



EPIDEMIOLOGY OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE

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Abstract

The post-World War II years saw a dramatic increase in the prevalence of cigarette smoking, especially among women. It is predicted that COPD will become increasingly more common for the next two decades due to the fact that women who began smoking during this time are the ones who will have the greatest increase in COPD rates. These people are now only becoming elderly and are just now starting to feel the long-term effects of cigarettes on their lungs. On the other hand, some European countries and the US are now seeing a slowdown and eventual fall in the COPD rates. This is due to the decrease in cigarette consumption in the last few decades. (Vespa2020)

Chronic obstructive pulmonary disease (COPD) is a life-threatening lung disease that is the fourth leading cause of death in the United States. The prevalence of the disease is increasing as the current adult population grows older. This review will summarize the new information that has become available related to the epidemiology of COPD. The review is divided into sections looking at descriptive epidemiology, time trends, the natural history of COPD, and lay out a general model describing the development and progression of the disease. (PRASAD2020)

Keywords: COPD, epidemiology, prevalence, risk factors, comorbidities, burden

1. Introduction

Given the heavy and growing burden of COPD, its prevention is an increasingly important public health challenge. The purpose of this seminar is to provide an overview of COPD epidemiology, its prevention, and its research and policy implications. As there is still much to be learned about the causes and natural history of COPD, this seminar also aims to identify areas in which more research is needed. (Adeloye et al.2021)

The economic burden of COPD is enormous and is growing. In 2010, the total national medical costs were projected to be \$18 billion; an increase of 5.5% from 2008. It is estimated that the total annual financial burden of COPD in the US is \$32 billion when both direct and indirect costs are considered.

Direct costs include health expenditures and indirect costs refer to morbidity and mortality. Since COPD occurs in populations traditionally at an age of high economic productivity, it is a disease that is likely to increase in economic importance in the coming decades. (Iheanacho et al.2020)

It is only in recent years that chronic obstructive pulmonary disease (COPD) has been recognized as a major health problem. There are now over 24 million individuals in the US who have the disease and it is responsible for over 120,000 deaths per year. At present, COPD is the fourth leading cause of death in the United States and is projected to rank fifth in the burden of disease worldwide by 2020.

2. Risk Factors for COPD

There are still a significant number of people who are exposed to occupational dusts and chemicals who are at risk of developing COPD despite improvements in industrial working environments. Between 10-20% of patients with COPD have a history of exposure to dusts and chemicals in the workplace. The risk of developing COPD is proportional to the degree of exposure. Workers exposed to dusty environments with poor ventilation, those who experience regular heavy lifting, and those working in below-ground coal mines have the highest risk compared to others exposed to dusts and chemicals in other working environments. This is a particular risk factor for those working in developing countries where there are less stringent health and safety regulations in the workplace. Exposure to vapors, irritant gases, and fumes is most often encountered in the chemical and related industry. These irritants can cause COPD in the absence of radiological findings or physiological abnormalities similar to chronic bronchitis or emphysema. Indoor air pollution and work in poorly ventilated or gas-tight buildings can lead to the development of COPD that is out of proportion to clinical signs and x-ray findings. (Silver et al.2021)

Cigarette smoking is the single most important risk factor for COPD. The relative risk of developing COPD in smokers compared to non-smokers ranges from 4:1 to 50:1. Although only 15-20% of smokers develop COPD, this is far higher than non-smokers and it is likely to be the greatest contributor to the development of COPD. Most smokers with long smoking histories develop some degree of airway obstruction and are diagnosed with chronic bronchitis. Symptoms of cough and sputum production lead to continuing exposure that eventually results in COPD in some individuals. Around 25% of smokers with long smoking histories will develop symptoms and signs of COPD. There is some variation in susceptibility to the effects of cigarette smoking. Factors causing this variation include genetic predisposition, rate of growth and maximum airway function achieved during lung development, and rate of decline in lung function with age. Children of parents with COPD are more likely to develop this disease, and it has been shown that offspring of parents with advanced COPD are likely to have airway obstruction even in the absence of cigarette smoking. (Yang et al., 2022)

Risk factors are traits or exposures that affect the likelihood a person will develop a disease. An increase in exposure to these factors will increase the risk for COPD. The strongest risk factor for the development of COPD is cigarette smoking. Other risk factors that increase the likelihood of developing COPD include occupational dusts and chemicals, indoor and outdoor air pollution, genetic factors, and frequent lower respiratory infections during childhood. (Pando-Sandoval et al.2022)

3. Prevalence and Incidence of COPD

The incidence of COPD starts to rise at about 40 years of age and increases with each decade. Because of the slow and progressive nature of the disease, the prevalence and incidence of COPD are much higher when based on the more severe stage of the disease. It is important to consider the disability and quality of life of those who have developed severe COPD when assessing the burden of disease and its potential impact on health systems. (Backman et al.2020)

The majority of COPD prevalence studies have been done in high-income countries, although it is expected that COPD prevalence and mortality are rising in low- to middle-income countries as rates of smoking and other risk factors increase. Prevalence of COPD varies widely within and between countries but is strongly related to increasing age. In no country has the prevalence of COPD surpassed that of asthma, and it is often regarded that women have lower rates of COPD than men, although this

is likely changing as women, in many countries, started smoking in large numbers long after men. (Xie et al., 2020)

COPD is a major cause of chronic morbidity and mortality throughout the world and is projected to rank fifth in the burden of disease and fourth in terms of disability-adjusted life years lost by the year 2020. Studies on the prevalence and incidence of COPD have been done in many countries using different methodologies. It is generally understood that COPD is underdiagnosed and undertreated, and epidemiological studies often use different methods to ascertain cases of COPD, making the results difficult to compare. (Yin et al.2022)

Prevalence can be defined as the proportion of people who have a particular disorder within a specified time period, and incidence can be defined as the number of new cases of a disorder that occur within a specified period. Measures of prevalence and incidence are fundamental to understanding the burden of any disorder in a population and are key elements of descriptive epidemiology. (Fox et al.2022)

4. Global Burden of COPD

COPD is a significant cause of mortality, morbidity, and economic burden. It is predicted that from 2005 to 2030, COPD will account for a 160% increase in deaths and a 30% increase in disability-adjusted life years (DALYs). DALYs lost from COPD in 2005 were 44.1 million, making COPD the 4th leading cause of disability worldwide. Additionally, COPD is a significant economic burden due to direct and indirect healthcare costs. The majority of these costs are due to hospitalizations, and consuming countries have reported the high cost of services as being particularly difficult to maintain due to the increasing prevalence of COPD and aging population. As a major cause of chronic morbidity and mortality, COPD has an important effect on the life expectancy of individuals. A major symptom of COPD is breathlessness, which is known to lead to physical inactivity. Therefore, it is predicted that COPD will become a major cause of loss of healthy life years.

The global burden of chronic obstructive pulmonary disease is a growing and serious public health crisis. It is predicted that as early as 2020, COPD will become the third leading cause of mortality and seventh leading cause of morbidity worldwide. Unfortunately, the true extent of the global prevalence of COPD is difficult to determine due to methodological differences between countries and a paucity of standardized data collection. However, the World Health Organization released estimates in 2007 suggesting approximately 210 million people have COPD worldwide. The greatest burden of COPD is in low and middle-income countries; however, it is particularly difficult due to under-recognition of COPD and lack of access to healthcare facilities.

5. Conclusion

COPD is one of the most prevalent respiratory diseases in the world. It is a major cause of chronic morbidity and mortality. Smoking is the most important risk factor for COPD. Despite this, only a minority of smokers develop COPD. This suggests that genetic factors are important in the development of COPD. The genetic epidemiology is still relatively unknown and future research is changing to focus on this, hoping the increase in insight will lead to better treatments and preventive strategies. While the prevalence of COPD is higher in men than women, since the 1970s, the increase in smoking among women is causing an increased prevalence of COPD in women that is starting to shadow that in men. COPD has a large economic burden, which will continue to grow with the increase in prevalence. This has been shown to be a significant factor in many countries. With proper prevention strategies, the burden to families, society, and the impact it will have on the economy can be stopped and decreased. This essay goes over the main ideas of the epidemiology of COPD, and it is shown that much has been learned, but there is still much to discover. It shows that COPD is significant in various populations; however, the burden to developed countries is higher. With the insight of learning the differentials that are in existence now, global strategies can be made to reduce the prevalence and impact of COPD. This essay has an important message, and with the rate of studies in COPD, we can only hope it is achieved. (PRASAD2020)

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