**Zona Keperawatan: Program Studi Keperawatan Universitas Batam** ISSN 2087-7285 [Print]
*Volume* 13, *Issue* 1, *October* 2022, *pp*. 9-16, DOI: http://dx.doi.org/10.37776/zk.v13i1 ISSN 2721-0170 [Online]
*Available online at http://ejurnal.univbatam.ac.id/index.php/Keperawatan*
*Received August 2022; Accepted September 2022*

# Effectiveness of Effective Cough Exercises in COPD Patients on Blood O2 Levels

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## Abstract

Chronic Obstructive Pulmonary Disease (COPD) or Chronic Obstructive Pulmonary Disease (COPD) is a persistent blockage of the respiratory tract caused by emphysema and chronic bronchitis. Chronic Obstructive Pulmonary Disease (COPD) or Chronic Obstructive Pulmonary Disease (COPD) is a persistent blockage of the respiratory tract caused by emphysema and chronic bronchitis. According to the American College of Chest Physicians/American Society (2015) COPD is defined as a group of lung diseases characterized by persistent slowing of airflow (Irianto, 2014). There are several factors that can lead to the occurrence of this disease, one of which is: lifestyle (smoking habits), environment and genetics. One of the methods in treating COPD problems in nursing is to provide interventions based on patient needs, one of which is teaching effective coughing to increase oxygen saturation in the blood, this method is certainly effective and has been tested by the 2019 Silampari study. KIAN aims to provide an overview of care nursing in patients with COPD with respiratory disorders nursing problems, the nursing intervention itself that is carried out is the Effectiveness of Effective Coughing Exercises in COPD Patients on O2 Levels in the Blood.

**Keywords:** COPD; Effective cough; O2

**Cite this Article** Sandra, RY., Yulianti, N., Sari, IN. & Syahrias, L. (2022). Effectiveness of Effective Cough Exercises in COPD Patients on Blood O2 Levels. *Zona Keperawatan: Program Studi Keperawatan Universitas Batam*, v13 (i1), pp. 9-16. Retrieved from http://ejurnal.univbatam.ac.id/index.php/Keperawatan/article/view/126

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***Abstrak***

***Efektifitas Latihan Batuk Efektif Pada Pasien PPOK Terhadap Kadar O2 Dalam Darah.*** *Penyakit Paru Obstruksi Kronik (PPOK) atau Chronic Obstructive Pulmonary Disease (COPD) adalah suatu penyumbatan menetap pada saluran pernapasan yang disebabkan oleh emfisema dan bronkitis kronis. Penyakit Paru Obstruksi Kronik (PPOK) atau Chronic Obstructive Pulmonary Disease (COPD) adalah suatu penyumbatan menetap pada saluran pernapasan yang disebabkan oleh emfisema dan bronkitis kronis. Menurut American College of Chest Physicians/American Society (2015) PPOK didefinisikan sebagai kelompok penyakit paru yang ditandai dengan perlambatan aliran udara yang bersifat menetap (Irianto, 2014). Ada beberapa factor yang dapat menyebapkan terjadinya penyakit ini salah satu nyai yaitu : gaya hidup (kebiasan merok),Lingkungan dan genetic. Salah satu metode dalam penanganan masalah PPOK dalam keperawatan adalah memberikan intervensi berdasarkan kebutuhan pasien salah satu nya yaitu mengajarkan batuk efektif guna meningkatkan saturasi oxsigen dalam darah,metode ini tentunya efektif dan telah di uji oleh penelitian silampari 2019. KIAN ini bertujuan untuk memberikan gambaran tentang asuhan keperawatan pada pasien penderita PPOK dengan masalah keperawatan gangguan pernafasan, intervensi keperawatan sendiri yang dilakukan adalah Efektifitas Latihan batuk Efektif Pada Pasien PPOK Terhadap Kadar O2 Dalam Darah.*

***Kata Kunci****: COPD; Batuk efektif; O2*

## Introduction

Chronic Obstructive Pulmonary Disease (COPD) or Chronic Obstructive Pulmonary Disease (COPD) is a persistent blockage of the respiratory tract caused by emphysema and chronic bronchitis. According to the American College of Chest Physicians/American Society (2015) COPD is defined as a group of lung diseases characterized by persistent slowing of airflow (Irianto, 2014).

COPD is a disease that forms a single unit with its medical diagnoses, namely Bronchitis, Lung Emphysema and Bronchial Asthma (Padila, 2012). Chronic Obstructive Pulmonary Disease (COPD) is a respiratory disorder that is becoming increasingly common. The morbidity

and mortality rates are increasing all the time. COPD is a major cause of morbidity and disability in 2019-2020. Silampari Nursing Journal 3 (1) 362-371 is estimated to be the third largest cause of death worldwide. As lung function deteriorates and disease progresses, the risk of hypoxia also increases. Tissue hypoxia is the key to maladaptive and comorbid processes. The incidence of hypoxemia in COPD patients causes a decrease in quality of life, reduced exercise tolerance, reduced skeletal muscle function, and ultimately increases the risk of death (Kent, 2011).

A case of expiratory airflow obstruction can be classified as COPD if the airflow obstruction tends to be progressive. The main problem that causes obstruction of the air flow lies in the respiratory tract (chronic bronchitis) and in the lung parenchyma (emphysema). Both diseases can be included in the COPD group if the severity of the disease has continued and the obstruction is progressive (Darmanto, 2015).

In 2004 the number of moderate to severe COPD sufferers in Asia Pacific countries had a prevalence (6.3%). Figures for each country range (3.5-6.7%). Countries with the smallest numbers are Hong Kong and Singapore (6.7%). Indonesia has the figure (5.6%). In 2008 it became one of the diseases with a high morbidity rate in New Zealand in 2012 with the proportion (14%) of the population aged 40 years and over and in the following year it is expected to increase (WHO, 2013).

The World Health Organization (WHO) reports that there are 600 million people suffering from COPD in the world with 65 million people suffering from moderate to severe COPD. In 2004 COPD was the fifth leading cause of death in the world and is estimated to be the third leading cause of death worldwide in 2030 More than 3 million people died from COPD in 2005, which is equivalent to 5% of all deaths globally (WHO, 2015) .

Based on the results of data collection on non-communicable diseases in 5 (five) provincial hospitals in Indonesia (East Java, West Java, South Sumatra and Lampung) in 2008, COPD was found to be the first contributor to morbidity (35%), followed by bronchial asthma ( 33%), and lung cancer (30%) (Riskesdas, 2018).

**Basic Concepts of Chronic Obstructive Pulmonary Disease.**

Chronic obstructive pulmonary disease (COPD) also known as COPD (Chronic Obstructive Pulmonary Disease) is a preventable diseases and addressed marked with airflow limitation permanent, usually progressive and related to presence chronic inflammatory process of the ducts breath and lungs to gas or harmful particles (Ikawati, 2016).

COPD is a term which is used for a group of lung diseases which lasts a long time, characterized by increased resistance airflow as main pathophysiological features. The three diseases that make up known as COPD is: chronic bronchitis, pulmonary emphysema and bronchial asthma (S. Meltzer, 2012).

Factors that cause Chronic Obstructive Pulmonary Disease according to Arief Mansjoer (2015) are lifestyle (smoking habits); environment (pollution Air, exposure to dust, factory fumes and chemical gases); genetic, while other causes of lung disease Chronic Obstruction according to David Ovedoff (2009) namely: existence smoking habit.

Clinical manifestations or signs that are common in patients with COPD or COPD include the presence of a productive cough at first intermittent and then happens almost every day time; White or mucoid sputum, if there is an infection becomes purulent or mukupurulent tightness to use the muscles additional breaths for breathe, cough and expectoration, where inclined increases and maxes out at morning; Shortness of breath after exertion weight goes hand in hand with disease development severe condition, shortness of breath it even happens with activity minimal and even at times break due to more worsening of the abnormality air exchange; In moderate disease to weight, physical examination can show decreased breath sounds, expiration elongated, rhonchi, and hyperresonance to percussion; Anorexia; Weight loss and weakness; Tachycardia, sweating and; Hypoxia (Ikawati, 2016).

Physiological changes that occur as a result of a pathological process that begins with a disturbance in the airways and lungs which function as a process of respiration, namely intake oxygen for metabolism and removal of carbon dioxide and water as a product of metabolism. this process consists of three stages, namely ventilation (the process of entering and leaving air from the lungs), diffusion (exchange of gases between the alveoli and blood vessels) and perfusion (distribution of oxygenated blood).

Ventilation disorders consist of restriction disorders, namely lung expansion disorders and obstructive disorders in the form of slowing airflow in the airways. The main risk factors for COPD are smoking, and environmental factors genetic. The components of cigarette smoke which contain harmful substances and free radicals will result in stimulation of changes in the bronchial mucus-producing cells. In addition, the cilia lining the bronchi suffer paralyzed or dysfunctional as well metaplasia.

Changes to mucus-secreting cells and cilia interferes with the mucociliary escalator system and causes large amounts of thick mucus to accumulate and is difficult to remove from the airways. Mucus serves as a seedbed for microorganisms that cause infection and becomes very purulent. Inflammation occurs which causes tissue edema. The process of ventilation especially expiration is inhibited. Hypercapnia arises as a result of prolonged expiration and is difficult due to thick mucus and inflammation (GOLD, 2011).

The components of cigarette smoke as well stimulate chronic inflammation of the lungs. Inflammatory mediators progressively damage the supporting structures in the lung. Due to the loss of elasticity of the airways and

collapse of the alveoli, ventilation occurs reduce. The airways collapse especially on expiration because normal expiration occurs as a result of passive recoil of the lung after inspiration. Thus, if there is no passive recoil, air will be trapped in the lungs and the airways will collapse (GOLD, 2011).

In contrast to asthma which have predominant inflammatory cells eosinophils, cellular composition in airway inflammation COPD is predominately mediated by neutrophils. Cigarette smoke induces macrophages to release neutrophils Chemotactic Factors and elastase, which are not balanced with antiproteases, resulting in tissue damage. During acute exacerbations, there is a worsening of gas exchange with ventilation perfusion imbalance. Ventilation abnormalities related to the presence of airway inflammation, edema, bronchoconstriction, and hypersecretion mucus. Impaired perfusion related to hypoxic constriction of arterioles.

**Focus Assessment**

The study was carried out with perform anamnesis on the patient. Collected data or studied include:

1. Medical History
    a) Main Complaint. The Main complaint is a factor main driving force for patients seek help or seek treatment hospital. Usually in patients with obstructive pulmonary disease Chronic (COPD) obtained complaints as shortness of breath.
    b) History of Present Disease. Patient with COPD will usually be initiated with signs like cough, shortness of breath, pleuritic pain, taste heaviness in the chest, weight loss etc. Also need to ask from when the complaint appeared. What actions that have been done for reduce or eliminate these complaints.
    c) Past medical history. Need to ask if before The patient had been admitted to the hospital with same complaint.
    d) Family history of disease. Need Ask if there are family members who suffer from the same disease.
2. Assessment of Health Patterns Functional Gordon quoted from Hidayat (2004).
3. Physical Examination. Head to Toe Physical Examination (Hidayat, 2004).
    a) General state: State This general can include impressions illness included facial expressions and positions patient, awareness that can includes an appraisal qualitative like compost mentis, apathetic, somnolent, sopor, coma and delirium.
    b) Checking vital signs: Includes pulse (frequency, rhythm, quality), pressure blood, respiration (frequency, rhythm, depth, pattern respiration) and body temperature.
    c) Examination of the skin, hair and lymph nodes. Skin: Color (eg pigmentation, cyanosis, jaundice, pallor, erythema, etc.). turgor, skin moisture and presence/absence of edema Hair : Can be judged by color, density, distribution and other characteristics.

Gland lymph nodes : Assessable from its shape and signs of inflammation that can assessed in the cervical region anterior, inguinal, occipital and retroauricular.

d) Examination of the head and Head neck : Can be judged by the shape and size of the head, hair and scalp, fontanel, asymmetrical face or presence/absence swelling, eye seen from vision, palpebrae, eyebrows, eyelashes, conjunctiva, sclera, pupils, lens, in the ear can be assessed on the auricle, ear canal, tympanic membrane, mastoid, hearing acuity, nose and mouth whether there is trismus (difficulty opening).

**Nursing Diagnoses**

1. Ineffective road cleaning breath associated with bronchoconstriction, increased sputum production, no cough effective, fatigue/reduced exertion and infection bronchopulmonary.
2. Ineffective breathing patterns related to breath shortness, mucus, bronchoconstriction and airway irritants.
3. Activity intolerance related with an imbalance between supply and demand oxygen.
4. Imbalanced nutrition less than body requirements related to dyspnea, weakness, drug side effects, sputum production and anorexia, nausea, vomiting.

**Summary of Managed Cases**

Mrs. J is 68 years old, has junior high school education, with no. MR 001xx. The person in charge of the client while in the hospital is Mr. A, 28 years old, namely the client's child. the client entered HJ Bunda Halimah Batam Hospital through the emergency room on December 6, 2021 at 10.37 WIB with complaints of shortness of breath as if 1 day ago, with composmentis awareness, TTV results obtained TD 150/76 mmHg, pulse 90 x/minute, temperature 37ºC, RR 26x/minute, SPO2 95%, body weak, cough accompanied by sputum, pain in the chest area like feeling stabbed.

At the time of the study on December 16, 2021 at 13:00 WIB in the hospital inpatient room. Hj mother halimah batam with interviews with patients and families Tn.A. Mrs. J complained that his breath still feels short of breath with a respiratory rate of 24 x/minute using a 3 L nasal cannula, pain in the chest and solar plexus area with a pain scale of 3, pain like being stabbed, body feels weak, and dizzy since 3 days ago, appetite eating decreased with weight in the last 3 months 60 kg and currently weighs 38 kg. Previously, Mrs. J had a history of active smoking for ± 20 years. Mrs. J actually lives in Malaysia and recently visited Batam to see her children and grandchildren.

Based on the assessment, there are 3 diagnoses: Ineffective breathing pattern b.d decreased lung expansion; Imbalanced nutrition less than body requirements b.d sputum production; and Activity intolerance b.d imbalance between supply and body needs.

## Discussion

The intervention that has been carried out by researchers, especially in NY J with COPD problems in the inpatient room of Hj. Bunda Halimah Hospital Batam, is to perform effective coughing techniques to increase O2 levels in the blood. Effective coughing is a necessary measure for clearing secretions, and also for training patients who do not have the ability to cough effectively (Potter & Perry, 2010).

Performing an effective coughing technique is maintaining a patent airway which allows the patient to remove secretions from the upper and lower airways. The normal sequence of events in the cough mechanism is deep inhalation, closure of the glottis, active contraction of the expiratory muscles, and opening of the glottis. Inhalation increases lung volume and airway diameter to allow air to pass through partially obstructing mucus plaques or other foreign bodies. Contraction of the expiratory muscles against the closed glottis causes high intrathoracic pressure. A large flow of air comes out at high speed when the glottis opens, giving secretions the opportunity to move to the upper airway, where secretions can be removed so that the airway becomes smooth and oxygen saturation (SaO2) increases. (Rosyidi & Wulansari, 2013).

This research is in line with research conducted by Silampari (2019) with the results of an effective cough effect on increasing oxygen saturation before and after intervention.

## Conclusions

Based on nursing care given to Mrs. J with a diagnosis chronic obstructive pulmonary disease (COPD), it can be concluded that patients are more likely to experience signs of shortness of breath during activity, heartburn and weight loss. Many nursing problems will arise in COPD sufferers, one of which is airway clearance, therefore by practicing effective coughing techniques that have been taught to patients, there will be an increase in oxygen saturation in the blood. The authors' conclusion is that there is an effect of increasing blood oxygen saturation in COPD patients after effective coughing exercises.

The author's recommendation for the hospital is that effective coughing exercises can be given as a whole and can be used as one of the regular actions or procedures that can be carried out by nurses in providing nursing care for COPD sufferers who have decreased oxygen saturation. Furthermore for health workers that the need for education or training for health workers more about Effective coughing procedures are related to research results where the provision of effective cough exercise interventions affects the increase in oxygen saturation for the better.

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