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Demographic Profile of Chronic Lung Disease and Role of Echocardiography in Predicting Pulmonary Hypertension in the Study Patients'

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Pulmonary hypertension defined as a mean pulmonary arterial pressure (mPAP) greater than 20mm Hg at rest and Pulmonary Vascular Resistance (PVR) greater than 3 Wood units[1]It is a progressive disease characterized by high mortality and morbidity.Hypertension due to left heart disease is the most commonly encountered form of PH.[2] Groups 3 that is, Pulmonary hypertension associated with lung diseases and hypoxia forms the second largest group. Group 2 and Group 3 comprise the most lethal form of PH. Out of 110 cases,majority of cases were males (68.2%) compared to females (31.8%). a male preponderance with a male to female ratio of 1.60:1. found that majority of cases were males (68.2%) compared to females (31.8%). The male to female ratio was 2.1:1. The age group of the study population ranged from 18 to 90 years with a mean age of 51.75±16.5 years In this study, it was found that out of 110 cases, majority of them (46.4%)had traction bronchiectasis on CT thorax The second most common finding was Hyperinflation which was seen in 41.8%. Ground glass opacification was seen in 15.5% of all cases and honeycombing was seen in 13.6% of all cases. In this study, echocardiography was done for all patients in the study population and it was found that out of a total of 110 cases, 28 cases had Pulmonary Hypertension, which was 25.45% of all cases..

I. INTRODUCTION

Pulmonary hypertension (PH) is a debilitating disease that pervades all aspects of a patient's daily life.[1]It is a progressive disease characterized by high mortality and morbidity. [2]As per the Sixth World symposium in Pulmonary Hypertension in 2018, Pulmonary hypertension is defined as a mean pulmonary arterial pressure (mPAP) greater than 20mm Hg at rest and Pulmonary Vascular Resistance (PVR) greater than 3 Wood units Pulmonary Hypertension, whenever found to be present either incidentally on echocardiogram or right heart catheterization, it should be evaluated for the underlying etiology, an understanding of the pathophysiology, and an appreciation of treatment options[6]When evaluating such patients with suspected PH, one should be well aware of the etiologies and classification. Based on pathophysiological, clinical, and therapeutic considerations, pulmonary hypertension is divided into five groups: 1) pulmonary arterial hypertension; 2) pulmonary hypertension due to left-sided heart disease; 3) pulmonary hypertension due to lung disease or hypoxia; 4) chronic thromboembolic pulmonary hypertension; and 5) pulmonary hypertension with unclear mechanism.Pulmonary Hypertension due to left heart disease is the most commonly encountered form of PH.[5] Groups 3 that is, Pulmonary hypertension associated with lung diseases and hypoxia forms the second largest group. Group 2 and Group 3 comprise the most lethal form of PH.Among the chronic lung diseases, two main diseases are included which are found to be associated with a high incidence of Pulmonary Hypertension- Chronic obstructive lung disease (COPD) and restrictive lung diseases which involve the lung parenchyma diffusely, including idiopathic pulmonary fibrosis (IPF) and sarcoidosis. PH in such cases is linked with exercise limitation and a worse prognosis[38].Cardiac dysfunction is a common comorbidity in patients with Chronic Lung Diseases and pulmonary arterial hypertension is the major cardiovascular complication. Right ventricular dysfunction is common in COPD patients particularly those with a low oxygen saturation. When present it may reduce excercise tolerance, increases dyspnoea and contribute to an overall decrease in functional status and portends a highmortality.Evidence suggests that World Health Organization functional class I or II patients are associated with significantly better long-term survival rates than patients in higher functional classes, thus providing a rationale for earlier diagnosis and treatment of Pulmonary Hypertension[9]

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AIM OF THE STUDY-
1.Demographic profile of Chronic Lung Disease
2.To study the clinical utility of echocardiography in predicting the presence of Pulmonary Hypertension in Chronic Lung Diseases
3.To study the severity of Pulmonary Hypertension associated with Chronic Lung Diseases

INCLUSION CRITERIA:
Patients will be included in the study if they met the following criteria:
1) Age more than 18 years
2) Diagnosed case of chronic lung disease (long term obstructive or restrictive or mixed pattern of lung disease) with or without hypoxia

EXCLUSION CRITERIA:
1) Patients not giving consent
2) Hemodynamically unstable patients
3) Age less than or equal to 18 years
4) Patients with active tuberculosis
5) Patients with known Left Heart disease or any other systemic disease (except lung diseases) known to cause Pulmonary Hypertension

SAMPLE SIZE:
A total of 110 cases attending the outpatient and indoor of the Department of Pulmonary Medicine, Cardiology, Internal Medicine, and its allied specialties were included in the study.Due to the prevailing pandemic situation, it was quite difficult to collect a large number of cases in the study population.
STUDY DESIGN:It is a hospital based observational study.
STUDY DURATION:The study was carried out for one year from 1st July 2020 to 30th June 2O21
The results and observations of the data were recorded in tabular form. Bar diagrams, histograms and pie diagrams were used wherever necessary. Appropriate statistical methods were applied, calculated and presented.

Table 1 – Sex wise distribution of cases

Sex	Number of cases	Percent
Male	75	68.2
Female	35	31.8
Total	110	100

110 cases were included. Out of 110 cases, majority of the cases (68.2%) were males and 31.8% were females. The Male to Female ratio was 2.1

Table 2- Age wise distribution of cases

Age group (years)	Number of cases	Percent
18-20	4	3.6
21-30	15	13.6
31-40	8	7.3
41-50	14	12.7
51-60	39	35.5
61-70	22	20
71-80	5	4.5
81-90	3	2.7

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Total	110	100

In the present study, the age group of patients ranged from 18 years to 90 years with a mean age of 51.75±16.5 years. The highest number of cases 35.5% were seen in the age group of 51 – 60 years. Lowest number of cases 2.7% were seen in the age group of more than 80 years. The highest age of case recorded in this study was 90 years.

Table 3- Age and sex wise distribution of cases

Age group (years)	Male		Female	
	Number	Percent	Number	Percent
18-20	2	1.8	2	1.8
21-30	10	9.1	5	4.5
31-40	4	3.6	4	3.6
41-50	5	4.5	9	8.2
51-60	28	25.5	11	10.0
61-70	20	18.2	2	1.8
71-80	5	4.5	0	0
81-90	1	0.9	2	1.8
Total	75	68.2	35	31.8

Table 4- Mean age group according to sex distribution

Sex	Mean Age	Standard Deviation (SD)
Male	54	16.3
Female	46.9	16.1
Total	51.8	16.5

From this table it is seen that the mean age group among the male patients was 54.0 ±16.3 years and in females it was 46.9 ± 16.1 years. the mean age of the study population was 51.8 ± 16.5 years.

Table 5- Distribution of cases according to smoking status

Smoker	Number of cases	Percent
No	61	55.5
Yes	49	44.5
Total	110	100

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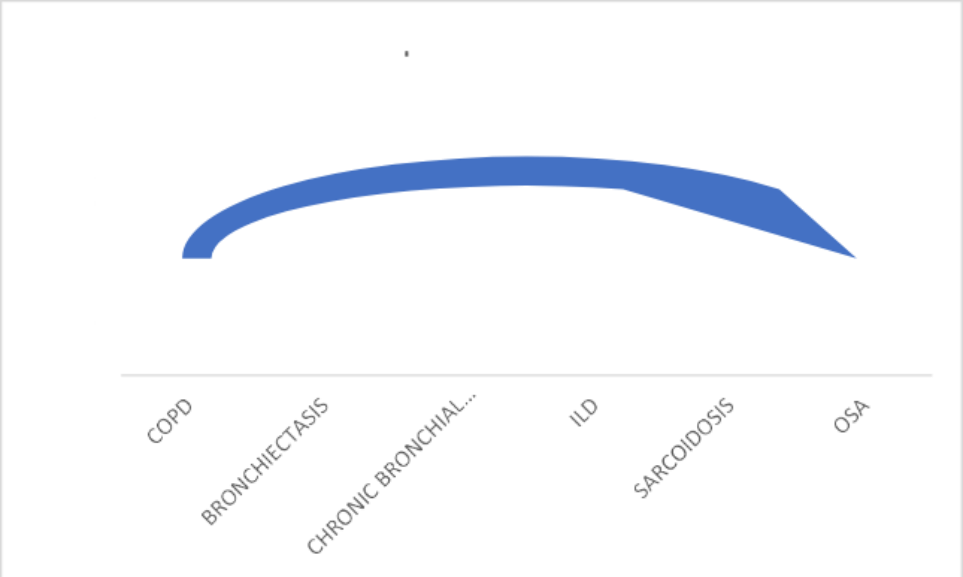
In this study, it was found that out of 110 cases, majority of the cases (55.5%) were smokers followed by 44.5% of cases, who were non- smokers.

Table 6- Distribution of cases according to biomass exposure

Biomass exposure	Number of cases	Percent
No	51	46.4
Yes	59	53.6
Total	110	100

In our study, most of the patients had a history of biomass exposure. It was seen that 53.6% cases had history of biomass exposure whereas 46.4% did not give any such history.In total, 78 out of 110 cases had a history of exposure to noxious stimuli (70.9%).

Graph 1- Distribution of cases according to underlying lung diseases



A total of 110 cases of diagnosed chronic lung diseases were included in this study. Out of these, majority of them were patients with Bronchiectasis, which was 38.2%. The second most common lung disease in this study was Chronic Obstructive Pulmonary Disease (COPD) (36.4%). Patients with Bronchial Asthma constituted 6.4%, those with Interstitial Lung Disease were 14.5%, sarcoidosis
was present in 1.8% of patients and Obstructive Sleep Apnea was seen to be present in 2.7% of all cases.

Table 7 Table showing mean duration of illness in the study population

	Minimum	Maximum	Mean	Standard deviation
Duration (years)	o.5	30	5.4	5.3

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In this study, the minimum duration of illness for the study population was 6 months and the maximum duration was 30 years. The mean duration of illness was 5.4 ± 5.3 years.

Table 8 Distribution of cases according to symptoms

Symptoms	Number of cases	Percent
Dyspnea	97	88.2
Cough	92	83.6
Chest pain	47	42.7
Hemoptysis	31	28.2

In this study, the most common symptom was dyspnea which was present in 88.2% of cases. The second most common symptom was cough which was seen in 83.6%. Chest pain was present in 42.7% of cases. The least common symptom among these 110 cases was hemoptysis which was present in 28.2% cases.

Table 9- Table showing associated comorbidity among study population

COMORBIDITY	NUMBER OF CASES	PERCENT
HYPERTENSION	35	31.8
TYPE 2 DM	28	25.5
NONE	41	37.2
BOTH	6	5.5
TOTAL	110	100

In this study we found that the most common comorbidity was Hypertension and the second most common comorbidity was Type 2 Diabetes Mellitus. Out of 110 patients, 31.8 % had hypertension alone, and 25.5% of them had Type 2 Diabetes Mellitus alone as comorbidity. There were 5.5% of patients who had both Hypertension and Type 2 Diabetes Mellitus and 37.2 % had none of these comorbidities.

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Table 10- Table showing severity of dyspnea among study population

mMRC Grading of dyspnea	Number of cases	Percent
0	20	18.2
1	32	29.1
2	38	34.5
3	17	15.5
4	3	2.7
Total	110	100

In this study, dyspnea was the most common symptom reported by 88.2% of the patients. Therefore, the severity of dyspnea was evaluated according to Modified Medical Research Council (mMRC) grading. We found in this study that out of all 110 cases, majority of them (34.5%) had dyspnea which was of mMRC grade 2. 29.1% of cases dyspnea of mMRC grade 1, 15.5% of cases had dyspnea of mMRC grade 3 while 2.7% of all cases had mMRC grade 4 dyspnea

PHYSICAL FINDINGS OF PULMONARY HYPERTENSION

Table 11- Table showing cases with presence of physical findings suggestive of pulmonary hypertension

Clinical findings of PH	Number of cases	Percent
Present	14	12.7
Absent	96	87.3
Total	110	100

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In the present study, it was found that majority of the cases (87.3%) did not present with any clinical feature suggestive of pulmonary hypertension, while only 12.7% of cases had features suggestive of Pulmonary Hypertension on presentation.

Table 12- Distribution of cases according to spirometry results

Spirometry	Number of cases	Percent
Normal	23	20.9
Obstructive	68	61.8
Restrictive	19	17.3
Total	110	100

In this study, spirometry was done for all cases and it was found that spirometry was normal in 20.9% of cases. Obstructive pattern was found in 61.8% of cases while 17.3% showed Restrictive pattern. The most common pattern of abnormality among 110 cases was an obstructive pattern.

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ARTERIAL BLOOD GAS (ABG) ANALYSIS

Table 13- Table showing Mean partial pressure of oxygen (according to ABG analysis)

	Minimum	Maximum	Mean PaO2	Standard Deviation
PaO2	39	99	82.72	15.58

ABG was done for all cases and the mean PaO2 among 110 patients was found to be 82.72 ± 15.58 mmHg.

Table 14- GRADING OF HYPOXEMIA ACCORDING TO ABG

Hypoxemia	Number of cases	Percent
No	78	70.91
Mild	14	12.73
Moderate	15	13.64
Severe	3	2.72
Total	110	100

Out of 110 patients, 70.91% of them had no hypoxemia according to ABG analysis 12.73% had mild hypoxemia on presentation, 13.64% had moderate hypoxemia and there were 2.72% patients in this study group who had severe hypoxemia. Therefore, among the patients with dyspnea, majority of them (13.64%) had moderate hypoxemia.

RADIOLOGY

Table 15 Table showing Chest X ray findings in the study population

CXR	NUMBER OF CASES	PERCENT
NORMAL	25	22.7
HYPERINFLATION	42	38.2
RETICULAR OPACITIES	12	10.9
NODULAR OPACITIES	11	10
RING LIKE OPACITIES	23	20.9
PROMINENT PULMONARY ARTERY	21	19.1

Chest Xray was done for all cases and it was found that Chest Xray was normal in 22.7% of all cases. Majority of the cases 38.2% showed hyperinflation. The second most common abnormal finding on Chest Xray was Ring like opacities which was 20.9%. Reticular and Nodular pattern of opacities were found in almost equalproportion of cases which was 10.9% and 10% respectively.

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Prominence of pulmonary artery on Chest Xray is a significant finding to suggest presence of Pulmonary Hypertension. It was observed in 19.1% of all cases.

Table 16- Table showing CT Thorax findings in the study population

CT THORAX	NUMBER OF CASES	PERCENT
NORMAL	8	7.3
HYPERINFLATION	46	41.8
HONEYCOMBING	15	13.6
TRACTION BRONCHIECTASIS	51	46.4
GROUND GLASS OPACITIES	17	15.5
MPA: AA ≥1	27	24.5

In this study, CT thorax was done for all cases and it was found to be normal in 7.3% of all cases. Majority of the cases 46.4% had traction bronchiectasis on CT thorax.

The second most common finding was Hyperinflation which was seen in 41.8%. Ground glass opacification was seen in 15.5% of all cases and honeycombing was seen in 13.6% of all cases. A major parameter was ratio of main pulmonary artery and ascending aorta. Ratio more than or equal to 1 was suggestive of presence of pulmonary hypertension. This ratio was found to be more than or equal to 1 in 24.5% of all cases.

ELECTROCARDIOGRAPHY (ECG)

Table 17- Table showing cases with signs of RVH and RV dysfunction on ECG

ECG	Number of cases	Percent
Signs of RV dysfunction present	10	9.1
Signs of RV dysfunction absent	100	90.9
Total	110	100

The current study showed that signs of RV dysfunction and RV hypertrophy on ECG were not seen in 90.9% of cases, whereas it was seen only in 9.1% of all cases.

ECHOCARDIOGRAPHY

Table 18- Table showing Right atrial (RA) and right ventricular (RV) Dilatation on Echocardiography

RA, RV	NUMBER OF CASES	PERCENT
DILATED	33	30
NOT DILATED	77	70

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TOTAL	110	100

Echocardiography was done for all patients and it was found that right atrial and right ventricular dilatation was present in 30% of all cases. It was absent in rest 70% of the cases.

Table 19- Table showing Inferior Vena Cava (IVC) Collapsibility

IVC COLLAPSIBILITY	NUMBER OF CASES	PERCENT
< 50%	28	25.5
>50%	82	74.5
TOTAL	110	100

Out of a total of 110 cases, Inferior vena cava collapsibility was more than 50% in 74.5% of cases which was normal. In the rest 25.5% of cases Inferior vena cava collapsibility was less than 50%.

Table 20- Table showing Tricuspid regurgitation jet velocity in the study population

TR JET VELOCITY	NUMBER OF CASES	PERCENT
<2.8	82	74.5
2.8- 3.4	18	16.4
>3.4	10	9.1
TOTAL	110	100

Tricuspid regurgitation jet velocity was recorded by echocardiography for all patients. Out of all cases, we found that majority of patients had tricuspid regurgitation jet velocity less than 2.8 m/s. In 16.4 % of all cases, the velocity was between 2.8 to 3.4 m/s and 9.1 % of all cases had tricuspid regurgitation jet velocity more than 3.4 m/s.

Table 21- Table showing Tricuspid Annular Pulmonary Systolic Excursion (TAPSE) values in the study population

TAPSE	NUMBER OF CASES	PERCENT
<17	23	20.9
≥17	85	77.3
Record not available	2	0.20
TOTAL	110	100

It was found in this study that TAPSE values were less than 17 mm in 20.9% out of 110 cases and it was more than or equal to 17mm in 77.3% of all cases. In 0.2 % of all cases, the value was not recorded.

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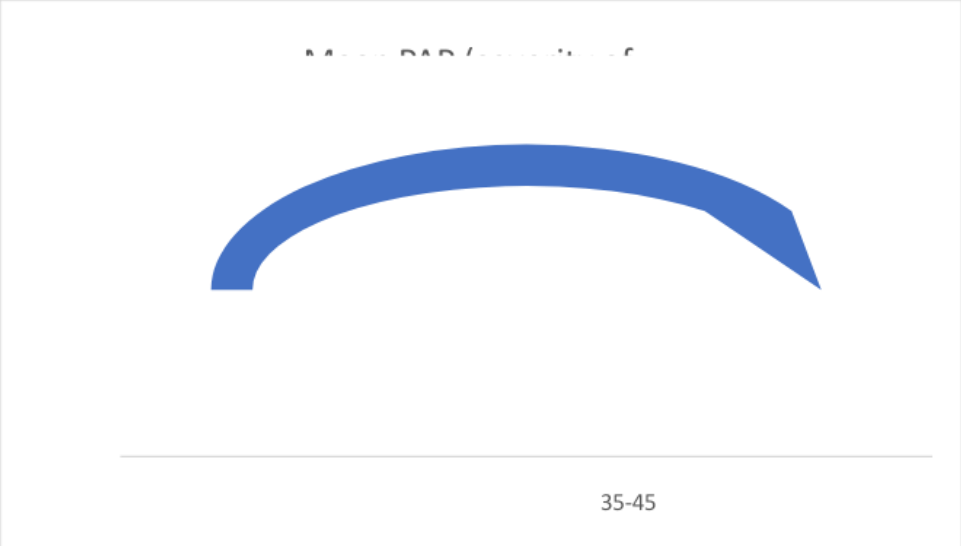
Table 22- Table showing Pulmonary Artery Acceleration Time (AT) in the study population

ACCELERATION TIME	NUMBER OF CASES	PERCENT
>100	85	77.3
80-100	23	20.9
<80	2	1.8
TOTAL	110	100

In this study, it was found with the help of echocardiography that Pulmonary artery acceleration time was more than 100 milliseconds in 77.3% of all cases. It was between 80 and 100 milliseconds in 20.9% of all cases and less than 80% in 1.8% of all cases.

Table 23- Table showing Mean Pulmonary Artery Pressure(mPAP) and its severity in the study population

Mean PAP (severity of PH)	Number of cases	Percent
<20	82	74.55
20-35 (Mild PH)	12	10.91
35-45 (Moderate PH)	13	11.82
>45 (Severe PH)	3	2.72
TOTAL	110	100



Graph 2 Graph showing mPAP) and its severity in the study population

The current study suggested that the mean Pulmonary artery pressure measured among 110 cases included in the study was 22.36 ± 10.17 mmHg. The minimum pressure observed was 12 mmHg while the maximum pressure observed was 60mmHg.

Out of a total of 110 cases, it was found that 28 cases had Pulmonary Hypertension, which

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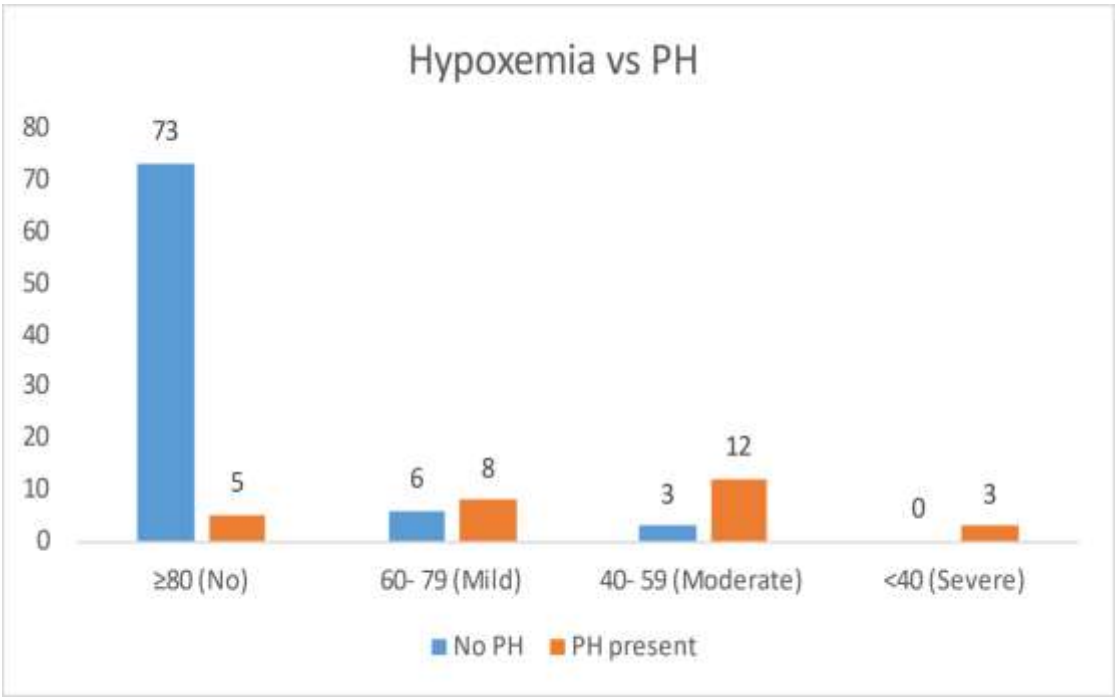
was 25.45% of all cases. The rest of 82 cases (74.55%) were found to have no Pulmonary Hypertension.

Among those diagnosed with Pulmonary Hypertension, 12 cases (10.91%) had mild pulmonary hypertension, 13 cases (11.82%) had moderate pulmonary hypertension and 3 cases (2.72%) had severe pulmonary hypertension.

Table 24- Table showing relation of hypoxemia with Pulmonary Hypertension

PaO2(grade of hypoxemia)	No PH	PH	Total
≥80 (No)	73	5 (17.86%)	78
60- 79 (Mild)	6	8 (28.57%)	14
40- 59 (Moderate)	3	12 (42.86%)	15
<40 (Severe)	0	3 (10.71%)	3
Total	82	28 (100)	110



Graph 3- Graph showing relation of Hypoxemia with Pulmonary Hypertension

The current study shows that among the 28 cases with Pulmonary hypertension, 23 cases (82.14%) had hypoxemia on Arterial blood gas analysis and 5 cases (17.86%) had no hypoxemia on presentation. Among those with Pulmonary Hypertension associated with hypoxemia, majority of the cases (42.86%) had moderate hypoxemia, 28.57% had mild hypoxemia and 10.71% had severe hypoxemia.Thus, from this study, it is found that hypoxemia has a role in causation of Pulmonary Hypertension in patients with Chronic Lung Diseases.

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Table 25- Table showing presence of Pulmonary Hypertension in different chronic lung diseases

Lung Disease	No PH	PH Present	Total	Percent
COPD	27	13	40	48.1
Bronchiectasis	33	10	42	30.3
Chronic Bronchial Asthma	5	1	7	20
OSA	2	1	3	33.3
ILD	13	3	16	23.07
Sarcoidosis	2	0	2	0
Total	82	28	110	

This study suggests that among the chronic lung diseases associated with pulmonary hypertension, COPD forms the majority. Out of 27 COPD patients included in the study population, 13 of them were found to have Pulmonary Hypertension (48.1%). Similarly, among the bronchiectasis cases, pulmonary hypertension was present in 10 out of 33 cases (30.3%). In cases with bronchial asthma, it was present in 1 out of 5 cases (20%). Among cases with ILD, pulmonary hypertension was present in 3 out of 13 cases (23.07%). 1 case with Obstructive sleep apnea had pulmonary hypertension (33.3%). None of the sarcoidosis patents were found to have pulmonary hypertension.

II. DISCUSSION

SEX-In the present study, it was found that majority of cases were males (68.2%) compared to females (31.8%). The male to female ratio was 2.1:1.The male female ratio may vary according to the underlying lung disease.Satyam Ramesh Bhai Ghadiya et.al[144] conducted a study in 2016 among 50 COPD patients and he found that the majority of patients were males with a male to female ratio of 4:1.

AGE

The age group of the study population ranged from 18 to 90 years with a mean age of 51.75±16.5 years. The maximum number of cases 35.5% were seen in the age group of 51 – 60 years. Lowest number of cases 2.7% were seen in the age group of 80-90 years. The highest age of case recorded in this study was 90 years. The mean age of presentation among males was 54 ± 16.3 years whereas in females it was 46.9 ± 16.1 years.Similar results were observed by Wig K.L Gulleria K.S et.al[148] in 1964 with maximum number of cases in patients with chronic bronchitis between the age group of 55 to 65 years.

EXPOSURE HISTORY

In this study, it was found that out of 110 cases, majority of them 55.5% were smokers In a study by Tariq Mahmood et.al[151] out of 200 COPD cases, majority of them were smokers (56.5%). Biomass exposure was present in 30% of the study population.

TYPE OF UNDERLYING LUNG DISEASE

In this study, it was seen that out of a total of 110 cases, majority of cases had bronchiectasis as the underlying lung disease which was 38.2%. The second most common lung disease in the study population was Chronic obstructive pulmonary disease (COPD) which was 36.4%. Patients with bronchiectasis, moderate obstruction was seen in 47%, severe obstruction in 33% and mild obstruction in 20% of all cases.

Matthew Horn et al[165] reported that 62.5% of patients with precapillary pulmonary hypertension demonstrated a severe restrictive ventilatory pattern on spirometry.

ARTERIAL BLOOD GAS ANALYSIS (ABG)

The current study showed that the mean partial pressure of oxygen (PaO2) in the study population was 82.71 ± 11.63 mmHg..Out of 110 patients, 70.91% of them had no hypoxemia according to ABG analysis. 12.73% had mild

hypoxemia on presentation, 13.64% had moderate hypoxemia and there were 2.72% patients in this study group who had severe hypoxemia.B Delclaux et al[166] conducted a study in COPD patients and found that the mean PaO2 was 75.2 ± 10.8 m

CHEST X RAY

Chest Xray was done for all cases and it was found that Chest Xray was normal in 22.7% of all cases. Majority of the cases 38.2% showed hyperinflation. The second most common abnormal finding on Chest Xray was Ring like opacities which was 20.9%. Reticular and Nodular pattern of opacities were found in almost equal proportion of cases which was 10.9% and 10% respectively. Prominence of pulmonary artery on Chest
Xray is a significant finding to suggest presence of Pulmonary Hypertension.
The findings of chest X ray varies according to the underlying lung disease.

Kumar R et al[169] in their study on ILD patients found Reticular/ Reticulo-nodular opacities as the most common (80.2%) CXR finding.Gagiya AK et al[146] in their study reported Reticulo nodular opacities as the most common (60%) CXR finding among ILD patients.

CT THORAX

In this study, CT thorax was done for all cases and it was found to be normal in 7.3% of all cases. Majority of the cases 46.4% had traction bronchiectasis on CT thorax. The second most common finding was Hyperinflation which was seen in 41.8%. Ground glass opacification was seen in 15.5% of all cases and honeycombing was seen in 13.6% of all cases. A major parameter was ratio of main pulmonary artery and ascending aorta. Ratio more than or equal to 1 was suggestive of presence of pulmonary hypertension. This ratio was found to be more than or equal to 1 in 24.5% of all cases.Chaan S et al[174] in a retrospective study of 50 cases found that the ratio of main pulmonary artery and ascending aorta, if more than 1, there is very high probability of Pulmonary arterial hypertension.The additional findings of underlying lung disease which was evident on CT Thorax was helpful in understanding the etiology of Pulmonary Hypertension.

ELECTROCARDIOGRAPHY

The current study showed that signs of RV dysfunction and RV hypertrophy on ECG were not seen in 90.9% of cases, whereas it was seen only in 9.1% of all cases.
Prakash et al[178] found in their study that ECG had a sensitivity and specificity of 31% and 85%, whereas echo had 93% sensitivity and 95% specificity in detecting RV dysfunction.

ECHOCARDIOGRAPHY

In this study, echocardiography was done for all patients in the study population and it was found that out of a total of 110 cases, 28 cases had Pulmonary Hypertension, which was 25.45% of all cases. The rest of 82 cases (74.55%) were found to have no Pulmonary Hypertension.Among those diagnosed with Pulmonary Hypertension, 12 cases (10.91%) had mild pulmonary hypertension, 13 cases (11.82%) had moderate pulmonary hypertension and 3 cases (2.72%) had severe pulmonary hypertension.

This study suggests that among the chronic lung diseases associated with pulmonary hypertension, COPD forms the majority. Out of 27 COPD patients included in the study population, 13 of them were found to have Pulmonary Hypertension (48.1%). Similarly, among the bronchiectasis cases, pulmonary hypertension was present in 10 out of 33 cases (30.3%). In cases with chronic bronchial asthma, it was present in 1 out of 5 cases (20%). Among cases with ILD, pulmonary hypertension was present in 3 out of 13 cases (23.07%). 1 case with Obstructive sleep apnea had pulmonary hypertension (50%). None of the sarcoidosis patents were found to have pulmonary hypertension.Felipe Aluja et al[179] found that almost 66% of all COPD patients have some degree of Pulmonary Hypertension, usually mild. They also observed that the prevalence of Pulmonary Hypertension in Interstitial Lung disease (ILD) varies from 32 to 84%. Pulmonary hypertension is found in 20 to 30 % of patients OSA . 10 to 15% of patients with Obstructive sleep apnea also have concomitant COPD, which increases the likelihood of Pulmonary hypertension.
The findings of the present study are summarized below-

The mean age of the study population was 51.75±16.5 years.

Out of a total of 110 cases, 28 cases (25.45%) had pulmonary hypertension suggested by echocardiography. Among these, 10.91% had mild pulmonary hypertension, 11.82% had moderate pulmonary hypertension and 2.72% had severe pulmonary hypertension.]The current study showed that 82.14% of the cases found to have Pulmonary Hypertension by echocardiography had associated underlying hypoxemia on ABG. Out of all such cases, majority of the cases (42.86%) had moderate hypoxemia, 28.57% had mild hypoxemia and 10.71% had severe hypoxemia.Among the various chronic lung diseases, pulmonary hypertension was

observed in 48.1% of COPD patients, 30.3% of bronchiectasis patients, 23.07% of ILD patients, 20% of bronchial asthma patients and 50% of patients with OSA.

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III. CONCLUSION

From the present study, it can be concluded that Pulmonary Hypertension is a debilitating disease, which is associated with considerable morbidity and mortality. So this condition needs early detection, complete etiological evaluation and treatment strategisation. Pulmonary Hypertension associated with chronic lung diseases constitute a large proportion of all cases of Pulmonary Hypertension.

Clinical examination and Electrocardiography alone were not sufficient for predicting the presence of Pulmonary Hypertension in such cases. Computed Tomography of the Thorax suggestive of Pulmonary Hypertension was almost comparable to Echocardiographic predictability. Therefore, echocardiography is superior to clinical examination and ECG for evaluation of Pulmonary Hypertension. Although Right Heart Catheterization remains the gold standard for measurement of Pulmonary Arterial pressures, however it has certain limitations like non availability in many regions, cost issues and its invasive nature. Also, in developing countries like India, there is a high prevalence of chronic respiratory diseases and it is not feasible to perform cardiac catheterization in every patient.

Thus from the current study, it can be recommended that echocardiography is a useful means to predict the presence and severity of Pulmonary Hypertension and should be included in the routine assessment of all such cases.