



Activity Intervention in COPD Patients to Improve Quality of Life in The Community

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ABSTRACT

The problem that often arises in chronic diseases such as COPD is shortness of breath (dyspnea), which causes the patient to experience activity intolerance. Activity intolerance is characterized by a decrease in the patient's ability to carry out physical activities or work that is quite heavy. This Literature Review report aims to find out what activity-based interventions have been shown to improve the quality of life of COPD patients significantly and can be implemented in the community. The author uses the method used to conduct a literature review is to search through the internet. Search literature through the internet based on several criteria, namely journals published in the last 10 years, English-language research types in the form of Randomized Control trials, and Quasi-Experimental. The keywords used are “((COPD) or (chronic obstructive pulmonary disease) or (chronic obstructive airway disease) or (chronic obstructive lung disease)) AND ((activity exercise) or (exercise intervention)) AND (quality of life) or (well being) or (well-being) or (health-related quality of life) or (life satisfaction)) AND (RCT) or (Quasi-Experimental)” through NCBI and Ebsco. From the nine articles, it was found that there were 8 interventions related to improving the quality of life of the elderly with COPD. Based on the elements that were proven to be significant, there was 1 intervention with $p = 0.000$ related to improving quality of life, the intervention was upper extremity resistance training. Intervention activities in COPD patients to improve quality of life, each intervention group has the most effective intervention significantly influence. So that the semi-Fowler's position is very effective in increasing extremity muscle strength in COPD patients with activity intolerance problems

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ABSTRAK

The problem that often arises in chronic diseases such as COPD is shortness of breath (dyspnea), which causes the patient to experience activity intolerance. Activity intolerance is characterized by a decrease in the patient's ability to carry out physical activities or work that is quite heavy. This Literature Review report aims to find out what activity-based interventions have been shown to improve the quality of life of COPD patients significantly and can be implemented in the community. The author uses the method used to conduct a literature review is to search through the internet. Search literature through the internet based on several criteria, namely journals published in the last 10 years, English-language research types in the form of Randomized Control trials, and Quasi-Experimental. The keywords used are “((COPD) or (chronic obstructive pulmonary disease) or (chronic obstructive airway disease) or (chronic obstructive lung disease)) AND ((activity exercise) or (exercise intervention)) AND (quality of life) or (well being) or (well-being) or (health-related quality of life) or (life satisfaction)) AND (RCT) or (Quasi-Experimental)” through NCBI and Ebsco. From the nine articles, it was found

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INTRODUCTION

Chronic Obstructive Pulmonary Disease (COPD) is a worldwide common preventable and treatable respiratory disease characterized by airflow limitation and persistent respiratory symptoms associated with airflow and/or alveolar abnormalities caused by exposure to noxious gases or particles (Gold, 2017, Kakarla et al., 2016, Soeroto dan Suryadinata, 2014). The previous definition of COPD emphasized the terms emphysema and chronic bronchitis which are no longer included in the sense used today. Chronic inflammation of COPD causes changes in structure, narrowing of the airways and damage to the pulmonary parenchyma, thus affecting alveolar function and lung elasticity (GOLD, 2017).

Chronic obstructive pulmonary disease (COPD) is a health problem that is a major burden especially for developing countries and causes high rates of morbidity and mortality. More than 200 million people in the world have COPD, with 65 million of them being at moderate to severe levels (WHO, 2017). Furthermore, 72%-93% of people are underdiagnosed and misdiagnosis often occurs (Forum of International Respiratory Societies., 2017). This disease is a preventable and treatable disease. The main cause of COPD is due to cigarette smoke (O'Donnell & Gebke, 2014). However, in addition to cigarette smoke, pollutants are also the cause of COPD. Countries that are classified as middle and low economic status are exposed to higher dust and smoke than countries with high economic status (Mizarti, Herman, Sabri, & Yanis, 2019). Indonesia, as one of the developing countries, tends to have high levels of air pollution. If people do not have good health behaviors, especially in hygiene pernapasan, it will result in a high incidence of COPD.

The main characteristics of COPD are chronic inflammation of the airway and lungs, limited air that enters persistently, and a progressive decrease in lung function (O'Donnell & Gebke, 2014). In addition to respiratory symptoms, there is also skeletal muscle dysfunction as a clinical manifestation that stands out in the early stages of COPD and increases the risk of patient mortality. In addition, skeletal muscle dysfunction can interfere with the exercise capacity and quality of life of COPD patients (Wu et al., 2014). The low physical activity performed by COPD patients causes adverse consequences, including low quality of life related to health, increased risk of acute exacerbation, high utilization rate of health facilities, increased mortality rate, and independence of lung function (Wan et al., 2017). With the many negative impacts that COPD can have, special interventions are needed as a preventive measure and as a healing effort for patients with COPD.

Pulmonary rehabilitation is one of the management of COPD patients (Palinggi, 2018). This rehabilitation program aims to reduce symptoms, improve lung function and

capacity, and improve the quality of life carried out through physical exercise, exercise, and health education (Lewis, Dirksen, & Heithkemper; 2014).

Physical activity is a core component of pulmonary rehabilitation planning in COPD patients (Wu et al., 2014). In general, COPD patients have less active activity than other healthy populations and the passivity of this physical activity consistently affects the worsening of the disease (Arbillaga-Etxarri et al., 2018). The involvement of physical activity can facilitate an effective airway to prevent deterioration of functional capacity, prevent physical disabilities, and improve and maintain an active lifestyle in COPD patients (Rinaldo et al., 2017).

Activity-based interventions carried out by COPD patients to improve their quality of life can be carried out in various ways. Through the writing of this evidence-based practice report, it is hoped that the author can explore and identify what interventions can be done by patients with COPD to help improve their quality of life.

The purpose of this Review Literature is to find out what activity-based interventions have proven to be significant in improving the quality of life of COPD patients and can be implemented in the community.

METHOD

The method used in writing this literature review is narrative review. According to the guidelines Rese, A., et al, (2017) this method strongly supports the author in drafting because of the general research questions to get an overview. This review uses the narrative review guidelines according to Green et al., (2006) Deep El Haffar, et al (2020) that Narrative review includes a summary, and does not have a specific review method (Goodman, S. N., et al, 2016). The selected articles are only summarized and reviewed because of time efficiency. Although narrative reviews have shortcomings, the material used must still be valid, from reliable sources, because narrative reviews are based on research articles produced from reliable and valid sources.

The method used to perform a literature review is by searching through the internet. Literature search through the internet based on several criteria, namely journals published in the last 10 years, in English type of research in the form of Randomized Control Trial and Quasi Experimental. Literature search using keywords as well as abstracts listed in the literature obtained

Scoping review is a comprehensive analysis and identifies literature related to research questions (DiCenso et al., 2010). There are five stages in conducting the scoping review method. The five stages are identifying research questions, searching and identifying literature that can be

used to answer predetermined research questions, sorting literature, presenting data or information from each literature, and forming conclusions, suggestions and reports on the results of literature analysis as a whole (Arksey & O' Malley, 2005).

Literature review using several sources, namely PubMed, and Ebsco. The purpose of the article search is to obtain articles from Indonesia or abroad that discuss alternatives to what activity-based interventions have proven to be significant in improving the quality of life of COPD patients and can be implemented in the community.

Electronic data sources in literature searches via the internet based on several criteria, namely journals published in the last 10 years, full text articles, english language, and types of research in the form of Randomized Control Trial and Clinical Trial. The keywords used are "(copd) or (chronic obstructive pulmonary disease) or (chronic obstructive airway disease) or (chronic obstructive lung disease) AND ((activity exercise) or (exercise intervention)) AND ((quality of life) or (well being) or (well-being) or (health-related quality of life) or (life satisfaction)) AND (RCT) or (Quasi Experimental)" through NCBI and Ebsco. The search results for articles that meet the author's criteria totaled 9 articles published in 2011 to 2020.

After searching through several sources using predefined keywords, article sorting is carried out. The articles obtained are sorted to get articles according to the topic of the literature study carried out. Article sorting is carried out by adjusting to the established inclusion and exclusion criteria.

The presentation of the results of the study of each literature used, the information of which will be presented in the form of a narrative. The narrative will contain interventions to find alternatives to what activity-based interventions have proven to be significant in improving the quality of life of COPD patients and can be implemented in the community, which can be directly applied by nurses and

or communities that have members suffering from COPD patients in improving their quality of lifewhich has been obtained from previous literature searches, article titles, the author of the article along with the year of publication of the article, type of research, research methods and research results.

RESULTS AND DISCUSSION

The characteristic outlined in this study article is to seek the most significantly influential interventions to improve the quality of life of copd elderly people with non-pharmacological methods. This study was made with 12 articles with the same research design, namely a randomized control trial, with a time span between 2011-2018.

This study focused on non-pharmacological exercises to improve physical activity, quality of life, and health status of patients with COPD. The interventions contained from several articles in this study are interventions using urban training, using telerehabilitation compared to therapy with exercise, interventions with exercise that measure the resistance of the upper extremities, using Liuzijue exercises combined with resistance exercises with elastic bands, interventions with combined resistance exercises compared to resistance exercises only, using therapy with exercise with body endurance and strength programs with gymnastics compared to breathing exercises, with educational program approaches regarding physical activity compared to strength and resilience, sports interventions carried out in water and on land, and interventions with community-based gymnastics

The following is a flowchart for sorting articles obtained according to the topic of the literature study carried out:

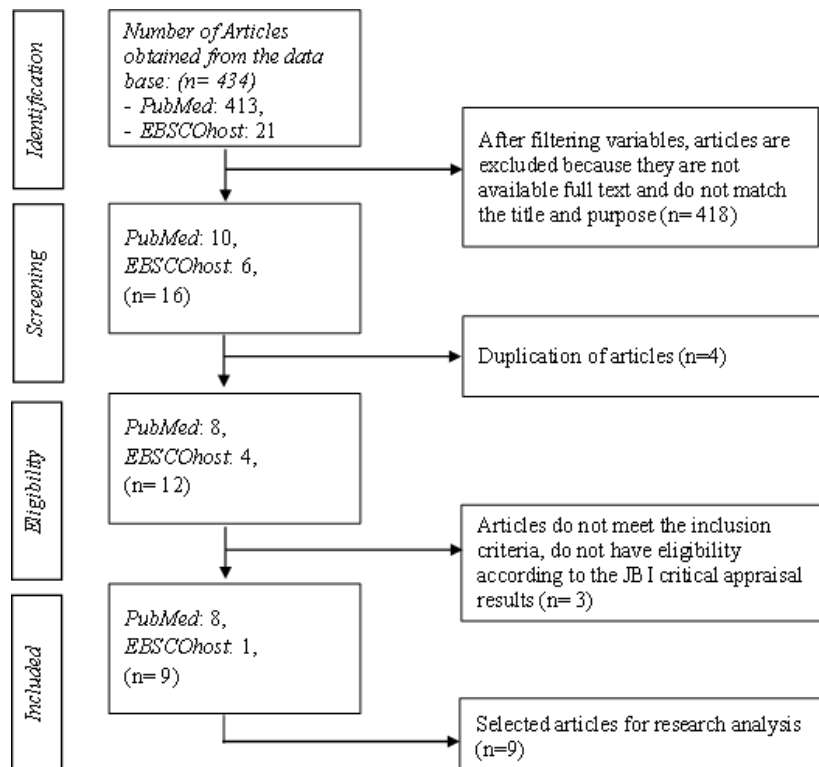


Chart 1. Article Selection Process Flowchart

In this Literature Review, we focus on finding journals related to the administration of interventions in COPD patients with the aim of improving their quality of life, both primary and secondary objectives. Among the 9 journals we studied, there were 4 journals that used the Saint George Respiratory Disease Questionnaire (SGRQ) to measure the quality of life of the elderly. In addition, there are 2 journals that use the Chronic Respiratory Disease Questionnaire (CRDQ), 1 journal uses the Mageri Respiratory Failure Questionnaire (MRF-26) and 1 journal uses the EQ-5D Health Questionnaire.

The Saint George Respiratory Disease Questionnaire (SGRQ) has been translated and validated in several countries, including China (2009) and Morocco (2006) (Hendrik, Perwitasari, D. A., Mulyani, U. A., & Thobari, J. A., 2015). Generally, the use of SGRQ in Indonesia is used to measure the quality of life in tuberculosis patients (Adnan, A., Perwitasari, D. A., & Mulyani, U. A., 2014). However, currently the authors found one journal that validates the Indonesian version of the SGRQ questionnaire as an instrument to measure the quality of life of COPD patients.

Based on the results of research conducted by Pratiwi, P., & Perwitasari, D. A. (2017), the Indonesian version of the SGRQ Questionnaire has not met the validity criteria but still meets reliable criteria. The subjects of this study were 90.24% aged 49 - 80 years. The results of the SGRQ reliability

test in COPD patients are declared acceptable all because the value is above 0.70 so that the Indonesian version of the SGRQ questionnaire has high consistency and reliability.

According to Ferreira & Patino (2017) output is a variable that is monitored during the study and can be in the form of recovery, worsening clinical events and deaths. Related to the focus of the EBP's goal, which is to know which interventions can improve the patient's quality of life, it means that the output is included in the category of "healing".

From the 9 Journals, it was found that there were 8 interventions related to improving the quality of life of the elderly with COPD, including telerehabilitation, upper extremity resistance training, Liu Zi Jue training combined with elastic band resistance training, resistance and endurance training and resistance training alone, exercise training programs, combined aerobic-strength training, and fitness education programs, exercise training in water, and a community-based exercise training programme. To find out which interventions have been shown to significantly improve the quality of life, the way is to look at the level of significance. Based on this element, there was 1 intervention with $p = 0.000$ related to improving the quality of life, the intervention was upper extremity resistance exercise based on the assessment of the RCT research in Table 1.

Tabel 1
Randomized Controlled Trial Critical Appraisal

No	Article Title and Author	1	2	3	4	5	6	7	8	9	10	11	SUM
1.	Long-term integrated telerehabilitation of COPD Patients: a multicentre randomised controlled trial (iTrain)	Y	Y	C	C	C	C	C	C	C	Y	C	3
2.	Effects of upper limb resistance exercise on aerobic capacity, muscle strength, and quality of life in COPD patients: a randomized controlled trial	Y	Y	Y	Y	Y	Y	C	C	Y	Y	C	8
3.	Effect of Liuzijue Exercise Combined with Elastic Band Resistance Exercise on Patients with COPD: A Randomized Controlled Trial	Y	Y	C	C	Y	Y	C	C	C	C	C	4
4.	Effects of Combined Resistance and Endurance Training Versus Resistance Training Alone on Strength, Exercise Capacity, and Quality of Life in Patients With COPD	Y	Y	C	Y	Y	C	C	C	Y	Y	C	6
5.	Effect of 2 Exercise Training Programs on Physical Activity in Daily Life in Patients with COPD	Y	Y	Y	C	Y	Y	C	C	C	Y	C	6
6.	Effects of Combined Aerobic- Strength Training vs Fitness Education Program in COPD Patients	Y	Y	Y	Y	Y	Y	C	C	C	C	Y	7
7.	Effects of exercise training in water and on land in patients with COPD: a randomised clinical trial	Y	Y	Y	C	Y	Y	C	C	Y	C	Y	7
8.	Effectiveness of a community-based exercise training programme to increase physical activity level in patients with chronic obstructive pulmonary disease: A randomized controlled trial	Y	Y	Y	C	Y	Y	C	C	Y	C	Y	7
9.	Long-term efficacy and effectiveness of a behavioural and community- based exercise intervention (Urban Training) to increase physical activity in patients with COPD: a randomised controlled trial	Y	Y	Y	Y	Y	Y	C	C	Y	C	C	7

Information:

1. Did the trial address a clearly focused issue?
2. Was the assignment of patients to treatments randomised?
3. Were all of the patients who entered the trial properly accounted for at its conclusion?
4. Were patients, health workers and study personnel 'blind' to treatment?
5. Were the groups similar at the start of the trial?
6. Aside from the experimental intervention, were the groups treated equally?
7. How large was the treatment effect?
8. How precise was the estimate of the treatment effect?
9. Can the results be applied to the local population, or in your context?
10. Were all clinically important outcomes considered?
11. Are the benefits worth the harms and costs?

Y= Yes

C= Can't Tell

SUM= Jumlah Yes (CASP Checklist: 11 questions to help you make sense of a Randomised Controlled Trial, 2022)

The focus of the intervention given to COPD patients from several journals we analyzed was on physical activity in adults and the elderly. There are a variety of physical activities that can be identified, including telerehabilitation (Regular gymnastics training program or strength training (strength training) and treadmills), upper extremity resistance training, upper extremity resistance combination exercises, combined resistance training, sports training programs, a combination of aerobic strength training with fitness education, water and land sports exercises, gymnastics exercises, and community-based exercises. These nine physical activity exercises have the same goal, which is to improve the quality of life of COPD patients.

Physical activity exercise is also proven to improve lung function, muscle strength, and other positive impacts so that this physical activity exercise will be very beneficial for COPD patients. The analysis that has been carried out at the results stage found that the most effective intervention was the upper extremity resistance exercise intervention on aerobic capacity, muscle strength, and quality of life of COPD patients. This is evidenced by looking at the level of significance in improving the quality of life in COPD patients.

This upper extremity resistance exercise intervention on aerobic capacity, muscle strength, and quality of life of COPD patients had a significance level of $p = 0.000$ related to improving the quality of life also had the highest score in the Critical Appraisal Skills Programme Checklist which reached 8 "Yes" answers from 11 questions including "Does the study address clearly focused issues?", "Were the interventions carried out on respondents randomly selected?", "Were all respondents involved in the study calculated correctly in the conclusion section?", "Were patients, health workers, and study respondents included in the group in a "blind" manner? (neither the researcher nor the respondent)", "Were the groups similar at the beginning of the study?", "Apart from the experimental interventions, were the groups treated equally?", "How much effect did the interventions performed have?", "How precise are the estimates of the impact of the treatment applied?", "Can the results

Upper limb resistance training is an upper limb muscle exercise performed for 30 minutes where the stages include a 10-minute warm-up period, 10-minute aerobic activity, and 10-minute cooling. (Elmorsy et al., 2012). The movements performed include overhead pulley exercise, shoulder abduction exercise, arm raise in quadruped position, shoulder flexion exercise, shoulder retraction exercise, and shoulder rotation exercise three times a week for six weeks. Exercise will be stopped if there is an exacerbation, the pulse exceeds the training heart rate target, difficulty speaking, or the frequency of breathing > 30

times / minute, the BORG scale is 7 – 8, and the O₂ saturation < 90%. Measurement scale using categorical (nominal) scale (Novianti et al., 2015).

The stages of performing upper extremity resistance exercises are as follows, (1) Shoulder flexion from 90° to 180°; (2) Shoulder abduction from 90° to 180°; (3) Horizontal stirring of the shoulder (with bent elbow 90°); (4) Full elbow extension of full elbow flexion (with shoulders fully bent) (Gadesha & Bhise, 2015). The exercise is performed using free weights (dumbbells) with an endurance of 50% of the maximum load measured by a maximum repeat test. During the exercise of resistance, flexion and abduction movements of the right arm and left arm are performed in three sets with 10 repetitions. The flexion and extension of the right elbow then the left elbow is performed in three sets with 10 repetitions. All exercises involve a 1 – 2 minute rest interval between each set according to the limits of the patient's ability.

This upper extremity resistance exercise can affect the quality of life and health in chronic obstructive pulmonary disease patients by increasing the capacity of the functional arm and reducing dyspnea as well as fatigue with the possibility of reducing oxygen consumption and ventilation per minute. Upper extremity resistance exercises in patients with chronic obstructive pulmonary disease can reduce disease symptoms and increase cardiopulmonary capacity and can increase muscle mass as well as peripheral muscle strength. Peripheral muscle strength is assessed by maximum repetition measurements to assess the strength and endurance of the upper extremity muscles. The patient is then asked to walk for 6 minutes (6-Six Minute Walk Test / 6-MWT) at a self-selected pace on a 30-meter path free of obstacles. Patients are allowed to take a short break if they wish. After walking for 6 minutes, an examination of the pulse, blood pressure, respiratory frequency, and Rated Perceived Exertion (RPE) (a scale to measure the intensity of exercise) is carried out.

Upper extremity resistance exercises showed a significant improvement in the distance traveled in the 6-minute (6-MWT) walking test which can contribute to an increase in functional capacity. This exercise can improve the quality of life, upper extremity muscle strength, exercise capacity, performance in carrying out daily activities, and can reduce fatigue (Magalhães et al., 2018). Before the training begins, the client has been given a short-work beta agonist (Salbutamol 2,5 mg) with nebulisers, and they are ensured to be in a clinically stable state when they come to a training program by a doctor.

First, they undergo muscle warm-up and stretching to avoid muscle injuries for 10-15 minutes. Then, 10 minutes of upper extremity training is led by a physiotherapist and a

pre-prepared video. Exercise of the upper extremities with respiratory gymnastics consists of several maneuvers such as: 1. while tilting the head towards the shoulders 2. The bird-like pattern with while inhaling straightens the body, exhales while bending forward down. 3. pattern by pursing the breathing lips, seeing movements left and right alternately. 4. Shoulders shrug with lips pursed breathing. 5. Fan-like movement with lips pursed breathing, hands bent, then turn right and left. 6. twisting the shoulders with the hands bent on the shoulders. 7. Like a vampire of movement,

the hands are straight forward while inhaling, then twisting the body right, left, and forward while exhaling. 8. The gesture of calling, the hand is raised, then touches it down, in the opposite direction. 9. Butterfly-like pattern, hands stretched straight forward and then hands stretched out. This upper extremity training is held twice a week for 8 weeks. Before and after each training session, vital signs are measured and there are few doctors who lead and monitor patients in the training program. This movement of limb resistance exercises is depicted as in the image below:

A 4x2 grid of eight photographs showing four elderly individuals (two men and two women) seated in a room, performing various upper extremity exercises. The room contains a sofa, a lamp, and several potted plants. The exercises shown include: 1. Head tilting towards the shoulders. 2. Bird-like pattern (inhaling straightens the body, exhaling bends forward). 3. Lips pursed, alternating left and right movements. 4. Shoulder shrugs with pursed lips. 5. Fan-like movement with pursed lips, hands bent and turned. 6. Twisting shoulders with hands bent on the shoulders. 7. Vampire-like movement (hands straight forward, twisting body). 8. Calling gesture (hand raised, then touched down). 9. Butterfly-like pattern (hands stretched forward, then out).

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Figure 1. Extremity Resistance Training

Source: COPD Treatments & Rehab: Upper Body Exercises: Burke Rehabilitation Center in White Plains

After training: 1. Lung function was measured by Forced Expiratory Volume in 1 second (FEV₁) and Forced Volume Capacity (FVC). The EMAS class is based on FEV₁ which is divided into four categories. GOLD 1 for FEV₁ > 80%, GOLD 2 for FEV₁ 50-79%, GOLD 3 for FEV₁ 30-49%, and GOLD 4 for FEV₁ < 30%. 2. Oxygen saturation is measured by pulse

oximetry. Oxygen saturation below 88 indicates hypoxia in COPD patients is stable and oxygen therapy is required during exercise sessions. 3. Functional capacity measured by a six-minute walking test (6 MWT). Patients are instructed to walk as quickly as possible for 6 minutes in the corridors of the hospital. The patient can rest or lower his speed if he has

dyspnea or discomfort in the chest, but the timer is not stopped. 4. The dyspnea scale measured with a modified Medical Research Council (mMRC) with a score of ≥ 2 indicates the patient has more symptoms. 5. Quality of life is measured by COPD Questionnaire Assessment Test (CAT). The results of ≥ 10 from CAT showed the patient's quality of life was impaired.

Upper extremity resistance exercises can help slow down muscle atrophy in COPD patients caused by the lack of physical activity of COPD patients. This exercise is an effective strategy to achieve upper extremity muscular endurance that also increases exercise capacity and decreases the incidence of tightness in COPD patients (Velloso et al., 2013). Thus, patients can perform daily activities better the quality of life of patients can be improved. This exercise is accompanied by respiration exercises as well which increase the inspiration capacity and lower the shortness of breath of Prida, et al., 2011).

Another study conducted by Zakiah Novianti (2015) at the Pulmonary Polyclinic of Dr. Moewardi Surakarta Hospital in August 2014 also showed that upper limb exercise for 6 weeks can increase the value of 6MWT, VO₂ max, and FFM in copd patients. This shows that the effectiveness of the intervention is very good and the upper extremity resistance exercise intervention will be an option to be carried out on COPD patients to improve the quality of life of patients and can be applied well in Indonesia.

CONCLUSIONS AND SUGGESTIONS

Based on the results of the literature review, it can be concluded that out of a total of 9 scientific articles on the topic of Activity interventions in COPD patients to improve the quality of life, each intervention group has the most effective intervention significantly influential. These various interventions can be applied as improving a good quality of life in patients with COPD. From the 9 Journals, it was found that there were 8 interventions related to improving the quality of life of the elderly with COPD. Based on the elements that have been shown to be significant, there is 1 intervention with $p = 0.000$ related to improving the quality of life, the intervention is upper extremity resistance training.

This literature review is also expected that health workers in this case are nurses can identify the quality of life of patients with COPD and can prevent a decrease in the quality of life in patients with COPD disease and nurses can help COPD patients carry out exercises in upper extremity resistance activities to improve the quality of life of COPD patients.

Recommendations for subsequent researchers are expected to conduct further literature reviews by paying attention to other variables that have not been touched by this review..

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