of tertiary care hospital". In this regard, the present cross-sectional survey was conducted with 130 patients with "idiopathic pulmonary fibrosis" enrolled using non-probability consecutive sampling and "pulmonary hypertension" was found

Table 1: Stratification of pulmonary hypertension with regards to demographic variables

Demographic variables		Pulmonary Hypertension		p-value
		Present	Absent	
Age	50-65 years	10 (13.8%)	62 (86.2%)	0.808
	65-80 years	9 (15.6%)	49 (84.4%)	
Sex	Male	10 (14.9%)	57 (85.1%)	0.912
	Female	9 (14.2%)	54 (85.8%)	
Duration of Disease	More than 12 months	7 (12.7%)	48 (87.3%)	0.802
	Less than 12 months	12 (16.0%)	63 (84.0%)	

in 19 (14.6%) patients with mean mPAP as 19.2±9.2 mmHg. In the Greek study by Papakosta et al.[8] 193 patients with idiopathic pulmonary fibrosis with 101 males with and mean age of 68.6±9.0 years, pulmonary artery systolic pressure was estimated by echocardiography to show "pulmonary hypertension" in 55% as compared to 14.6% in our study which may be due to ethnic differences between the two populations. The study by Castria et al.[7] with 126 patients with idiopathic pulmonary fibrosis showed pulmonary hypertension in 39.7% being more common in females and smokers. Furthermore, patients having FVC <50% showed a notable worsening of mPAP and pulmonary hypertension at 1-year follow-up and poor survival rates (hazard ratio 3.56).[7] In the present study, the mean age was 64.5±8.7 years and by using the chi-square test it was found that there was no significant "association between age groups and the presence of pulmonary hypertension (p-value 0.808). With 67 (51.5%) male patients and 63 (48.5%) female patients, a significant association was not found between gender and the presence of pulmonary hypertension (p-value 0.912)". The mean duration of disease was 13.6±6.4 months and there was no significant association between the duration of disease and the presence of pulmonary hypertension (p-value 0.802). In our study, moderate pulmonary hypertension was seen in 14 (10.7%) patients while 5 (3.8%) had severe disease. In the study by Andersen et al.[5] 29 (14%) suffered pulmonary hypertension while 13 (6%) had severe pulmonary hypertension and 16 (8%) had mild disease.

A risk score of 1-7, 8, 9, 10-11, and ≥12 is correlated to the one-year survival rate of 95%, 92%, 89%, 72%, and 66% respectively.[13] Another study that used data from the REVEAL registry reported that patients with PAH had 1,2,3, and 7-year survival rates of 85%, 68%, 57%, and 49% respectively.[14] Another registry found 1,3,5, and 7 years survival rates of 90%, 76%, 57%, and 44% respectively, while those aged 50 or younger had survival rates of 95%, 91%, 87%, and 75% respectively.[15] The contribution of being male toward the risk of death among individuals older than 60 years was confirmed in a separate study.[16] The study by Sitbon et al.[12] showed men older than 60 years had a poor two-year survival rate as compared to women (64% vs 78%) but there was no difference in survival between women and men aged 60 years or younger (84% vs 86%). Age >45 years at onset, WHO functional class III or IV, failure in reduction to lower WHO functional class with therapy, hypocapnia, septal shift during diastole, increased NT-pro-BNP, decreased pulmonary arterial capacitance, prolonged QRS duration and pericardial effusion are factors indicating a poor prognosis.[12] Pulmonary hypertension patients who suffer cardiac arrest rarely revive. In the study by Hoeper et al.[17] with over 3000 pulmonary hypertension patients who needed CPR merely 6% survived for 90 days. Pulmonary hypertension has been linked with interstitial pulmonary fibrosis and its presence increases the risk of death approximately 3-fold.[4] It is important to realize that the prognostic factors described above are evaluated when PAH is newly diagnosed so that measures can be taken to reduce the disease burden and improve the quality of life in our population.

CONCLUSION

We conclude that Pulmonary Hypertension is not an uncommon finding in patients with Idiopathic Interstitial Fibrosis. The frequency of Pulmonary Hypertension was 14.6% in patients with idiopathic pulmonary fibrosis in our study. No statistical association of age, sex, or duration of disease with the prevalence of pulmonary hypertension was seen. However further studies are required to determine morbidity and mortality caused by pulmonary hypertension so that measures can be taken to reduce the disease burden and improve the quality of life in our population.

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Author's Contribution

MH contributed to initial literature research and designed the proforma for data collection, and assessed the patients. MA wrote the manuscript. NIB and MQT contributed to data analysis, and interpretation, and writing of the manuscript. FA and SA conceived the idea and did the final critical review and corrections. Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Conflict of Interest

Authors declared no conflict of interest

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None

Data Sharing Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.