

## Literature Review: Effect of Water-Based Exercise on Chronic Obstructive Pulmonary Disease (COPD) Patients

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### ABSTRACT

**Background & Objective:** Chronic Obstructive Pulmonary Disease is a chronic condition of injury to the respiratory tract due to exposure to toxic gases or substances. The various clinical manifestations caused have a major effect on the patient's quality of life. Water-based exercise is a non-pharmacological intervention that helps improve the functional of the lung organs so that the quality of life increases. The purpose of this study was to determine the effect of water-based exercise for COPD patients. **Method:** This type of research uses the literature review method through google, google scholar, ncbi, openknowledge and garuda in the range of published years 2018 to 2023 using the keywords water-based exercise; water exercise; water-based exercise; COPD; COPD; Chronic Obstructive Pulmonary Disease; Chronic Obstructive Pulmonary Disease. **Result:** From the five journals analyzed, participants experienced functional improvements in lung function, respiratory muscle strength, and tolerance to physical activity or exercise. **Conclusion:** Water-based exercise provides several benefits for people with COPD, including improving lung function, increasing respiratory muscle strength, and optimizing tolerance to physical activity so that quality of life can be supported slowly.

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### Introduction

Chronic obstructive pulmonary disease (COPD) is a condition characterized by the accumulation of fluid or mucus in the respiratory tract as a product of the inflammatory process in the lungs due to exposure to foreign particles and is toxic to the respiratory system (Anissa, 2022). Based on the American Lung Association, it presents data related to COPD trends, namely from 2014 to 2020 the prevalence of COPD is flat, which means that there has been no decrease in the number of cases in

that time span (American Lung Association, 2020). The data also shows that on average COPD occurs in the female gender and elderly people in the age range of 65 years and over. Common symptoms found include shortness of breath (dyspnea), cough, chronic phlegm which certainly has a major effect on the quality of life of individuals (Anissa, 2022; Rahmawati & Purwanti, 2017).

With the clinical appearance, it will greatly interfere with activity and rest. Management to support quality of life needs to be pursued both pharmacologically and non-pharmacologically. Non-pharmacological needs to be the most important consideration because this condition is chronic so as to minimize the risk of complications or adverse effects of long-term consumption of pharmacological therapy (Ambarwati et al., 2019). Previous research studies recommend several non-pharmacological therapies, one of which is water-based exercise. This therapy is effective in optimizing lung function, the range of individual abilities in activities (Chen et al., 2021). The advantage of this therapy is that it does not require considerable costs and if you are able to do it independently but still according to the doctor's advice and the strength of each individual's training.

## Objective

Knowing the effect of water-based exercise for COPD patients

## Method

This study is a literature review with the stages of collecting previous study articles related to water-based exercise then sorting and analyzing the research results. The collected articles were searched through electronic media google, google scholar, ncbi, openknowledge and garuda in the range of publication years 2018 to 2023 using the keywords water-based exercise; water exercise; water-based exercise; COPD; COPD; Chronic Obstructive Pulmonary Disease; Chronic Obstructive Pulmonary Disease. The researcher analyzed similarity, contrast, criticize, compare, and summarize. The analysis is then presented in the discussion section.

## Results

The results of the literature review analysis are presented in Table 1.

**TABLE 1.** Results of Recapitulation of Literature Review Articles

Author	Article Title	Methods	Subject	Results
Wu et al. (2018)	<i>Effectiveness of water-based Liuzijue exercise on respiratory muscle strength and peripheral skeletal muscle function in patients with COPD</i>	A randomized controlled trial	A total of 45 COPD patients completed the program and were included in the analysis.	Water-based Liuzijue exercise had beneficial effects on COPD patients' respiratory muscle strength and peripheral skeletal muscle function, and additional benefits for improving lower limb endurance compared with

					land-based Liuzijue exercise.
de Castro et al. (2020)	<i>Effects of land- and water-based exercise programmes on postural balance in individuals with COPD: additional results from a randomised clinical trial</i>	A randomized controlled trial	Participants were randomly assigned to a land group (LG; n=27) or a water group (WG; n=23).		Most participants experienced clinically relevant improvements in functional balance at 3 months after undergoing aquatic training.
Charususin et al. (2021)	<i>Beneficial Effect of Water-Based Exercise Training on Exercise Capacity in COPD Patients- a Pilot Study</i>	A randomized controlled trial	14 stable COPD participants were recruited and randomized into either a water-based exercise or land-based exercise group.		The water-based exercise program can be recommended to COPD rehabilitation programs to improve endurance, exercise capacity, and inspiratory muscle strength;
Chen et al. (2021)	<i>Rehabilitation effects of land and water-based aerobic exercise on lung function, dyspnea, and exercise capacity in patients with chronic obstructive pulmonary disease</i>	Riview sistematis ini dilaporkan sesuai dengan pedoman Preferred Reporting Items for Systematic Riviews and Meta-Analyses (PRISMA).	Eighteen studies (1311 COPD cases) were included.		Moderate to high quality evidence suggests that water aerobic exercise can effectively improve dyspnea and exercise capacity in COPD patients.
Jiabin et al. (2021)	<i>Rehabilitation effect of water-based Liuzijue for patients with stable chronic obstructive pulmonary disease</i>	A randomized controlled trial	Sixty patients with stable COPD were randomly divided into three groups.		The efficacy of Liuzijue practice combined with conventional western medicine is superior to that of conventional Western Medicine alone, and can improve lung function, improve quality of life, and increase exercise tolerance.

## Discussion

Of the articles found, four of them used the same research method, namely randomized controlled trials (RCTs). This method uses pure research with great complexity in controlling bias (accompanying factors) during the experimental process so that comparison of results between intervention and control groups can be optimal (Potter et al., 2019). In addition to research methods, the approach in the study written by Charususin et al. (2021); Chen et al. (2021); de Castro et al. (2020); Jiabin et al. (2021) is also similar, namely with a pre-post test design where groups in the study are given a test or examination before and after being given an intervention. The purpose of this design is to make it easier for researchers to measure any differences or effects on research participants after being given an intervention. One study by Chen et al. (2021) used the systematic review method. Quoted from Barbara (2020) states that this method has the highest indication of potential in evidenced based practice and is able to be a strong justification of research.

According to the Global Initiative for Obstructive Lung Disease, COPD or Chronic Obstructive Pulmonary Disease is defined as a state of inadequate airflow through the respiratory tract that tends to get worse due to an inflammatory response caused by exposure to harmful materials or gases. The resulting chronic injury will cause early changes in the patient characterized by the appearance of several clinical manifestations. In the event of a severe exacerbation, hypoxemia and hypercapnia often occur, which if it continues will cause respiratory acidosis and respiratory failure (Anggraini et al., 2023; Rahman & Bintari, 2020).

According to Wu et al. (2018) water-based Liuzijue exercise has a beneficial effect on COPD patients' respiratory muscle strength and peripheral skeletal muscle function, as well as the added benefit of increasing lower limb endurance when compared to land-based Liuzijue exercise. The results of the study indicated that the Maximal Inspiratory Pressure (MIP) in the water-base Liuzijue group increased from 4.03 kPa to 5.68 kPa. This statement is commensurate with research by Jiabin et al. (2021) which states that the combination of water-based Liuzijue exercise and conventional western medicine is superior to conventional western medicine alone. In addition, water-based Liuzijue exercise is known to be able to improve lung organ function, improve quality of life, optimize tolerance to activity or exercise for people with COPD.

The article written by de Castro et al. (2020) states that most research participants experienced clinically relevant improvements in pulmonary functional balance after undergoing aquatic exercise training. It is explained in the results of this study that the time up and go test value is known to have an average difference of -1.17, which means that water-based exercise training has a positive effect on the functional balance of COPD patients. In addition, the findings concluded that regardless of the environment, non-specific training does not seem to be able to help improve static balance because it remained unchanged in both rehabilitation groups. This article is supported by another article written by Charususin et al. (2021). Charususin et al. (2021) concluded in their article that water-based exercise programs can be recommended in COPD rehabilitation programs to improve endurance training capacity and inspiratory muscle strength. The explanation of the results of his research is that it is known that the endurance shuttle walk test (ESWT) increased ( $p = 0.001$ ) and the maximum inspiratory pressure (MIP) increased significantly ( $p = 0.026$ ). Other findings were that there were no significant differences in pulmonary function,

peripheral muscle strength, balance ability variables, exercise capacity (6-min walking test (6MWT)) and incremental shuttle walk test (ISWT).

In the article Chen et al. (2021) explain their findings regarding aerobic exercise in water effectively reducing dyspnea complaints and increasing exercise capacity of COPD patients. The analysis in the study explained that periods of water-based exercise performed for more than 8 weeks tended to optimize improvements in lung function and compared to land-based exercise, water-based exercise had an additional positive role in maintaining and improving pulmonary function. All five articles found explained that the exercise or intervention program was implemented over a period of more than eight weeks. Two articles were conducted over a period of 8 weeks, two articles trained participants over a period of 12 weeks, and one article was conducted over a period of more than 6 months. Exercise was generally performed twice a week.

The authors' views on the above articles agree regarding water-based exercise having a positive impact on COPD patients. The advantages of this exercise can be done independently by everyone, can save costs, and more importantly in suppressing further complications both due to the chronic condition of COPD and the effects of long-term medical treatment. This exercise is also good to be done repeatedly and regularly and will provide several very important benefits for people with COPD, including improving lung organ function, increasing respiratory muscle strength, and optimizing tolerance to physical activity so that quality of life can be supported slowly.

## Conclusion

Water-based exercise should be recommended as a long-term non-pharmacological therapy for patients with COPD in the hope that it can help improve the quality of life of patients. For health institutions, it is hoped that this article can be taken into consideration in providing nursing care or discharge planning to COPD patients for long-term therapy. For the community, it is hoped that this article can help provide an overview of water-based exercise or water-based exercise or water exercise in helping to optimize clinical health conditions and the quality of life of patients with COPD or COPD.

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