Jurnal Aisyah : Jurnal Ilmu Kesehatan

Volume 6, Issue 1, March 2021, pp. 165–174
ISSN 2502-4825 (print), ISSN 2502-9495 (online)

# Intervention for Prevention of Exacerbation on Chronic Obstructive Pulmonary Disease (COPD) Patients

Iwan Shalahuddin[1*)]; Sandra Pebrianti[2]; Theresia Eriyani[3]

[1*), 2, 3] Fakultas Keperawatan Universitas Padjadjaran Bandung

ARTICLE INFO

*Article history:*

Received December 11, 2020
Accepted January 30, 2021
Published March 20, 2021

*Keyword:*

Effectiveness of Prevention
Exacerbations
Interventions
COPD

ABSTRACT

COPD is the leading cause of morbidity and mortality worldwide Worsening symptoms of COPD or what is called acute exacerbations are common occurrences that often lead to hospitalization, and the frequency gets worse as the disease progresses. Often associated with a deteriorating quality of life, increased health care costs, and increased mortality. The purpose of searching for articles is to obtain articles from Indonesia or abroad that discuss effective methods in relieving exacerbation symptoms of chronic obstructive pulmonary disease. This study uses a literature review method approach that is suitable for use in this literature study is a scoping review because the purpose of this literature study is to determine an effective method in relieving exacerbation symptoms of chronic obstructive pulmonary disease, so that it can be used as an alternative method of handling exacerbation symptoms in patients with disease chronic obstructive pulmonary. Literature search using several sources, namely Ebscoshot, Google Scholar and Pubmed. Literature search results. The most nutritional deficiencies in COPD patients are vitamin B12 and vitamin D deficiency. Based on 10 journals on interventions in patients with COPD, vitamin D intake is a more effective intervention than other interventions. The number of COPD exacerbations in the intervention group with vitamin D intake decreased significantly compared to the control group (P value <0.001). In addition, FEV1 in the intervention group increased compared to the control group that experienced a decrease (P value <0.001). Recommendations for nurses play an important role in administering medication, including the provision of vitamin D interventions as a result of collaboration with doctors to patients. The nurse should know all the components of the drug order and question the order if it is incomplete or unclear or the dose is outside the recommended limit.

This open access article is under the CC–BY-SA license.

# Intervensi untuk Pencegahan Eksaserbasi pada Pasien Penyakit Paru Obstruktif Kronis (PPOK)

*Kata kunci:*

Efektifitas
Pencegahan
Eksaserbasi
Intervensi
PPOK

**) corresponding author*

Departement of Nursing, Fakultas Keperawatan Universitas Padjadjaran Bandung

Email: shalahuddin@unpad.ac.id

https://doi.org/10.30604/jika.v6i1.442

ABSTRAK

PPOK adalah penyebab utama morbiditas dan mortalitas di seluruh dunia. Gejala PPOK yang memburuk atau biasa disebut Eksaserbasi akut adalah kejadian umum yang sering menyebabkan rawat inap, dan frekuensinya memburuk seiring dengan perkembangan penyakit. Sering dikaitkan dengan kualitas hidup yang memburuk, peningkatan biaya perawatan kesehatan, dan peningkatan kematian. Tujuan dari pencarian artikel yaitu untuk mendapatkan artikel dari Indonesia ataupun luar negeri yang membahas mengenai metode efektif dalam meringankan gejala eksaserbasi penyakit paru obstruktif kronis. Penelitian ini menggunakan pendekatan metode literatur review yang sesuai untuk digunakan dalam studi literatur ini adalah scoping review dikarenakan tujuan dari studi literatur ini adalah untuk mengetahui metode efektif dalam meringankan gejala eksaserbasi penyakit paru obstruktif kronis, sehingga dapat digunakan sebagai metode alternatif penanganan gejala eksaserbasi pada pasien penyakit paru

obstruktif kronis. Pencerian literatur dengan menggunakan beberapa sumber yaitu Ebscoshot, Google Scholar dan Pubmed.. Hasil penelusuran literatur. Kekurangan nutrisi paling banyak oleh pasien PPOK adalah defisiensi vitamin B12 dan vitamin D. Berdasarkan 10 jurnal mengenai intervensi pada pasien dengan PPOK, pemberian asupan Vitamin D menjadi intervensi yang lebih efektif dibandingkan intervensi lainnya. Jumlah eksaserbasi PPOK pada kelompok intervensi pemberian asupan vit D menurun secara signifikan dibandingkan dengan kelompok kontrol (P value <0,001). Selain itu FEV1 pada kelompok intervensi mengalami peningkatan dibandingkan dengan kelompok kontol yang mengalami penurunan (P value <0.,001). Rekomendaasi untuk perawat berperan penting dalam memberikan obat-obatan termasuk dalam pemberian intervensi vitamin D sebagai hasil kolaborasi dengan dokter kepada pasien. Perawat harus mengetahui semua komponen dari perintah pemberian obat dan mempertanyakan perintah tersebut jika tidak lengkap atau tidak jelas atau dosis yang diberikan di luar batas yang direkomendasikan

This open access article is under the CC–BY-SA license.

## INTRODUCTION

COPD is a chronic airway disease characterized by air flow obstruction, especially expiratory air and it is slowly progressive (getting worse over time), caused by exposure to risk factors such as smoking, indoor or outdoor air pollution (Ihsan, 2019). The onset (the begining of disease) is usually in middle age and does not go away with treatment.

Defined as COPD if you have experienced shortness of breath which increases with activity and / or increases with increasing age accompanied by cough with phlegm or has experienced shortness of breath accompanied by cough with phlegm and the Brinkman Index value is ≥200 (Zein et al., 2020). Lack of public awareness of COPD is a major problem in suppressing this respiratory disease.

The early stages of COPD often go unrecognized because many sufferers view symptoms such as shortness of breath, chronic coughing and the presence of phlegm as normal conditions that occur with age or a common result of smoking. Whereas in the final stage of COPD, most sufferers often feel hopeless because of symptoms and the decrease in quality of life they experience (Nanda, 2019).

COPD is one of the main non-communicable diseases, which is rarely exposed due to the lack of information provided. In the United States, 2007 data shows that the prevalence of COPD is 10.1% (SE 4.8) in males at 11.8% (SE 7.9) and for women 8.5% (SE 5.8) 3. Meanwhile, mortality was the fourth most common cause, namely 18.6 per 100,000 population in 1991 and this mortality rate increased by 32.9% from 1979 to 1991 (American Thoracic Society, 2020). Meanwhile, the prevalence of COPD in Southeast Asian countries is estimated to be 6.3% with the highest prevalence in Vietnam (6.7%) and China (6.5%) (Chan-Yeung et al., 2004).

WHO estimates that around 80 million people will suffer from COPD and 3 million will die from COPD in 2005, referring to 5% of all deaths globally. Total deaths from COPD are projected to increase by> 30% in the next 10 years. A drastic increase in two decades is expected in Asian and African countries due to increased tobacco use (Ismail et al., 2017)

WHO says COPD is the fourth cause of death in the world. It is estimated that it causes death in 2.75 million people or the equivalent of 4.8% (WHO, World Health Statistics, 2008). In Europe, the COPD mortality rate is around <20 / 100,000 people (Greece, Sweden, Iceland, Norway) to> 80 / 100,000 people (Ukraine and Romania), while in France the COPD mortality rate is 40 / 100,000 people. In developing countries, deaths from COPD have also increased, this is associated with an increase in the number of people who consume cigarettes. In China smoking causes 12% of deaths and is expected to increase to 30% by 2030 (Ismail et al., 2017).

COPD mortality is higher in males and will increase in the age group> 45 years. This can be attributed to decreased respiratory function at the age of 30-40 years (Mannino et al., 2002). Research in America states that COPD is associated with the risk of death which is defined as the Hazard Ratio (HR), from the cohort study the results of Satdium I, HR 1.4 with 95% CI 1.31 - 1.70 and stage II, HR 2.04 with 95% CI 1.34 - 3.11, and acute COPD: HR 2.7 with 95% CI 2.1-3.5 (Centers for Disease Control and Prevention, 2008).

The mortality rate during hospitalization with exacerbation is estimated to be between 2.5 - 10%. Mortality after hospitalization is estimated to be between 16-19% at 3 months after hospitalization; 23 - 43% after one year of hospitalization and 55 - 60% after 5 years of discharge (Virhia et al., 2013).

Worsening symptoms of COPD or what is called acute exacerbations are common occurrences that often lead to hospitalization, and the frequency gets worse as the disease progresses. Often associated with a deteriorating quality of life, increased health care costs, and increased mortality.

Limited activity in COPD patients is the main complaint that will affect the quality of life. In addition, systemic inflammation, weight loss, increased risk of cardiovascular disease, osteoporosis and depression are systemic manifestations of COPD patients (Oemiati, 2013).

Shortness of breath and a pattern of shortness of breath that is out of sync will cause COPD patients to become panic, anxious and ultimately frustrated. This symptom is the main cause of COPD patients reducing their physical activity to avoid shortness of breath. A decrease in body cell mass to > 40% of active soft tissue metabolism is an important systemic manifestation of COPD. The loss of free fat mass will affect the respiratory process, peripheral muscle function and

health status. Weight loss has a negative effect on the prognosis of COPD patients (Schwartz, 2006).

The objective of this literature review is to find out what type of intervention is most effective in reducing exacerbations in patients with COPD. And to increase the role and responsibility of nurses in making effective interventions in dealing with patients with COPD.

## METHOD

The literature review methodology that is suitable for use in this literature study is a scoping review because the aim of this literature study is to determine an effective method in relieving symptoms of exacerbation of chronic obstructive pulmonary disease, so that it can be used as an alternative method of treating exacerbation symptoms in patients with chronic obstructive pulmonary disease.

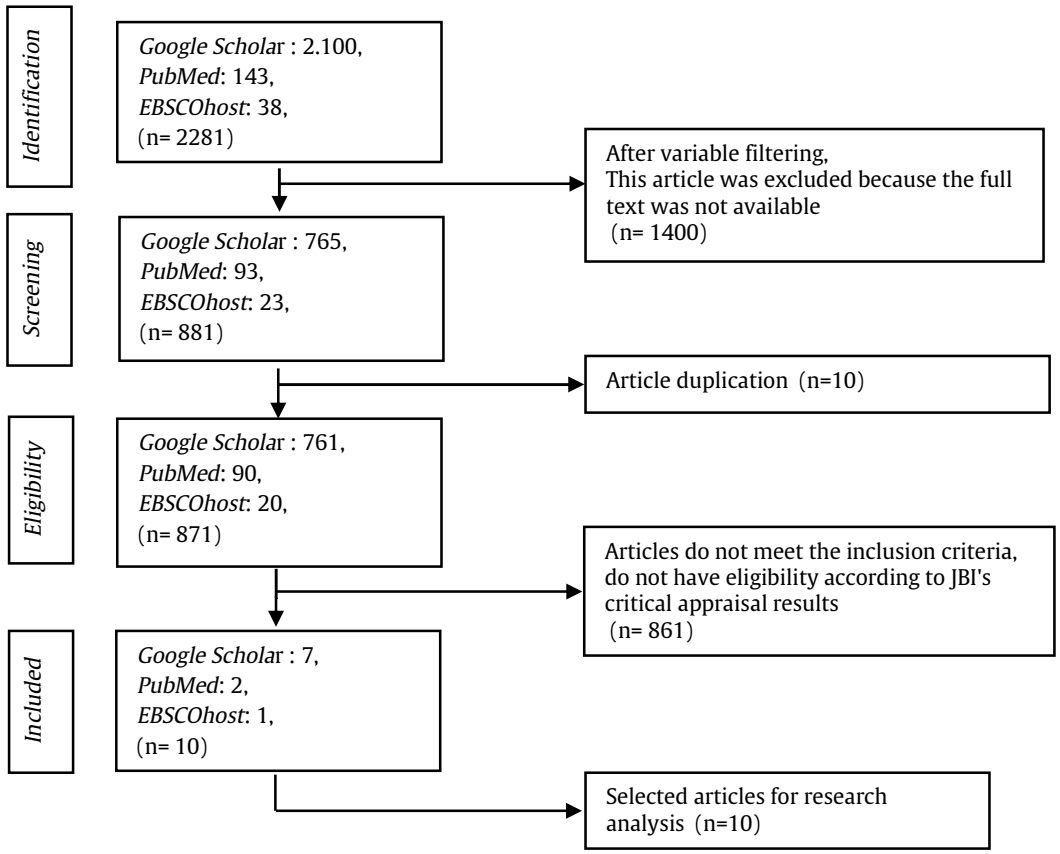
Scoping review is a comprehensive analysis and identifies the literature related to the research question (Arksey & O'Malley, 2005). There are five stages in carrying out the scoping review method. The five stages are identifying research questions, searching for and identifying literature that can be used to answer predefined research questions, sorting literature, presenting data or information from each literature, and forming conclusions, suggestions and reports on the results of the overall literature analysis (Arksey & O'Malley, 2005).

Query literature using several sources, namely Ebscoshot, Google Scholar and Pubmed. To make it easier to obtain appropriate literature, the PEO technique is used in conducting literature searches, P (population / problem / patient), E (Exposure) and O (Outcome). The population in this literature study is COPD sufferers, exposure: exacerbations, and established outcomes are effective methods of relieving symptoms of exacerbations.

Based on these techniques in the search for English literature, the author uses keywords using electronic databases, namely Pubmed and Google Scholar. Keywords that are used in English are “COPD Patients”, “Randomized Controlled Trial”, “prevent Exacerbation”.

Meanwhile, to search Indonesian literature, the keywords used were “Chronic Obstruction Lung Disease or COPD exacerbation” and “effective” and “prevention”.

**Chart 1. Flowchart of the article selection process**




## RESULTS AND DISCUSSION

The articles obtained are sorted to obtain articles according to the topic of the literature study being carried out. The sorting of articles was carried out by adjusting the inclusion and exclusion criteria that had been set.

The established inclusion criteria are articles that discuss effective interventions in preventing the exacerbation of COPD, the year the article was published (2010-2020), the sample used is COPD sufferers, articles in Indonesian or English, availability of full text, published in an accredited journal. or indexed scopus.

The exclusion criteria in this literature study were articles that did not include the volume, number, and publisher of the article.

The next stage is the critical appraisal of the article using the Joanna Briggs Institute (JBI) instrument (The Joanna Briggs Institute, 2015).

The results of the critical appraisal obtained articles that were appropriate or not used in this study. While articles that have been in accordance with the topic of literature studies and have been considered suitable for use in this literature study are reviewed and read as a whole in order to find out which intervention methods are effective in reducing and preventing exacerbations of COPD disease described in the article. The following is a flow chart for sorting the articles obtained according to the topic of the literature study being describe in chart 1.

Presentation of the results of the study of each literature used, the information will be presented in tabulated form. The tabulations that are made will contain the interventions that are effective in preventing and reducing COPD exacerbations that have been obtained from previous literature searches, article titles, article authors and year of publication of the articles, types of research, research methods and research results.

To find the most effective intervention in dealing with exacerbation symptoms in patients with COPD, a journal analysis was carried out by comparing the number of participants in each study group, the final results of FEV1 and the probability value of p value for each intervention. Based on the results of the journal search, there were 10 articles with various interventions that showed positive results as presented in table 1.

Patients with a history of COPD generally experience inadequate nutritional intake. Research by Nguyen et al., (2019), revealed that as many as 74.4% of COPD patients were diagnosed with malnutrition and as many as 81.5% of COPD patients reported experiencing unintentional weight loss. This is because COPD patients experience an increase in resting energy expenditure (REE) (Collins et al., 2012). COPD patients are in a hypermetabolic state, that is, they consume more calories per kilogram on calorimetric measurements, possibly due to increased work of breathing.

Nonetheless, COPD patients experience decreased food intake due to loss of appetite due to decreased general physical activity, a tendency to depression, or dyspnea with eating. The most nutritional deficiencies in COPD patients are vitamin B12 and vitamin D deficiency. Research by Horadagoda et al., (2017), showed that as many as 31% of COPD patients had vitamin D deficiency and as many as 56% had vitamin B12 deficiency.

Adequate monitoring of nutritional intake is a component of the management of COPD. COPD patients are also advised to consume foods that contain vitamins and minerals. Unfortunately, the prevalence of vitamin D deficiency in COPD is quite high. Vitamin D is one of the vitamins that has been widely researched regarding its function as a prevention in acute exacerbation of COPD.

Vitamin D is a fat soluble vitamin that has an important function in the body. Vitamin D has a major role, namely the absorption of calcium and phosphorus (Fatimah et al., 2019). In addition, vitamin D is also known to suppress inflammation of the airways (Ardiaria, 2020). Vitamin D is divided into two, namely vitamin D2 or ergocalciferol and vitamin D3 or cholecalciferol. Vitamin D2 comes from plants and is very small in amount compared to vitamin D3. Vitamin D3 is the vitamin most widely used by the body and is the result of sun exposure.

Both vitamins are prohormones that are considered inactive, so vitamin D must be activated first to carry out its biological functions (Ardiaria, 2020; Fatimah et al., 2019). Vitamin D plays a role in the repair of epithelial cells and lung cells including increased production of antimicrobial peptides, regulation of inflammatory responses, and airway renovation, and improvement of respiratory muscle function (Finklea et al., 2011).

When exposed to UVB, provitamin D3 or 7-dehydrocholesterol in the skin will undergo photochemical cleavage into previtamin D3, then previtamin D3 will be converted into vitamin D3 due to the heat of the sun (Bringhurst et al., 2011). Vitamin D3 will be activated by enzymes in the liver and kidneys (Ardiaria, 2020). Sources of vitamin D come from sun exposure, food, and supplementation (Fatimah et al., 2019; Finklea et al., 2011). Ultraviolet B from sunlight is considered the main source of vitamin D because it can convert 7-dehydrocholesterol in the skin into vitamin D3, so vitamin D is often referred to as the sun vitamin.

Vitamin D can also be obtained from foods, such as salmon, tuna, eggs, cheese, mushrooms, and foods that have been fortified using vitamin D, such as milk, margarine, and cereals. In addition, vitamin D3 can also be consumed in supplement form, especially in countries that have winter (Fatimah et al., 2019). The most recent health strategy for dealing with vitamin D deficiency is to provide dietary fortification and recommend vitamin D supplementation in certain populations. Supplementation is not recommended if a person is exposed to adequate sunlight (Bringhurst et al., 2011). This is because it can cause vitamin D toxicity when serum 25 (OH) D in the body exceeds 500 nmol / L.35 Supplement therapy not only increases nutritional deficiencies, but is also useful in preventing acute exacerbations in COPD because it can suppress the inflammatory response.

The results of a study conducted by Heidari et al., (2015), show that most patients with COPD experience vitamin D deficiency or insufficiency regardless of age. Serum 25-OHD levels in the intervention group differed significantly from those in the control group (Heidari et al., 2015).

According to Herr et al., (2011), the relationship between vitamin D and the incidence of COPD has recently attracted attention. This is based on data from observational studies that determine vitamin D levels in COPD patients. Several studies have shown that the content of 25- (OH) D3 in patients with COPD. Førli et al., (2004), created Vitamin D deficiency (defined in this study as at baseline 20 ng / ml) in more than 50% of the group awaiting lung transplantation.

There are several aspects that can cause vitamin D deficiency in COPD sufferers: poor diet, reduced skin aging capacity for vitamin D synthesis, reduced outdoor activity and therefore sun exposure, increased catabolism by glucocorticoids, activation constraints due to dysfunction. kidney, as well as a lower storage capacity in muscle or fat due to waste (Herr et al., 2011).

The main pathogenesis of COPD includes inflammation and oxidative stress. This study also proved that vitamin D can reduce oxidative stress and particulate matter-induced IL-6 responses, and that vitamin D is beneficial for protecting against pollution-related diseases associated with airway induction and systemic inflammation. Smoking is the most important element that causes airway inflammation (Khan et al., 2017). in muscle or fat because of waste (Herr et al., 2011).

According to Suryadinata et al., (2017) suggesting that the dose of vitamin D used to treat COPD patients and baseline levels of serum vitamin D in patients may lead to contradictory results. Research by Zendedel et al., (2015), showed that vitamin D supplementation can improve FEV1 values and the rate of acute exacerbations in COPD patients.

**Table 1**
**Effective Interventions to Prevent COPD exacerbations**

| Researches | Research Design | Sample | Intervention | Result | Conclusion |
|---|---|---|---|---|---|
| Trappenburg, J. C. A., Monninkhof, E. M., Bourbeau, J., Troosters, T., Schrijvers, A. J. P., Verheij, T. J. M., & Lammers, J. W. J. (2011) | Randomized Controlled Trial | 233 people 111 Intervention 122 Control | The intervention provided in the form of an action plan in the form of individualized treatment prescriptions (Pharmacology & Non-Pharmacology) associated with color coded symptom status to increase adequate response to periods of symptom reduction. | The intervention was carried out for 6 months and the results obtained that exacerbations in the AP (intervention) group had a lower symptom intensity according to the Anthonisen classification. When exacerbations were reported, patients in the AP (intervention) group were on average 2.9 (95% CI 2.4 to 3.5) days faster than those in the control group (p <0.001). | This study shows that individual AP, continued support in case management, reduces the impact of exacerbations on health status and tends to accelerate recovery. AP can be considered a key component of self-management programs in COPD patients |
| Lehouck, A., Mathieu, C., Carremans, C., Baeke, F., Verhaegen, J., Van Eldere, J., & Janssens, W. (2012) | Randomized Controlled Trial | 182 COPD patients (moderate, severe, history of recent exacerbations) | 2 groups, namely n = 91 groups of vitamin D-naive and n = 91 groups of placebo | The results were that the annual exacerbation rate was 2.8 per patient-year in the vitamin D group and 2.9 in the placebo group, resulting in an insignificant rate ratio of 0.94 (CI, 0.76 to 1.16; P 0). , 57). We found no significant difference in the median time to first hospitalization for exacerbations (HR, 0.84 [CI, 0.50 to 1.40]; P 0.50). A total of 152 exacerbations resulted in hospitalizations: 79 in the vitamin D group and 73 in the placebo group (rate ratio, 1.13 [CI, 0.70 to 1.82]; P 0.62) | High-dose vitamin D supplementation in a sample of patients with COPD did not reduce the incidence of exacerbations or the rate of exacerbations |
| Murphy, P. B., Rehal, S., Arbane, G., Bourke, S., Calverley, P. M. A., Crook, A. M., … Hart, N. (2017) | Randomized Clinical Trial | 116 COPD patients | 2 groups n = 59 home oxygen groups alone, and n = 57 groups home oxygen plus home NIV | There were no significant changes between groups (median oxygen flow rate, 1.0 L / min [IQR, 0.5-2.0 L / min] for the home oxygen-only group vs 1.0 L / min [IQR, 0.5-1.5 L / min] for oxygen therapy at home plus the non-invasive ventilation group at home; P = .11) | Among patients with persistent hypercapnia after acute exacerbation of COPD, adding non-invasive home ventilation to home oxygen therapy prolongs relapse or death time by 12 months |
| Martínez Ibán, M., Alonso Porcel, C., Sánchez Rodríguez, L. M., Arce Rodríguez, A., Díaz Pérez, P., & Arboleya Álvarez, L. (2019) | Randomised Controlled Clinical trial with parallel design | 96 patients | 2 groups n = 56 patients were included in the intervention group and n = 41 for the control group<br>The intervention was a brief education on the correct use of inhalers | In the intervention group, 44.6% of patients had exacerbations, compared to the control group, with 56.1% or adjusted = 0.57 (95% CI: 0.22-1.22). Probability of posterior OR <1 = 93%. Exacerbations requiring hospitalization had OR = 0.21 (95% CI: 0.02-0.75) with a posterior probability OR <1 = 99%. | The short educational technique is an effective method for reducing the number of exacerbations in COPD patients. |
| Torres-Sánchez, I., Valenza, M. C., Cabrera- | Randomized controlled trial | 58 patients | The intervention using pedal exercises is in the form of cycling exercises using | Significant differences between groups were found in muscle strength (p = 0.028) | Gymnastic intervention using pedal exercise during |

| Researches | Research Design | Sample | Intervention | Result | Conclusion |
|---|---|---|---|---|---|
| Martos, I., Lopez-Torres, I., Benítez-Feliponi, Á., & Conde-Valero, A. (2017) | | | pedal exercises in addition to standard care | and balance (p = 0.013) after the intervention. All variables increased significantly (p <0.05) in the exercise intervention group. In the intervention group, the mean difference in muscle strength between baseline and discharge was 10.47 N. The balance also improved, indicating a mean difference of 7.56 seconds in the right leg and 6.57 seconds in the left leg. Exercise capacity also increased, with a difference of 4.97 between baseline and discharge. All variables show a decrease in value in the control group. | hospitalization of frail elderly patients with AECOPD improves muscle strength, balance, and exercise capacity. |
| Devereux, G., Cotton, S., Fielding, S., McMeekin, N., Barnes, P. J., Briggs, A., ... & Price, D. (2018) | Randomized Clinical Trial | 1567 respondents | Participants were randomized to receive low-dose theophylline (200 mg once or twice daily) to provide a plasma concentration of 1 to 5 mg / L (determined by ideal body weight and smoking status) (n = 781) or placebo (n = 786). | Baseline evaluation results for 1,536 participants (98%) (772 in the theophylline group; 764 in the placebo group). In total, there were 3430 exacerbations: 1727 in the theophylline group (mean, 2.24 [95% CI, 2.10-2.38] exacerbations per year) vs 1703 in the placebo group (mean, 2.23 [95% CI, 2,09-2,37] exacerbations per year); difference in unadjusted means, 0.01 (95% CI, -0.19 to 0.21) and adjusted incidence rate ratio, 0.99 (95% CI, 0.91–1.08). Serious side effects in the theophylline and placebo groups included cardiac, 2.4% vs 3.4%; gastrointestinal, 2.7% vs 1.3%; and adverse reactions such as nausea (10.9% vs 7.9%) and headache (9.0% vs 7.9%). | Among respondents with COPD at high risk of exacerbation who were treated with inhaled corticosteroids, the addition of a low dose of theophylline, compared to placebo, did not reduce the number of COPD exacerbations over the 1 year period. These findings do not support the use of low-dose theophylline as an adjunct to inhaled corticosteroids for prevention of COPD exacerbations. |
| Wan, E. S., Kantorowski, A., Polak, M., Kadri, R., Richardson, C. R., Gagnon, D. R., ... & Moy, M. L. (2020) | Randomized Clinical Trial | 109 Participants | The intervention group consisted of 57 participants and the control group consisted of 52 participants. The facilities provided to the intervention group included the use of a pedometer and a website that included a feedback feature, setting health program goals, health education related to COPD, and a community forum for 3 months. The facilities provided to the control group included the use of a pedometer alone for 3 months | The results of this study indicated that there was a significant decrease in the frequency of acute exacerbations in the intervention group (0.31) compared to the control group (0.85), so that the p value obtained was 0.01. For mean daily measures, quality of life (HRQOL), and self-efficacy there were no significant differences between the two groups. | Internet-mediated PA intervention for 3 months was associated with a reduced risk of AEs from COPD during 12-15 months of follow-up |

| Researches | Research Design | Sample | Intervention | Result | Conclusion |
|---|---|---|---|---|---|
| Zendedel, A., Gholami, M., Anbari, K., Ghanadi, K., Bachari, E. C., & Azargon, A. (2015). | Randomized Clinical Trial | 88 participants with severe COPD and very severe COPD | Eighty-eight patients with severe and very severe COPD were randomly selected from those attending the internal medicine clinic at Ashayer Hospital. They were randomly assigned to the case group and the placebo group. Patients receive routine treatment for COPD. Along with routine treatment, the placebo group received 100,000 IU of oral vitamin D per month, for 6 months | The FEV1 value in the intervention group (51.6 ± 9.4) was higher than the control group (31.9 ± 7.6), so the p value obtained was <0.001. The number of COPD exacerbations in the intervention group (9.7 ± 1.3) decreased significantly compared to the control group (18.8 ± 3.6), so that the p value obtained was <0.001 | This study shows that vitamin D intake has been shown to reduce exacerbations of COPD and increase FEV1 in patients with severe and very severe COPD. |
| Cordova, F. C., Ciccolella, D., Grabianowski, C., Gaughan, J., Brennan, K., Goldstein, F., & Criner, G. J. (2016) | Randomized controlled trial | 79 Participants | Patients were randomly assigned to either the intervention group or the control group (usual medical care). Control group patients were instructed to seek medical care if their condition worsened. The symptom scores of the intervention group were assessed by a computer algorithm and compared with baseline scores. Scores of 1 or more points above the initial score result in a "warning", and the patient is reviewed by the nurse and referred to the doctor who prescribes medication. | The results obtained were that the intervention group submitted 8,909 symptom reports and the control group submitted 8,396 symptom reports. All patients reported the presence of at least one symptom of COPD every day. The distribution of symptom severity differed between the intervention and control groups, with the intervention group reporting significantly fewer days of moderate and severe symptoms (p <0.001) | Telemedicine-based symptom reporting programs facilitate early symptom treatment and improve pulmonary function and functional status |
| Silva, C. M. D. S. E., Gomes Neto, M., Saquetto, M. B., Conceição, C. S. D., & Souza-Machado, A. (2018) | Randomized controlled trial | 58 patients | The control group did warm-up, aerobic exercise, inspiratory muscle training, and stretching sessions, followed by massage therapy. The treatment group did a warm-up, aerobic exercise, inspiratory muscle training, three sets of upper limb resistance training, and stretching sessions, followed by massage therapy. A total of three sessions per week for eight weeks | 51 patients (25 in the control group and 26 in the treatment group); 41% of the subjects were male. The mean forced expiratory volume was 2.6 ± 0.6 L, and the mean body mass index was 27.3 ± 7.0 kg / m2. Upper limb endurance training yielded much greater benefits in terms of training capacity (88.5 ± 81.9 m, P = 0.043), inspiratory muscle strength (22.9 ± 24.2 cm H2O, P = 0.001), muscle strength. upper limb (2.3 ± 3.1 kg, P = 0.027), and quality of life score (−15.3 ± 10.9 points, P = 0.000). | Upper limb resistance training improves exercise capacity, respiratory muscle strength, and quality of life |

The results of this previous study were also in line with research by Monadi et al., (2012), which revealed that there was a relationship between 25-OHD serum concentration and FEV1 volume in COPD patients. Research by Bellocchia et al., (2015), also resulted in a significant reduction in symptoms of acute exacerbations in COPD patients after giving vitamin D. Khan et al., (2017) research also revealed that vitamin D supplementation had a significant effect in reducing rates. acute exacerbations in COPD patients when given over a long period of time.

Therefore, this vitamin D supplementation intervention can be considered as an evidence-based practice to relieve symptoms of acute exacerbations in COPD patients, either in capsule form or in food fortification adjusted to the serum vitamin D levels of patients with COPD.

## CONCLUSIONS AND RECOMMENDATIONS

There are several interventions that can be applied to patients that aim to reduce or prevent exacebations in COPD patients. From the above description, the authors conclude that Vitamin D is effective in reducing COPD exacerbations and increasing FEV1 on patients with severe and very severe COPD.

Nurses play an important role in administering drugs including in the provision of vitamin D interventions as a result of collaboration with doctors to patients. They are responsible for providing safe medicines. For this reason, the nurse must know all the components of a drug order and question the order if it is incomplete or unclear or the dose given is outside the recommended limits.

The nurse is responsible for administering drugs that are prescribed and the dosage is incorrect or they are contraindicated in the client's health status. Once the medication has been administered, the nurse is responsible for the drugs expected effect.

## Declaration of Conflicting Interests

The authors declared that no potential conflicts of interests with respect to the authorship and publication of this article.

## REFERENCES

American Thoracic Society. (2020). American Thoracic Society SALUD DEL PACIENTE | SERIES INFORMATIVAS www.thoracic.org CLIP AND COPY. *American Thoracic Society*.

Ardiaria, M. (2020). PERAN VITAMIN D DALAM PENCEGAHAN INFLUENZA DAN COVID-19. *JNH (Journal of Nutrition and Health)*. https://doi.org/10.14710/JNH.8.2.2020.79-85

Arksey, H., & O'Malley, L. (2005). Scoping studies: Towards a methodological framework. *International Journal of Social Research Methodology: Theory and Practice*. https://doi.org/10.1080/1364557032000119616

Bellocchia, M., Boita, M., Patrucco, F., Ferrero, C., Verri, G., Libertucci, D., Coni, F., Tabbia, G., Mattei, A., & Bucca, C. (2015). *Vitamin D deficiency and COPD exacerbations: Effect of vitamin D supplementation*. https://doi.org/10.1183/13993003.congress-2015.pa3961

Bringhurst, F. R., Demay, M. B., & Kronenberg, H. M. (2011). Hormones and Disorders of Mineral Metabolism. In *Williams Textbook of Endocrinology*. https://doi.org/10.1016/b978-1-4377-0324-5.00028-6

Centers for Disease Control and Prevention, U. (2008). Fatalities among oil and gas extraction workers - United States, 2003-2006. *MMWR: Morbidity and Mortality Weekly Report*.

Chan-Yeung, M., Aït-Khaled, N., White, N., Ip, M. S., & Tan, W. C. (2004). The burden and impact of COPD in Asia and Africa. In *International Journal of Tuberculosis and Lung Disease*.

Collins, P. F., Stratton, R. J., & Elia, M. (2012). Nutritional support in chronic obstructive pulmonary disease: A systematic review and meta-analysis. In *American Journal of Clinical Nutrition*. https://doi.org/10.3945/ajcn.111.023499

Fatimah, A. D., Soemarwoto, R. A., & Karima, N. (2019). Suplementasi Vitamin D Sebagai Pencegahan Eksaserbasi Akut pada Penyakit Paru Obstruktif Kronik (PPOK) Vitamin D. *Majority*, *8*(2), 193–199.

Finklea, J. D., Grossmann, R. E., & Tangpricha, V. (2011). Vitamin D and chronic lung disease: A review of molecular mechanisms and clinical studies. In *Advances in Nutrition*. https://doi.org/10.3945/an.111.000398

Førli, L., Halse, J., Haug, E., Bjørtuft, Vatn, M., Kofstad, J., & Boe, J. (2004). Vitamin D deficiency, bone mineral density and weight in patients with advanced pulmonary disease. *Journal of Internal Medicine*. https://doi.org/10.1111/j.1365-2796.2004.01337.x

Heidari, B., Javadian, Y., Monadi, M., Dankob, Y., & Firouzjahi, A. (2015). Vitamin D status and distribution in patients with chronic obstructive pulmonary disease versus healthy controls. *Caspian Journal of Internal Medicine*.

Herr, C., Greulich, T., Koczulla, R. A., Meyer, S., Zakharkina, T., Branscheidt, M., Eschmann, R., & Bals, R. (2011). The role of vitamin D in pulmonary disease: COPD, asthma, infection, and cancer. In *Respiratory Research*. https://doi.org/10.1186/1465-9921-12-31

Horadagoda, C., Dinihan, T., Roberts, M., & Kairaitis, K. (2017). Body composition and micronutrient deficiencies in patients with an acute exacerbation of chronic obstructive pulmonary disease. *Internal Medicine Journal*. https://doi.org/10.1111/imj.13453

Ihsan, M. (2019). *Karakteristik Foto Thorax pada Penyakit Paru Obstruktif Kronik (PPOK) di RS Unhas Makassar, Periode Januari-Juni 2019*. http://repository.unhas.ac.id/id/eprint/489/2/C11116335_skripsi_23-10-2020_1-2.pdf

Ismail, L., Sahrudin, S., & Ibrahim, K. (2017). ANALISIS FAKTOR RISIKO KEJADIAN PENYAKIT PARU OBTRUKTIF KRONIK (PPOK) DI WILAYAH KERJA PUSKESMAS LEPO- LEPO KOTA KENDARI TAHUN 2017. *Jurnal Ilmiah Mahasiswa Kesehatan Masyarakat Unsyiah*.

Khan, D. M., Ullah, A., Randhawa, F. A., Iqtadar, S., Butt, N. F., & Waheed, K. (2017). Role of Vitamin D in reducing number of acute exacerbations in Chronic Obstructive Pulmonary Disease (COPD) patients. *Pakistan Journal of Medical Sciences*. https://doi.org/10.12669/pjms.333.12397

Mannino, D. M., Homa, D. M., Akinbami, L. J., Ford, E. S., & Redd, S. C. (2002). Chronic obstructive pulmonary disease surveillance--United States, 1971-2000. *MMWR. Surveillance Summaries : Morbidity and Mortality Weekly Report. Surveillance Summaries / CDC*.

Monadi, M., Heidari, B., Asgharpour, M., Firouzjahi, A., Monadi, M., & Mirsaied, M. A. G. (2012). Relationship between serum

vitamin D and forced expiratory volume in patients with chronic obstructive pulmonary disease (COPD). *Caspian Journal of Internal Medicine*.

Nanda, A. (2019). *Pengaruh Logoterapi Untuk Menurunkan Tingkat Depresi Dan Meningkatkan Kualitas Hidup Pasien Penyakit Paru Obstruktif Kronik Di Rsud Dr. Moewardi Surakarta* [Universitas Sebelas Maret]. https://digilib.uns.ac.id/dokumen/detail/69785/Pengaruh-Logoterapi-Untuk-Menurunkan-Tingkat-Depresi-Dan-Meningkatkan-Kualitas-Hidup-Pasien-Penyakit-Paru-Obstruktif-Kronik-Di-Rsud-Dr-Moewardi-Surakarta

Nguyen, H. T., Collins, P. F., Pavey, T. G., Nguyen, N. V., Pham, T. D., & Gallegos, D. L. (2019). Nutritional status, dietary intake, and health-related quality of life in outpatients with COPD. *International Journal of COPD*. https://doi.org/10.2147/COPD.S181322

Oemiati, R. (2013). Kajian Epidemiologis Penyakit Paru Obstruktif Kronik (Ppok) yang disebabkan oleh rokok. *Media of Health Research and Development*.

Schwartz, D. B. (2006). Malnutrition in Chronic Obstructive Pulmonary Disease. In *Respiratory Care Clinics of North America*. https://doi.org/10.1016/j.rcc.2006.09.001

Suryadinata, R. V., Lorensia, A., & Aprilia, A. P. (2017). PROFIL VITAMIN D PADA PASIEN ASMA DAN NON-ASMA DEWASA DI SURABAYA. *The Indonesian Journal of Public Health*. https://doi.org/10.20473/ijph.v12i1.2017.106-117

The Joanna Briggs Institute. (2015). The Joanna Briggs Institute Reviewers' Manual 2015: Methodology for JBI scoping reviews. *Joanne Briggs Institute*.

Virhia, P., Staver, J. R., Loddenkemper, R., Gibson, G. J., Sibille, Y., Lundbäck, B., & Booth, B. E. (2013). European Lung White Book. *Smmdp*.

Zein, W. A., Siregar, Y., & Tarigan, A. P. (2020). Peran Polimorfisme Gen Matriks Metalloproteinase-9 Dengan Kejadian Penyakit Paru Obstruktif Kronik. *Jurnal Keperawatan dan Fisioterapi (JKF)*. *3*(1), 1-5. https://doi.org/10.35451/jkf.v3i1.427

Zendedel, A., Gholami, M., Anbari, K., Ghanadi, K., Bachari, E. C. eneice., & Azargon, A. (2015). Effects of Vitamin D Intake on FEV1 and COPD Exacerbation: A Randomized Clinical Trial Study. *Global Journal of Health Science*. https://doi.org/10.5539/gjhs.v7n4p243