INTRODUCTION

Chronic Obstructive Pulmonary Disease (COPD): is recently defined as a common preventable and treatable disease 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 comorbidities contribute to the overall severity in individual patient ***(GOLD, 2016).***

As a consequence of its high prevalence and chronicity, COPD causes high resource utilization with frequent clinician office visits, frequent hospitalizations due to acute exacerbations, and the need for chronic therapy ***(Buist et al., 2007).***

Early symptoms of COPD include cough, production of sputum, and/or dyspnea (breathlessness) related to physical exercise, or evidence of airflow obstruction without symptoms. In severe stages, exacerbations can occur regularly ***(Wesseling et al., 2006).***

COPD is estimated to be undiagnosed or misdiagnosed in about 50% of the 24 million men and women estimated to have COPD in the U.S. Many people are not aware they have it until symptoms such as coughing, shortness of breath (dyspnea), increased mucus

production, and wheezing develop slowly over time. Many patients fail to report symptoms to their doctors because they assume these symptoms are a normal part of aging or even due to smoking and are unaware of the symptoms of COPD ***(Fromer et al., 2011).***

Currently, chronic obstructive pulmonary disease (COPD) is regarded as a systemic disease causing structural and functional changes in many organs as well as in the lung. Malnutrition, weight loss, and peripheral muscle weakness are some of the systemic manifestations of COPD that seriously affect the health related quality of life and exercise capacity of patients ***(Decramer et al., 2005).***

Advances in understanding the systemic nature of COPD have given rise to the development of a combined index of multiple mortality predictors for this disease known as the "BODE index". The components of the index are: body mass index (BMI), airway obstruction (O), dyspnea (D) and exercise capacity (E). The BODE index includes both symptoms and physiological measurements and it has been reported as a better mortality predictor than forced expiratory volume in one second (FEV1) ***(Celli et al., 2004).***

The BODE index predicts mortality from any cause as well as respiratory causes and gives more comprehensive

information than the FEV1-based staging system described in the Global Initiative for Chronic Obstructive Lung Disease (GOLD) ***(Global Strategy of COPD, 2006).***

In view of the systemic nature of COPD, other tools such as quality of life questionnaires (QoLQ) have been developed to establish the systemic impacts of the disease. It has been recommended to administer QoLQs to determine disease severity and treatment responses in collaboration with physiological measurements ***(Jones, 2001).***

The health status of patients with Chronic Obstructive Pulmonary Disease (COPD) is currently being assessed using several different questionnaires. One of them is the COPD Assessment Test (CAT), which is a quick and easy test to be completed and provides a score that indicates the impact of the disease on the health status of the patients ***(Gu et al., 2014).***

In Egypt; prevalence, morbidity and mortality are still lacking and have to be estimated; however, COPD is arising significant health problem in Egypt ***(ESCT, 2003).***

Currently, clinical outcomes are being used to determine the pulmonary function and systemic effects of COPD. Evaluating of COPD, a multicomponent disease, functionally and systemically will improve understanding

of this disease as it is the fourth leading cause of death worldwide and is estimated to be the third leading cause of death by 2020 ***(Murray et al., 1997).***

Aim of the Work

The aim of this study is to assess the relationship between the components of BODE index (Body mass index, Obstruction of the airflow, Dyspnea degree and Exercise capacity) and quality of life in COPD patients (assessing by CAT score), during the period from March 2017 to August 2017.

Chronic Obstructive Pulmonary Disease (COPD)

Definitions:

In 2010 the National Institute for Health and Clinical Excellence (NICE) COPD Guideline has defined COPD as characterized by airflow obstruction that is not fully reversible. The airflow obstruction does not change markedly over several months, and is usually progressive in the long term.

Chronic obstructive pulmonary disease (COPD) refers to a group of diseases that cause airflow blockage and breathing-related problems. It include chronic bronchitis, emphysema, and in some cases asthma ***(Centers for Disease Control and Prevention, 2015).***

Now, COPD is defined as 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 comorbidities contribute to the overall severity in individual patients ***(GOLD, 2015).***

Asthma and chronic obstructive pulmonary disease (COPD) are traditionally recognized as distinct diseases.

However, the difference between the two is not always clear. Patients with severe asthma may present with fixed airway obstruction, and patients with COPD may have hyper-responsiveness and eosinophilia. Recognizing and understanding these overlapping features, may offer new insight into the mechanisms and treatment of chronic airway inflammatory diseases ***(Kim and Rhee, 2010).***

Burden of (COPD)

Epidemiology:

COPD is a leading cause of morbidity and mortality worldwide and results in an economic and social burden that is both substantial and increasing. COPD prevalence, morbidity, and mortality vary across countries and across different groups within countries. COPD is the result of cumulative exposures over decades. Often, the prevalence of COPD is directly related to the prevalence of tobacco smoking, although in many countries, outdoor, occupational and indoor air pollution, are major COPD risk factors. The prevalence and burden of COPD are projected to increase in the coming decades due to continued exposure to COPD risk factors and the changing age structure of the world's population ***(GOLD, 2015).***

Prevalence:

Approximately 65 million people have moderate-to-severe COPD ***(WHO, 2015).***

COPD is prevalent in Western society and its incidence is rising in the developing world. Acute exacerbations of COPD, about 50% of which are unreported, lead to deterioration in quality of life and contribute significantly to disease burden ***(Seemungal et al., 2009).***

In United States From 1997 through 2007, the prevalence of physician diagnosed COPD decreased slightly for all age groups. In 2007, within racial groups, the prevalence of COPD was higher in females than in males, with one exception: In those aged 65 years and older, the prevalence was similar in males and females. Differences were observed between races, in males aged 45–64 years and in both males and females aged 65 years and older, the prevalence of COPD was higher in whites than in blacks ***(National Heart, Lung, and Blood Institute, 2009).***

In the United States the exact prevalence of COPD, as in the rest of the world, is unknown. This is largely due to the fact that it is an under diagnosed disease. The most recent study estimates a prevalence of 10.1% in the United States ***(Buist et al., 2007).***

In England, an estimated 842,100 of 50 million people have a diagnosis of COPD; translating into approximately one person in 59 receiving a diagnosis of COPD at some point in their lives ***(Simpson et al., 2010).***

In Egypt, although COPD is a rising significant health problem, data on its prevalence, morbidity, and mortality are still lacking and have to be estimated ***(Egyptian Society of Chest Diseases and Tuberculosis (ESCT), 2003).***

Smoking-related COPD rates will continue to be high for some time. The future of COPD is related most

dramatically to low- or middle-income countries, where more than four in five current smokers in the world live ***(Slama, 2008).***

Morbidity:

Morbidity includes physician visits, emergency department visits and hospitalizations. COPD databases for these outcome parameters are less readily available and usually less reliable than mortality databases ***(American Thoracic Society/European Respiratory Society, 2004).***

COPD is associated with enormous healthcare costs. It has systemic effects, and common co-morbid conditions such as cardiovascular disease, muscle wasting and osteoporosis may all be linked through a common systemic inflammatory cascade ***(Nazir and Erbland, 2009).***

Although COPD is associated with many different co morbidities, cardiovascular disorders (CVDs) are of particular importance, as they are the leading causes of hospitalization and a major contributor of total mortality, accounting for a quarter to a third of all deaths in COPD patients ***(Zvezdin et al., 2009).***

Comorbid diseases potentiate the morbidity of COPD, leading to increased hospitalizations, mortality and health care costs. Comorbidities complicate the management of COPD and need to be evaluated carefully ***(Barnes and Celli, 2009).***

Mortality:

COPD will be the fourth leading cause of death in 2030 ***(Mathers and Loncar, 2006).***

Under-recognition and under-diagnosis of COPD still affect the accuracy of mortality data ***(Pena et al., 2000; Talamo et al., 2007)***.

In 2012, more than 3 million people died of COPD, which is equal to 6% of all deaths globally that year ***(WHO,*** 2015***).***

More than 90% of COPD deaths occur in low-and middle-income countries, where effective strategies for prevention and control are not always implemented or accessible ***(WHO, 2015).***

Economic burden:

In the United States the estimated direct costs of COPD are $29.5 billion and the indirect costs $20.4 billion **(*National Heart, Lung, and Blood Institute, 2009)***, $8.0 billion in indirect morbidity costs and $12.4 billion in indirect mortality costs.

As a consequence of its high prevalence and chronicity, COPD causes high resource utilization with frequent clinician office visits, frequent hospitalizations due to acute exacerbations, and the need for chronic therapy ***(Buist et al., 2007).***

Social burden:

In 1990, COPD was the twelfth leading cause of the Disability-Adjusted Life Years (DALYs) lost in the world, responsible for 2.1% of the total. According to the projections, COPD will be the seventh leading cause of DALYs lost worldwide in 2030 ***(GOLD, 2015).***

A Lung Association survey revealed that half of all COPD patients (51%) say their condition limits their ability to work. It also limits them in normal physical exertion (70%), household chores (56%), social activities (53%), sleeping (50%) and family activities (46%) ***(Schulman et al., 2000).***

The majority of COPD patients were of low social class indicated by low educational level, poor housing and low employment grade ***(Youssef, 2011).***

Epidemiology in Egypt:

In one year study of COPD patients in Ain Shams Chest Section during period from July 2006 to June 2007, 108 patients fulfilled the diagnostic criteria of COPD, 38.9% of them from outpatient clinic, 35.2% admitted in general ward and 25.9% admitted in Respiratory intensive care unit ***(El Sayed, 2007).***

In one year study of COPD patients admitted in the period from the beginning of November 2009 to November 2010 in Qena Chest Hospital, 107patients fulfilled the diagnostic criteria of COPD. In this study, there were 1.9% in mild stage, 1.9% in moderate stage, 22.4% were in severe stage and 73.8% were in very severe stage ***(Youssef, 2011)*.**

Smoking burden in Egypt

An estimated 9.7 million Egyptian adult's smoke tobacco ***(WHO, 2010 and Global Adult Tobacco Survey (GATS), 2009).***

The prevalence of smoking in Egyptian adult males was about 37.7% in 2009 ***(WHO, 2010)***.

1. Tobacco Use

- 19.4% (9.7 million adults) currently smoke; Men
- 37.7% (9.5 million); Women 0.5% (127 thousand).
- 18.5% currently smoke daily (Men 35.8%; Women 0.5%).
- 15.7% currently smoke cigarettes daily (Men 30.6%; Women 0.2%).
- 3.3% currently smoke shisha (Men 6.2%; Women 0.3%).

2. Cessation

- 42.8% stated they were interested in quitting.
- 16.6% of ever daily smokers quit during the past year.
- 17.9% of those who smoked in the past 12 months successfully quit.

3. Secondhand Smoke

- 60.7% (6.5 million adult workers) are exposed to second-hand smoke in enclosed areas at their workplace.
- 51.2% were exposed to smoke in their home at least weekly.

4. Economics

- 109.8 Egyptian pounds is the average cigarette expenditure per month among manufactured cigarette smokers.

5. Media

- 8.0% of adults noticed cigarette marketing in stores where sold.
- 2.5% of adults noticed shisha marketing in stores.
- 79.1% of adults noticed on any media anti-cigarette information.

6. Knowledge, Attitudes and Perceptions

- 97.6% of adults believe smoking causes serious illness.

(Global Adult Tobacco Survey (GATS), 2009).

Risk factors:

COPD results from a gene-environment interaction. Among people with the same smoking history, not all will develop COPD due to differences in genetic predisposition to the disease, or in how long they live ***(GOLD, 2015).***

Current understanding of risk factors **(table 1)** for COPD is in many respects still incomplete ***(GOLD, 2015).***

Table (1): Risk factors for COPD

- Genes
- Age and Gender
- Lung Growth and Development
- Exposure to particles:
  - Tobacco smoke
  - Occupational dusts, organic and inorganic
  - Indoor air pollution from heating and cooking with biomass in poorly vented dwellings
  - Outdoor air pollution
- Socioeconomic Status
- Asthma/ Bronchial Hyper-reactivity
- Chronic Bronchitis
- Respiratory Infections

(Global initiative for Chronic Obstructive Lung Disease, 2015)