



"STUDY OF INCIDENCE, DISTRIBUTION AND ITS CORRELATION ON CHRONIC OBSTRUCTIVE PULMONARY DISEASES" IN MADHUBANI DISTRICT OF BIHAR, INDIA

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ABSTRACT

Background: Chronic Obstructive Pulmonary Diseases (COPD) has been described by the Global Initiative for chronic obstructive lung disease (GOLD) as "a disease stage characterized by air flow limitation that is not fully reversible. **Aims And Objective:** To Study the incidence, age and sex distribution and its correlation with the clinical symptoms with Spirometry abnormalities in Chronic Obstructive Pulmonary Diseases. **Methods And Material:** Study was conducted at the department of TB, Chest and Respiratory Medicine at Madhubani Medical College, Madhubani, Bihar during the period of from April 2020 to December 2020 with 60 patients. Spirometry was performed when the patient was clinically stable. Test was performed with the patient comfortably seated, with clothes loosened. The patients were instructed to take a deep inspiration then close the lips around the mouth piece and blow out as hard and fast as possible, following deep inspiration. Volume was obtained on the vertical axis of recording paper and time on the horizontal axis. By using Spirometry results patients were classified based on GOLD staging of COPD. Severity of clinical symptoms was correlated with GOLD staging of COPD. Pack Years of smoking was compared with severity of COPD. **Result:** It is observed that the majority of the patients were belonging to male sex, between 61 – 70 years of age constituting 38.8% and females were in the age group of 61 – 70 years constituting 40%. 42 out of 60 cases were from the rural areas constituting 70% of the total cases, 18 cases from the urban area constituted only 30% of the total. It has been also observed that the majority of patients had more than 20 pack/years of smoking which constituted 96% of total cases. Low flattened diaphragm with hyperinflated lungs was the major radiological feature present in 65% of cases. 50% of cases were shown obtuse costo phrenic angle in chest x-ray. 20% of the patients in this study had Normal x-ray chest. **Conclusion:** Chronic Obstructive Pulmonary Diseases is a preventable disease as smoking is the major risk factor for Chronic Obstructive Pulmonary Diseases. Spirometry is mandatory to diagnose and assess the severity of Chronic Obstructive Pulmonary Diseases.

KEYWORDS : Chronic Obstructive Pulmonary Diseases, Spirometry, rural areas and smoking.

INTRODUCTION:

Chronic Obstructive Pulmonary Diseases (COPD) has been defined by the Global Initiative for chronic obstructive lung disease (GOLD) as "a disease stage characterized by air flow limitation that is not fully reversible" [1]. Chronic Obstructive Pulmonary Diseases includes (i) Emphysema defined as the permanent abnormal distension of the air spaces distal to the terminal bronchioles accompanied by destruction of their wall without fibrosis. (ii) Chronic Bronchitis defined on the presence of chronic productive cough on most days for 3 months in each of two consecutive years. (iii) Small airway disease [2]. in which small bronchioles are narrowed. Excluded from this definition is Bronchial Asthma [3].

Chronic Bronchitis and emphysema were frequently coexist since they share common etiological factors and after many years chronic bronchitis get complicated by emphysema. GOLD estimates suggested that Chronic Obstructive Pulmonary Diseases, sixth most common cause of death worldwide at present, will be the third most common cause of death world wide by 2020. [1]. In India Chronic Obstructive Pulmonary Diseases is the second most common lung disorder after pulmonary tuberculosis. [4] This disease is frequently seen in middle-aged subjects. Chronic Obstructive Pulmonary Diseases affects male more frequently than females because of smoking. [5]. It is equally prevalent in rural and urban areas [4]. Increased smoking habits among younger people, increasing urbanization, increasing automobiles and emergence of industries leading to Air pollution that has definite impact on the epidemiology of Chronic Obstructive Pulmonary Diseases. Low birth weight, malnutrition, recurrent respiratory infection in childhood also predisposed to Chronic Obstructive Pulmonary Diseases in future. [6] Spirometry is the most robust test of airflow

limitation in patient with Chronic Obstructive Pulmonary Diseases [3]. A low FEV1 (FEV1 < 80%) with FEV1 /FVC ratio < 0.7 and < 15% reversibility of airflow obstruction to bronchodilators is the diagnostic criteria for COPD. [2] (FEV1 – Forced Expiratory Volume in 1 sec. FVC – Forced Vital Capacity) This study, conducted at Madhubani Medical College during the period of April 2020 to March 2021, try to find out the age and sex incidence of Chronic Obstructive Pulmonary Diseases and incidence of various risk factor. Furthermore, this study is to elucidate the relationship of clinical symptom and Spirometry abnormalities.

PREVALENCE IN INDIA:

Chronic Obstructive Pulmonary Diseases is the second most common lung disorder after pulmonary tuberculosis. Incidence is higher in males due to higher prevalence of smoking. It is a disease of middle aged and elderly people, less common below the age of 35 years. Studies from North India, reported that the prevalence of chronic bronchitis was as high as 16% in people above 40 years from rural areas. Prevalence is more in North India than South India due to seasonal variability, particularly extremes of climate in North India. A study by Bhattacharya et al showed prevalence of chronic bronchitis in rural population aged more than 30 years was 57 / 1000 there was a male preponderance which was higher with increasing age and pack years of smoking.

AIMS AND OBJECTIVE:

1. To study the age and sex distribution in Chronic Obstructive Pulmonary Diseases.
2. To study the incidence of various risk factors in Chronic Obstructive Pulmonary Diseases.
3. To correlate the clinical symptoms with Spirometry abnormalities in Chronic Obstructive Pulmonary Diseases.

MATERIAL AND METHODS:

This study was conducted at Department of TB, Chest and Respiratory Medicine of Madhubani Medical College, Madhubani, Bihar during the period of from April 2020 to December 2020. Number of patients in this study is 60 cases.

Inclusion Criteria:

The cases in this study have following characters: (i) Cases between the age group of 30 – 70 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, dyspnoea, 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:

Case with history of the following diseases was excluded; (i) Bronchial Asthma. (ii) Pulmonary Tuberculosis. (iii) Suppurative lung disease. (iv) Systemic Hypertension. (v) Primary Pulmonary Hypertension. (vi) Valvular Heart disease. (vii) Sleep Apnoea syndrome.

PROCEDURE:

With above inclusion and exclusion criteria a proforma was prepared to meet the objectives of the study. Patients were from Madhubani town and rural areas of Madhubani districts. All the patients were subjected as follows.

1) Detailed History. 2) Smoking History. i) Age at which smoking was started. ii) Pack – years was calculated by formula.

$$\text{Pack Year} = \frac{\text{No. of Cigarettes smoked / day} \times \text{Number of years of smoking}}{20}$$

3) General examination and examination of Respiratory system, and other systems and Changes of COPD.

4) X-ray chest PA view and left lateral view.

5) Spirometry: - Spirometry was performed when the patient was clinically stable. Test was performed with the patient comfortably seated, with clothes loosened. The patients were instructed to take a deep inspiration then close the lips around the mouth piece and blow out as hard and fast as possible, following deep inspiration. Volume was obtained on the vertical axis of recording paper and time on the horizontal axis. The curve which was obtained is referred to as forced vital capacity curve. Forced Vital Capacity (FVC) is the volume of air that can be forcibly exhaled (as fast as possible) after a maximal inspiration. It is expressed in litres. Forced Expiratory Volume in one second (FEV1). It is defined as the volume of air expelled in the first second, from the start of maximum expiratory effort of the forced vital capacity. It is expressed in litres or percentage of predicted. Forced expiratory volume in one second as a percentage of forced vital capacity (FEV1 / FVC). It is the percentage of forced vital capacity which is expelled in the first one second of maximal expiratory effort. By using Spirometry results patients were classified based on GOLD staging of COPD. Severity of clinical symptoms was correlated with GOLD staging of COPD. Pack Years of smoking was compared with severity of COPD. Patients who showed clinical sign of right heart failure where subjected to Echo cardiography for confirmation.

Statistical Analysis:

Data were analyzed using SPSS (Statistical package for the

Social Sciences, SPSS) with latest software version. Descriptive and inferential analyses were conducted as appropriate, and level of significance was set at P < 0.05.

RESULT:

The result collected from this study was tabulated into different varieties and incidence of each variety was calculated in percentage.

Table – 1 Sex Distribution:

Sex	No. of cases	percentage
Male	54	90%
Female	6	10%
Total	60	100%

From the above table, it is observed that the majority of the patients in this present study were belonging to male sex. The male to female ratio was 9:1.

Table – 2 Varieties And Incidence Of Each Variety Was Calculated In Percentage

Age in Years	Male	Percentage	Female	Percentage	Total	Percentage
31-40	3	5.5%	-	0%	3	5%
41-50	5	9.2%	-	0%	5	8.3%
51-60	16	29.6%	2	33.3%	18	30%
61-70	21	38.8%	3	50%	24	40%
71-80	9	16.6%	1	16.6%	10	16.6%
Total	54	100	6	100	60	100

From the above table it is observed that the majority of cases among males were between 61 – 70 years of age constituting 38.8% and the minimum numbers of cases were in the age group of 31 – 40 constituting 5.5%. Among females the majority of cases were in the age group of 61 – 70 years constituting 40% and nil cases were observed in the age group of 31 – 50 years. Both sexes put together the maximum cases were in the age group of 61 – 70 years constituting 40% of total cases and minimum cases were observed in the age group of 31 – 40 years which constituted 5% of total cases.

Table – 3 Geographical Distribution:

Area	No. of case	Male	Female	Percentage
Rural	42	37	5	70%
Urban	18	17	1	30%
Total	60	54	6	100%

It is observed from the above table 42 out of 60 cases were from the rural areas constituting 70% of the total cases. 18 cases from the urban area constituted only 30% of the total.

Table – 4 Intensity Of Smoking

Pack year	No. of patients	Percentage
10-12	2	4%
20-30	38	76%
30-40	10	20%

PIE DIAGRAM SHOWING GEOGRAPHIC DISTRIBUTION OF CASES



From the above table it can be observed that the majority of patients had more than 20 pack years of smoking which constituted 96% of total cases. All the patients in this table

were active smokers and all the patients were male.

Table – 5 Distribution Of Symptoms

Symptoms	No. of patients	Percentage
Cough	60	100%
Cough with expectoration of sputum	56	93.3 %
Wheeze	46	76.6%
Breathlessness	52	86.6%
Swelling both legs	5	8.3%

From the above table it is noted that all the patients in this study had cough. Cough was the major symptom constituted 100% in this study. Cough with expectoration of sputum was present in 93.3% of cases. Breathlessness which constituted 86.6% of cases. Wheeze which constituted 76.6% of cases. Swelling of both legs were observed in 8.3% of cases.

Table – 6 Distribution Of Radiological Findings

Chest x-ray	No. of patients	Percentage
Low flattened diaphragm with hyperinflated lungs	39	65
Obtuse costophrenic angle	30	50
Reduction in no and size of pulmonary vessels in periphery	12	20
Normal	12	20

From the study it is observed that Low flattened diaphragm with hyperinflated lungs was the major radiological feature present in 65% of cases. 50% of cases were shown obtuse costo phrenic angle in chest x-ray. 20% of the patients in this study had Normal x-ray chest.

DISCUSSION:

In the present study maximum number of case were in the age group of 61-70 years. This coincides well with the various study as follows, i) Wig K.L Guleira K. S et al 1964 study showed maximum number of cases in 55-65 years. [7] ii) Higham MA Dawson et al at 2001 showed maximum number cases in 61-70years. [8] iii) Suzzane Hurd et al showed maximum number of cases in 60-70 years [3]. In this study, it was noted the incidence of COPD was higher in males than females with male to female ratio of 9:1. Male cases accounted for 90% of the total cases in this study. This finding also coincides with the following studies, 1. Trivedi H.S. et al study showed 80% of cases were male. [9] 2. Miegure et al showed 93% of cases were male. [10] **GEOGRAPHICAL DISTRIBUTION:** In this study it is observed that 70% of patients were from rural areas and 30% were from urban areas. The study by Bhattacharya S.N. et al, 1975, also made similar observation. [11] Anderson et al, 1963, made similar observation in his study. [12] In spite of heavy Air pollution, the urban areas contributed only 30% of the cases in this study.

RISK FACTOR:

Among the various risk factors Smoking is the major risk factor accounted for 87% of the causative risk factor in this present study. Ashley F, Kannel WB et al, 1975, made similar observation. [12] Burrows et al, 1979, made similar observation. [13] Intensity of smoking was expressed in pack-years in this study.

As the number of pack-years more than 20, increased predisposition to COPD was observed in many studies. In this study, most of the patients were 20-30 pack-years of smoking constituting 96% of the total. Higgins ITT et al, 1959, observed in his study 86% patients were more than 30 pack-years of smoking. [14] Chronic respiratory infection which constituted 28.3% was the second major risk factor observed in this study, followed by Air Pollution and Allergy. Burrows B et al, 1977, also made similar observation. In his study chronic respiratory infection constituted 35%. [15] Air pollution constituted 13.3% of risk factor and Allergy 8.3% of risk factors. [16]

Duration Of Diseases:

In this present study of most of the cases were above 10 years of duration of the disease. Barnes BJ et al, 1999, in his study observed 55% had more than 15 years. [15] In this study cough and cough with expectoration of sputum was observed in 100% and 93% of cases respectively Burrows et al, 1979, made in his study 96% of patients had cough with exportation of sputum [13]. Dyspnoea was observed in 86.6% cases. Altose MD et al, 1985, observed 90% of cases had dyspnoea. [16]

Physical Signs:

This study observed acting accessory muscles of respiration was the major physical sign observed in 40% of cases. Polycythaemia (Secondary to hypoxia) was observed in only 3.3% of cases. Pedal oedema raised JVP and congestive hepatomegaly observed in 8.3% of cases.

Chest X-ray PA view:

In this present study most common radiological finding in chest X-ray PA view was hyper inflated lungs with low flattened diaphragm which constituted 65% of cases. Thurlbeck WM et al, 1970, observed in his study 78% of the patients showed radiological evidence of emphysema with chronic bronchitis [17]. Normal X-ray chest was observed in 20% of cases. In the study most number of patients was in GOLD Stage III COPD which constituted 56.6% of cases. The study by Higham et al [8] showed that majority of patients were in Stage III (BTS Scheme for COPD) constituted 57 – 58% of cases. Renzetti AD et al, 1966 observed 76% of his cases belong to moderate to severe stages of COPD [15]

CONCLUSION:

Chronic Obstructive Pulmonary Diseases is a preventable disease as smoking is the major risk factor for Chronic Obstructive Pulmonary Diseases. Spirometry is mandatory to diagnose and assess the severity of Chronic Obstructive Pulmonary Diseases FEV1 was the single most important parameter in Spirometry to diagnose Chronic Obstructive Pulmonary Diseases along with the less than 15% of reversibility of airflow obstruction to bronchodilators. Severity of Chronic Obstructive Pulmonary Diseases has direct relation.

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