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EVALUATION OF CLINICAL PROFILE OF PATIENTS WITH CHRONIC CORPULMONALE IN A TERTIARY CARE HOSPITAL

Pulmonary Medicine

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ABSTRACT

Chronic corpulmonale is a serious protracted disease, consuming frequently a large segment of sufferer's life and quiet often resulting in fatal human experience. Chronic Corpulmonale is traditionally defined as Right ventricular failure secondary to disorders that effect either the structure or function of lungs. It is only recently that clinical physiologists have worked out physiological relationships between chronic pulmonary disease and corpulmonale and still more recently that adequate methods of diagnosis have been established.

Chronic corpulmonale can be diagnosed clinically, radiologically, electro cardiographically, by echocardiography, by invasive techniques and more importantly by combination of these methods.

Methodology: 50 patients of chronic corpulmonale attending Alluri Sitarama Raju academy of medical sciences, Eluru, Department of Pulmonology who fulfilled the inclusion criteria of the study between December 2015 to June 2017 were taken into this analytical cross sectional study. Detailed history and clinical examination findings were recorded and a battery of investigations -12 lead ECG, x-ray chest,2D Echo cardiogram was done. In selected patients a HRCT chest was done to assess the type and extent of pulmonary lesion. The clinical profile along with the probable etiology, radiological, electrocardiographic and echo cardiographic findings were summarized and compared between different variables.

Results: The age of the patient ranges from 35 -80years.The peak incidence was in the fifth and sixth decade, with male and female ratio 80:20 respectively.

76% of male patients were smokers-smoking more than 10 cigarettes/beedies per day.

All the patients with cor pulmonale had cough and breathlessness with loss of appetite in 74%.

54% of patients showed radiological signs of chronic bronchitis, only 18% of patients showed gross fibrosis,10%of patients showed normal chest-x- ray.

54% of patients showed right axis deviation on ECG,28% of patients showed P Pulmonale.

33% of patients showed RVSP(right ventricular systolic pressure) more than or equal to 40mmhg and 16% of patients showed paradoxical inter ventricular septum movement.

CONCLUSION: chronic corpulmonale was predominantly a disease of middle and older age groups with a peak incidence in the 5th and 6th decades of life.

Smoking plays a significant role in participating and aggravating primary lung disease resulting in cor pulmonale.

Chronic bronchitis ,COPD, sequelae of pulmonary tuberculosis ,bilateral bronchiectasis were found to be of major causating relationship to corpulmonale.

Thorough clinical examination, chest-x-ray ,ECG and echo cardiogram were major contributors to aid in the diagnosis of cor pulmonale.

KEYWORDS

Cor Pulmonale, COPD, Smoking, ECG, Right Heart Failure

INTRODUCTION:

Cor-pulmonale traditionally defined as the right ventricular failure secondary to disorders that affect either the structure or function of the lungs.

Chronic Cor-pulmonale is recognised as a serious protracted disease ultimately fatal human experience, consuming frequently a large segment of the sufferer's life.

It is only recently that the clinical physiologists have worked out physiological relationships between chronic pulmonary disease and Cor-pulmonale and still more recently that adequate methods of diagnosis have been established.

Chronic corpulmonale can be diagnosed clinically, radiologically, electrocardiographically, by Echocardiography and also by invasive techniques.

AIMS:

1. Identify the probable causes and the primary lung disease, which lead to chronic corpulmonale.
2. Study the clinical profile including Electrocardiographic and Radiological features

Patients and Methods:

Place of Study: Department of Pulmonary Medicine, Alluri sita ramaraju Institute of Medical Sciences, Eluru.

Study design: Analytical Cross-sectional study.

Period of Study: Dec 2015 to June 2017

INCLUSION CRITERIA:

Presence of right ventricular hypertrophy and / or dilatation in Echocardiography along with mean pulmonary arterial pressure of ≥ 25 mm hg

EXCLUSION CRITERIA:

Underlying heart disease (eg: Rheumatic, congenital, coronary heart disease) which could have led to right ventricular failure.

Methodology:

50 patients of chronic corpulmonale who fulfilled the criteria were selected. A detailed history was obtained from them and symptom analysis was done. A detailed clinical examination was also done.

A 12 lead electrocardiogram which included right sided chest leads V3R and V4R was obtained and analyses. A chest radiograph which comprised of a poster anterior chest film was obtained.

In selected cases Computerised Tomogram of the chest was done. Parenchymal lesions in the lung were analyzed which would give a clue to the underlying lung disease which caused chronic corpulmonale.

Presence of pulmonary artery dilatation and other features suggestive of corpulmonale were also looked for.

The clinical profile along with the probable etiology, radiological, electrocardiographic and Echocardiographic findings were summarised and compared between different variables.

Observation and Results:

Out of these 50 patients 40 were male patients and 10 were females.

Peak incidence was in the 5th and 6th decades.

Reason for the peak Incidence in 5th and 6th decade could be most of the patients started smoking in 3rd decade.

Damage to the lung occurs over a period of time which leads to peak incidence of corpulmonle in 5th and 6th decade

Age Distribution

Age Groups (in Years)	Number of Cases	Percentage
<40 Years	8	18%
40-50	12	40%
51-60	20	40%
>60 Years	10	20%

Sex Distribution

Sex	Number of Cases	Percentage
Male	40	80%
Female	10	20%

Smoking Habits

Smoking	Number of Cases	Percentage
Absent	12	24%
Present	38	76%

Previous History of Tuberculosis: Past history of tuberculosis was present in nine among the 50 patients

Symptomatology:
All the patients with corpulmonale had breathlessness and cough. Most patients presented with pain abdomen and swelling of feet.

Fever was present in 24% percent of patients whereas loss of appetite was in74 percent; chest pain was noted in 12% and hemoptysis in 16 percent. 20percent of patients presented with palpitations.

A cardinal sign of right heart failure (pedal edema, palpable tender liver and raised jugular venous pressure) was present in all cases.

Radiological Features:
Majority of the X-ray showed Chronic bronchitis with or without emphysema, the major etiological factor of chronic corpulmonale.

15 cases (30%) showed evidence of cardiomegaly, with pulmonary artery dilatation.

Radiological Features

Lung parenchyma	Number of Cases	Percentage
Gross Fibrosis with or without compensatory Emphyseema	9	18%
Incrased Bronchovascular Markings with or without over inflated lung fields suggestive of COPD	28	54%
Bilateral Bronchiectasis	5	12%
Thoracic cage deformity	1	2%
Reticulo-Nodular Pattern	2	4%
Normal	5	10%

Electrocardiogram:
Among the 50 cases 27 (54%) cases showed evidence of right axis deviation, 24 (48%) cases showed low voltage complexes, 14 (28%) cases showed P Pulmonale and 10 (20%) cases showed right bundle branch block.

Eight cases (16%) showed right ventricular hypertrophy. Six cases showed other ECG changes i.e. Ventricular ectopics (1 case), T inversions in II, III, AVF (4cases), sinus tachycardia (1 case).

Echocardiography Features:
In 50 patients right ventricular systolic pressure of equal to or less than 40mmhg was observed in17 patients in 33 patients right ventricular systolic pressure was greater than 40mmhg.

Paradoxical interventricular septal motion was observed in 16 patients absent in 34 Patients

Causes of Chronic Corpulmonale:
In our study the cause of chronic corpulmonale in majority of the cases was chronic bronchitis and emphysema 54%.

In nine of the cases sequelae of pulmonary tuberculosis was the cause. Five cases had chronic bronchial asthma,six cases bronchiectasis, one case had kyphoscoliosis with thoracic deformity and two had interstitial lung diseases.

DISCUSSION:
Most of the study population in our present study were in the 40 to 60 year age group. The age and sex ratio in our study is comparable to the studies done previously.

Age distribution in comparison with different studies: Most of the studies like basavaraju et al. Gupta et al and sunil babu et,al showed peak incidence of age in the 6th decade. Reason for this could be due to cumulative damage to the lungs over decades of cigarette smoking. Most of the patients started smoking in 2nd to 3rd decade.

Among other patients, diseases like bronchial asthma, bronchiectasis and interstitial lung diseases contributed to development of corpulmonale in 5th and 6th decade. One case had chest wall deformity and developed corpulmonale earlier

Comparision of Cor Pulmonale with and without COPD aetiology among Males and Females:

	CorPulmonale		Total
	With copd aetiology	Without copd aetiology	
Male	33 (66%)	7 (14%)	40 (80%)
Female	3 (6%)	7 (14%)	10 (20%)
Total	36 (72%)	14 (28%)	50

chi square test:8.48
p value:0.0035

This study showed significant association of corpulmonale with copd aetiology being more common in males than in females as smoking is more common in males.

In females the causes of corpulmonale was other than smoking like sequelae of Pulmonary tuberculosis, bronchiectasis.

The present study showed that 76% of the patients were smokers as compared to 70% reported by Padmavathi et al and 80% reported by Shankar et al.

The importance of smoking has also been stressed in various studies done previously in our country and outside.

Comparision of corpulmonale with and without copd aetiology amongsmokers and non-smokers:

	CorPulmonale		Total
	With COPD aetiology	Without COPD aetiology	
Smokers	32 (64%)	6 (12%)	38 (76%)
Non- Smokers	4 (8%)	8 (16%)	12 (24%)
Total	36 (72%)	14 (28%)	50

Chi Square:9.3221
p value:0.00226

Most of the studies including present study showed high incidence of smokers among corpulmonale cases Smoking is a significant independent risk factor for the development of corpulmonale. This study showed significant association of smoking with corpulmonale of copd aetiology.

Smoking is well established risk factor for development of copd which over a period of time ultimately lands up in corpulmonale in the natural course of the disease.

In our study this aetiological factor is well established in the causation of the disease.

Clinical Features:
All patients admitted to the hospital with dyspnea and cough with expectoration and other signs of right heart failure.

The majority of patients presented with signs and symptoms of cardiac

failure and they sought medical advice only when their symptoms were distressing.(Corpulmonale definition itself includes derangement of right heart failure) in this study.

The inclusion criteria represents the dilatation of chambers with increased PAH and because of that most of the patients have signs of right heart failure which includes tachypnea, tachycardia, breathlessness, the findings of which are similar to most of the other studies.

Signs of pulmonary hypertension like loud p2 and parasternal heave were also elicited well in some cases which represent patients with advanced stages of corpulmonle. In those patients signs of pulmonary hypertension are more obvious.

Radiological Features:

Most common finding in chest x ray is copd changes which includes hyperinflation and increased vascularity followed by fibrosis which is due to pulmonary Koch's; other findings like Bronchiectasis and chest wall deformities which are less common when compared to copd changes .

The above findings could be due to increased incidence of smoking among the study population. Significant association of corpulmonale with copd aetiology and emphysematous chest x ray findings was found among smokers.

Comparision of corpulmonale with copd and without copd aetiologywith x ray Findings of emphysema and without emphysema:

	Corpulmonale with copd aetiology		
	Present	Absent	Total
Emphyseema Present	28 (56%)	1 (2%)	29 (58%)
Emphyseema Absent	5 (10%)	16 (32%)	21 (42%)
Total	33 (66%)	17 (34%)	50

chi square:25.57
p value0.000006

In our study significant association of corpulmonale with copd aetiology with emphysematous findings in chest x ray was observed. Absence of emphysematous changes in other patients may be due to corpulmonale of other aetiology like pulmonary tuberculosis sequelae, bronchiectasis, bronchial asthma, and other chest wall deformities which present with different x ray findings like fibrosis, cystic opacities, and chest wall deformities.

Comparative Percentage of p pulmonale in different Studies:

Series	Percentage
Spodick 1959	13.9%
Catalayud 1970	46.2%
Ivan j.pinto	33.3%
Chappel 1966	29%
Present Study	28%

Comparative Percentage of Right Axis Deviation:

Series	Percentage
Padmavathi	43.4%
Pinto	45.5%
Present study	54%

Comparative Percentage of RBBB:

Series	Percentage
Padmavathi	7.2%
Pinto	13.3%
Present study	20%

Increased incidence of severe ECG findings of right heart failure in this study could be due to selection criteria of study which includes patients with later stages of corpulmonale.

P Pulmonale and RBBB and right axis deviation usually represent right ventricular and right atrial dilation. These findings are seen in advanced stages of corpulmonale who are having high RVSP values.

Different studies showed ECG changes which are similar to the findings of the present study.

2D ECHO CARDIOGRAPHY:

All patients showed right ventricular chamber dilatation and mean PAP greater than 25 mm hg because inclusion criteria includes all these.

Right ventricular systolic pressure and paradoxical inter ventricular septum motion was studied. Both parameters correlated well with duration of smoking. Number of patients with RVSP≤40 mm of hg are 17.

Number of patients with RVSP≥ 40mmhg are 33. Number of patients with Paradoxical IVS present are 16, Paradoxical IVS absent are 34.

These two parameters represent the severity of the disease and resistance against which right ventricle contracts determines right ventricular systolic pressure and paradoxical motion of the inter ventricular septum.

In study both these findings correlate well with duration of the symptoms presenting advanced stage of the disease.

Causes of chronic corpulmonale in our study were COPD in 54%, sequelae of Pulmonary tuberculosis in 18% and bronchiectasis in 12%. The etiological causes in Padmavati et al series was chronic bronchitis and emphysema in 50.8% of cases.

In Kamal et al series chronic bronchitis and emphysema were the contributors in 60% of cases. Thus the present study and various other studies show that emphysema and chronic bronchitis is major etiological factor in the development of chronic corpulmonale.

In studies done recently from United States and United Kingdom the cause of corpulmonale was found to be COPD in 85% of cases.

Pulmonary tuberculosis was very rarely associated with corpulmonale. But in our study we found an association of 18% with pulmonary tuberculosis, which study formed a significant number.

It probably reflects the increased prevalence of pulmonary tuberculosis in our set up as compared to the other parts of the World.

Summary:

Chronic corpulmonale was predominantly found to be a disease of middle and older age groups with a peak incidence in the fifth and sixth decades.

Smoking plays a significant role in precipitating and aggrevating the primary lung disease and hence corpulmonale.

Chest X-ray was done in all cases. Chest X-ray showed details of relevant clinical profile. Thus the changes included chronic bronchitis with or without emphysema (54%), bronchiectasis (12%),Bilateral pulmonary tuberculosis with fibrosis with or without compensatory emphysema (18%). One case (2%) showed kyphoscoliosis with gross thoracic deformity. Two (4%) had reticulo nodular pattern suggestive of ILD. CT scan was done in necessary cases.

ECG varied between normal (only sinus tachycardia) to evidence of dominant right ventricular activity. The latter was evidenced by RVH(16%). Right Axis deviation (54%) RBBB (20%) and P - Pulmonale(28%). One case had ventricular ectopics.

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