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**Research Article**

# Chronic Obstructive Pulmonary Disease (COPD)

**BHAIRAV PRASAD**
College of Health Sciences, Vidya Jyoti Eduversity, Derabssi
SAS Nagar -140508 (Punjab) India
Email id: bhairavmicro@gmail.com, (m): +91-9878-514434
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**ABSTRACT**
Chronic diseases increase their prevalence as the population pyramid inverses and respiratory diseases are among the most frequent conditions in old individuals. Chronic obstructive pulmonary disease (COPD) is a multi factorial entity with a wide range of clinical manifestations, and a leading cause of morbidity and mortality globally. It is a preventable and treatable respiratory disorder largely caused by smoking, and is characterized by progressive, partially reversible airflow obstruction and lung hyperinflation with significant extra pulmonary manifestations and comorbid conditions. All of which may contribute to the severity of the disease in individual patients. It is estimated that about 30 million people in the United States have COPD. As many as half are unaware that they have it. COPD is the major cause of chronic morbidity and will rank 7th of global burden of diseases in 2030. The estimated prevalence of COPD are 4-20% worldwide in adults over 40 years of age and 6.3% in Asian population. Furthermore, it is the 4th most common causes of hospitalization and most economic burden among chronic diseases in old age patients.

**Key words:** COPD, Emphysema, Lung hyperinflation, Smoking

## INTRODUCTION

Chronic obstructive pulmonary disease, usually referred to as COPD (Chronic obstructive pulmonary disease), is a group of progressive lung diseases. The most common are emphysema and chronic bronchitis [1]. Many people with COPD have both of these conditions. Emphysema slowly destroys air sacs in the lungs, which interferes with outward air flow while, Bronchitis causes inflammation and narrowing of the bronchial tubes, which allows mucus to build up. Both the condition cause obstruction of air flow in the respiratory system and develops respiratory problems [2]. COPD is a preventable and treatable respiratory disorder largely caused by smoking and long term exposure to chemical irritants. It is characterized by progressive, partially reversible airflow obstruction and lung hyperinflation with significant extra pulmonary (systemic) manifestations and comorbid conditions all of which may contribute to the severity of the disease in individual patients [3]. The co-morbid conditions associated with COPD include ischemic heart disease; osteopenia, osteoporosis and bone fractures; cachexia and malnutrition; normochromic normocytic anemia; skeletal muscle wasting and peripheral muscle dysfunction; diabetes mellitus; sleep disorders; cataracts and glaucoma; lung cancer; and anxiety and depression both of which increase in incidence with disease severity[1]. It is a disease that usually takes a long time to develop. It is estimated that about 30 million people in the United States have COPD. As many as half are unaware that they have it. COPD is the major cause of chronic morbidity and will rank seventh of global burden of diseases in 2030. The estimated prevalence of COPD are 4-20% worldwide in adults over 40 years of age and 6.3% in Asian population [4]. Furthermore, it is the fourth most common causes of hospitalization and most economic burden among chronic diseases in old age patients [5]. Exacerbation of COPD is "an acute event characterized by a worsening of the patient's respiratory symptoms that is beyond normal day-to-day variations and leads to a change in medication [6].

### COPD statistics

Globally, it is expected that about 65 million people have moderate to severe COPD. About 12 million adults in the United States have a diagnosis of COPD. It is estimated that million more have the disease, but don't know it yet. Most people with COPD are 40 years of age or older. The majority of people with COPD are smokers or former smokers. Smoking is the most important risk factor that can be changed. Between 20 and 30% of chronic smokers develop COPD that shows symptoms and signs. Between 10 and 20% of people with COPD have never smoked [7]. An account of up to 5% of people with COPD, found that their cause is a genetic disorder involving a deficiency of a protein called alpha-1-antitrypsin. COPD is more prevalent and cause of hospitalizations in industrialized countries. In the year 2000, it was noted that there were over 700,000 hospital admissions and approximately 1.5 million emergency visited hospital in United States. Among people with lung cancer, between 40 and 70% also have COPD. About 120,000 people die from COPD each year in the United States. It is the third leading cause of death in the United States. It is estimated that the number of patients diagnosed with COPD will increase by more than 150% from 2010 to 2030. Much of that can be attributed to an aging population [8]. It has been also observed that the case of COPD has been also increase in India each year.

A Graph shows the COPD prevalence in the different region of India (Fig-1).

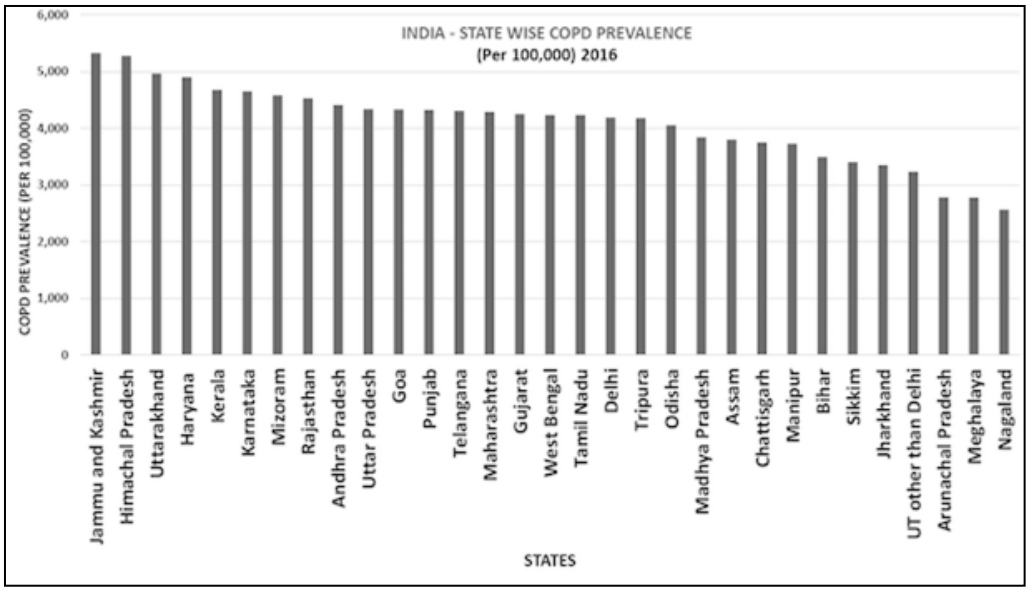


**Fig. 1: India –state wise COPD prevalence**

## Symptoms of COPD

As the COPD is associated with the respiratory system and adversely affects the pulmonary system. It harder to breathe. Symptoms may be mild at first, beginning with intermittent coughing and shortness of breath. The air passage of normal and COPD patients is shown in fig 2 [9]. As it progresses, symptoms can become more constant to where it can become increasingly difficult to breathe. The person may experience wheezing and tightness in the chest or have excess sputum production. Some people with COPD have acute exacerbations, which are flare-ups of severe symptoms. At first, symptoms of COPD can be quite mild. People might mistake them for a cold. The early symptoms include [10]: occasional shortness of breath, especially after exercise mild but recurrent cough, needing to clear your throat often, especially first thing in the morning, People might Start making slight changes, such as avoiding stairs and skipping physical activities. Symptoms can get progressively worse and harder to ignore. As the lungs become more damaged, people may experience: shortness of breath, after even mild exercise such as walking wheezing, which is a type of higher pitched noisy breathing, especially during exhalations, chest tightness, chronic cough, with or without mucus urge to clear mucus from lungs every day frequent colds, flu, or other respiratory infections lack of energy, In later stages of COPD, symptoms may also include: fatigue, swelling of the feet, ankles, or legs, weight loss, Immediate medical care is needed if: people have bluish or gray fingernails or lips, as this indicates low oxygen levels in blood, if you have trouble catching your breath or cannot talk, if you feel confused, muddled, or faint, if your heart is racing.

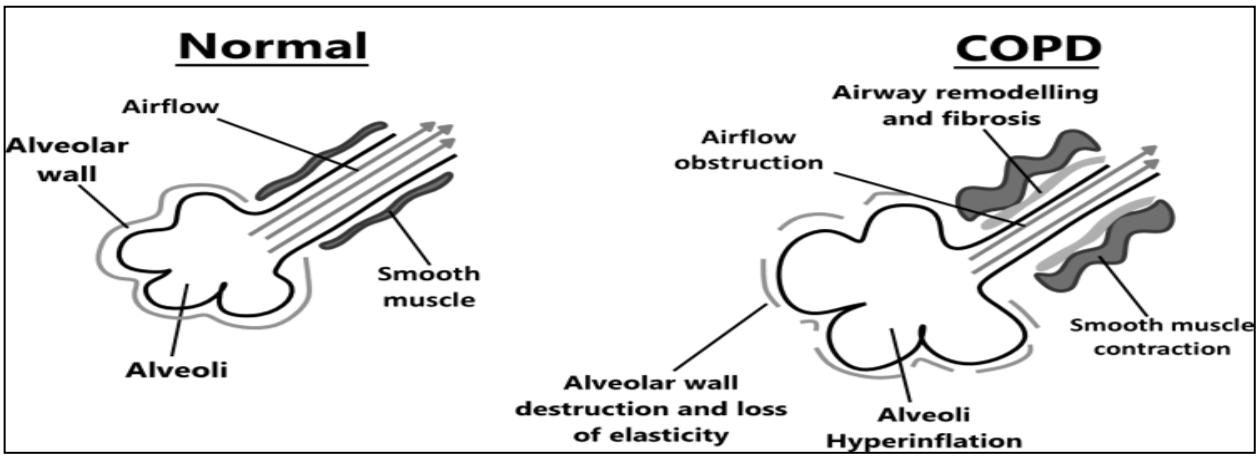


**Fig.2: Lungs in COPD**

## Risk factors for COPD

Smoking is the main cause of COPD in developed and developing countries. In developed countries like the United States, the single biggest cause of COPD is cigarette smoking. About 90% of people who have COPD are smokers or former smokers. Among long-

time smokers, 20 to 30% develop COPD. Research says most people with COPD are at least 40 years old and have at least some history of smoking [11]. The chronic and addicted tobacco users are at greater risk of COPD. In addition to tobacco smoke, cigarette smoke, cigar smoke, pipe smoke, and secondhand smoke can cause COPD. Risk of COPD is even greater if a person has asthma and smoke. The smoking and progress to COPD and its impact on body is shown in Fig. 3. Apart from smoking some other factors such as a person exposed to chemicals and fumes in the workplace, residing in heavy polluted air, Long-term exposure to air pollution and inhaling dust can also develop COPD. The risk factors for developing COPD are varied and listed in table 1. In developing countries, along with tobacco smoke, homes are often poorly ventilated; forcing families to breathe fumes from burning fuel used for cooking and heating are also at some risk. There may be a genetic predisposition to developing COPD up to an estimated 5% of people with COPD have a deficiency in a protein called alpha-1-antitrypsin. This deficiency causes the lungs to deteriorate and also can affect the liver [12].

**Table 1: Risk factors for COPD**

| S.NO. | FACTORS |
|---|---|
| 1. | Genes |
| 2. | Exposure to particle:<br>• Tobacco smoke<br>• Organic and inorganic occupational dusts<br>• Indoor air pollution from heating and cooking with biomass in poorly ventilated dwellings<br>• Outdoor air pollution |
| 3. | Lung growth and development |
| 4. | Oxidative stress |
| 5. | Gender |
| 6. | Age |
| 7. | Respiratory infections |
| 8. | Socioeconomic status |

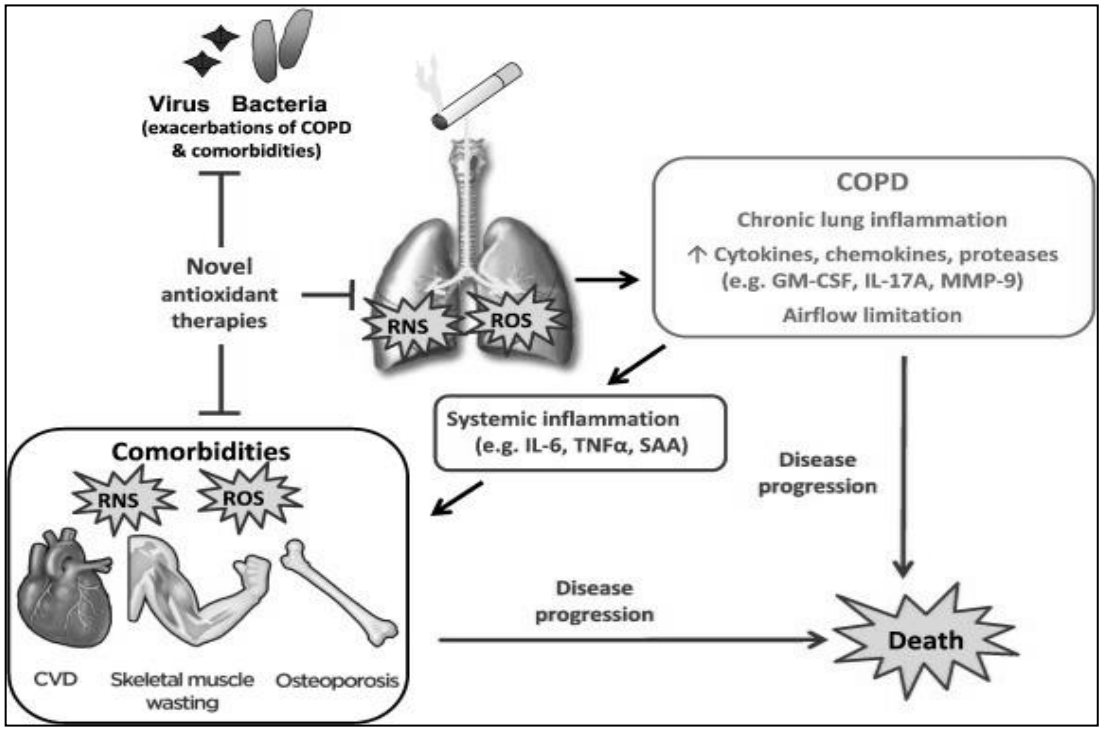


**Fig.3: Smoking and COPD**

## Classification of COPD

The stage of COPD varies from mild to very severe. The classification of COPD is achieved by spirometry grading. The classification is used for determining COPD severity and helping to form a prognosis and treatment plan [13]. There are four GOLD grades based on spirometry testing: Grade I: Mild, Grade II: Moderate, Grade III: Severe, Grade IV: Very severe, As the disease progresses, the patient vulnerable to complications, such as: respiratory infections,

including common colds, flu, and pneumonia, heart problems pulmonary hypertension (high blood pressure in lung arteries) ,lung cancer, depression and anxiety.

### Diagnosis of COPD

There is no single test for COPD. Diagnosis is based on symptoms, a physical exam, and diagnostic test results [14]. The physician inquires: You are a smoker or have smoked in the past, You are exposed to lung irritants on the job/work place, You are exposed to a lot of secondhand smoke, you have a family history of COPD, you have asthma or other respiratory conditions, During the physical exam, doctor will use a stethoscope to listen to your lungs as you breathe. Based on all this information, doctor may order some of these tests to get a more complete picture: Spirometry is a noninvasive test to assess lung function. During the test, patients advise to take a deep breath and then blow into a tube connected to the spirometer. Imaging tests include a chest X-ray or CT scan. These images can provide a detailed look of lungs, blood vessels, and heart. An arterial blood gas test involves taking a blood sample from an artery to measure blood oxygen, carbon dioxide, and other important levels.

### Treatment for COPD

Treatment can ease symptoms, prevent complications, and generally slow disease progression. A lung specialist (pulmonologist) and physical and respiratory therapists may help.

### Medication

Bronchodilators are medications that help relax the muscles of the airways, widening the airways so patient can breathe easier. They are usually taken through an inhaler or a nebulizer. Glucocorticosteroids can be added to reduce inflammation in the airways.

### Oxygen therapy

If blood oxygen level is too low, the patient receives supplemental oxygen through a mask or nasal cannula to help breathe better. A portable unit can make it easier to get around.

### Surgery

Surgery is reserved for severe COPD or when other treatments have failed, which is more likely when a person have emphysema. A surgery is called bullectomy in this procedure, surgeons remove large, abnormal air spaces (bullae) from the lungs. Another is lung volume reduction surgery, which removes damaged upper lung tissue. Lung transplantation is an option in some cases [15].

### Lifestyle changes

Certain lifestyle changes may also help to improve your symptoms or provide relief [14].Quit smoke. Your doctor can recommend appropriate products or support services. Whenever possible, avoid secondhand smoke and chemical fumes. Doctor or dietician to create a healthy eating plan. Talk to your doctor about how much exercise is safe for you.

### COPD Management

COPD requires lifelong disease management. That means following the advice of your healthcare team and maintaining healthy lifestyle habits. Since your lungs are weakened, you have to avoid anything that might overtax them or cause a flare-up. Number one on the list of things to avoid is smoking. If a person having trouble quitting, talk to your doctor about smoking cessation programs. Try to avoid secondhand smoke, chemical fumes, air pollution, and dust. A little exercise each day can help you stay strong. Eating a diet of nutritious foods. Avoid highly processed foods that are loaded with calories and salt but lack nutrients [14]. If you have other chronic diseases along with COPD, it is important to manage those as well, particularly diabetes mellitus and heart disease [16].

### Connection between COPD and lung cancer

COPD and lung cancer are major health problems worldwide. These two diseases are linked in a number of ways. COPD and lung cancer have several common risk factors. Smoking is the number one risk factor for both diseases. Both are more likely if you breathe secondhand smoke, or are exposed to chemicals or other fumes in the workplace [17]. There may be a genetic predisposition to developing both diseases. Also, the risk of developing either COPD or lung cancer increases with age. It was estimated in 2009 that between 40 and 70% of people with lung cancer also have COPD and concluded that COPD is a risk factor for lung cancer. Another study in 2015 suggests they may actually be different aspects of the same disease, and that COPD could be a driving factor in lung cancer [18]. In some cases, people don't know that they have COPD until they are diagnosed with lung cancer. However, having COPD doesn't necessarily mean that a person get lung cancer. It does mean that a person have higher risk [19].

### Future outlook

COPD tends to progress slowly. The person may not even know that he or she has it in early stage. Early symptoms can usually be managed, and certain lifestyle choices can help you maintain a good quality of life for some time. Once a person diagnose, need to start seeing doctor on a regular basis. As the disease progresses, symptoms can become increasingly limiting. People with severe stages of COPD may not be able to care for themselves without assistance. They are at increased risk of developing respiratory infections, heart problems, and lung cancer. They may also be at risk of

depression and anxiety. COPD generally reduces life expectancy, though the outlook varies considerably from person to person. People with COPD who never smoked may have a modest reduction in life expectancy, while former and current smokers are likely to have a larger reduction.

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