ORIGINAL ARTICLE

Clinical Spectrum and Etiological Evaluation of Patients with Pulmonary Hypertension in Municipal Corporation Hospital of Ahmedabad City

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Abstract

Objectives: To study the demographical profile and etiological evaluation of patients with pulmonary hypertension

Materials and methods: Total 66 patients coming to medical OPD and admitted in medical wards having pulmonary hypertension were enrolled in study after obtaining approval from ethics committee of our institute. Demographic profile of all these patients and detailed general and systemic examination was done as per the preformed proforma. We have utilized multiphase investigative approach for etiological evaluation.

Results: Involvement of younger age group, gender reversibility, housewives and labourers contributing as major occupational etiological factor, were few of the surprising observations in our study. Left sided heart disease and lung parenchymal diseases were most frequent causes of PH.

Conclusion: This study provides some novel information on PH in Indian population. There is, however, a definite need to conduct a large-scale study involving urban as well as rural population to reconfirm the above mentioned new observations concluded in our study.

Introduction

Pulmonary hypertension (PH) is a serious disorder that affects the functional quality of patients in form of disabling the patient in performing routine day to day activities and decreases their life span. If diagnosed early, a better quality of life can be provided. A stepwise approach for investigation of patients suspected of pulmonary hypertension is essential to initiate appropriate treatment. The routine workup of a patient suspected to have pulmonary hypertension could easily be carried out in any well-equipped peripheral hospital in many advanced countries. However, in developing countries the necessary work up can only be done in major tertiary hospitals. The typical patient who diagnosed in a developing country such as India or China often has advanced disease and poor prognosis.[1,2]

About 20 to 25 million people or more suffering from PH of different causes in the developing world.[3]

There are regional differences regarding the etiology of PH; for instance, in France, the frequency of PH due to anorexigenic drugs is higher. In one study from Brazil, 30% of PH was due to schistosomiasis.[4,5] Therefore, it is likely that there is a strong regional influence in PH aetiologies, justifying the reproduction of these prevalence studies in our country.

Patients presenting with dyspnoea on exertion and pedal oedema are not infrequent in medical OPD. Few of them have no common identifiable cause. On detailed evaluation significant number of such patients is found to have pulmonary hypertension to account for their symptoms. Based on this observation we have decided to systematically study series of such patients and try to conclude some meaningful conclusion that may help in diagnosis and management of such patients in future.

There is a need to study PH in Indian scenario in view of several unique characteristics like high prevalence of certain diseases (as has been well demonstrated in other chronic diseases), attitudes and cultural beliefs of the people which are quite different from the western population. So it is necessary to study demographic profile and etiological evaluation of patient in India to know the disease etiology and course for further management of patients.

Objectives of Study

1. To study the demographical profile of patients with pulmonary artery hypertension
2. Etiological evaluation of patients with pulmonary artery hypertension.

Material and Methodology

It is an observational cross-sectional study, conducted for 1 year duration from May 2013 to May 2014

Inclusion Criteria

Patients admitted in medical wards with symptomatology suggestive of pulmonary hypertension and confirmed by echocardiography (RVSP >40MMHG).

Exclusion Criteria

- Pediatric patients
- Pregnant patients
- Patients having no PH on echocardiography

All patients attending medical OPD and admitted to medical wards having clinical suspicion of PH were subjected to 2dimension echocardiography after obtaining written informed consent from the patient. Pulmonary

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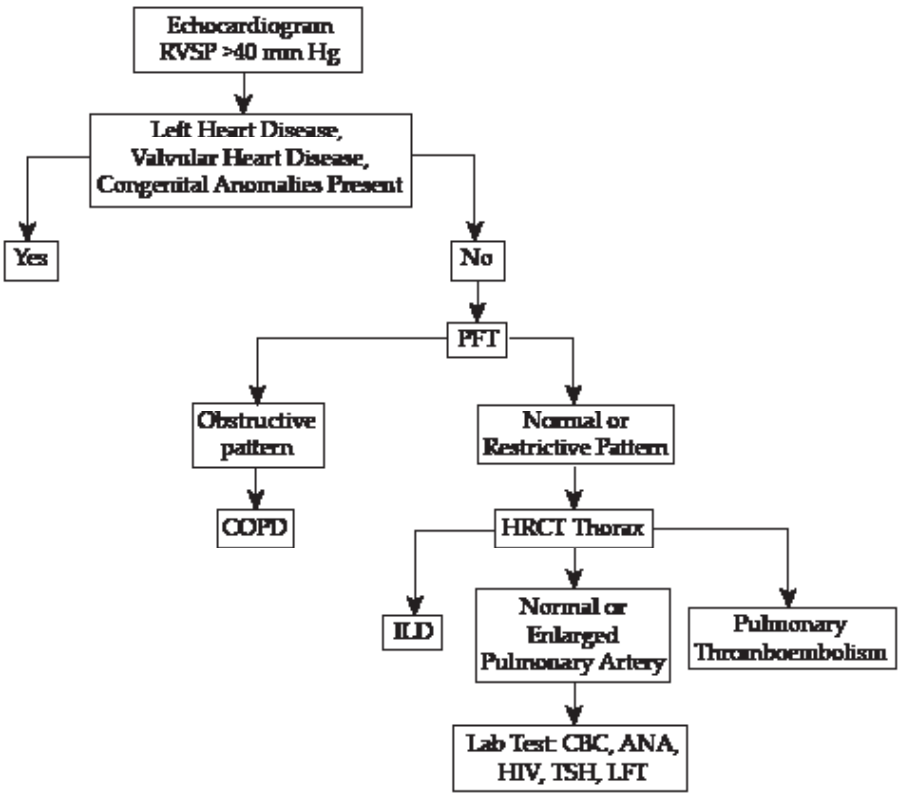

PAH: Pulmonary artery hypertension; PFT: Pulmonary function test; COPD: Chronic obstructive pulmonary disease; HRCT: High resolution computerized tomography; ILD: Interstitial lung disease; CBC: Complete blood count; ANA: Anti nuclear antibody; HIV: Human immune virus; TSH: Thyroid stimulating hormone; LFT: Liver function test

Fig. 1: An algorithm for workup of patients with ↑PH

hypertension was suspected on the basis of following clinical features. The symptoms and signs suggestive of pulmonary hypertension are Exertional dyspnoea, Chest pain, Fatigue, Abdominal discomfort, Pedal Oedema, Hypoxia, Cyanosis, Clubbing, Raised JVP, Ascites, and Pedal Oedema.

All Patients having above mentioned clinical features were subjected for 2D echo evaluation and those patients with right ventricle systolic pressure (RVSP) > 40 mm Hg were considered as candidate for the study. Demographic profile of all these patients including age, sex, residence, occupation, addiction, symptoms of PH was noted in a preformed proforma. Detailed general and systemic examination was done and the findings were also recorded in proforma. CXR (PA) and ECG were done in all patients recruited in the study.

For evaluation of cause of PH, further investigation was done according to diagnostic flow chart as given in the following Figure 1.

We have utilized multiphase investigative approach according to flow chart described above. According to this multiphase approach we first did echocardiography to confirm PH to rule out any cardiac cause of PH like diastolic or severe systolic dysfunction, congenital heart disease, valvular heart disease etc. All the patients having any organic heart disease diagnosed on 2D echocardiography were excluded from the further investigations as we already have found the aetiology of PH.

If RVSP is >40 mm Hg and rest of the echocardiography is normal then we moved to next step of investigation. By that way, using stepwise approach we had diagnosed the aetiology of PH. In small number of patients all the investigation turned out to be negative and was required to undergo cardiac catheterization to confirm primary PH and to rule out other secondary cause of PH as well. This multiphase investigative approach is cost effective and also least inconvenient to patients by avoiding unnecessary investigations.

Results

Total 66 patients were studied in this study; age group most commonly affected is 51 to 60 years. Mean age group is 53 years. In present study there is slight male preponderance. Most commonly affected group is housewives followed by labourers. Smoking was found as risk factor in 20% of patient. Chulha exposure was found as a risk factor in 21%.

Table 1: Clinical features

Symptoms	Number of patients
Dyspnoea	64 (96.97%)
Fatigue	62 (93.93%)
Pedal oedema	57 (86.36%)
Coughing	44 (66.67%)
Abdomen distension	30 (45.46%)
Abdomen discomfort	23 (34.84%)
Chest pain	15 (22.72%)

Table 2: NYHA grading of dyspnoea at time of presentation

NYHA grade	Number of patients
NYHA 3	38 (57.58%)
NYHA 4	19 (28.79%)
NYHA 2	07 (10.60%)

Table 3: General examination

General examination	Number of patients
Raised jugular venous pressure	59 (89.34%)
Jaundice	17 (25.76%)
Use of accessory muscles	17 (25.76%)
Pallor	07 (10.60%)
Clubbing	06 (9.09%)
Cyanosis	04 (6.06%)
Kyphoscoliosis	03 (4.55%)
Barrel shape chest	02 (3.03%)

Out of 66 patients, 12 patients were hypertensive, 10 patients were of ischemic heart disease, 9 patients had past history of tuberculosis and 8 patients were known case of chronic obstructive pulmonary disease.

In systemic examination signs of right side heart failures like congestive hepatomegaly (72.73%), clinically ascites (46.97%), loud s2 (21.21%), presence of gallop (12.12%), murmur of tricuspid regurgitation (50%).

Most common ECG finding is p pulmonale (42.42%) followed by non-specific ST/T changes (31.81%) and right axis deviation (19.70%).

In CXR findings, cardiomegaly was found in 80.30%, blunting of cardiophrenic angle in 30.30%, dilated pulmonary artery in 22.72%, tuberculosis in 19.70%, bronchiectasis in 13.63%, interstitial lung disease in 13.63%, emphysema in 10.60%. Most of patients were able to maintain saturation above 90%. Pao2 < 60 found in 15.16%, and Paco2 >45 found in

Table 4: Echocardiography findings

Echocardiographic finding	Number of patients
Tricuspid regurgitation	66 (100%)
RVSP >25	66 (100%)
TR velocity >2.6	57 (86.36%)
Pericardial effusion	32 (48.48%)
RVOT > 2.3	28 (42.42%)
Left ventricle systolic dysfunction	23 (34.84%)
Right ventricle dysfunction	19 (28.79%)
Regional wall motion abnormality of left ventricle	16 (24.24%)
IVC > 2.3	12 (18.18%)
Right atrium area > 28 cm2	12 (18.18%)
Pulmonary regurgitation	11 (16.67%)
Size of left atrium >4.5	06 (9.09%)
Congenital anomaly	05 (7.58%)
Left ventricle diastolic dysfunction	04 (6.06%)
Rheumatic heart disease	03 (4.55%)

10.60%.

Pulmonary function test was performed in 30 patients, out of which 12 reports were inconclusive due to poor effort, obstructive pattern in 13.64%, and restrictive pattern in 13.64%.

HRCT Thorax performed in 28 patients. Bronchiectasis found in 8 patients, tuberculosis in 8 patients, interstitial lung disease in 7 patients, fibrosis in 2 patients, chronic thromboembolism in 1 patient.

In present study, left ventricle dysfunction was most common cause. Among respiratory causes, interstitial lung disease, tuberculosis, and bronchiectasis predominate over COPD. Thyrotoxicosis and Lymphangitis carcinomatosis are rare cause of pulmonary HTN. There has been no patient of familial PAH.

Most common type of pulmonary hypertension in present study is type 3 (46.97%). Type 2 pulmonary hypertension found in 36.36%. Type 1 pulmonary HTN found in 15.15%. There has been no patient of familial PAH. Chronic thromboembolism found only in one patient. The absence of patients of type V PH (miscellaneous causes like sarcoidosis, histiocytosis X, etc.) is probably due to rarity of these conditions and under detection due to lack of knowledge about the association with PH in these conditions.

Discussion

The incidence of PH in global population is 1%. With increase in the age the incidence of PH increases and

Table 5: Etiological distributions

Etiology	Number of patients
Left ventricle dysfunction	16 (24.24%)
Interstitial lung disease	09 (13.63%)
Tuberculosis + bronchiectasis	06 (9.09%)
Tuberculosis	05 (7.58%)
Congenital heart disease	05 (7.58%)
Chronic obstructive pulmonary disease + Congestive cardiac failure	04 (6.065)
Bronchiectasis	03 (4.55%)
Chronic obstructive pulmonary disease	03 (4.55%)
Rheumatic heart disease	03 (4.55%)
Undiagnosed	02 (3.03%)
Fibrotic lung disease	02 (3.03%)
Dilated cardiomyopathy	02 (3.03%)
Restrictive lung disease	01 (1.51%)
Chronic thromboembolism	01 (1.51%)
Obstructive sleep apnoea	01 (1.51%)
Thyrotoxicosis	01 (1.51%)
Lymphangitis carcinomatosis	01 (1.51%)

goes up to 10% in age group >65 years.

Age group most commonly affected in our study is 6th decade of life. Mean age group is 53 years. Mean age in earlier studies were higher (7th decade onwards) than the mean age in present study. This could be explained by fact that previous studies were conducted in western population where incidence of infectious disease like rheumatic heart disease, tuberculosis, COPD, viral infections etc are less as compared to our country [7] and approximately 33% of patients in our study have developed PH secondary to these aetiologies.

Contrary to standard medical literature gender preponderance is reversed in our study. It is generally been shown to have female preponderance in almost all registries. Male: Female ratio was 1.7 in NIH (national institute of health) and 1.9 in French registry data. Male outnumbers females in present study probably due to history of smoking, exposure to fumes and dusty work environment is common in male gender explaining higher incidence of PH in Indian male.[8 n] Higher rate of illiteracy and lack of health awareness coupled with higher symptom tolerance of average Indian woman could also be a factor for gender reversibility.

For obvious reason our study also confirms that labourers are commonly affected, as reported by previous studies on PH.[8] Additionally, our study also found that high number of females who are housewives, have developed

Table 6: Classifications according to type of pulmonary hypertension

Type of pulmonary hypertension	Number of patients	Percentage
Type 1	10	15.15%
Type 2	24	36.36%
Type 3	31	46.97%
Type 4	1	1.51%

PH. This is probably due to their exposure to chulha run by kerosene fumes, cow dung, and is more prone to develop lung parenchyma disease and pulmonary hypertension compared to smoking as a risk factor in western women.[8]

It is well accepted fact that chronic smoking leads to COPD and COPD itself is an established etiological factor for PH, hence habit of smoking makes person more vulnerable to pulmonary hypertension. Exposure to smoke either due to smoking or any other means (Chulha, passive smoking) has led to PH in 45 patients (67%).

As far as presenting symptoms of PH are concerned (Table 1), Most common complains of patients were dyspnoea on exertion (96.97%) follow by fatigue (93.93%), pedal oedema (86.36%), coughing (66.67%). This is in concert with previous studies those have also reported dyspnea on exertions the most common symptom at presentation. Rich et al[9] have reported 60% incidence of dyspnea in patients of pulmonary hypertension, followed by fatigue (19%) and syncope (13%). Total 13 patients were overweight and obese.

NYHA class at time of presentation remains vital prognostic parameter (Table 2). It can also be used as a surrogate marker of general awareness of patient about his health. Most of the patients had NYHA grade 3 breathlessness (57.58%) on presentation indicating lack of health consciousness and relatively poor treatment outcome.

The unique mechanism of pulmonary hypertension in obese individual include obstructive sleep apnoea, obesity hypoventilation syndrome, anorexic agents, cardiomyopathy of obesity and pulmonary thromboembolic disease[10]. Novel mechanisms of pulmonary hypertension in obese are endothelial dysfunctions and hyperuricemia[10].In our study about 20% of the patients had obesity. However, unlike sleep apnoea and hypoventilation syndrome, ILD and LV dysfunctions probably secondary to

obesity associated cardiomyopathy were major etiological factors in our study. Thromboembolism was found to be least important aetiology for PH in obese patients.

Presenting signs, symptoms and systemic examination findings do not reveal anything special to confirm the diagnosis of PH on clinical basis (Table 3). However, pedal oedema not responding adequately to diuretic therapy in absence of significant CCF and liver dysfunction was found to be a reasonable ground to suspect PH and subject such patients to ECHO for final confirmation of PH (Table 4).

In developing countries 80% of cases are due to congenital heart disease, valvular heart disease and infections and most of these cases are younger (age <65 years).Left sided ventricular dysfunction or valvular dysfunction result in chronic left atrial hypertension leading to passive backward transmission of this pressure to pulmonary vasculature leading to pulmonary hypertension (Tables 5 and 6).

Left sided heart diseases and lung parenchymal diseases are most frequent cause of pulmonary hypertension in our study, matching with the etiological factors in younger population (< 65 years) of western world. There has been no patient of familial PAH. This is quite understandable considering the relative rarity of condition, cost and availability of genetic testing and feasibility of invasive procedure like cardiac catheterization as well as small number of study population. Connective tissue diseases are also less common as compared to western studies, a finding difficult to explain.

Conclusion

This study provides some novel information on PH in the subcontinent. Total 66 patients presenting with pulmonary hypertension were studied for demographic, clinical, etiological and echocardiographic data. Some of the findings are quite similar to the western world but few interesting observations have also emerged. Male outnumbers females in present study. Mean age group is 53 years, much younger than western world. Housewives and labourers are commonly affected. Left sided heart diseases and lung diseases are most frequent cause of pulmonary hypertension. Pulmonary thromboembolism is infrequent.

Limitation of study

Right heart catheterization is gold standard for diagnosis of pulmonary hypertension, but this facility is not available in our institute, so it is not done – is the main limitation of our study.

A definite need to conduct a large-scale study involving urban as well as rural population to reconfirm the above mentioned etiological and gender differences found in our study compared to western literature data.

Abbreviations

OPD – out door patient department; PH – Pulmonary Hypertension; RVSP – Right ventricle systolic pressure; ECG – Electrocardiogram; 2D ECHO – 2 dimension echocardiography; CBC – Complete blood count; RBS – Random blood sugar; RFT – Renal function test; LFT – Liver function test; CXR (PA) – chest x-ray postero-anterior view; NYHA – New York heart association; BMI – Body mass index; IVC – inferior vena cava; COPD – Chronic obstructive pulmonary disease; ILD – Interstitial lung disease; CCF – congestive cardiac failure

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