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A PROSPECTIVE OBSERVATIONAL STUDY ON EXTRA PULMONARY COMORBIDITIES IN CHRONIC OBSTRUCTIVE PULMONARY DISEASE

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ABSTRACT

The aim of the study is to assess how COPD is affecting other systems in our body. COPD is a chronic inflammatory disease. The prevalence of COPD is increasing day by day in India and there is a need to study the prevalence of COPD, particularly in the rural areas, which may be most affected due to their life style. In 2020 it is the third most leading disease in the world. COPD can no longer be considered as disease affecting the lungs alone. COPD is associated with various comorbidities, which influence the course of COPD and worsen prognosis. Patients with COPD typically have comorbid conditions, such as lung cancer, cardiovascular disease (example-ischemic heart disease), corpulmonale, pulmonary arterial hypertension, depression, muscle wasting, osteopenia and chronic infection. One explanation for this is that tobacco use drives disease in multiple organs. These disorders contribute to a high disease burden and early mortality in patients with COPD.

So we have collected 100 cases of patients who are diagnosed with COPD along with extrapulmonary comorbidities (EPC). In our study we observed that the highest rate of EPC is anaemia and the most common is corpulmonale. We also assess the patient's disease severity by using mMRC dyspnoea scale and we observed that patients are mostly in grade III and IV.COPD is frequently associated with other diseases and there is consistent evidence that these comorbidities had greater negative impact in COPD patient's life.

Key Words: Chronic obstructive pulmonary disease (COPD), Extra pulmonary comorbidities (EPC), Dyspnea, smoking, Depression, Anemia, Pulmonary arterial hypertension (PAH), Coronary artery disease (CAD), Exacerbations, Mortality.

INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is characterized by air flow limitation that is not fully reversible. The airflow limitation is usually both progressive and associated with an abnormal inflammatory response of the lungs to noxious particles or gases. [1]The most common conditions comprising COPD are chronic bronchitis and emphysema. Chronic obstructive pulmonary disease is a progressive and incurable disease and it is a major cause of chronic morbidity and mortality throughout the world. It is currently the 3rd leading cause of death in the world. More than 3 million people died of COPD in 2012 accounting for 6% of all deaths globally. COPD represents an important public

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health challenge that is both preventable and treatable. Many people suffer from this disease for years and died prematurely from its or its complications. [2]

COPD is more common in elder people and the risk factors of COPD are

- Tobacco smoking
- Exposed to fumes from burning fuel for cooking and heating in poorly ventilated homes.
- Air pollution and work place exposure to dust, smoke or fumes.
- α -1 antitrypsin deficiency: It is made in liver and secreted into bloodstream to help protect lungs. Its deficiency can affect liver as well as lungs (genetic disorder – 1% of possibility of getting COPD). Damage to the lung can occur in infants and children, not only adults with long smoking histories. And the COPD disease is characterised by
    - Increased Shortness Of Breath
    - Frequent Coughing (With Or Without Mucus)
    - Wheezing
    - Tightness In Chest
    - Cyanosis (Blueness Of The Lips Or Fingernail Beds)
    - Frequent Respiratory Infections
    - Lack Of Energy
    - Unintended Weight Loss
    - Swelling In Ankles, Feet's Or Legs[3]

COPD represents an important public health challenge that is both preventable and treatable. Many people suffer from this disease for years and died prematurely from its or its complications. COPD disease can no longer be considered a disease affecting the lungs alone. It also affects the other systems too. [2] Extra pulmonary comorbidities are:

- Corpulmonale
- Pulmonary Arterial Hypertension
- Diabetes
- Weight Loss
- Respiratory Infections
- Heart Problems
- Lung Cancer
- Depression
- Skeletal Muscle Dysfunction
- Osteoporosis
- Nutrient Abnormalities

The prevalence of COPD is increasing in India and there is a need to study the prevalence of COPD, particularly in the rural areas, which may be most affected due to their lifestyle. [4] COPD is associated with various comorbidities, which influence the course of COPD and worsen prognosis. These comorbidities contribute to a high disease burden

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and early mortality in patients with COPD. The main aim of the study is to assess how COPD is affecting other systems in our body and the prevalence of extra pulmonary comorbidities in COPD patients.

METHODOLOGY

- **Study design:**

Our Current Study is a prospective observational study which involves active observation of patients diagnosed with COPD.

- **Study Duration:**

The study was carried out for a period of 6 months that is from august 2019 to January 2020.

- **Study Site:**

The study was conducted at government general hospital and Andhra hospital, Eluru, Andhra Pradesh

- **Population Size:**

The study population size is 100

- **Study Criteria:**

Inclusion Criteria:

I. All patients diagnosed with COPD
II. Patients of both genders
III. Patients with comorbid conditions
IV. Patients with age limit between 30-90
V. Includes both out patients and in patients

Exclusion Criteria:

I. Patients diagnosed with COPD along with CKD
II. Patients diagnosed with HIV/AIDS

Statistical plan:

All the data was recorded in Microsoft excel statistics were carried out using anova test: two-factor without replication.

RESULTS

We have collected about 100 cases of COPD with extra pulmonary comorbidities, based on inclusion and exclusion criteria.

Table 1: Smokers vs. Non-smokers

Parameters	Total	Male	Female
Total	100	66	34
Smokers	83	63	20
Non-smokers	17	3	14

Chart 1: Smokers vs. Non-smokers

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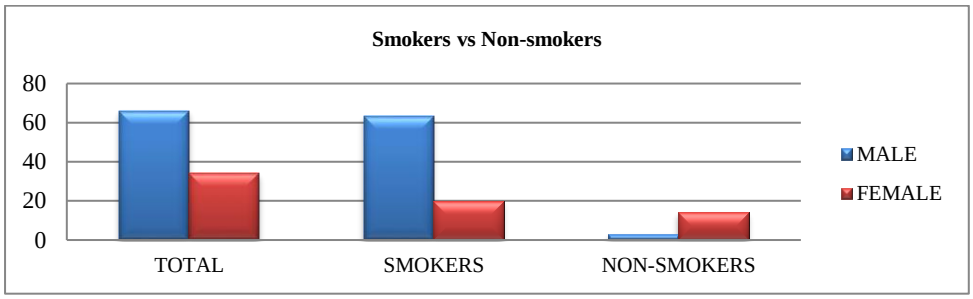

Table 2: Current Smokers vs. Ex-smokers:

PARAMETERS	TOTAL NUMBER	%	MALE	%	FEMALE	%
CURRENT SMOKER	55	55%	41	75.54%	14	25.45%
EX-SMOKERS	28	28%	22	78.57%	6	21.42%

Chart 2: Current Smokers vs. Smokers

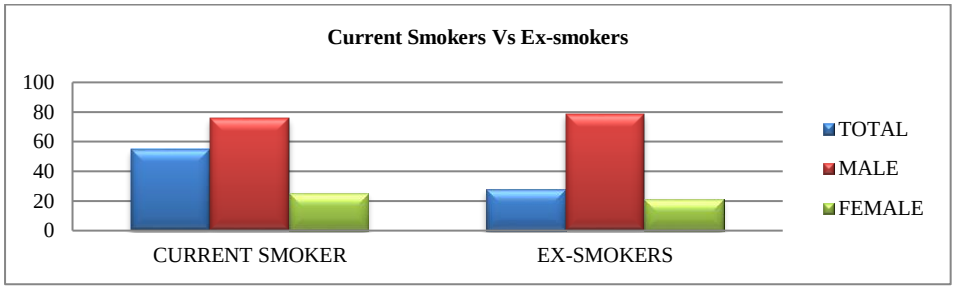

Table 3: Age Vs Number of Patients:

AGE	NUMBER OF PERSONS	PERCENTAGE
21-30	1	1%
31-40	3	3%
41-50	6	6%
51-60	25	25%
61-70	44	44%
71-80	16	16%
81-90	5	5%

Chart 3: Age vs No. of Patients

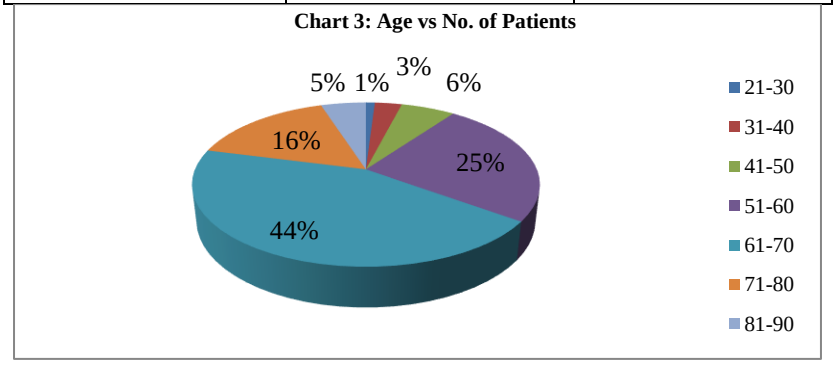

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Table 4: Stages of Dyspnea Scale Vs Number of Patients:

STAGES	NO.OF PATIENTS	PERCENTAGE
STAGE 0	1	1%
STAGE I	2	2%
STAGE II	17	17%
STAGE III	56	56%
STAGE IV	24	24%

Chart 4: Dyspnea scale vs No. of patients:

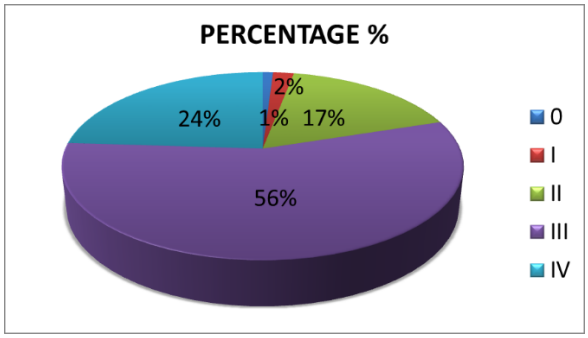

Table 5: Age Vs Stage:

AGE	TOTAL	STAGE 0	STAGE 1	STAGE 2	STAGE 3	STAGE 4
21-30	1	0	0	0	1	0
31-40	3	0	0	0	3	0
41-50	9	0	1	5	3	0
51-60	22	1	1	5	14	1
61-70	44	0	0	5	26	13
71-80	16	0	0	1	8	7
81-90	5	0	0	0	2	3
TOTAL	100	1	2	16	57	24

Chart 5: Age Vs Stage

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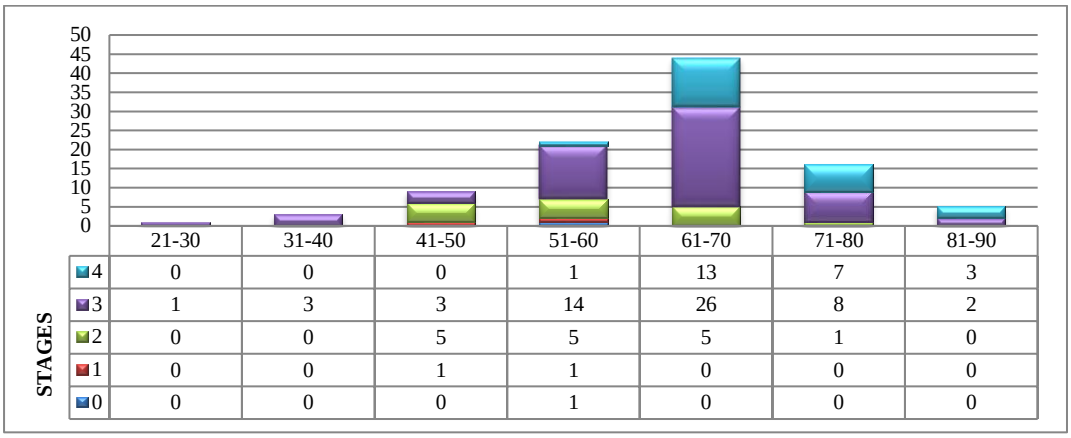

Table 6: Extrapulmonary Comorbidities Vs Number of Patients:

PARAMETERS	TOTAL	%	MALE	%	FEMALE	%
Anemia	69	81.17%	39	56.52%	30	43.47%
Cor pulmonale	14	16.47%	8	57.14%	6	42.85%
Osteoporosis	5	5.88%	3	60%	2	40%
Depression	5	5.88%	2	40%	3	60%
Pulmonary arterial hypertension	3	3.52%	2	66.66%	1	33.33%
Coronary artery disease	3	3.52%	3	100%	0	0
Diabetes	2	2.35%	0	0	2	100%
Tuberculosis	2	2.35%	1	50%	1	50%

Chart 6: EPC vs No. of patients

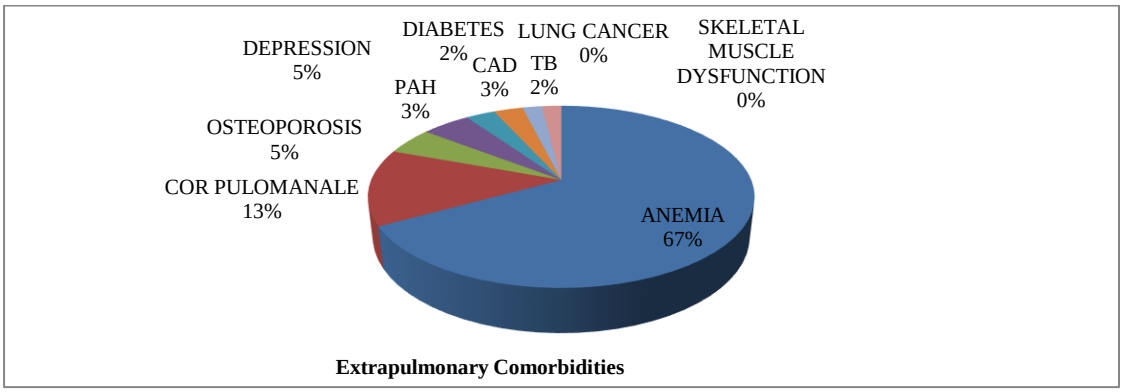

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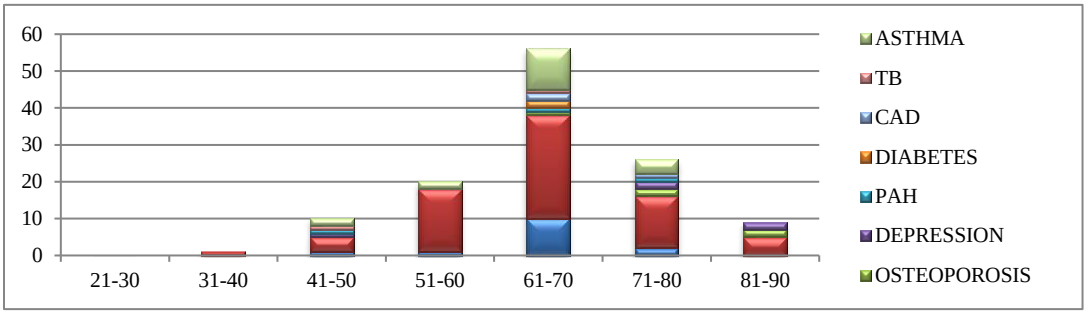
Table 6.1: Overlap Syndrome

PARAMETER	TOTAL	MALE	FEMALE
ASTHMA	22	12	10

Table 7: Age Vs Complications:

AGE	TOTAL	COR PULMONALE	ANEMIA	OSTEOPOROSIS	DEPRESSION	PAH	DIABETES	CAD	TB	ASTHMA
21-30	0	0	0	0	0	0	0	0	0	0
31-40	1	0	1	0	0	0	0	0	0	0
41-50	10	1	4	0	1	1	0	0	1	2
51-60	20	1	17	0	0	0	0	0	0	2
61-70	56	10	28	1	0	1	2	2	1	11
71-80	26	2	14	2	2	1	0	1	0	4
81-90	12	0	5	2	2	0	0	0	0	3

Chart: 7 Age Vs Complications



DISCUSSION

We have collected about 100 cases of patients who are diagnosed with COPD along with extra pulmonary comorbidities based on both inclusion and exclusion criteria.

Majority of patients affected with COPD are smokers with a smoking history of minimum of 25-30 years. Non-smokers are also affected with COPD due to the exposure of occupational pollutant or biomass smoke (females are more prone to this kind of exposure). Out of 100 COPD cases we find 85 of patients are with extra pulmonary comorbidities, remaining are 15 cases are with stable COPD but in future they may also affected with extra pulmonary comorbidities if the disease progressed. In our study the highest rate of extra pulmonary comorbidity is anaemia and the least rate of comorbidities are Diabetes and TB. After that most common extra pulmonary comorbidity is **Corpulmonale.** Based on our study we prioritise according to the prevalence of extra pulmonary comorbidities from highest to lowest.

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Table 8: Hierarchical organisation:

Extra pulmonary comorbidities	Number of cases
1. Anaemia	69
2. Corpulmonale	14
3. Depression	5
4.Osteoporosis	5
5. PAH	3
6. CAD	3
7. TB	2
8. Diabetes	2

Using MMRC DYSPNOEA SCALE we categorised the patients into 4 stages based on severity. Majority of Patients are with grade III and IV. In our study on observing patients with EPC of COPD we find 22 cases are with asthma overlap syndrome (how asthmatic patients will develop COPD).

Asthma patients develop COPD due to smoking on daily basis even though non-smoker asthmatic patients will develop COPD because they only using medications when symptoms / exacerbations present and stop using medications when symptoms resolved this leads to improper usage of medications (nebuliser, inhalers). Or late diagnosis will also develop COPD.

The main reason for more prevalence of COPD cases is not screening properly when symptoms present. Patients with COPD due lack of proper education about their disease condition, usage of proper medication techniques, may lead to more hospitalizations due to exacerbations and finally leads to mortality.

Doctors for likely to diagnose more COPD patients with smoking history at the early stage of disease by the use of questionnaire and spirometry test if diagnosed at an early stage, COPD patients could potentially preserve their lung function by smoking cessation thus preventing the subsequent development of complications and disabilities.[6]

The studies discussed in the present project clearly support the concept that chronic obstructive pulmonary disease can no longer be considered a disease affecting the lungs alone. The available evidence indicates that:

- Chronic obstructive pulmonary disease has an important systemic component
- Clinical assessment of chronic obstructive pulmonary disease ought to take into consideration the systemic components of the disease and the treatment of these extra pulmonary effects appear to be important in the clinical management of disease.

A better understanding of the systemic effects of chronic obstructive pulmonary disease may permit new therapeutic strategies that might result in a better health status and prognosis for these patients [7].

COPD will remain a significant health care problem for years to come. Smoking and biomass fuel smoke are the important risk factors for COPD. [8] In our study we showed that COPD is frequently associated with EPC. The prevalence of COPD with EPC is remarkably high in the age group of 61-70 and the most common and severe comorbidity we observed is anemia. When compared current smokers with ex-smokers, ex-smokers have lesser exacerbations and reduced hospitalization than current smokers. COPD exacerbations are often triggered by airway infection and external factors are an important cause of morbidity, impairment of health status and mortality. [9] Main goals in management of COPD are:

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- Early identification of the disease through primary care screening for the common symptoms in smokers or those exposed to air pollutants or toxins will lead to earlier diagnosis and treatment.
- Mainly to focus on smoking cessation and tobacco abstinence will have greater impact on decreasing the progression of disease.[10]
- To individuals with COPD require significant education about disease condition and respiratory drugs and devices.
- Finally we concluded that COPD is frequently associated with other diseases and there is consistent evidence that these comorbidities have a greater negative impact in COPD patients in terms of quality of life, exacerbation and mortality. Thus, diagnosis and management of comorbidities is an important challenge for the COPD patient.

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