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A Literature Review of Depression and Anxiety in Chronic Obstructive Pulmonary Disease (COPD) Patients

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ABSTRACT

Chronic obstructive pulmonary disease (COPD) is a disease that causes disability problems in the world. The high incidence exacerbation of COPD causes an increase in hospitalization rates. Depression and anxiety are conditions that are often associated with COPD, this is due to the burden of disease borne on patients such as shortness of breath, intensity of recurrence, chest pain, chronic cough with productive sputum that interferes with the quality of daily life patients. To assess the scale of depression and anxiety in COPD patients, the Hamilton Depression Rating Scale (HAMA) is used to determine the anxiety scale and the Hamilton Depression Rating Scale (HAMD) is used to assess the depression scale in COPD patients. Both of these scales are tools that are often used in the world because they have good consistency and validity. This literature review also discusses the effective therapies for depression and anxiety patients in COPD such as pulmonary rehabilitation, oxygen therapy, and also includes psychological pharmaceutical therapy.

1. Introduction

Chronic obstructive pulmonary disease (COPD) is one of the leading causes of death in the world. The most severe thing in COPD is during an exacerbation where the symptoms are shortness of breath, chest pain, cough with disturbing phlegm production. The incidence of exacerbations that cause hospitalization is very high, which is around 60% and patients require inpatient care in these circumstances. From 1990-2003 the order of COPD rose from 5 to 8 as the global burden of disease according to the Global Burden Disease study. The prevalence of COPD increases with increasing years, namely in adults aged 18-44 years, from 3.2% to 11.6% in the elderly over 65 years.¹

COPD can linked by several diseases such as heart disease, skeletal muscle dysfunction, depression, and

anxiety. The incidence of acute exacerbations, increasing frequency of hospitalization, and the patient's quality of life can be influenced by the level of anxiety and depression suffered by the patients. This can affect the patient's psychology such as morale, reduce sleep deprivation, anorexia, sleep disturbances, and can lead to suicidal symptoms. The depression rate shown by the data for patients with acute exacerbations of COPD is higher, ranging from 10-86%, while in stable COPD it is 10-42%.²

COPD, depression, and anxiety are different but common conditions. People with COPD and depression pose a high global economic and social burden. The relationship between COPD and depression must be due to social isolation in the community. The

prevalence of depression in COPD is higher than compared with chronic disease.³

Clinical practitioners have long recognized that COPD is predisposed to depression and anxiety. Some doctors also link the COPD which occurs in elderly patients with difficulties in their quality of daily life. COPD should be recognized as a multisystem disorder and have existing pathophysiological anomalies. Therefore, this literature review will discuss the relationship between depression and anxiety with COPD.⁴

Classification of COPD

There are 4 levels GOLD staging of COPD severity based on FEV1 (Table 01). Stage 1 is mild COPD where the number of FEV1 is still within normal limits of 80%. Stage 2 is moderate COPD, FEV1 levels are below normal, which ranges from 50-79%, while COPD stages III and IV are severe and very severe where FEV1 values range from 30-49% and very severe degrees are <50 %. Grade IV COPD can lead to respiratory failure, and usually these very severe degrees will require long-term oxygen therapy.⁵

Table 1. COPD severity based on FEV15

	COPD stage	Characteristic	
Stage I	Mild COPD	FEV1/FVC<0.70	FEV1≥ 80% normal
Stage II	Moderate COPD	FEV1/FVC<0.70	FEV1 50-79% normal
Stage III	Severe COPD	FEV1/FVC<0.70	FEV1 30-49% normal
Stage IV	Very Severe COPD	FEV1/FVC<0.70	FEV1 <30% normal, or <50% normal with chronic respiratory failure present

Etiology and risk factor

The development of COPD is mostly caused by cigarette smoke. For this reason, it is better if you give up smoking should be given counseling so that they can reduce and even have to stop smoking. According to research, people who die from COPD are 13 times more likely to be smokers.⁵ Men experience COPD more often than women, but in studies among women who smoke frequently, the incidence of COPD showed more frequent and severe exacerbations in women than men.⁶ Air pollution also has an effect on COPD exacerbations. Several studies show that air pollution shows a statistically significant increase in the risk of exacerbations. According to a meta-analysis study, even short-term exposure to air pollution can increase the risk of exacerbation of COPD.⁶

To a small extent, are also involved in triggering COPD although cases caused by this gene are rare. The studies show that 25% of people around who have never smoked can develop COPD because of this genetic factor. This study was conducted in chronic patients suffering from COPD at the age of 80 years,

and the cause is a genetic component, namely the single effect of gene polymorphisms, but this is weak and the only cause of clear genetic risk factors but rare occurrence is protein 1 antitrypsin deficiency. (AAT).⁵

Evidence of chronic colonization of the lower respiratory tract with bacteria may also be present in COPD patients. A high bacterial count on sputum examination of COPD patients in general does not mean that the patient is at high risk of exacerbation. The incidence of disease exacerbations is associated with pathogenic bacteria undergoing strain isolation according to a new study. Viral infection is also a contributing risk factor for COPD exacerbations. Respiratory viral pathogens were found in respiratory specimens in hospitalized patients with a diagnosis of COPD. This was found in a case control study. Where the results, in COPD exacerbations compared to control patients, namely 56% versus 19%. Picornaviruses were the most common type of virus detected at 36%, followed by influenza A 25%, syncytial virus 22% and parainfluenza virus 10%. With the above ingredients, exposure to viral infections

is a factor that has the potential to cause COPD exacerbations.⁶

Mechanism pathologic of COPD

In COPD, pathological changes occur in the large (central) airways, bronchioles (peripheral) and the lung parenchyma. The most common cause is the result of exposure to stimuli from harmful substances that

trigger COPD, namely cigarette smoke. In persons susceptible to the development of COPD, a normal inflammatory response occurs (Figure 02). This response increases the number of activated polymorphonuclear leukocytes, then releases elastase, and results in lung damage. Mechanisms and accelerated aging are also involved in this mechanism.⁵

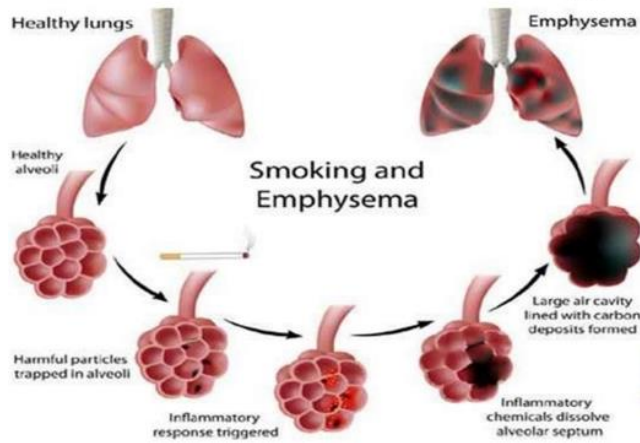


Figure 1. Mechanism of healthy lungs become COPD caused by smoking⁵.

The influx of neutrophils is caused by cigarette smoke, then occurs to MMP secretion; This mechanism suggests that macrophages and neutrophils contribute to the development of emphysema. In addition, C8+, which is part of T lymphocytes, plays an important mechanism in the occurrence of pulmonary airflow limitation caused by smoking. (Figure 3). Dysregulated apoptosis, the

destruction of apoptotic cell damage caused by macrophages, that plays an important role in respiratory tract inflammation, especially in emphysema. A high prevalence of microalbuminuria occurs in stable COPD patients without comorbid cardiovascular disease. It is associated with hypoxaemia.⁵

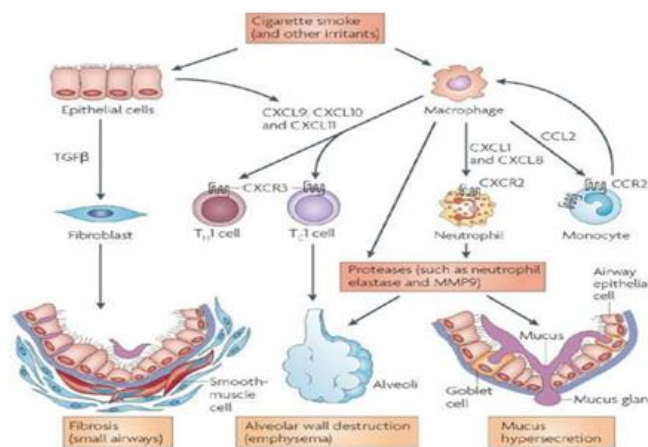


Figure 2. Mechanism immunology of COPD⁵

In emphysema, there is a dramatic decrease in the alveolar surface area available for gas exchange. This airflow limitation is caused by loss of the alveoli with 2 mechanisms, such as a decrease in the elasticity of the airway which makes airflow limitation, and the airway becomes narrower due to a decrease in the alveolar supporting structure.⁵

Diagnosis of depression and anxiety in COPD

The latest diagnostic recommendations for determining COPD refer to the Global Initiative for Chronic Obstructive Lung Disease (GOLD). To diagnose COPD, patients usually have symptoms such as shortness of breath, a long cough with phlegm, and there are risk factors for smoking. Spirometry examination is an examination that must be done to assess the persistence of airflow limitation in the respiratory tract. The result of the ratio of forced expiratory volume in 1 second to forced vital capacity (FEV1/FVC) after the use of bronchodilators according to diagnostic criteria is 0.72, which is the limit of chronic airflow.⁷

Resting inspiratory capacity (IC) is the maximum amount of air that can be inspired after a normal expiration. This examination is to assess the size of lung hyperinflation non-invasively and see the elastic load on the inspiratory muscles. In moderate COPD, when the FEV1 value is mostly within normal limits, IC values are seen to fall and flow limitation is seen to be sensitive to assessing airway compromise. To determine the prognostic factors, IC assessment is the recommended indication.⁷

The most popular diagnostic methods for depression nowadays are the ICD-10 and DSM-V criteria. Individuals with severe somatic illness and then get the depression can doubt the validity of the DSM examination. The severity of depression is indicated by symptoms of complaints and functional disorders. Symptoms that can be experienced by COPD patients are short-term depression to mood disorders with decreased affect such as sadness, dysthymia, and severe depression.⁸

The assessment that can be done to detect depression and anxiety in COPD patients is the Hamilton Anxiety Rating Scale (HAM-A). This tool is used to assess the anxiety symptoms of patients. Rating 14 is said to be significant anxiety. While, to evaluate symptoms of depression, it can be assessed by The Hamilton Depression Rating Scale (HAM-D). This scale is often used in the world. There are 24 versions of the items used by raters from 0-76 points where a score of 20 is categorized as depression. Both tests have excellent internal consistency and validity.⁹

Symptoms of COPD

COPD patients typically experience a widespread cough with productive sputum, as well as shortness of breath and wheezing. The symptoms that patients encounter in everyday life vary based on a number of circumstances, including the severity of the disease and the patient's comorbidities. The frequency and severity of symptoms experienced by patients varies greatly throughout the day; for example, symptoms that appear in the morning and evening have a significant impact on the patient's quality of life (QoL) and health.¹⁰

Depression and anxiety in COPD

Psychiatric problems like depression and anxiety are common clinical scenarios in COPD patients. These co-morbidities make treatment more difficult and increase the number of hospitalizations and deaths.¹¹ Anxiety and depressed symptoms affect 6 percent to 80% of patients, while anxiety and mood problems affect up to 55% of patients. Some of the factors that make it difficult to detect a high detection rate when diagnosing depression and anxiety status in COPD patients, such as, health providers fail to recognize symptoms or depression as psychology, as well as for patients who are not aware of these symptoms, because they have a chronic disease and are considered as a natural response that cannot be cured, patients are also always checked because they do not want to be isolated by the social environment where this usually occurs in COPD patients, the last

one is during routine care and control there is no routine screening done systematically for psychological distress in patients.⁴

COPD patients who experience symptoms of depression, such as hopelessness caused by difficulty sleeping and resting because of the symptoms that arise. Patients also experience difficulty and lazy in carrying out daily activities such as eating, and tend to lack from social activities. The severity of COPD can be influenced by the mood of the patient, the physical burden that causes the patient's quality of life to be caused by the symptoms of depression that arise. The patients feel because of the burden that they made to the family and also with the severity of the disease that can make symptoms of depression worse. Smoking, COPD, and depression are an endless circle of causal relationship where depression can lead to a desire to smoke again, then lead to COPD, and lead to depression. Depressive symptoms experienced by younger patients may lead to drug addiction, this implies that genetic susceptibility may be a factor in COPD.⁸

There is systematic evidence and indicators of increased oxidative damage in the incidence of depression in COPD, this also occurs with microvascular disorders. According to another study, sTNFR-1 followed an increased incidence of depression in COPD patients. The cause of this depression has been caused by the systemic system without any other disease suffered previously. In human and animal models of depression research, IL-6 is a major contributor to this disease.⁸

Treatment and management

From the levels of depression and anxiety in COPD patients, only a few studies have focused on overall management. Pulmonary rehabilitation (PR) is one of the treatment options, it has been performed in a small number of COPD patients and has a very good effect on the therapeutic outcome.⁸

According to the study, effectiveness of oxygen therapy specifically for COPD patients in men and women was found to be very beneficial. Miyamoto et al

mentioned that women who run oxygen therapy for a long period of time experience good survival. The same results were also found in a cohort study in Sweden, they studied 5689 patients who were followed for > 10 years with oxygen therapy and the results were fewer deaths in women than in men. Pulmonary rehabilitation exercises performed by patients proved beneficial to the quality of life. Therapeutic programs have been shown to be beneficial and reduce psychological symptoms in sufferers.¹²

The preferred classes drugs of antidepressants are selective serotonin reuptake inhibitors (SSRIs) and serotonin norepinephrine reuptake inhibitors (SNRIs) to control both symptoms of depression and anxiety. SSRIs and SNRIs can increase compliance with COPD patients who use inhaler drugs, so that symptoms of COPD can be controlled. COPD with level severe and very severe experienced a lot in patients who do not routinely use antidepressants. According to studies, this class of anti-depressant drugs can decrease symptoms of depression and anxiety in COPD patients so that patient compliance with drugs and activities of daily living can improve.¹³

Macrolide antibiotics Groups that are used continuously in optimal doses can be known to reduce the effectiveness of COPD recurrence. From several studies, changes in the bacterial load of the respiratory tract can be reduced. In a 12-week RCT study, 30 stable COPD patients with respiratory inflammation treated with optimal dose of azithromycin showed a decrease in the frequency of severe exacerbations and decreased neutrophil counts.¹⁴

2. Discussion

Alicia Guillien et al conducted a study in the French Franche-Comté, comparing depression rates with lower FEV1 occurring in dairy farmers compared to subjects who were not exposed to work, the result was $p = 0.001$, the incidence of COPD with a more severe grade i.e. grade 2 to above with $p=0.003$, and severe dyspnea on the mMRC scale with $P=0.03$. So, it can be said that in French dairy farmers the rate of depression in COPD that occurs in people with FEV1

is low, the severity is high, and the dyspnea is severe. Furthermore, anxiety and despair were exclusively linked to more severe dyspnea in non-farmers. These findings are in line with findings from studies in the general population that found a connection between the severity of depression and the severity of dyspnea. It's worth noting that this correlation shows that symptoms of anxiety and depression, on the one hand, and symptoms of COPD, on the other, overlap; this overlap could explain, at least in part, the study's findings.¹⁵

According to a study conducted by César de Andrade de Lima et al, they measured the quality of life, anxiety and depression in patients with chronic obstructive pulmonary disease using BDI (The Beck Depression Inventory) and found levels of depression and anxiety, 52 (74.3%) patients had moderate depression, 17 (24.3%) had severe, and one (1.4%) had mild. None of the patients had minimal depression. All patients had a significant level of anxiety. This shows that the incidence of COPD greatly affects the level of depression and will affect the patient's daily activities. Almost all of the patients suffered from moderate to severe depression, as well as significant anxiety. Furthermore, hospitalization that makes patients unable to be close to their families can worsen moods. Building a professional relationship between doctors and patients regarding health care can provide assistance and mobilize patient problems for the better.¹⁶

When compared to healthy adults, the frequency of major depressive episodes, panic disorders, substance abuse, and other psychiatric problems was shown to be considerably greater in COPD patients. As many as 66% of patients with stable COPD face worry and/or anxiety. However, it was not related to age, sex distribution, disease severity, smoking history, or work position. Because COPD is a disease that affects older people, and the sample is predominantly male, age and gender are unlikely to be determinants of COPD patients.¹⁷

3. Conclusion

The incidence of depression and anxiety in COPD is highly correlated. This is based on the fact that the burden of illness such as shortness of breath, chest pain, productive cough can interfere with the patient's daily activities. In some health systems, treatment for COPD is still largely limited to pharmacological therapy and not comprehensive. Special screening for psychological symptoms of patients has not been carried out routinely, so that the incidence of depression in COPD is still high. Pulmonary rehabilitation and oxygen therapy are the recommended therapies and have a good effect on the patient's symptoms. This therapy can also be combined with pharmacological therapy for antidepressants of the SSRI and SNRI groups, which have been shown to improve patient compliance with taking medication regularly. So that it can reduce symptoms and improve the life quality of COPD patients.

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