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Medicine

Study of Pulmonary Hypertension among the Patients of Lung Disease: A Prospective Observational Study

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Abstract: Pulmonary arterial hypertension is a rapidly progressive devastating disease with significant morbidity and mortality. In lung diseases the predominant cause of PH is alveolar hypoxia as a result of either chronic lung disease, impaired control of breathing, or residence at high altitude. Aim and objectives: To evaluate pulmonary hypertension in patients with lung diseases and / hypoxemia using noninvasive methods. Methodology: it is observational prospective study. 100 Patients with lung disease who fulfill the inclusion and exclusion criteria, attending the outpatient department or undergoing inpatient treatment at CareMax hospital Jalandhar during the period of December 2017 to march 2018 had been chosen for study. Result: From the study it has been observed that mean age of patients is 62.9 ± 14.7years, 51 were male. Cough was present in 94% patients, dyspnea in 97%, sputum in 62%, fever in 51% and swelling of lower limbs in 45% patients It was observed that pulmonary hypertension is common in age group 61-80years (whether mild, moderate or severe). P value is 0.219 which is statistically insignificant (as >0.05)
Keywords: Pulmonary hypertension, lung disease, hypoxia, echocardiography.

INTRODUCTION

Pulmonary arterial hypertension is a rapidly progressive devastating disease with significant morbidity and mortality. PAH is characterized by increased pulmonary vascular resistance leading to impending right heart failure and death, unless treated appropriately and early.

Lung diseases are one of the most frequent causes of pulmonary hypertension (PH). PH in the course of lung diseases develops as a result of both "parenchymal" and vascular pathology, in the patients with genetic predisposition. Prolonged infection (especially viral one) may be an additional promoting factor[1].

In lung diseases the predominant cause of PH is alveolar hypoxia as a result of either chronic lung disease, impaired control of breathing, or residence at high altitude. However, the precise prevalence of PH in all these conditions remains largely unknown. In the revised classification, the heading has been modified to reinforce the link with the development of PH. A category of lung disease characterized by a mixed obstructive and restrictive pattern was added, including chronic bronchiectasis, cystic fibrosis and the recently described syndrome of combined pulmonary fibrosis and emphysema in which the prevalence of PH is almost 50%[2].

In PAH associated with parenchymal lung disease, the increase of pulmonary arterial pressure is usually modest (mean PAP lower than 35 mmHg) [3].

Pulmonary hypertension is frequent in late-stage idiopathic pulmonary fibrosis, and is associated with a shorter survival. They emphasized that it should be suspected in case of dyspnea or hypoxemia disproportionate with the degree of parenchymal lung disease [4].

The golden standard for diagnosis of PH is right heart catheterization; however, evidence of PH can be appreciated on clinical examination, serology, radiological imaging, and Doppler echocardiography [4-6].Treatment of PH in lung diseases focuses on management of the underlying lung disorder and hypoxia.

Though PH is very common in lung disease it is often unnoticed due to common symptoms. The present study was undertaken to evaluate pulmonary

hypertension among various lung diseases and /or hypoxemia.

AIM AND OBJECTIVES

- To study pulmonary hypertension in patients with lung diseases and / hypoxemia.
- To study clinical profile of patients with pulmonary hypertension.
- To evaluate pulmonary hypertension in patients with lung diseases and / hypoxemia using noninvasive methods.

MATERIALS AND METHODS

Study design

Prospective Observational study

Study site

This study was conducted at Caremax Hospital Jalandhar, with well-equipped Emergency and Critical Care Unit.

Study population

Patients with lung disease who fulfill the inclusion and exclusion criteria, attending the outpatient department or undergoing inpatient treatment at Ruby Hall Clinic, Pune during the period of December 2017 to March 2018

Sample size calculation

By considering the prevalence of pulmonary hypertension among patients of lung diseases and /hypoxia as 45% (in our hospital), we have calculated the sample size by using following formula

$N = 4* P * Q/ L^ 2$

Where P = Prevalence

Q = 100-P

L = experimental error (10%), Thus N = 99

We have considered the sample size 100.

Time frame to address the study

December 2017 to March 2018

Inclusion Criteria

Clinically diagnosed as lung disease and /or hypoxemia with subsequent confirmation by spirometry, Chest x ray, ABG and CT scan and echo screening showing raised pulmonary artery pressure which includes chronic obstructive pulmonary disease, interstitial lung disease, other pulmonary diseases with mixed restrictive and obstructive pattern, Sleep-disordered breathing, alveolar hypoventilation, chronic exposure to high altitudes and Developmental abnormalities

Exclusion Criteria

It involves Valvular heart diseases**,** acute Left Ventricular Failure and Pulmonary edema secondary to other causes (hypertension, ischemic heart disease, and cardiomyopathies)**,** Primary pulmonary hypertension**,** and **c**hronic thromboembolic pulmonary hypertension

Methodology

After obtaining ethical committee clearance patient who are fulfilling the inclusion criteria were selected. The purpose of the study was explained to the patient and informed consent obtained. Data was collected using a pretested study proforma meeting the objectives of the study. Detailed history, physical examination and necessary investigations was undertaken Using noninvasive methods like ECG, Chest X-Ray CT scan, ABG diagnosis was confirmed

Echocardiography was done by experienced cardiologist to evaluate pulmonary hypertension. Systolic Pulmonary Artery Pressure was obtained by echo which was converted into mean Pulmonary Artery Pressure (m PAP) by using formula.

$$mPAP\ (mmHg) = 0.61\ X\ sPAP + 2$$

Pulmonary Hypertension grading is done.

STATISTICAL ANALYSIS

Statistical analysis of data is done by help of SPSS 20.0 Software (trail Version). Statistical analysis was done for mean and frequency. Chi square test had been applied to find the relationship between the factors.

OBSERVATIONS AND RESULTS

From the study it has been observed that mean age of patients is 62.9 ± 14.7years and maximum number of patients belongs to age group 61-80 years. Minimum age was 13 year and maximum age was 96 year. Out of 100 patients 51 were Male and 49 were Female.

Cough was present in 94% patients, dyspnea in 97%, sputum in 62%, fever in 51% and swelling of lower limbs in 45% patients. Figure 1. Mean duration of illness was 13.6 years with SD 11.2 years. Majority of patients belongs to group 6-10 years duration of illness. It was observed that juglar venous pulsation was raised in 32% patient, 20% patients were cyanosed and pedal edema was present in 39% patients.(Table 1). When arterial blood gas had been measured it was found that 50 % patients had acidosis, 47% patients were having hypercapnea and 90% patients were hypoxic.

It was observed that 33% patients had Moderate obstruction, 22% patients had severe obstruction, 14% patients had moderate restriction, 24% patients had severe restriction while 6% patients had mixed pattern on PFT. Table 2 Out of 100 patients 49% patients had COPD, 26% had ILD, 11 % had bronchiectasis, 8% had OSA, 3% had CPFES, 2% kyphoscoliosis and 1% had cystic fibrosis. Figure 2

It was observed that pulmonary hypertension is common in age group 61-80years (whether mild, moderate or severe). P value is 0.219 which is statistically insignificant (as >0.05) Table 3

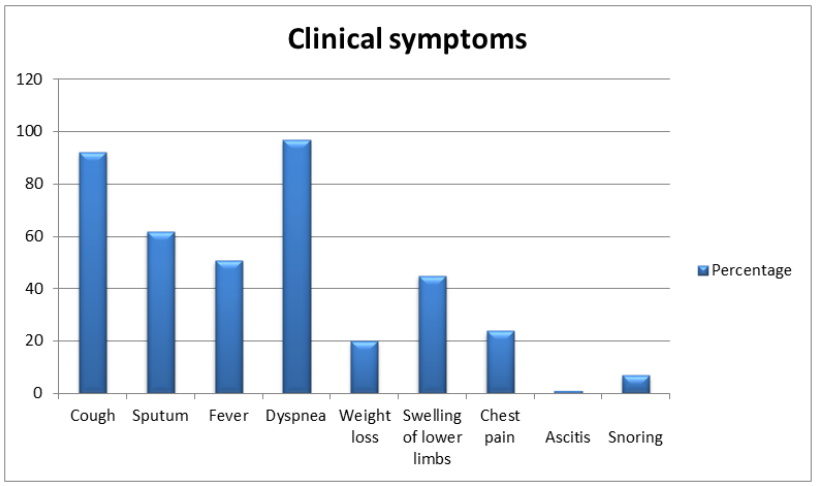

Fig-1: Clinical symptoms of the patients of pulmonary hypertension

Table-1: General examination

Examination	Number of patient(n)	Percentage (%)
JVP		
Raised	32	32
Not raised	68	68
Cyanosis		
Present	20	20
Absent	80	80
Pedal edema		
Present	39	39
Absent	61	61

Table-2: Pulmonary function test (PFT)

PFT	Number of patients (n)	Percentage (%)
Mild restriction (MiR)	1	1
Moderate restriction (MoR)	14	14
Severe restriction (SR)	24	24
Mild obstruction (MiO)	0	0
Moderate obstruction (MoO)	33	33
Severe obstruction (SO)	22	22
Mixed pattern (MIX)	6	6
Total	100	100

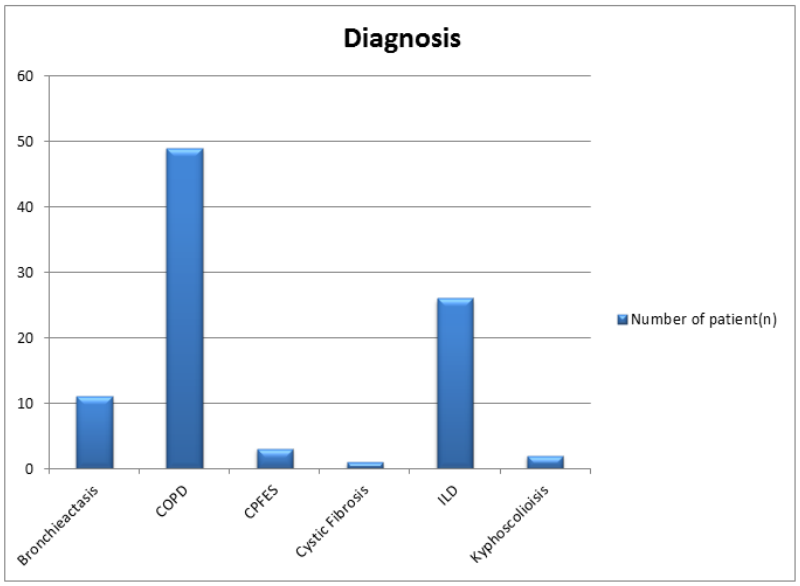

Fig-2: Diagnosis of the patient with pulmonary hypertension

Table-3: Association of age and severity of pulmonary hypertension

Age		Mean pulmonary artery pressure			Total	Chi Sq	P value
		Mild	Moderate	Severe			
	0-20 Years	0	0	2	2		
		0.0%	0.0%	7.7%	2.0%		
	21-40 Years	2	1	0	3		
		3.9%	4.3%	0.0%	3.0%		
	41 - 60 Years	16	10	11	37		
		31.4%	43.5%	42.3%	37.0%	10.701	0.219
	61-80 Years	24	10	12	46		
		47.1%	43.5%	46.2%	46.0%		
	80-100 Years	9	2	1	12		
		17.6%	8.7%	3.8%	12.0%		
Total		51	23	26	100		
		100.0%	100.0%	100.0%	100.0%		

DISCUSSION

Pulmonary hypertension is a common complication in lung disease. In the most recent revised classification of pulmonary hypertension (PH), chronic lung diseases or conditions with alveolar hypoxia are included in WHO Group III of PH-related diseases. In present study 100 patients with lung diseases and /or hypoxia were studied in a tertiary centre. The mean age of patients is 62.9 ± 14.7years and maximum number of patients belongs to age group 61-80 years. Similar findings had been obtained in the study conducted by Mc Goon M.D. *et al.* [7] in US aming the patients of pulmonary hypertension.

Female male ratio is non accordance to other studies by Humbert M ea(French registry) [8] and Badesch DB RG(US registry) [9], where much higher female preponderance is seen. However these registries are consistent with pulmonary arterial hypertension i.e. Group I and no such registry for group III is available.

In present study 90% patients have hypoxia and the mean PaO2 is 71.2 ± 14.5 mmHg. Hypercapnia is present in 47% patients with mean PaCO2 of 47.5 ± 11.2mmHg. Findings in present study are in accordance to study done by in present study 90% patients have hypoxia and the mean PaO2 is 71.2 ± 14.5 mmHg. Hypercapnia is present in 47% patients with mean PaCO2 of 47.5 ± 11.2mmHg. Findings in present study are in accordance to study done by Weitzenblum *et al*. However this study was mainly for COPD patients [10].

CONCLUSION

- Pulmonary hypertension is very common complication in chronic lung diseases and hypoxemic conditions. Early diagnosis of pulmonary hypertension among lung diseases is necessary to prevent its progression. Echocardiography is very useful, cheap, noninvasive, reliable and easily available modality to diagnose pulmonary hypertension in lung

diseases and /or hypoxemia. Early diagnosis of pulmonary hypertension among lung diseases is necessary to prevent its progression. Echocardiography is very useful, cheap, noninvasive, reliable and easily available modality to diagnose pulmonary hypertension in lung diseases and /or hypoxemia.

LIMITATIONS

Sample size was small in our study. It was a hospital based study, so only symptomatic patients were included in the study. Right heart catheterization is gold standard method for evaluation of pulmonary hypertension but it was not used in our study due to invasive method and hospital limitations

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