



EPIDEMIOLOGY OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD) IN INDONESIA: A LITERATURE REVIEW

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Abstract

In Indonesia, Chronic Obstructive Pulmonary Disease (COPD) is a non-communicable disease that poses a public health problem. Its main risk factors include active and passive smoking, air pollution, as well as genetic factors. The prevalence of COPD is likely to increase due to high smoking rates among the Indonesian population and high levels of air pollution in some areas. This study aims to describe the problem of COPD in Indonesia epidemiologically from the definition, diagnosis, symptoms, terminology, prevention, treatment, pathogenesis, prevalence in Indonesia and complications of COPD. The research method used is qualitative and the primary literature of this research comes from books, articles, journals, and seminar papers. Descriptive analysis was then used to process the data that had been obtained. Based on the results of research (WHO) said that in 2002, around 64 million people were affected by COPD and 3 million people died from the disease. In 2020, it is estimated that (COPD) will be the third highest cause of death in the world. The conclusion of this study is that it is important to take preventive measures such as maintaining hand hygiene, avoiding exposure to air or cigarette smoke, and getting vaccinations as recommended by the doctor to reduce the risk of infections that can worsen the condition of COPD. Lack of awareness of the importance of COPD prevention and management is also a challenge that needs to be addressed.

Keywords: COPD, Indonesia, Smoking, Prevalence

Introduction

In Indonesia, Chronic Obstructive Pulmonary Disease (COPD) is a non-communicable disease that poses a problem for public health (Hartina et al., 2021; DS et al., 2023; Agustin et al., 2023; Ramadhan & Hartono, 2020; Oemiati, 2013). Its main risk factors include active and passive smoking, air pollution, as well as genetic factors (Iskandar, 2020; Hermanto, 2018; Masitha et al., 2021; Indonesian Lung Doctors Association, 2003; Simbolon & Mayasari, 2020). The prevalence of COPD tends to increase due to high smoking rates among the Indonesian population and high levels of air pollution in some areas (Kusumawardani et al., 2017; Silalahi & Fransiska, 2019; Setyonaluri, D. & Aninditya, 2019; Ahmad, 2020). (COPD is an increasingly serious lung disease characterized by irreversible airway obstruction due to the lung's inflammatory response to toxic gases (Riskesdas, 2019; Setiawan, 2019; Riswardani, 2019; Saputra, 2021). One of the most common respiratory disorders in developed or developing countries. It is caused by increasing age and increased exposure to risk factors, including an increase in the number of smokers and hereditary factors thought to be associated with COPD (Anissa, 2022).

According to the World Health Organization (WHO), approximately 64 million people experienced COPD in 2002 and 3 million people died from the disease. COPD is estimated to be the

fourth leading cause of death in the world in 2020 (Gilda Simanjuntak & Serepina, 2020; Susanto, 2021; Sulistiowati et al., 2021). A survey conducted by the Directorate of Communicable Disease Eradication in 2004 in 5 provincial hospitals in Indonesia found that COPD was the main cause. The incidence rate was 35%, followed by asthma, lung cancer, and other diseases (Anissa, 2022).

The number of people with COPD, asthma, bronchitis in Indonesia is increasing every year (Lukito & Permana, 2018; Asyrofy et al., 2021). This is due to the high level of air pollution, the number of smokers and longer life expectancy. According to research conducted in West Java province, the number of (COPD) in Indonesia reached 14%. COPD can cause alveolar damage (Asyrofy et al., 2021; Perhimpunan Dokter Paru Indonesia, 2003; Oktaria & Ningrum, 2017; Susilowati et al., 2019; Pajarrini et al., 2022). This can alter respiratory physiology, which in turn impacts the body's overall oxygenation. The risk factors can lead to bronchitis and damage to the walls of the terminal bronchioles. Once the bronchial wall is damaged, the obstruction in the small bronchi (terminal bronchioles) closes at the beginning of the expiratory phase. During inhalation, air can easily enter the alveoli, but during expiration, more air is trapped in the alveoli, causing a buildup of air called air trapping. This triggers complaints of shortness of breath and its complications. Expiration will become more difficult and the expiratory phase will be inhibited if there is resistance early in the process. There will be disturbances in all lung functions, including ventilation, gas distribution, gas diffusion, and blood perfusion (Samosir, et al., 2018).

Methods

This research applies a qualitative research method with a literature study method (Yusuf, 2014; Cooper & Schindler, 2014). This review is organized based on topics and documents that are relevant to the object of research to be reviewed in this article. Primary literature in this study comes from articles, books, journals, and seminar papers published in the last 10 years. Descriptive analysis is then used to process the data that has been obtained. This method explains the facts, then analyzed to provide adequate understanding and explanation.

Results

3 million patients (5%) died from moderate to severe COPD in 2015. The 2018 Riskesdas results said that the prevalence of COPD in Indonesia was different, with 4.2% in males and 3.3% in females, and only 3.1% in the DIY sector. Meanwhile, this is also related to the increase in smoking in adolescents aged 10 to 18 years by 7.2% (Kurnia et al., 2023). In Indonesia, smoking is a major risk factor for COPD (Oktaria & Ningrum, 2017; Amelia et al., 2023; Najihah & Theovena, 2022; Kusumawardani et al., 2017; Salawati, 2016). The number of people who smoke in Indonesia is among the highest in the world. Cigarettes contain chemicals that damage the lungs and cause inflammation and narrowing of the airways (Meiliyani, 2017; Rahmawati, 2019; Amanati et al., 2021; Asad et al., 2022; Suheri et al., 2022) and in fact in Indonesia more than 70% of adult men are active smokers. Apart from smoking, exposure to air pollution from motor vehicles, solid fuel combustion in households, exposure to dust, and exposure to chemicals in the workplace are some other sources of risk.

Discussion

Definition of COPD

COPD is a non-communicable disease (Hartina et al., 2021; DS et al., 2023; Agustin et al., 2023; Ramadhan & Hartono, 2020; Oemiati, 2013) and is one of the problems for public health in all regions. COPD is a disease with symptoms of increased airflow obstruction and chronic inflammation of the airways and lung parenchyma caused by exposure to harmful gases (Seriasih, 2021; Ulwan et al., 2021; Ikhsan, 2023). COPD causes pulmonary fibrosis and parenchymal damage. COPD, which is considered the world's No. 4 disease by mortality, is expected to become the leading cause of morbidity and the No. 3 cause of mortality by 2030. The number of patients who died from COPD reached 3 million in 2012 (Swastikanti et al., 2021).

The initial concept was that COPD could be caused not only by cigarette smoke inhalation but also by infections such as tuberculosis, and asthma. Compared to classic COPD caused by smoking, COPD from different sources develops in different ways. In addition, the main causes of COPD in most countries, especially in women, include smoking (D. A. Hasanah et al., 2023). Second, new tools, such as chest x-rays, have shown that structural abnormalities of the lungs can be identified even in people who do not have airway obstruction. Thirdly, epidemiological studies have shown that respiratory symptoms such as cough and sputum may indicate the risk of future airway obstruction (Perhimpunan Dokter Paru Indonesia, 2003).

In previous definitions of COPD, the terms emphysema and chronic bronchitis were mentioned. However, for several reasons, these terms are no longer used in the current definition of COPD. Chronic bronchitis is a clinical and epidemiological diagnosis characterized by emphysema, a pathological diagnosis characterized by damage to the alveolar surface, a site of gas exchange, and coughing for at least 3 months for at least 3 consecutive months. This condition only occurs in some patients and is not always a sign of airway obstruction (Indonesian Lung Doctors Association, 2003). Meanwhile, COPD is a lung disease characterized by impaired lung function due to longer expiratory time due to airway narrowing. Obstructive lung disease is the result of smoking, infection, and air pollution. Shortness of breath that increases during exertion (Astriani et al., 2018; Salsha Bella et al., 2023), coughing with phlegm that increases with age, or having experienced shortness of breath along with coughing with phlegm are symptoms and signs of COPD (Yunica Astriani et al., 2021). COPD can be caused by increased resistance due to bronchial mucosal edema or smooth muscle contraction. Decreased elasticity can also cause COPD. Elasticity can be defined as the ability to shrink the lungs so that they can passively exhale (La Ode, 2023).

It is understood that COPD is projected to be the 3rd highest cause of death in the world by 2020. A survey conducted by the Directorate General of Communicable Disease Eradication in 2004 in 5 provincial hospitals in Indonesia showed that COPD was the leading cause of morbidity with 35%, followed by asthma, lung cancer, and others (Anissa, 2022).

Diagnosis of COPD

Based on medical history, physical examination, and additional tests, such as chest X-ray and spirometry, the diagnosis of COPD can be first initiated. In addition, the diagnosis of COPD can be classified into mild, moderate, or severe (M. Hasanah & Djajalaksana, 2013; Putra et al., 2016; Fauzi & Syafna, 2022; Madania & Sawitri, 2022; Marpaung, 2024). The following are some supporting examinations (Ahmad, 2020); (1) To find out whether the lungs can absorb sufficient amounts of oxygen into the blood, spirometry is used to perform a lung function test. (2) Blood tests to measure the level of alpha-1-antitrypsin protein in the blood and detect symptoms of other diseases, such as anemia or polycythemia. (3) To measure the concentration of carbon dioxide and oxygen in the blood using arterial blood gas analysis. (4) Identification of lung diseases such as emphysema through x-ray and computed tomography (CT) scan images.

Risk factor exposure, spirometry confirmation, and complaints determine the diagnosis. For people aged >40 years who have risk factors such as smoking, exposure to smoke and dust in the workplace and environment, and complaints of coughing, both with and without sputum, the diagnosis of COPD can be confirmed through spirometry examination. If no spirometry facilities are clinically available, spirometry examination is required (Rosyid et al., 2022).

Symptoms of COPD

At first, they may not show any symptoms because COPD develops gradually, you may only experience mild symptoms without realizing that you have the disease. Indeed, COPD is a progressive disease (Endrian, et al., 2018; Astriani et al., 2020; Veryanti & Wulandari, 2020; Ramadhani et al., 2022; Najihah, Theovena, et al., 2023; Najihah, Paridah, et al., 2023; Adiana & Maha Putra, 2023; Bella et al., 2023), the symptoms only become really bothersome after developing for years. Eventually, COPD symptoms begin to affect your quality of life and activity levels. You may only realize that your lungs have a problem. Both types of symptoms and signs are chronic clinical and statistical symptoms similar to emphysema, known as rosacea. Tatis sufferers often experience the following symptoms: weakness, cough with phlegm, difficulty breathing on movement, and wheezing. On physical examination, elongated expiration, chest cavity and accessory respiratory muscle use, weakening of Hayas sound, paradoxical breathing, leg edema, and ascites are common (Ahmad, 2020).

There are two types of symptoms and signs: chronic statistics, and clinical symptoms that resemble emphysema, known as pink puffers. Tatis patients usually experience the following symptoms: weakness, cough with phlegm, shortness of breath, and wheezing. On physical examination, prolonged expiration, chest cavity, use of respiratory muscles, decreased breath sounds, paradoxical breathing, leg edema, and ascites are common symptoms (Ahmad, 2020).

Shortness of breath is a common symptom of COPD patients. Shortness of breath usually appears when FEV is less than 60% predicted. In addition to shortness of breath, other symptoms may include a history of exposure, recurrent cough, and sputum production. The risk of COPD can be influenced by genetics, smoking, exposure to harmful gases, age, asthma, social status (Tommy et al., 2023: 31).

Common signs of COPD are persistent respiratory symptoms and airflow obstruction. The disease is preventable and treatable. It occurs because the supply of harmful gases or particles causes changes in the alveolus and airways. Risk factors for COPD include occupation, air pollution, and smoking. The diagnosis of COPD is based on clinical symptoms, spirometry, and risk factors. COPD treatment aims to reduce symptoms, prevent recurrent exacerbations, improve and prevent lung function decline, and improve the patient's quality of life. The main medications for COPD are bronchodilators, such as B2 agonists and anticholinergics, also known as muscarinic antagonists (Ikhsan, 2023).

Due to the adverse effects of COPD disease, patients experience a decrease in quality of life. One of the main complaints of COPD patients is activity limitation, which impacts their quality of life. Due to chronic shortness of breath, some patients are unable to do any activities they want, even though they are still of working age. COPD patients experience anxiety, panic, and frustration as a result of shortness of breath and unsynchronized breathing patterns (Asyrofy et al., 2021).

COPD Terminology

(Perhimpunan Dokter Paru Indonesia, 2003) Early COPD can occur early in life and continues to progress, so it can be defined as “approaching a process”. As a result, it is very difficult to identify patients who fall under the term early COPD. The term “early” requires both clinical and biological understanding. Early COPD biologically indicates the mechanism or event that causes COPD. Meanwhile, biologically secure early COPD indicates the mechanism or event that causes COPD. Meanwhile, clinical early COPD indicates the perception of complaints, problems and/or structural impairment. This is a more precise definition.

COPD at a young age: Patients with COPD at a young age usually have significant structural and functional lung abnormalities, but are often not diagnosed correctly. Their lung function values usually have not reached a peak or their lung function values drop rapidly after reaching a peak. Young people with COPD may also have a family history of lung disease or respiration disorders. This suggests that COPD can occur in childhood.

COPD (PPOK) disease is mild for most studies, For the early stages of COPD, mild degrees of obstruction are considered the benchmark. However, this assumption is incorrect because not all patients have a milder or severe degree of obstruction. As a result, the measure of early stage COPD should no longer use the term “mild”. Instead, the term should be used only to describe the degree of obstruction indicated by spirometry results.

Pre-COPD is used to describe a person at any age who has respiratory-related complaints and structural and functional problems that can be found even though spirometry results do not show signs of obstruction. These sufferers may eventually develop persistent airflow obstruction. However, they probably will not. To achieve this, further studies in Pre-COPD patients are needed.

VEPI/KVP values remain normal (more than 70% post bronchodilator), but other spirometer values become abnormal (VEPI and/or KVP less than 80% post bronchodilator). This is called PRISm. This condition is found in 7.1-20.3% of individuals. People who most commonly experience it are those who have a very high or very low body mass index, as well as people who have smoked or have quit smoking. In later life, there is a correlation between PRISm and higher mortality rates. PRISm often turns into “spirometric obstruction” over time.

Types of COPD

The types of COPD are as follows; (1) Spirometry examination shows VEPI more than 80% (normal) and VEPI/KVP less than 70% in mild COPD patients. They also show sputum production or breathlessness levels zero to one. (2) COPD patients have symptoms such as cough or no cough, grade two shortness of breath or sputum production, and spirometry examination shows VEPI more than 70% and VEP. (3) Severe COPD patients show long-term respiratory failure and three or four degrees of shortness of breath. Cor pulmonary problems or right heart failure cause exacerbations. Spirometer results show 70% VEPI/KVP, 30% predicted, and 30% chronic respiratory failure (Oemiati, 2013). For the initial evaluation of the diagnosis of COPD, in addition to spirometry, additional examinations are required such as Thorax X-ray examination, which is used to eliminate other pathological possibilities and identify comorbid lung disorders such as fibrosis, bronchiethaxis, and pleural disorders. In addition, a complete blood test is performed to identify polycythemia and anemia (Gilda Simanjuntak & Serepina, 2020).

COPD Epidemiology

COPD risk factors are factors that are associated with and can cause disease in certain people or groups (Oktaria & Ningrum, 2017). These risk factors include (MOH, No. 1022, 2008: 11-16); (1) Airway hyperresponsiveness, lung growth, and genetic variables are Absence of alpha 1 antitrypsin, a serine protease inhibitor, is the most significant genetic factor. Gestational exposure, birth weight, and impaired lung growth may also be associated with the likelihood of developing COPD. (2) Smoking Behavior: Cigarette smoke is the biggest risk factor for COPD (Zuriati et al., 2017). Smokers experience the highest respiratory distress and decreased lung function, and cigarette smoke is the greatest risk factor for COPD. Age at smoking onset, number of smokers per year, and age of active smoking are all associated with mortality. Not everyone who smokes is COPD: the reason could be genetics. Other risk factors for COPD are secondhand smoke and smoking during pregnancy. Smoking is the most common cause of COPD, accounting for 80% of cases. It is estimated that about 20% of people who smoke will develop it, with individual risk increasing in proportion to the number of cigarettes consumed (Francis,

2011). (3) Environmental Factors (Air Pollution): Air pollution includes indoor pollution, such as cigarette smoke, stove smoke, coal smoke, firewood smoke, mosquito coil smoke, and others; outdoor pollution, such as motor vehicle dust, road dust, forest fires, volcanic eruptions, and others; and workplace pollution, such as chemicals, dust, and substances (Nasjum, 2020).

Epidemiological studies on the effects of imal smoking Several studies examined the impact of smoking on disease: (1) Dr. Richard Doll and Dr. AB Hill conducted the first important study in the UK from 1951 to 1956. This study showed the impact of smoking on lung cancer. And the high mortality rate among doctors in the UK. (2) The Framingham study also looked at the impact of smoking on heart disease; smoking is among the top three causes of coronary heart disease. (3) Various smoking-related diseases have been researched by US NHS Surgeons for many years (Susanti, 2020).

Chronic obstructive pulmonary disease (COPD) has a long chain of infection. First, an infectious agent, such as a bacterium or virus, enters a susceptible person's environment, such as through contaminated air or direct contact with an already infected person. Then the agent multiplies and damages the tissues of the respiratory tract, causing coughing, shortness of breath and other symptoms of COPD. This process can continue and cause exacerbations or more severe flare-ups in COPD. So, it is necessary to take preventive measures such as maintaining hand hygiene, avoiding exposure to air or cigarette smoke, and getting vaccinations as recommended by the doctor to reduce the risk of infections that can worsen the condition of COPD (Sodikin et al., 2022).

Pathogenesis of COPD

Four parts of the lung are involved in the pathological changes that lead to chronic obstructive pulmonary disease: the central airway, peripheral airways, lung parenchyma and pleura. These pathological transitions are seen in COPD patients in different ways.

Several processes begin to occur upon exposure to cigarette smoke, which is the main trigger of COPD. First, damage is caused by harmful particles from cigarettes as well as thermal trauma, such as burns. Next, smoke particles can trigger direct activation of macrophages, neutrophils, other cells, and/or initiate repair processes. Lung damage caused by smoking is a result of the “normal” repair pathway, but the failure of this process causes abnormal tissue reactions. This occurs in the lungs and results in a variety of pathological characteristics typical of COPD (Marpaung, 2024).

Emphysema and chronic bronchitis are examples of chronic obstructive pulmonary disease. The airway disorder called knomic bronchitis is characterized by a cough with phlegm that lasts for at least 3 months a year, at least 2 consecutive years, and is not caused by other diseases. Then, emphysema is characterized by enlargement of the alveolus and ductus alveolaris which is not normal and damage to the alveolar wall (Nasjum, 2020).

Disorders of the bronchi and alveoli can occur in COPD or a combination of chronic bronchitis and emphysema. The development of bronchial mucosal glands, inflammation, respiratory smooth muscle hypertrophy, and distortion of the impact of fibrosis are signs of chronic bronchitis. Dilation of the distal air cavity of the terminal bronchioles along with damage to the walls of the alveoli is a sign of infection (Nasjum, 2020).

Chronic bronchitis leads to accumulation of mucus and excess secretions that obstruct the airways and results in prolonged inflammation of the lower respiratory tract. It occurs due to exposure to air pollutants, cigarette smoke, or recurrent allergies. Emphysema is a condition in which the exchange of oxygen and carbon dioxide is impeded due to excessive expansion of the lung air spaces causing damage to the alveolar walls. Signs of emphysema are collapse of the small airways and damage to the alveolar wall, resulting in loss of lung elasticity. Excessive release of trypsin-like protein-degrading enzymes and alveolar macrophages as a defense reaction to exposure to cigarette smoke is the most common cause of edema.

Complications

Several conditions can worsen stable COPD, including acute bronchitis, pneumonia, pulmonary embolism, and left ventricular failure. In patients with more advanced COPD, pulmonary hypertension, pulmonary cast, and chronic respiratory failure are common. A small proportion of emphysema patients develop spontaneous pneumothorax. One may experience hemoptysis due to chronic bronchitis or due to bronchogenic carcinoma (M. L. A. Rahmawati, 2010; Somantri, 2010; Zuriati et al., 2017).

COPD Prevention

Generally, COPD problems can be solved by reducing exposure to smoke and improving air quality. A person suffering from COPD can reduce severity, length of hospitalization, and death by receiving an annual flu vaccine. In addition, the pneumococcal vaccine is also beneficial. **Quit Smoking:** One of the first ways to reduce COPD is to prevent people from starting to smoke. Strategies created by government public health agencies, and anti-smoking organizations can support lower smoking rates by tackling people who start smoking and telling them to quit (Maunaturrohman & Yuswatiningsih, 2018).

Prevention of COPD The main way to prevent COPD is to live a healthy lifestyle, such as quitting smoking: Smoking is the main cause of COPD, so quitting smoking or staying away from cigarette smoke is the main step in prevention. (1) **Avoid air pollution:** Do not be exposed to industrial smoke or motor vehicle fumes, as both can damage the lungs. (2) **Eating foods that contain plenty of antioxidants** can help protect the lungs from damage. (3) **Exercise regularly:** Exercising can strengthen the lungs and make them stronger. (4) **Avoid other sources of irritants:** Avoid tobacco smoke, cigarette smoke, dust, and chemicals. (5) **Follow the treatment plan prescribed by the doctor:** Follow healthy lifestyle advice and prescribed medications if you have symptoms of COPD or are at risk of developing it (Nursiswati et al., 2023).

COPD Treatment

COPD is a treatable obstructive lung disease, so the focus of treatment is on preventing symptoms and lung function decline, as opposed to disease. The first step to reduce symptoms is to stop smoking (smokers and non-smokers) and avoid cigarette smoke (Susanti, 2020); (1) **Medication consumption:** To reduce COPD symptoms, pulmonary doctors usually give inhalers or live medications. If the combination of bronchodilators and corticosteroids is unable to reduce symptoms, the doctor can give inhaled drugs in the form of capsules or tablets. Theophylline to help ease breathing and open the airway, mucolytics to thin phlegm or mucus, and corticosteroids on a short-term basis to reduce airway inflammation when symptoms become more severe. And antimicrobial drugs. (2) **Chest physiotherapy** aims to teach people with obstructive lung disease (COPD) about the consequences of their medical condition. In addition, they offer recommendations on a healthy diet as well as breathing and physical activities, such as walking. (4) **Surgery;** this is only performed on COPD patients whose symptoms cannot be relieved through therapy or medication. One of them is lung transplantation, which is a procedure of transporting damaged lungs in exchange for healthy lungs.

Patients can also help prevent more severe lung damage. Among them (Susanti, 2020): (1) **Stopping smoking or avoiding cigarette smoke** is an important step to prevent COPD from becoming more severe; (2) **implementing air conditioning devices** in the room to reduce pollution such as motor vehicle fumes; (3) **exercising more often;** (4) **receiving regular flu and pneumococcal vaccinations;** and (5) **consulting a doctor to maintain health.**

COPD is a treatable disease, so the focus of treatment is to prevent symptoms and decline in lung function, not an infectious disease. The first step to reduce symptoms and improve the quality of life of people with COPD is to stop smoking, both smokers and non-smokers (Najihah & Theovena, 2022).

Prevalence of COPD in Indonesia

Management and prevention of chronic diseases that are detrimental to public health (COPD) can be done. Worldwide, COPD is a leading cause of morbidity and mortality. The disease causes premature death and complications as many people suffer for years. Due to continuous exposure to factors, the global COPD burden is expected to increase in the next ten years. COPD risk: with the increasing prevalence of smoking in developing countries and the increasing population in countries with high rates of COPD, it is estimated that the burden of COPD and related conditions will reach more than 54 million deaths annually by 2060 (Ikhsan, 2023).

According to data collected by the World Health Organization, smoking is considered the main cause of COPD and a major risk factor. Therefore, the rate of active smoking in Indonesia is the highest compared to other developing countries. According to the World Health Organization (WHO), Indonesia is the third most smoker worldwide. Smoking behavior in Indonesia among people over the age of fifteen continues to increase every year. This number increased to 36.3% in 2013 from 34.2% in 2007. 2.1% of women are active smokers, and 64.9% of men are active smokers. The highest rate of COPD is experienced by 4.7% of people who work as farmers, fishermen, or laborers (Ikhsan, 2023). Current COPD data vary depending on the diagnostic criteria and survey methods used (Nasjum, 2020).

Data shows that COPD in Indonesia is 3.7%. In East Nusa Tenggara, COPD is highest at 10.0%, followed by Papua at 8.0%; Central Sulawesi at 4.3%; West Sulawesi at 3.5%; and South Sulawesi at 6.7%. In Kalimantan, COPD was highest at 5.0%, followed by South Kalimantan at 5.0%, West Kalimantan at 35%, and East Kalimantan at 2.8%. Smoking, air pollution, chemicals and dust, infections, age, gender, lung growth and development, are sources of COPD risk. Family, social status, and genetics (Najihah & Theovena, 2022).

Peripheral blood clots (COPD) is a major health problem facing Indonesians. This is due to a higher standard of living and higher risk assessment. Daycare groups, and revealing in the workplace both in the workplace and in public places. According to World Health Organization (WHO) statistics, COPD was the 6th leading cause of death in the world in 1990, followed by 5th in 2002, and is projected to be 3rd in the world by 2030, causing kidney disease and skin cancer (Perhimpunan Dokter Paru Indonesia, 2003).

In a 2010 cohort study conducted by the OII Litbangkes Kemenkes RI and the Department of Pulmonology and Respiratory Medicine FKUI in Bogor, West Java, COPD was 5.5%. In the 2013 Biomass Indonesia study, in a non-smoker population aged over 40 years with spirometry and questionnaires conducted in the provinces of DKI Jakarta, Banten, and West Java, the prevalence of COPD was 6.3 or 5.4% in the Bogor, West Java area. In Bogor, the prevalence of COPD was 6.3 or 5.4%. In 2010, the national prevalence of smoking was 34.7%. The province with the highest smoking rate was Central Kalimantan (43.2%), and the lowest was Southeast Sulawesi (28.3%) (Indonesian Lung Doctors Association, 2003). However, 18.6% of 15-24 year olds smoke daily, with a prevalence of 37-38.2% in the 25-64 year old group. Males (65.9%) smoke more frequently than females (4.2%).

According to the 1989 Pneumobile Project study, people who smoke have abnormal lung function compared to people who do not smoke. A dose-response relationship shows the relationship between smoking and COPD: the more cigarettes smoked and the longer the smoking habit, the greater the risk of COPD. This risk ranges between 15% and 20%.

Worldwide, 64 million people have moderate to severe Chronic Obstructive Pulmonary Disease (COPD). More than 3 million people died from the disease in 2015, accounting for 5% of all deaths. By 2020, it is projected that COPD will be the 4th leading cause of death epidemiologically.1. Papua New Guinea, India, Lesotho, and Nepal have the most COPD in the world. Countries with high incomes such as Latin America, the Caribbean, Western Europe, North Africa and the Middle East, Asia Pacific, and Central Europe have the lowest COPD (Hartina et al., 2021).

As Indonesia is one of the countries with a high rate of COPD cases and ranks 6th out of 10 causes of death in Indonesia with an average prevalence of 3.7%, it is very important to know the risk factors associated with COPD. Therefore, the number of COPD cases in Indonesia will continue to increase if the risk factors associated with COPD are not well known and controlled (Hartina et al., 2021). Air pollution, cigarette smoke, gender, age, impaired lung growth and development, socioeconomic status, and history of respiratory disease are risk factors for COPD in Indonesia.

Not many studies have been conducted on COPD prevalence in Indonesia using spatial analysis, although COPD prevalence tends to cluster. While Sumatra and Java regions tend to have low COPD, eastern Indonesia tends to have high COPD. Studies in other countries show that COPD is influenced by spatial aspects (Aini & Dokhi, 2019).

Conclusion

In Indonesia, the main causes of COPD are smoking, air pollution and exposure to biomass fuel smoke, which are very common in rural areas. These factors worsen the condition of the lungs and lead to airway obstruction that becomes stronger and irreversible. According to research conducted in Indonesia, public awareness and knowledge about COPD is still low. Many patients do not receive adequate treatment after being diagnosed due to initial symptoms, such as coughing and shortness of breath, which are often taken for granted.

In Indonesia, the management of COPD still faces many problems, such as limited access to health services, lack of adequate medical facilities, and limited medicines. To reduce the burden of COPD and improve the quality of life of patients, strategies for managing COPD in Indonesia should include increasing public awareness through health campaigns and education, improving the ability of medical personnel in the diagnosis and management of COPD, and increasing access to better health services.

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