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Study of clinical profile of physiological and hematological findings in patients with chronic bronchitis and emphysema with cardiac complications

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***Abstract*---**Introduction: Chronic bronchitis is a symptom of chronic obstructive pulmonary disease (COPD). Chronic bronchitis is one of a number of lung conditions included in this group. These conditions can obstruct lung airflow and lead to breathing issues. Chronicbronchitis and emphysema are the 2 most prevalent diseases associated with COPD. Method: The investigation was carried out at the Government Medical College in Jagdalpur, Chhattisgarh's Bastar district. Cross sectional study was the method used. 32 subjects in all were enrolled in this investigation. The participants in the study ranged in age from 35 to over 70. Each person who was a part of this study signed an informed consent form. In this study, people between the ages of 35 and beyond 70 were included. Result: In comparison to female individuals, male subjects were more. More than 50% of participants reported having trouble breathing, while 12(37.5%) of them also reported having chest pain. In addition, 15 of the subjects displayed indications of tachypnea, while 10 of them had tachycardia, and 7 of them had cyanosis. Twenty patients had neutrophilia, ten

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had lymphocytosis, two had eosinophilia, and just one had leucocytosis. Right ventricular hypertrophy issues were seen in the smallest number of individuals and pulmonary hypertension complications in the most number of subjects. Conclusion: majority of patients with chronic bronchitis, emphysema, and heart failure reported feeling out of breath. Tachypnea and pulmonary hypertension predominate in them.

***Keywords*---**chronic bronchitis, emphysema, heamatology, cardiac failure.

Introduction

Emphysema and chronic bronchitis have long been used interchangeably; however there is no clinical or radiological evidence of emphysema in”bronchitis" unless it is advanced. Centrilobular emphysema has just lately been detected; the objective methods of the physiologist can aid the physician in his confusion about the clinical diagnosis of emphysema. Understanding physiological data in chronic bronchitis should benefit from further research on the fundamental pathological manifestations of emphysema.[1]

A common yet variable symptom of chronic obstructive lung illness is chronic bronchitis (CB). It has a number of clinical effects, including as a quicker deterioration in lung function, a higher likelihood of smokers developing airflow obstruction, a propensity for lower respiratory tract infections, more frequent exacerbations, and worse overall mortality. Overproduction and hypersecretion of mucus by goblet cells, which worsens luminal blockage of small airways, epithelial remodelling, and altered surface tension of the airway, are the main contributors to CB.[2]

The main radiographic abnormalities associated with chronic bronchitis include thickening of the bronchial wall and a rise in lung markings, also known as the "dirty chest. They were found in 18% of 119 individuals with chronic bronchitis in one investigation, these findings indicate a limited sensitivity in the identification of chronic bronchitis. The results are likewise non-specific and are frequently observed in healthy non-smokers, asthmatics, people with bronchiectasis, and people with acute bronchitis due to a variety of etiologies.[3]

Chronic obstructive pulmonary disease (COPD) has a wide range of cardiac symptoms. It is widely established that pulmonary vascular disease and right ventricular dysfunction impairments exacerbate the clinical course of COPD and negatively correlate with survival. As a result of changes in gas exchange, vascular biology, pulmonary vasculature structural abnormalities, and mechanical variables, the pathophysiology of pulmonary vascular disease in COPD is likely multifaceted. Right heart catheterization is still the gold standard for the assessment of pulmonary vascular disease in COPD, despite the availability of other methods. There has been a resurgence of interest in specific pulmonary vasodilators, despite the fact that no specific medication other than

oxygen has been largely acknowledged for the treatment of pulmonary hypertension in this population.[4]

Breathlessness and exercise restriction are symptoms brought on in part by decreases in lung elastic rebound, airway support, and alveolar capillary bed surface area. Compressing the tiny intraparenchymal airways causes progressive hyperinflation to further reduce expiratory flow, which ultimately affects respiratory mechanics and results in respiratory failure. When Cooper and colleagues reintroduced lung volume reduction surgery (LVRS) in the early 1990s, interest in surgical therapy of severe emphysema was rekindled. The idea behind the surgery was that shrinking the lung would improve lung mechanics and lung function by restoring elastic recoil and radial traction on the terminal bronchioles. 3–5 LVRS for emphysema improved lung function, exercise capacity, and quality of life, according to several controlled trials.[5]

Method

The subjects for the study were selected from the cases admitted to the medical wards of Government Medical College Jagdalpur, Bastar district, Chhattisgarh. The study conducted for a period of one year from MARCH 2018 to FEB 2019. Total number of Subjects included in this study was 32, and 32 cases were selected by simple random sampling method for the study. Study was carried out among the people aged 35 to above 70 years. Informed consent form was taken from all the participants included in this study. On the basis of patient's history, physiological and hematological findings, radiological examination, the diagnosis of chronic bronchitis and emphysema was made.

Inclusion criteria

All patients were included in the study with chronic bronchitis and emphysema of both the genders as cases.Th e diagnosis of chronic bronchitis and emphysema was established by:

- Clinical history with cough with sputum, fever, dyspnea, recurrent chest infections, cyanosis, fatigue, chest pain etc.
- General physical examination suggesting signs of tachycardia, tachypnea etc.

Exclusiuon criteria

- Patients with history of significant inflammatory disease, other than COPD (e.g. rheumatoid arthritis and Lupus)
- Having undergone lung surgery (e.g. lung reduction, lung transplant)

Statistical analysis

Statistical analysis for this study was done by using statistical software SPSS version 16.

Result

Table 1: Age and sex distribution of study subjects

AGE	MALE	FEMALE	TOTAL NO OF PATIENTS
35 - 45	5	3	8
46 -55	7	4	11
55 -70	6	4	10
ABOVE 70	3	0	3
TOTAL	21	11	32

Table 1 denotes age and sex distribution of study subjects. Our study subjects included 21 males and 11 females. Total numbers of male subjects were more compared to female subjects. Maximum (11 subjects) were present in the age group of 46 – 55 years. Followed by 10 subjects in the age group of 55 -70 years. Minimum 3 subjects were present in the age group of above 70 years and all 3 subjects were males.

Table 2: Symptoms in study subjects

SYMPTOMS	NO OF CASES	PERCENTAGE
Haemoptysis	03	9.375%
Chest pain	12	37.5%
Breathlessness	17	53.125
TOTAL	32	100%

Table 2 denotes symptoms of study subjects. Breathlessness was found to be present in 17(53.12%) subjects. So in more than 50% subject's breathlessness was noted. Chest pain was present in 12 (37.5%) subjects. Heamoptysis was least common symptom noted and was present in only 3(9.37%) subjects.

Table 3: Physiological findings in study subjects

SIGNS	NO OF CASES	PERCENTAGE
TACHYPNOEA	15	46.87%
TACHYCARDIA	10	31.25%
CYANOSIS	07	21.87%
TOTAL	32	100%

Table 3 denotes physiological findings in study subjects. Out of 32 subjects, 15(46.87%) subjects showed signs of tachypnoea. Tachycardia was noted in 10(31.25%) subjects. And least number of subjects i.e. is 7(21.87%) subjects showed signs of cyanosis.

Table 4: Heamatological findings in study subjects

HEAMATOLOGICAL FINDINGS	NO OF CASES	PERCENTAGE
NEUTROPHILIA	20	62.5%
LYMPHOCYTOSIS	10	31.25%

EOSINOPHILIA	02	6. 25%
LEUCOCYTOSIS	01	3.125%
TOTAL	32	100%

Table 4 denotes hematological findings. Out of 32 subjects neutrophilia were noted in 20(62.5%) subjects, 10(31.25%) subjects were of lymphocytosis, 2(6.25%) subjects of eosinophilia and leucocytosis was noted in only 1 (3.12%) subject. Therefore neutrophilia was noted in more subjects compared to other hematological findings.

Table 5: Cardiac complications

COMPLICATIONS	NO OF CASES	PERCENTAGE
PULMONARY HYPERTENSION	26	81.25%
CORPULMONALE (FAILURE)	04	12.5%
RIGHT VENTRICULAR HYPERTROPHY	02	6.25%

Table 5 shows cardiac complications. 26 (81.25%) subjects were of pulmonary hypertension and 4(12.5%) subjects were of corpulmonale and 2 (6.25%) subjects were of right ventricular failure. Maximum number of subjects was of pulmonary hypertension complications and right ventricular hypertrophy complication was noted in minimum number of subjects.

Discussion

Chemo attractants must be released for neutrophil recruitment to occur. According to studies, the main chemo attractants in patients with bronchial disease are IL-8 and LTB4, and both of these factors correlate with the MPO activity as described here. However, it is unknown where these two chemo attractants come from. For instance, endotoxin and tumour necrosis factor-alpha (TNF-alpha) are known to stimulate IL-8 synthesis by epithelial cells (both of which are likely to be present in the airway). Additionally, IL-8 is held within a neutrophil's distinct granules and released from this cell upon activation. Last but not least, it has been proposed that elastase itself, when released by the neutrophil, can cause bronchial epithelial cells to produce IL-8.[6]

The only additional risk factor for exacerbations has already been identified as coexisting cardiac and pulmonary illness. Congestive cardiac failure, ischemic heart disease, and exacerbation frequency were not correlated with one another, although this could be because there were so few patients with cardiac illness in this study. However, our research showed a significant correlation between the frequency of exacerbations and bronchial symptoms. According to research by Jousilahti and colleagues, the presence of bronchitis symptoms independently predicted the risk of coronary artery disease.[7]

The main conclusion of this study is that those with a history of COPD are more likely to develop heart disease. Due to the known increased risk of cardiovascular illness in patients with decreased pulmonary function, this result was not a surprise. 15,411 people between the ages of 45 and 64 were divided into five

categories in a survey by Hole et al. based on FEV 1. They discovered a substantial inverse connection between FEV 1 and death from ischemic heart disease and stroke after controlling for risk variables, such as smoking. Patients with significant airflow obstruction were 2.1 times more likely than controls in a cross-sectional examination of patients aged 1 to 50 to have electrocardiographic evidence of probable previous heart failure, according to Sin and Man.[8]

Hogg has emphasized the significance of minor airway obstruction, most recently demonstrating an association between the severity of COPD and the development of the condition with airway remodeling and wall thickening, the presence of inflammatory mucous exudates, and B and CD8 T cell inflammation. Emphysema has been promoted by Christie, Thurlbeck, and others as the primary pathology responsible for the abnormal physiology. They have demonstrated, for instance, that in a subgroup of patients, the connection between flow and recoil pressure is in fact normal. Although this line of research yielded many significant findings, we are still unsure of the relative importance of minor airway obstruction vs. emphysema in a given patient or the potential connection between these two disorders.[9]

In terms of FEVl and RV/TLC (Residual volume and Total lung capacity) ratio, Ruskin et al. determined severity. Only 40% of individuals with moderate COPD had a QRS axis in this range, compared to 66% of those with severe COPD. The majority of patients experienced ECG alterations as the severity of the airflow obstruction increased. Burrows et al. reported statistically significant variations in right axis deviation between participants with less than 25% of expected FEV and those with greater levels of ECG alterations. One of the main causes of the ECG abnormalities in COPD is hypoxia.[10]

Conclusion

Most of the patients with chronic bronchitis and emphysema with cardiac failure complained of breathlessness and have neurophilia on hematological examination. They mostly have tachypnea and pulmonary hypertension. This indicates that most of the patients have acute infections leading to acute exacerbation of breathlessness.

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