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## Prevalence of systemic hypertension in COPD patients with GOLD stage 1 disease

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### Abstract



Morbidity and death in COPD patients is greatly influenced by co morbidities. We aim to study the prevalence of systemic hypertension in the initial stages of COPD, i.e. in patients with GOLD stage 1 disease having a FEV1 greater than 80% of predicted value in PFT. We conducted a period prevalence study on patients with early stages of COPD. Patients were evaluated for systemic hypertension after being diagnosed with COPD by pulmonary function test. The study was conducted at Sri Venkateswaraa Medical College Hospital and Research Institute, Chennai. A total of 205 patients were identified with COPD meeting the necessary inclusion and exclusion criteria. 150 patients were male and 55 were female. Among them 53.6% patients were diagnosed with systemic hypertension. 20.9% of the hypertensive patients were having obesity. 95.4% of the patients with hypertension were tobacco smokers. 4.6% of the patients with hypertension were having a history of biomass fuel smoke exposure. Tobacco smoking, biomass fuel smoke exposure and obesity are important factors which influence lung function and many cardiovascular/cerebrovascular diseases. Patients in the early stages of COPD have a higher prevalence of systemic hypertension. Systemic hypertension must be identified and treated early to prevent long term cardiovascular/cerebrovascular complications in COPD patients.

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### INTRODUCTION

COPD is an important cause of morbidity and mortality in the world for people above the age of 40 years. Chronic Obstructive Pulmonary Disease (COPD) is characterized by chronic respiratory symptoms due to changes in the airways and alveoli that cause persistent and progressive airflow obstruction[1]. Co morbidities markedly influence health in COPD patients[3]. COPD patients mostly expire of non-respiratory causes particularly cardiovascular and cerebrovascular events rather than respiratory failure[4]. Co morbidities also influence the quality of life in the COPD patients [3]. Hypertension is probably the most likely co morbidity found in COPD patients[3].

Systemic hypertension is multifactorial. Tobacco smoking and biomass smoke exposure are not just a risk factor for COPD but also for systemic hypertension[5]. Hypertension further increases the chances of having a cardiovascular and cerebrovascular event[2].

Obesity is a risk factor for both diabetes mellitus and cardiovascular diseases[10]. Obesity complicates quality of life[11]. Obesity in patients with COPD is associated increased symptoms of breathlessness, difficulty in controlling the symptoms with known inhaler therapies, and increased healthcare utilization[13]. The aim of this study is to know the prevalence of systemic hypertension in GOLD 1 stage of COPD patients that is with a FEV1 greater than 80% of predicted value in PFT

## MATERIALS AND METHODS

This study was done in Sri Venkateswaraa Medical College Hospital and Research Institute, Chennai. Study is a period prevalence study of the patients who presented to the hospital. Patients who came to OPD, whose symptoms and history were suggestive of COPD had their PFT done. Patients who came in exacerbations were admitted, stabilized and their PFT was done at discharge. COPD was diagnosed as per GOLD guidelines that is with FEV1/FVC < 0.7 in their PFT. Patients in the GOLD 1 stage of COPD that is FEV1 greater than 80% of predicted were included in the study and were evaluated for hypertension. Hypertension was diagnosed according to Indian guidelines. Diagnosis of hypertension was based on a minimum of 2 sets of readings on 2 different occasions, which were at least 1-4 weeks apart.

### Inclusion criteria

- Patients with PFT proven disease who met the criteria of FEV1/FVC > 0.7
- FEV1 > 80% of predicted

### Exclusion criteria

- FEV1 < 80% of predicted
- Patients with cardiac arrhythmias
- Patients with congestive heart failure
- Patients with ischemic heart disease
- Patients with respiratory failure at discharge

- Patients with cerebrovascular disease

All patients who fulfilled the above criteria's were documented for their sex, personal history, occupation, BMI. And were later followed up after one week and their BP recorded and their diagnosis of hypertension confirmed.

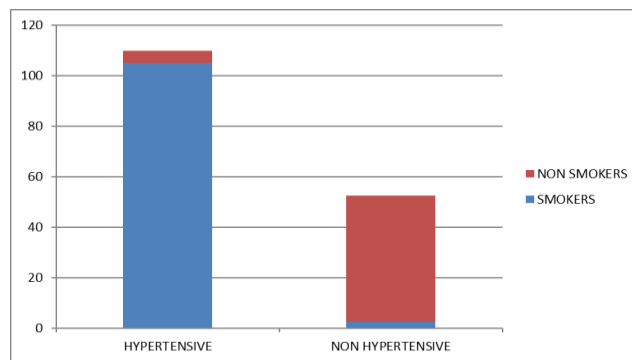
## RESULTS

A total of 205 patients were enrolled to find out the prevalence. The mean age of the patients was 59.1 +/- 6 years. 150 patients were male and 55 patients were female. 53.6% of the COPD patients were diagnosed with hypertension, shown in **Table 1**.

95.4% of the patients with hypertension were tobacco smokers, shown in **Figure 1**. There were exposure differences among male and female patients in the study. All male patients diagnosed with COPD were current smokers who were having difficulties in quitting smoking. And all female COPD patients diagnosed in the study were nonsmokers but having significant biomass fuel exposure history. There was no male COPD patient with significant exposure to biomass smoke and there were no female smokers in the study.

The mean BMI was around 28.5 +/- 4 including both male and female patients, shown in **Figure 2**. All female COPD patients incidentally were obese. 78% male COPD patients were in the overweight category, 10 % with normal BMI and the remaining 12% in the obese category.

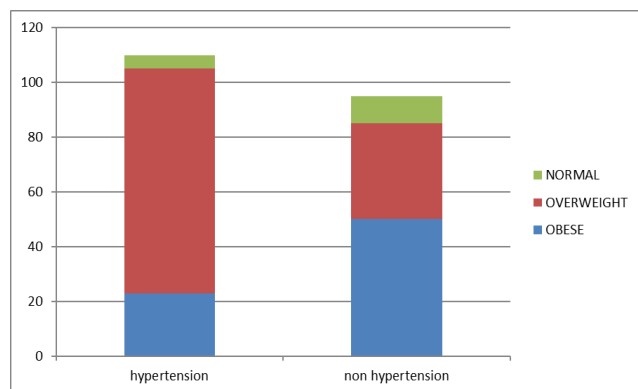
20.9% of the hypertensive patients in the study were obese. 53.6% of the patients with COPD were diagnosed with having hypertension and were eventually started on anti-hypertensive drugs besides being advised on lifestyle modifications such as salt restricted diet and regular cardiovascular activities.



**Figure 1** Distribution of patients according to their smoking history

**Table 1 Demographic details of the study**

Hypertension	53.6%
Mean Age	59.15 +/- 6 years
Smokers	73.1%
Biomass Smoke Exposure History	26.8%
Mean BMI	28.5 +/- 4

**Figure 2 Distribution of patients according to BMI**

## DISCUSSION

Hypertension is the most common co morbidity diagnosed in COPD patients. Nearly 53.6% patients in the study were having both hypertension and COPD. Almargo et al documented a prevalence of 55% of COPD patients having systemic hypertension. Almargo et al included both tobacco smokers and non-smokers[2]. Present study also includes both tobacco smokers and non-smokers.

In India, tobacco smoking is an addiction which is having a tendency towards the male population. 96.4% of the COPD patients with hypertension were smokers and all were male. Tobacco smoking is a known risk factor for hypertension. Fumagalli et al reported a prevalence of hypertension in 52.1% of smokers in his study[9].

COPD in females in Asian countries is mostly due to biomass smoke exposure[7]. Biomass smoke exposure in males has also been documented [8]. Barman et al in his study noted a prevalence of 13.9% of the people exposed to biomass smoke having hypertension [6]. 9% of the COPD patients with exposure to biomass smoke in this study had hypertension. Barman et al didn't evaluate the patients with biomass smoke exposure for COPD. The present study had included only patients during the early stages of COPD i.e. GOLD stage 1

disease which are limitations in making a conclusive statement.

Obesity is a modifiable risk factor for systemic hypertension. Weight loss and aerobic exercises are offered to all patients with hypertension to control their blood pressure[2]. Obesity also complicates symptoms in COPD. In the present study nearly 20.9% of the patients with hypertension were obese. In the study done by stuetan et al, the prevalence of obesity in patients with COPD was 18%, and most of them were in the early stages of the disease that is in GOLD stages 1 and 2(16% - 24%)[12]. Similar observations were noted in this study as the present study exclusively included only GOLD stage 1 patients. Longer follow up is required to observe the prognosis of patients suffering from obesity, COPD and hypertension.

Most of the patients observed with hypertension in this study were male patients. Nearly 96.6% of patients in the study with hypertension were male and only 3.4% patients with hypertension were female. There were no female smokers in the study and there were also no male patients exposed to biomass fuel exposure which were one of the limitations of the study.

Tobacco smoking and biomass smoke exposure are risk factors for many diseases. COPD is particularly a disease of elderly age and rarely occurs below 60 years of age. The patients enrolled in the study were having a mean age of 59.1 +/- 6 years of age. COPD was diagnosed at an early stage where the FEV1 was still greater than 80%. Study done was a prevalence study. Patients were not followed up. All of which are limitations of the study. Both biomass smoke and tobacco smoke, besides geriatric age group > 65 years are risk factors for the development of many cardiovascular, cerebrovascular diseases and cancers etc. Patients need to be followed up regularly and evaluated for all other co morbidities whenever there is an increase in symptoms or a new symptom arises

## CONCLUSION

We from our study conclude that systemic hypertension is common co morbidity in COPD patients irrespective of their exposure history. It must be identified and adequately treated to avoid future cardiovascular and cerebrovascular complications and to improve the quality of life. Obesity is a modifiable risk factor for systemic

hypertension and is not so uncommon in the initial stages of COPD.

### Ethical Approval

This research was conducted in line with the principles of the Declaration of Helsinki. All procedures involving study participants were carried out with care and consideration for their welfare, in compliance with ethical standards and regulations.

### Author Contribution

All authors made substantial contributions to the conception, design, acquisition, analysis, or interpretation of data for the work. They were involved in drafting the manuscript or revising it critically for important intellectual content. All authors gave final approval of the version to be published and agreed to be accountable for all aspects of the work, ensuring its accuracy and integrity.

### Conflict of Interest

The authors declare no conflict of interest, financial or otherwise.

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