# Study of Chronic Obstructive Pulmonary Disease patients in El Mahalla Chest Hospital in 2017

***Thesis***

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# ABSTRACT

## BACKGROUND AND AIMS:

Chronic Obstructive Pulmonary Disease COPDis a disease state characterized by airflow 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 and associated with systemic manifestations.[1]Chronic Obstructive Pulmonary Disease [COPD] is one of the fastest growing causes of death; from its sixth position in 2000, it is expected to climb to the third position within a period of 20 years [2020]. [2] The aim of this study is to assess the pattern of COPD patients in El- Mahalla Chest Hospital in the period from January 2017 to June 2017.

## MATERIALS AND METHODS:

All COPD patients at El mahalla Chest Hospital in the period from January 2017 to June 2017 either referred to outpatient chest clinic or admitted to the hospital were subjected to Full medical history, general and local examination , Pre and post bronchodilator spirometric study according to (GOLD,2017) and Each patient will be subjected to the following questionnaire [ Serial number, Name, Age, Sex, Occupation, Residence, Level of education, Smoking, Smoking index, Family history of COPD, Symptoms, Number and severity of exacerbation attacks in the last year, Number of Hospitalization during the last year, Vaccination status, Spirometry, Treatment prescribed by, Treatment, Inhalation therapy, Regulation of treatment, Non pharmacological therapy, Satisfaction of treatment, co morbidities, Complications, Outcome for In patient].

## RESULTS:

In the current study, 120 COPD patients were investigated. Among these, the mean age of the patients was 59.31 ± 9.43 year and males represent 93.3% more than females 6.7%. The majority of the studied cases were Current smoking but only 22.5% was ex smoker. Mean FEV1% pred. Post-bronchodilator was 75.9 ± 16.9 in out patients and mean FEV1% pred. Post-bronchodilator was 52.9 ± 13.4 in in patient. The most common co morbidities in COPD patients were hypertension in 25% of cases.More than half of all studied cases had complications and the most frequent complication was Corpulmonal and respiratory Failure. In this study, Severity of COPD according to GOLD 2017 was 27.8% in mild stage, 34.2% in moderate stage, 35.8% in severe stage and 2.5% in very severe stage.

## CONCLUSION:

Spirometry had a great role in diagnosis of COPD and its differential diagnosis from asthma. Smoking is the major risk factors in developing COPD and the number of smokers continues to grow up in addition to other habits like smoking shisha, all of this reflects on the disease occurrence and severity. There were great defect in patients' education and rehabilitation as non pharmacological treatment of COPD patients.



## KEYWORDS:

**Chronic Obstructive Pulmonary Disease, El- Mahalla Chest Hospital.**

# Introduction

Chronic Obstructive Pulmonary Disease (COPD), a common preventable and treatable disease, is characterized by persistent airflow limitation that is usually progressive and associated with an enhanced chronic inflammatory response in the airways and the lung to noxious particles or gases. Exacerbations and co morbidities contribute to the overall severity in individual patients**.** ***(GOLD, Updated 2016 )***

Chronic Obstructive Pulmonary Disease (COPD) is one of the fastest growing causes of death; from its sixth position in 2000, it is expected to climb to the third position within a period of 20 years (2020). ***( Namhee K et al; 2013)***

The burden of Chronic Obstructive Pulmonary Disease (COPD) is underestimated because it is not usually recognized and diagnosed until it is clinically apparent and moderately advanced. Prevalence, morbidity, and mortality in Egypt are still lacking and have to be estimated, however, COPD is a significant health problem in both men and women. The economic costs of COPD are high and will continue to rise in direct relation to the ever-aging population, the increasing prevalence of the disease, and the cost of new and existing medical and public health interventions. ***(GOLD, 2013)***

Chronic Obstructive Pulmonary Disease (COPD) is a disease state characterized by airflow 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 and associated with systemic manifestations.***(European Respiratory Society,***

***European Lung White Book: Huddersfield, European Respiratory Society Journals Ltd, 2003.)***

The diagnosis of Chronic Obstructive Pulmonary Disease (COPD) is based on symptoms, the presence of risk factors and spirometry. Smoking is an important cause for the development of COPD. Exposure to biomass fuel is an important risk factor in nonsmoker and female population. Although COPD develops in only about 10–15% of smokers, studies have shown that 4 of 5 patients with COPD are either current or former smokers**. *(GOLD , Updated, 2014), ( Vestbo J, 2007)***

Morbidity from COPD may be affected by other co morbid chronic conditions (e.g. cardiovascular disease, musculoskeletal impairment, and diabetes mellitus) that are related to COPD and may have an impact on the patient's health status, as well as interfere with COPD management. ***(Schirmhofer L et al;2007)***

Observed increases in mortality and morbidity appear to be related to past trends in cigarette smoking. Part of the rise in morbidity and mortality may be due to increasing numbers of people living longer, the increases in morbidity and mortality are particularly staking among older people who continue to smoke.***( Mathers CD and Loncar D ,2006)***

# Aim of the work

The aim of the present study is to assess the pattern of COPD patients in El- Mahalla Chest Hospital in the period from January 2017 to June 2017.

# Chronic Obstructive Pulmonary Disease

## Definition

Chronic Obstructive Pulmonary Disease (COPD), a common preventable and treatable disease, is characterized by persistent airflow limitation that is usually progressive and associated with an enhanced chronic inflammatory response in the airways and the lung to noxious particles or gases. Exacerbations and co morbidities contribute to the overall severity in individual patients**.** ***(GOLD, Updated 2016)***

## Prevalence

COPD affects more than 400 million people worldwide. The prevalence rate of COPD is highly variable ranging from 0.2% in Japan to 37% in the United States. According to the 12-site Burden of Obstructive Lung Disease (BOLD) study, the average prevalence of COPD is 10.1%, with wide variations. ***( Buist et al ;2007)***

In an Egyptian study done by Tageldin et al., the prevalence of COPD in the general population using the GOLD clinical definition of symptomatic COPD was 3.6%. ***(Tageldin et el; 2012)***

Prevalence of COPD in the south Upper Egypt, Qena governorate was 6.6% with high rates among ex and current smokers, males more than females and in those exposed to biomass fuels. Using CAT scoring as a case- finding tool may help to identify people who need spirometry for a possible diagnosis of COPD. ***( Badway et al;2016)***

## Burden of COPD

Chronic obstructive pulmonary disease (COPD) is one of the main causes of morbidity and mortality worldwide and is expected to become the

third cause of death and the fifth cause of disability-adjusted life years in 2020. ***( Vestbo et al.,2013)***

The burden of COPD is underestimated because it is not usually recognized and diagnosed until it is clinically apparent and moderately advanced. Prevalence, morbidity, and mortality in Egypt are still lacking and have to be estimated, however, COPD is a significant health problem in both men and women. The economic costs of COPD are high and will continue to rise in direct relation to the ever-aging population, the increasing prevalence of the disease, and the cost of new and existing medical and public health interventions**. *(GOLD, 2013)***

The cost increases during acute exacerbations and as severity of the disease progresses***.( Miratvilles et al.,2003)***

## Morbidity and Mortality

In the coming decades, chronic obstructive pulmonary disease (COPD) is expected to occur with increasing frequency resulting in enormous healthcare expenditures and high mortality. Thus, COPD presents a challenge for clinicians and is a leading public health problem worldwide. However, COPD is almost invariably associated with other chronic conditions and is thus an important component of the epidemy of multi-morbidity (due to ageing, smoking, indoor and outdoor pollution, alcohol, inactivity and other risk factors) that affects elderly patients. ***( Vestbo, Hurd et al;2013)***

Observed increases in mortality and morbidity appear to be related to past trends in cigarette smoking. Part of the increase in morbidity and mortality may be due to increasing numbers of people living longer, the increases in morbidity and mortality are particularly staking among older people who continue to smoke. ***( Mathers , Loncar et al., 2006)***

The high mortality of COPD is mainly due to exacerbations requiring hospitalization, and in patients with hyper capnia and respiratory acidosis, the mortality reaches 10%, increasing to 40% in the first year after hospital discharge**. *(GOLD, 2015)***

The most common causes of death from smoking in 2000 were cardiovascular disease (1.69 million deaths), COPD (0.97 million deaths), and lung cancer (0.85 million deaths). ***( khattab et al;2012)***

Morbidity from COPD may be affected by other co morbid chronic conditions (e.g. cardiovascular disease, musculoskeletal impairment, and diabetes mellitus) that are related to CORD and may have an impact on the patient's health status, as well as interfere with COPD management .The age-adjusted death rates for COPD by race and sex in the US from 1960 to 1996 revealed that COPD death rates are very low between people under age 45, but then increase with age, and COPD becomes the fourth or fifth leading cause of death among those over 45 years, a pattern that reflects the cumulative effect of cigarette smoking**. *(NIH, 2003)***

## Risk Factors for COPD

### 1) Inhalation Exposure:

#### A) Tobacco Smoke:

Cigarette smoking is the most important single causal factor for developing chronic obstructive pulmonary disease (COPD**).** ***(Mark et al; 2010)***

Smoking is the leading cause of COPD. Smoking is also a trigger for COPD flare-ups. Smoking damages the air sacs, airways, and the lining of your lungs. Injured lungs have trouble moving enough air in and out, so it's hard to breathe.

Smoking is a trigger for many people who have COPD. Smoking can cause an exacerbation, or flare-up, of your symptoms. Exposure to someone else's smoking (called secondhand smoke) is also a trigger for COPD flare-ups.Smoking damages your lungs. When you have COPD and smoke, your lungs will get damaged more rapidly than if you were to stop smoking**.**

***(Celli and Zuwallack, 2016)***

#### B) Occuptional dusts and Chemicals:

Occupational exposures, including organic and inorganic dusts and chemical agents and fumes, are an underappreciated risk factor for COPD.

***( Paulin et al;2015).***

Exposure to biomass fuel is an important risk factor in nonsmoker and female population**.** ***(GOLD, 2014)***

#### c) Indoor air pollution:

Wood, animal dung, crop residues, and coal, typically burned in open fires or poorly functioning stoves, may lead to very high levels of indoor air pollution. The evidence that indoor pollution from biomass cooking and

heating in poorly ventilated dwellings is an important risk factor for COPD (especially among women in developing countries) continues to grow. ***(Boman et al; 2006)***

Indoor air pollution resulting from the burning of wood and other biomass fuels is estimated to kill two million women and children each year. *(Smith, 1999)*

**D) Outdoor air pollution:**

The impact of outdoor air pollution appears to be smaller than that of cigarette smoke and indoor pollution (in respect of chronic obstructive pulmonary disease). ***(Tager et al; 2005)***

It has also been difficult to assess the effects of single pollutants in long-term exposure to atmospheric pollution. However, air pollution from fossil fuel combustion, primarily from motor vehicle emissions in cities, is associated with decrements of respiratory function. **(*Abbey, 1998*)**

## 2) Genetic factors:

The genetic risk factor that is best documented is a severe hereditary deficiency of alpha-1 antitrypsin, ***( Stoller and Aboussouan ,2005)***

A major circulating inhibitor of serine proteases. Although alpha-1 antitrypsin deficiency is relevant to only a small part of the world's population, it illustrates the interaction between genes and environmental exposures leading to COPD. A significant familial risk of airflow limitation has been observed in smoking siblings of patients with severe COPD. ***(McCloskey et al; 2001)***

Suggesting that genetic together with environmental factors could influence this susceptibility. Single genes such as the gene encoding matrix metalloproteinase 12 (*MMP12*) have been related to decline in lung function. ***( Hunninghake et al; 2009)***

**3) Age and gender:**

Age is often listed as a risk factor for COPD. It is unclear if healthy aging as such leads to COPD or if age reflects the sum of cumulative exposures throughout life. ***(Mercado et al; 2015)***

In the past, most studies showed that COPD prevalence and mortality were greater among men than women but data from developed countries show that the prevalence of the disease is now almost equal in men and women, probably reflecting the changing patterns of tobacco smoking. ***(Landis et al; 2014)***

**4) Lung growth and development:**

Any factor that affects lung growth during gestation and childhood has the potential for increasing an individual's risk of developing COPD. ***(Lawlor et al.,2005)***

**5) Socioeconomic status:**

There is strong evidence that the risk of developing COPD is inversely related to socioeconomic status.***( Gershon et al.,2011)***

It is not clear, however, whether this pattern reflects exposures to indoor and outdoor air pollutants, crowding, poor nutrition, infections, or other factors that are related to low socioeconomic status**. *(Silva et al., 2004)***

**6) Asthma and airway hyper-reactivity:**

Asthma may be a risk factor for the development of COPD, although the evidence is not conclusive. In a report from a longitudinal cohort of the Tucson Epidemiological Study of Airway Obstructive Disease, adults with asthma were found to have a twelve-fold higher risk of acquiring COPD over time than those without asthma, after adjusting for smoking.***(Silva et al; 2004)***

Health Survey, bronchial hyper responsiveness was second only to cigarette smoking as the leading risk factor for COPD, responsible for 15% of the population attributable risk (smoking had a population attributable risk of 39%). ***(Marco et al; 2011)***

Bronchial hyper reactivity can exist without a clinical diagnosis of asthma and has been shown to be an independent predictor of COPD in population studies ***(Rijcken et al., 1987)*** as well as an indicator of risk of excess decline in lung function in patients with mild COPD. ***(Tashkin et al., 1996)***

**7) Chronic bronchitis:**

In younger adults who smoke the presence of chronic bronchitis is associated with an increased likelihood of developing COPD**.** ***(Guerra et al., 2009)***

Chronic bronchitis has also been associated with an increased risk in the total number as well as severity of exacerbation. ***(Kim et al; 2011)***

**8) Infections :**

Viral infection, in particular influenza, plays an important role in exacerbation of COPD and associated functional decline. There is clear evidence that influenza vaccines can reduce serious illness and death in patients with COPD by about 50%, irrespective of the severity of disease. ***(Wongsurakiat et al; 2004)***

There is evidence that HIV infection accelerates the onset of smoking –related emphysema and COPD ***(Drummond and Kirk, 2014)*****;** tuberculosis has also been identified as a risk factor of COPD ***(Byrne et al; 2015)***.

In addition, both a differential diagnosis for COPD and a potential comorbidity. ***(Jordan et al; 2010)***

**Pathology, Pathogenesis and Pathophysiology :**

**A) Pathology:**

Pathological changes characteristic of COPD are found in the proximal airways, peripheral airways, lung parenchyma, and pulmonary vasculature. ***(Hogg, 2004)***

The pathological changes include chronic inflammation, with increased numbers of specific inflammatory cell types in different parts of the lung, and structural changes resulting from repeated injury and repair. In general, the inflammatory and structural changes in the airways increase with disease severity and persist on smoking cessation. Most pathology data comes from studies in smokers and the same balance of airway and parenchymal disease cannot necessarily be assumed when other factors are operative. Systemic inflammation may be present and could play a role in the multiple co morbid conditions found in patients with COPD. ***(Barnes, 2016)***

**B) Pathogenesis:**

The inflammation in the respiratory tract of COPD patients appears to be a modification of the inflammatory response of the respiratory tract to chronic irritants such as cigarette smoke, Oxidative stress and an excess of proteinases in the lung further modify lung inflammation. Together, these mechanisms lead to the characteristic pathological changes in COPD. Lung inflammation persists after smoking cessation through unknown mechanisms. Lung inflammation persists after smoking cessation through unknown mechanisms, although autoantigens and perturbations in the lung microbiome may play a role.***( Sze et al; 2015)***

Oxidative stress may be an important amplifying mechanism in COPD.***( Barnes , 2016)***