Introduction

GOLD (the Global initiative for Obstructive Lung Disease) considers COPD a major public health problem and one of the well-known age-associated diseases and believes that COPD fails to receive adequate attention from the healthcare community and government officials ***(GOLD, 2014).***

COPD is considered an accelerating aging disease: As the prevalence is reported to be two to three times higher in the elderly, therefore, COPD is known as an aging associated disease. The evidence for the role of accelerated aging in COPD progression is growing ***(Lee et al., 2011).***

COPD is a disease state characterized by a progressive and disabling deterioration in lung function. The typical symptoms of COPD include persistent cough, chest tightness, shortness of breath and sputum production. These symptoms are often distressing, severely restricting a patient's ability to perform normal daily activities and significantly affecting their quality of life ***(GOLD 2014).***

According to world health organization (WHO) worldwide, COPD affects 329 million people or nearly 5% of the population. In 2012, it ranked as the third-leading cause of death in the developed world. By the year 2020 it will be faster growing than lung cancer, heart disease and stroke, killing over 3 million people ***(WHO, 2013).***

Smoking is the predominant risk factor for COPD, accounting for 80-90% of the risk of developing the disease. Rising rates of smoking have dramatically increased the levels of illness and death associated with COPD ***(Feenstra et al., 2001).***

Diagnosis of COPD is based on an assessment of risk factors (e.g. smoking, exposure to pollutants) and symptoms and is then confirmed with spirometry (lung function testing) ***(GOLD 2014).***

"Quality of life is the concept of total well-being psychosocial as well as physical. Central to the concept of quality of life and its measurement is that the assessment should include not only the actual event or function per se but also the patient's perceptions of its impact on his or her life" ***(Wenger et al., 1984).***

Health-related quality of life (HRQL) in COPD patients has received an increasing interest over the past decade. An impaired health status is a risk factor for frequent exacerbations and hospital admissions ***(Miravitlles et al., 2006).***

Chronic obstructive pulmonary disease (COPD) is responsible for approximately 5% of deaths worldwide and is predicted to become the third leading cause of death by 2030 ***(WHO, 2013).***

COPD is a severe and irreversible pulmonary disease that impacts the patient's general physical condition, functioning, and quality of life ***(Viegi et al., 2007).***

COPD is a progressive disease, many people living with COPD experience deconditioning, as their ability (and sometimes motivation) to perform everyday tasks becomes increasingly compromised which affect their QOL ***(GOLD 2014).***

Progression of COPD usually results in patients experiencing complications and severe exacerbations which require a visit to their doctor, emergency attention or hospitalization. This has major consequences regarding quality of life ***(GOLD 2014).***

COPD is a main cause of severe deterioration of quality of life in elderly subjects and that the degree of this impairment mainly depends on the severity of airway obstruction ***(Peruzza et al., 2003).***

The main goal of management and treatment in COPD is to improve symptoms and QOL ***(GOLD, 2014).***

According to the GOLD (Global Obstructive Lung Disease) guideline the goals of clinical control in patients with COPD include health-related quality of life goals (improved exercise tolerance and emotional function) and clinical goals (prevention of disease progression and minimization of symptoms) ***(Fabbri and Hurd, 2003).***

Aim of the Work

This work aims to assess quality of life among elderly with COPD.

Chapter (1): Chronic Obstructive Pulmonary Disease (COPD)

Introduction:

The prevalence of Chronic Obstructive Pulmonary Disease (COPD) is constantly increasing. COPD is a leading cause of morbidity worldwide, particularly in developing countries ***(Murray et al., 1997).***

Whereas COPD is an obstructive and progressive airway disease, it is also associated with a significant reduction in physical activity, and psychological problems, all of which contribute to the patient's disability and poor health-related quality of life (HRQoL). Its incidence is growing in old age ***(Vestbo et al., 2013).***

Although COPD is initially asymptomatic, the continued destruction of airway and lung parenchyma with subsequent worsening airflow obstruction leads to the development of progressive symptoms of cough, dyspnea, wheezing and chest tightness ***(Ford et al., 2013).***

While there is clinical variability, most patients have a progression of disease severity leading to an acceleration in sensation of dyspnea, decrease in physical activity and social functioning which correlates with a decline in forced expiratory volume in 1 second (FEV1) ***(Ford et al., 2013).***

Definition of COPD:

The Global Initiative for Chronic Obstructive Lung Disease (GOLD) defines COPD as follows:

COPD, a common preventable and treatable disease, is characterized by 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, 2014).***

Chronic obstructive pulmonary disease (COPD) is a chronic, progressive disease with symptoms of dyspnea, increased respiration rate, sputum production, and a reduced exercise intolerance ***(NIHCE 2010).***

In 2008, the World Health Organization estimated that COPD was the tenth most prevalent cause for moderate to severe disability, and was the fourth leading cause of death, worldwide ***(WHO 2008).***

Chronic Obstructive Pulmonary Disease (COPD) is characterized by airflow limitation due to obstruction of airways. Due to peripheral airway obstruction, air volume may become trapped in the lungs (i.e. hyperinflation) ***(GOLD, 2014).***

The respiratory rate may increase. Adjustment of rapid shallow breathing may lead to respiratory muscles fatigue. Hyperinflation may lower the dome of the

diaphragm, shorten respiratory muscle fibers, and impair the possibility of muscle contraction. In addition, gas exchange may be inefficient. Hence, patients with COPD might develop symptoms of breathlessness or dyspnea ***(GOLD 2014).***

With this significant burden, the impact of this disease on individuals, families' quality of life, and the associated health care expense, COPD is recognized as an international health priority ***(NIHCE 2010).***

Prevalence:

COPD is an international health problem with a worldwide prevalence of at least 9.34/1000 in men and 7.33/1000 in women. It is the fourth leading cause of death worldwide ***(WHO, 2013).***

COPD will be the third leading cause of death globally by 2020 and it will be the fifth leading cause of lost disability adjusted life years ***(Tkacova, 2010).***

Statistics by Country for COPD, (2013) revealed that the extrapolation of undiagnosed prevalence rate of COPD in Egypt is 4,197,651 and the diagnosed prevalence rate in Egypt is 3.777.886 **.**

It was estimated that 80 million people worldwide have moderate to severe COPD. COPD symptoms and exacerbation are responsible for considerable healthcare consumption, with high levels of physician consultation and hospitalization ***(Khattab et al, 2012; Idrees et al, 2012).***

COPD Prevalence in Middle East and North Africa seems to be lower than that reported in industrialized countries, under reporting and risk factors other than smoking may contribute to this difference ***(Tageldin et al., 2012).***

The number of deaths is projected to increase due to higher smoking rates and an aging population in many countries ***(Mathers and Loncar, 2006).***

Total deaths from COPD are projected to increase by more than 30% in the next 10 years unless urgent action is taken to reduce underlying risk factors, especially tobacco use. Almost 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, 2013).***

COPD was more common in men, but because of increased tobacco use among women in high-income countries, and the higher risk of exposure to indoor air pollution in low-income countries, the disease now affects man and women almost equally ***(WHO, 2013).***

COPD is more common in older people; it affects 34-200 out of 1000 people older than 65 years, depending on the studied population ***(Vestbo et al, 2013).***

Chronic obstructive pulmonary disease (COPD) is a leading cause of morbidity and mortality in countries of high, middle, and low income ***(Lopez et al., 2006).***

Estimates from WHO's Global Burden of Disease and Risk Factors project 1-1 show that in 2001, COPD was the fifth leading cause of death in high-income countries, accounting for 3.8% of total deaths, and it was the sixth leading cause of death in nations of low and middle income, accounting for 4.9% of total deaths ***(Lopez et al., 2006).***

In this same report, COPD was also estimated to be the seventh and tenth leading cause of disability-adjusted life years in countries of high income and in those of low or middle income, respectively ***(Lopez et al., 2006).***

Causes:

The primary cause of COPD is tobacco smoke, with occupational exposure and pollution from indoor fires being significant causes in some countries ***(Vestbo et al., 2013).***

Typically these exposures must occur over several decades before symptoms develop. Person's genetic predisposition is also a risk ***(Vestbo et al., 2013).***

Smoking

The primary risk factor for COPD globally is tobacco smoking ***(Vestbo et al., 2013).***

Worldwide, tobacco smoke remains the most important cause of COPD. WHO estimates that in high-income countries, 73% of COPD mortality is related to

smoking, with 40% related to smoking in nations of low and middle income ***(Lopez et al., 2006).***

The processes involved with lung damage due to smoking include oxidative stress produced by high concentrations of free radicals in tobacco smoke and released by inflammatory cells, and breakdown of the connective tissue of the lung by proteases ***(Vestboet al., 2013).***

Abnormally accumulated inflammatory cells including neutrophils and macrophages resulted from cigarette smoke produce reactive oxygen species which play an important role in the pathogenesis of COPD ***(Shapiro et al., 2005).***

Chronic cigarette smoke exposure leads to accumulation of activated macrophages, neutrophils and T lymphocytes in the distal airways and alveolar spaces, that results in continuous destruction of lung parenchyma ***(Houghton et al., 2012).***

Air pollution

Poorly ventilated cooking fires, often fueled by coal or wood, lead to indoor air pollution and are one of the most common causes of COPD in developing countries ***(Kennedy et al., 2007).***

WHO estimates that, in countries of low and middle income, 35% of people with COPD developed the disorder after exposure to indoor smoke from biomass fuels ***(Murray and Lopez, 1997).***

Furthermore, WHO suggests that 36% of mortality from lower respiratory disease is also related to indoor smoke exposure ***(Lopez et al., 2006).***

These fires are a method of cooking and heating for nearly 3 billion people with their health effects being greater among women due to more exposure ***(Vestbo et al., 2013).***

WHO estimates that urban air pollution causes 1% of COPD cases in high-income countries and 2% in nations of low and middle income ***(Lopez et al., 2006).***

Occupational exposures:

Occupational hazards can be risk factors for developing COPD. A recent statement from the Global Initiative for Chronic Obstructive Lung Disease (GOLD) suggested that there was epidemiologic evidence of occupational exposures for developing COPD ***(Vestbo et al., 2013).***

The proportion of patients with COPD attributable to occupation was about 19% overall and 31%in never-smokers. Increased prevalence of COPD has also been reported in occupations associated with chronic exposure to diesel exhaust (e.g. garages and mines) and other irritant gases and vapours ***(Weinmann et al., 2008).***

Particulate pollutants, ozone and nitrogen dioxide can produce bronchial hyperreactivity, airway oxidative stress, pulmonary and systemic inflammation ***(Ko et al., 2012).***

Genetics:

Genetics play a role in the development of COPD. It is more common among relatives of those with COPD who smoke than unrelated smokers ***(Vestbo et al., 2013).***

Alpha1-antitrypsin deficiency is an established genetic cause of COPD especially in the young and it has been reported that α1-antitrypsin deficiency occurs in 1-2 per cent of individuals with COPD ***(Gooptu et al., 2009).***

Other:

A number of other factors are less closely linked to COPD. The risk is greater in those who are poor, although it is not clear if this is due to poverty itself or other risk factors associated with poverty, such as air pollution and malnutrition ***(Vestbo et al., 2013).***

There is tentative evidence that those with asthma and airway hyperreactivity are at increased risk of COPD ***(Vestbo et al., 2013).***

Birth factors such as low birth weight may also play a role as do a number of infectious disease including AIDS and tuberculosis ***(Vestbo et al., 2013).***

Pathophysiology

COPD develops as a significant and chronic inflammatory response to inhaled irritants. The inflammatory cells involved include neutrophil granulocytes and macrophages, two types of white blood cell ***(Vestbo et al., 2013).***

Systemic hypoxemia noted in patients with COPD is associated with acceleration of TNFα production in alveolar macrophages and peripheral blood mononuclear cells ***(Di Vita et al., 2006).***

TNF is an endogenous pyrogen that stimulates the production of other endogenous pyrogens such as IL1β ***(Finder et al., 2001).***

The proposed pathogenesis of COPD includes proteinase-antiproteinase hypothesis, immunological mechanisms, oxidant-antioxidant balance, systemic inflammation, apoptosis and ineffective repair ***(Shapiro et al., 2005).***

(i) The proteinase-antiproteinase hypothesis

The proteinase-antiproteinase hypothesis is based on the assumption that tissue destruction and emphysema occur due to an imbalance between the proteinases and their inhibitors ***(Shapiro et al., 2005).***

The patients with α_1AT deficiency have mutations in the α_1AT gene. Z mutation is the common mutation and these mutations impair secretion of the protein from hepatocytes. As a result, there is markedly decreased circulating level of serine proteinase inhibitor ***(Shapiro et al., 2005).***

Macrophages and neutrophils are the main sources of proteases in lungs ***(Houghton et al., 2012).***

Cigarette smoke causes macrophages to produce Matrix metalloproteinases (MMP) MMP-12 which can cleave elastin into fragments. Elastin fragments are chemotactic to monocytes and fibroblasts and this increases the inflammatory and protease burden in the lung and leads to subsequent lung destruction. This creates a positive feedback loop that results in continuous destruction of lung parenchyma ***(Hunninghake et al., 1981).***

(ii) Immunological mechanisms

COPD is associated with an abnormal inflammatory response of the lungs to noxious particles or gases, most commonly cigarette smoke ***(Chauhan et al., 1990).***

Serum levels of immunoglobulin free light chains (IgLC) were found to be increased in smoking-induced COPD. IgLC were found to bind neutrophils and cross-linking of IgLC on neutrophils results in increased production of IL8 which is a selective attractant of neutrophils. B cells have been found to be increased in COPD and these cells produce IgLC, in addition to IgG and IgA in COPD ***(Chauhan et al., 1990).***

(iii) Oxidant-antioxidant balance

Oxidative stress can impair vasodilation and endothelial cell growth. When the oxidant load exceeds the antioxidant capacity of the lung, modification of proteins, lipids, carbohydrates and DNA occurs, resulting in tissue injury. Though the oxidants cannot degrade extracellular matrix, these can modify elastin ***(Shapiro et al., 2005).***

Modified elastin is then more susceptible to proteolytic cleavage. Cigarette smoke can inactivate histone deacetylase (HDAC2) and this leads to transcription of neutrophil chemokines/cytokines (TNF-α and IL-8) and MMPs. Neutrophil elastase and MMPs overwhelm their respective inhibitors. This can augment the matrix-degrading capacity which can promote emphysema formation ***(Shapiro et al., 2005).***

(iv) Systemic inflammation

In addition to the pulmonary component, COPD has several extrapulmonary manifestations. It has been postulated that persistent pulmonary inflammation may promote the release of pro-inflammatory chemokines and cytokines into the circulation ***(Tkac et al., 2007).***

These mediators can stimulate liver, adipose tissue and bone marrow to release excessive amounts of leucocytes, C-reactive protein (CRP), interleukin (IL)-6, IL-8, fibrinogen and tumour necrosis factor-α (TNF-α) into the circulation. This may lead to a persistent low-grade systemic inflammation ***(Tkac et al., 2007).***

Systemic inflammation may initiate or worsen comorbid diseases, such as ischaemic heart disease, heart failure, osteoporosis, normocytic anaemia, lung cancer, depression and diabetes ***(Barnes et al., 2009).***

(v) Apoptosis

Recent studies have highlighted that apoptosis is involved in the development of COPD and it has been