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"THE STUDY OF CLINICAL INCIDENCE AND PREVALENCE OF RIGHT HEART FAILURE IN CHRONIC OBSTRUCTIVE PULMONARY DISEASES" IN TERTIARY CARE HOSPITAL.

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ABSTRACT **Background:** Heart failure (HF) and chronic obstructive pulmonary disease (COPD) are leading causes of death worldwide **Aims And Objective:** To study the clinical incidence of Right Heart failure in Chronic Obstructive Pulmonary Diseases. **Methods And Materials:** This study was conducted at Department of Medicine in Madhubani Medical College during the period of 1 year from August 2019 to July 2020. **Result:** Nine cases having the clinical features of right heart failure constituting 9.0 % of total. All the 9 % are also proved by echocardiography. More number of patients with right heart failure having disease more than 20 years of duration constituting 80% of the total cases of right heart failure in COPD. Median life expectancy (95% CI) was 78.8 (78.4–79.2) years in the no COPD group, 77.9 (75.6–79.5) years in GOLD stage I COPD, 73.4 (72.2–74.4) years in GOLD stage II COPD and 67.2 (65.2–68.9) years in GOLD stage III/IV COPD. **Conclusion:** Clinical signs of right heart failure in Chronic Obstructive Pulmonary Diseases were effective in screening the patients for cor-pulmonale. Right heart failure denotes severity and duration of Chronic Obstructive Pulmonary Diseases.

KEYWORDS : Heart failure, chronic obstructive pulmonary disease, Echocardiography

INTRODUCTION:

Heart failure (HF) and chronic obstructive pulmonary disease (COPD) are leading causes of death worldwide [1], through shared risk factors and pathogenic mechanisms the conditions frequently coexist, presenting diagnostic and therapeutic challenges for physicians [2,3] Pulmonary disease is common in patients with heart failure, through shared risk factors and pathophysiological mechanisms. Each is an independent predictor of morbidity, mortality, impaired functional status, and health service use. Each is also powerfully associated with socioeconomic deprivation [4, 5]. The conditions therefore undermine the two fundamental goals of healthcare: to improve both the overall level and distribution of health. Healthcare internationally is dominated by individual disease approaches, lacking coordination and integration [6]. Multimorbidity is a key challenge for these health systems [7].

The diagnoses of both HF and COPD require typical symptoms combined with objective evidence of organ dysfunction [8, 9]. The European Society of Cardiology mandates typical symptoms and signs resulting from any abnormality of cardiac structure or function, including systolic and diastolic dysfunction, Valvular, pericardial, and heart rhythm abnormalities [8]. The Global Initiative for Chronic Obstructive Lung Disease (GOLD) defines airflow obstruction by FEV1/FVC ratio, 0.70, [9], a consensus definition endorsed by the European Respiratory Society and American Thoracic Society (Table 1) [10]. This simple definition avoids complex reference equations, is understandable, universal, generalizable, comparable, and lowers barriers to diagnosis [11]. However, the fixed ratio overestimates disease in the elderly relative to lower limit of normal indices [12] as FEV1/FVC declines in healthy never smokers with advancing age [13]. Cardiovascular diseases as a chain of events initiated by risk factors and progressing through numerous physiological pathways to the development of end-stage heart disease and HF [14].

GOLD classification of chronic obstructive pulmonary disease severity

Stage	FEV1/FVC	FEV1 predicted
I: Mild	<0.70	FEV1 80%
II: Moderate	<0.70	50% FEV1 < 80%
III: Severe	<0.70	30% FEV1 < 50%
IV: Very severe	<0.70	FEV1 < 30% or FEV1 50% plus chronic respiratory failure

FEV1, forced expiratory volume in one second; FVC, forced vital capacity; respiratory failure, arterial partial pressure of oxygen (PaO2), 8.0 kPa (60 mmHg) with or without arterial partial pressure of CO2 (PaCO2) .6.7 kPa (50 mmHg) while breathing air at sea level.

Risk factors to pathophysiological mechanisms:

Cardiologists readily accept the 'cardiovascular disease continuum', the hypothesis that frames cardiovascular diseases as a chain of events initiated by risk factors and progressing through numerous physiological pathways to the development of end-stage heart disease and HF [14]. Interest has grown in the association of chronic pulmonary and cardiac diseases; the observation that HF and COPD coexist more frequently than expected from their respective population prevalence being a major reason for this interest. These epidemiological observations encourage new pathophysiological interpretations to understand the connection between the pulmonary and cardiovascular continuum. Apart from smoking as a common risk factor, patients with COPD share an additional determinant of cardiovascular disease: low-grade systemic inflammation [15, 16]. The risk of underlying ischaemic heart disease is greatest in patients with airflow obstruction and elevated C-reactive protein [17]. Furthermore, almost 50% of patients with COPD present coexisting metabolic syndrome as well as increased levels of systemic inflammatory markers, independent of lung function impairment [18]. Diabetes is likewise independently associated with reduced lung function, while obesity may further worsen ventilatory mechanics [19]. Diabetes, metabolic syndrome (and its individual components), and physical inactivity are all major determinants of cardiovascular disease. The fact that each also acts through pro-inflammatory mechanisms strengthens the view that low-grade systemic inflammation is a common pathophysiological link between COPD and cardiovascular diseases [20].

Prevalence Of Concurrent Heart Failure And Chronic Obstructive Heart Disease:

Prevalence estimates vary widely according to cohort selection, population age structure, risk factor exposure, diagnostic criteria, measurement methods, and surveillance systems [2,21], From around 10–40% of patients with HF have reported concurrent COPD [2]. However, only a handful of studies employed Spirometry [22 – 25]. In the largest of these, COPD was diagnosed in 36% of 532 consecutive patients hospitalized with HF, acknowledging that pulmonary edema may have contributed to airflow obstruction [53].

A similar proportion (30%) was observed in a recent prospective study of consecutive patients with stable HF [25]. Estimates of HF prevalence in COPD are likewise sparse though consistent. The prevalence of unrecognized HF was 20.9% in patients with COPD or asthma presenting to the emergency department, [26], 20.5 and 17% in community patients with stable COPD [27,28]. The latter two studies

included echocardiography in all patients, detecting LVSD in 10.4 and 13.8%. These findings have significant ramifications. Given COPD is far more prevalent than LVSD in the general population, then COPD is potentially masking a large proportion of patients with LVSD.

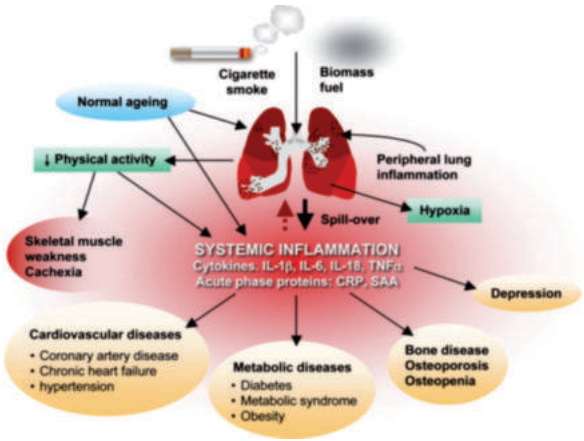

Figure 1: Inflammatory pathways involved in the cardiopulmonary continuum. Patients with chronic obstructive pulmonary disease have peripheral lung inflammation

Method Of Assessing Cardiac Function In Patients With Copd :
One of the major difficulties in assessing pulmonary haemodynamics and right ventricular function is the need to measure pressure and flow which involves the use of invasive techniques such as cardiac catheterization. More recently non-invasive technique have been used to assess patients with COPD, these include radiography, electrocardiography, echocardiography, radionucleide, ventriculography and magnetic resonance imaging.

Aims And Objective:
To study the clinical incidence of Right Heart failure in Chronic Obstructive Pulmonary Diseases.

MATERIAL AND METHOD:
TOTAL NUMBER OF PATIENTS IN THIS STUDY: - Number of patients in this study is 100 cases.

Inclusion Criteria: - The cases in this study have following characters:
(i) Cases between the age group of 30 – 80 years of both sexes.
(ii) These cases having the symptoms suggestive of chronic airway obstruction like cough, cough with expectoration of sputum of more than 2 years duration, dyspnea, and with (or) without swelling of both legs.
(iii) Cases in whom clinical diagnosis of COPD was made.
(iv) All the cases were subjected to Spirometry and the presence of COPD was confirmed by post bronchodilator Spirometry values of
I. FEV1 < 80%.
ii. FEV1 / FVC < 0.7
iii. Reversibility of obstruction < 15%.

(FEV1 – Forced Expiratory Volume in 1 sec. FVC – Forced Vital Capacity)

Exclusion Criteria: -
Cases with history of the following diseases were excluded:
(I) Bronchial Ashma
(ii) Pulmonary Tuberculosis
(iii) Suppurative lung disease (iv) Systemic Hypertension
(v) CAHD
(vi) Primary Pulmonary Hypertension
(vii) Valvular Heart disease.
(viii) Sleep Apnoea syndrome.

Some comorbidity, such as hypertension and diabetes has been evaluated. Conversely, other cardiovascular diseases, such as ischemic heart disease or arrhythmias, were not considered for this study.

Procedure:
With above inclusion and exclusion criteria a proforma was prepared to meet the objectives of the study.

Statistical Analysis:
Statistical differences between groups of patients were performed using ANOVA Student-Newman-Keuls as appropriate and Chi-square test for categorical variables.

RESULT:

Table – 1 Distribution Of Right Heart Failure In Copd

Total No. of Patients			Patient with clinical signs of Right Heart Failure			Percentage
Male	Female	Total	Male	Female	Total	
88	12	100	7	2	9	9.0

From the above table it is observed that 9 cases having the clinical features of right heart failure constituting 9.0 % of total. All the 9 % are also proved by echocardiography.

Table – 2 Distribution Of Right Heart Failure In Duration Of Disease

Duration of cases	Number of	cases
	Male	Female
2-5 years	-	-
6-10 years	-	-
11-15 years	-	-
16-20 years	1	-
21-25 years	3	1
>25 years	3	1
Total	7	2

From the above table it is observed more number of patients with right heart failure having disease more than 20 years of duration constituting 80% of the total cases of right heart failure in COPD**.**

Median life expectancy (95% CI) was 78.8 (78.4–79.2) years in the no COPD group, 77.9 (75.6–79.5) years in GOLD stage I COPD, 73.4 (72.2–74.4) years in GOLD stage II COPD and 67.2 (65.2–68.9) years in GOLD stage III/IV COPD.

DISCUSSION:
In this study we collected information on patients suffering from either COPD or HF alone. Right Heart Failure: In this study it is observed that 9.0 % of cases showed clinical evidence of right heart failure. All the patients who showed the clinical evidence of right heart failure were subjected to echocardiography and confirmed the presence of right heart failure. Mattay R et al, 1981, observed that 12.5% of his cases were showed evidence of cor-pulmonale [29]. It has been observed that the prevalence of HF in the examined population was 0.6% while in COPD patients it was 22.5%, in accordance with literature [30, 31]. The analysis of risk factors has evidenced a higher percentage of patients exposed to smoke in COPD and in COPD þ HF compared to HF alone, while there is a higher percentage of patients' suffering from diabetes and hypertension in HF and COPD þ HF patients compared to COPD alone. The analysis of BMI has shown that it is significantly higher in HF and in COPD þ HF compared to COPD alone. Conversely, total cholesterol is significantly lower in HF and in COPD þ HF group compared to COPD alone but we have to take into account that they were more frequently treated with statins.

CONCLUSION:
The interaction between the heart and lungs is complex and incompletely understood. As with the kidney, direct physical connection and systemic neuro-hormonal and inflammatory activation are responsible. However, many of the challenges facing physicians and healthcare systems have potential to be addressed through existing resources. Comprehensive large-scale cohort studies and trials are required: establishing the prevalence and clinical consequences of the respective coexistent condition; prospectively testing diagnostic strategies; establishing the efficacy and cost-effectiveness of screening; undertaking randomized controlled trials of beta-blockers and beta-agonists across a spectrum of pulmonary and cardiovascular diseases, respectively; and determining the efficacy of integrated chronic disease management strategies. Such far reaching studies require closer collaboration between the cardiovascular and pulmonary communities.

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