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## THE EFFECT OF PHYSICAL EXERCISE ON MUSCLE STRENGTH IN CHRONIC RENAL FAILURE PATIENTS DURING HEMODIALYSIS: ARTICLE REVIEW

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### Abstract

**Introduction:** Chronic kidney failure is a condition in which kidney tissue has progressively decreased function so that it is unable to maintain fluid balance in the body and requires therapy, namely hemodialysis. Improving physical work capacity and reducing functional limitations of muscle strength can be done through regular physical exercise in patients with chronic kidney failure after undergoing hemodialysis. Therefore it is necessary to conduct a systematic review study to determine the effect of physical exercise on chronic kidney failure patients. There are 5 articles used in this research. Based on the articles obtained, it can be concluded that physical exercise in patients with chronic kidney failure during the hemodialysis period greatly influences muscle strength.

**Keyword:** Physical Exercise, Muscle Strength, Hemodialysis

### INTRODUCTION

Chronic kidney failure (CKD) is a pathophysiological process with various etiologies, which results in an irreversible and progressive decline in kidney function where the body fails to maintain metabolism and fluid and electrolyte balance, which causes uremia in patients. Chronic kidney disease is a chronic or irreversible condition in which kidney tissue has progressively decreased function so that it cannot maintain fluid balance in the body and requires therapy, namely dialysis (hemodialysis, peritoneal dialysis) and transplantation (Retno, 2014). Kidneys are vital organs in the body responsible for filtering waste and harmful substances from the blood and regulating water and electrolyte balance. When the kidneys are severely damaged and can no longer function, toxins and wastes build up, disrupting the chemical balance essential for maintaining normal body function. As a result, severe symptoms and complications can develop.

The incidence of chronic kidney failure is increasing every year. Patients with chronic kidney disease worldwide have increased since 1996. In 1996 the number of patients with kidney failure worldwide was 1 million people and doubled in 2010 (Firmansyah in Retno, 2014). Renal replacement therapy (RRT) is one of the therapies considered in patients with end-stage chronic kidney failure (CKD). Renal replacement therapy can be through dialysis or a kidney transplant. One

of the actions of dialysis is hemodialysis.

Hemodialysis is a kidney replacement therapy that is widely performed with increasing numbers yearly. Hemodialysis is a method of treatment to replace kidney function that is not functioning correctly or has failed. This procedure aims to cleanse the blood of waste and toxins that are normally eliminated by healthy kidneys. Hemodialysis is a type of dialysis which is a process used to filter blood when the kidneys are not functioning correctly. Hemodialysis can extend life indefinitely. However, this action will not change the natural course of kidney disease. Patients will still experience several problems and complications. One problem that often occurs in patients undergoing hemodialysis is weight gain between two times of dialysis (Laoli et al., 2021).

The results of a previous study conducted in 2014 by Firmansyah stated that implementing physical exercise after undergoing hemodialysis therapy could increase muscle strength in the extremities of chronic kidney failure patients at the general hospital in Semarang. The problem that is often complained of by patients is the occurrence of muscle weakness and stiffness caused by prolonged dressing during the hemodialysis process. In theory, the muscle weakness is due to activity restrictions during hemodialysis.

Muscles that experience weakness can be overcome by doing physical exercise. Physical exercise is a planned, regular, structured, and directed movement to improve and maintain one or more aspects of physical fitness in someone who experiences muscle weakness (Kadir, 2013).

Physical exercise aims to maintain and improve overall body health and improve the circulatory system. Three general physical exercise methods can be carried out in patients with kidney failure: the exercise program for the first 60 minutes during hemodialysis. Physical exercise during the dialysis process can increase blood flow to the muscles

Implementation of physical exercise can reduce the scale of muscle stiffness and weakness after hemodialysis. One type of physical exercise that can be done during hemodialysis is muscle strength training using a tool. Muscle strength, the driving force for every physical activity, is the basis for having other physical abilities, and muscle strength can be measured using a dynamometer. (Murniasih, 2017). Muscles will become stronger and work harder if they are exercised regularly. Research conducted by Delima (2013) reported that strengthening exercise can improve respiratory muscle strength, functional capacity, and quality of life in patients with chronic kidney disease undergoing hemodialysis.

## METHOD

This article review method uses simple data analysis (simplified approach). Article search adjusted to Medical Subject Heading (MeSH). This search is done by looking at the title of the article that has keywords like the following:

Table 1. MeSH

Latihan Fisik	Kekuatan Otot	Terapi Pengganti Ginjal
Or	Or	Or
Physical training	Muscle Weakness	Hemodialysis

Journal searches certainly have inclusion and exclusion from article searches. The inclusion and exclusion of this study are as follows:

Table 2. Criteria for Scientific Articles

Inclusion	Exclusion
Quasi Experimental Design (One or Two Group Pre Test - Post Test) and Time Series Design	Literature Review, correlation research
Research samples of patients with chronic kidney failure in the hemodialysis room	The study sample was patients who did not experience chronic kidney failure in the hemodialysis room
Journal articles published from 2016	Journal articles published before 2016
Articles in Indonesian and English	Articles do not use Indonesian and English

## RESULTS AND DISCUSSION

### Characteristics of Selected Articles

The theme of the discussion obtained from this systematic review is the influence of muscle strength in patients with kidney failure using the hemodialysis therapy method. The following journal search results can be seen in Table 3.

Table 3. Journal Search Results

Researchers and Journals	Research Title	Method	Conclusion
Fitri Rahayu Dwi Wulandari Dilfera Hermiati  The Indonesian Journal Of Health Science (2019)	The Influence Of Physical Exercise On The Muscle Strength Of Chronic Rental Failure Patients In The Hemodialysis Room	Using a Quasi-Experimental Design research design (One Group Pre Test-Post Test Design), using the Non-Random Sampling sampling technique, and taking 30 samples.	There is a difference between kidney failure patients after and before doing physical exercise.

<p>Delfrin Laoli Vitrah Permana Putra Hulu Yamoaro Buulolo Kristina L Silalahi</p> <p>Jurnal Keperawatan (2019)</p>	<p>The Influence Of Physical Exercise During Hemodialysis On Muscle Strength In Chronic Rental Failure Patients At Royal Prima Hospital Medan</p>	<p>Using a Quasi Experiment research design and taking 24 samples for 2 weeks.</p>	<p>After being given exercise for 2 weeks, respondents experienced changes in muscle strength. This therapy is very good for training muscles and very easy for patients to do.</p>
<p>Lisavina Juwita Lilia Febrita Yelmi Reni Putri</p> <p>Human Care Journal (2016)</p>	<p>Effectiveness Of Intra Dialysis Physical Exercise On Creatinine Levels In Hemodialysis Patients</p>	<p>Using the Quasi Experiment method and taking 18 samples.</p>	<p>There are differences in the creatinine levels of patients before and after undergoing HD with physical exercise.</p>
<p>Elvi Murniarsih</p> <p>Ners: Jurnal Awal Bros (2017)</p>	<p>The Effect Of Physical Exercise During Hemodialysis On The Muscle Strength Of Chronic Rental Failure Patients In The Hemodialysis Room Awal Bros Panam Hospital, 2017</p>	<p>This study used a quasi-experimental research design with a time series design and took 45 samples.</p>	<p>There is a significant effect in providing physical exercise on muscle strength in patients.</p>
<p>Ganik Sakitri, Nurul Makiyah, Azizah Khoiriyati</p> <p>PROFESI (Profesional Islam) (2017)</p>	<p>Effect of Intradialytic Exercise on Fatigue in Hemodialysis Patients At RSUP dr. Soeradji Tirtonegoro Klaten</p>	<p>This study uses the true method experiment with pre-post test design with control approach. Study carried out at Dr. Soeradji Tirtonegoro General Hospital, Klaten. Samples are taken with purposive sampling amounted to 32 respondents who met the criteria</p>	<p>The results shows an influence intradialytic exercise on fatigue in the intervention group p value 0.000. The conclusion of this study is that intradialytic exercise reduces fatigue in hemodialysis patient.</p>

### **Benefits of Physical Exercise on Muscle Strength in Kidney Failure Patients During Hemodialysis**

Physical exercise is the right way to overcome or reduce and maintain quality of life and restore independent function in hemodialysis patients with fatigue (Juwita et al., 2019). Physical exercise performed on patients undergoing HD (Hemodialysis) increases circulation in the muscles, facilitates the distribution of nutrients to the cellular level, and increases the transfer of urea and toxins into the vessels by widening the surface area of the capillaries (Rahayu et al., 2019). Thus there will be an increase in muscle mass and the number of muscles that affect increasing muscle strength.

Based on research conducted physical exercise during hemodialysis can increase VO<sub>2</sub> peaks, reduce self-reported depression, and show significant developments in the quality of life index and life satisfaction index (Ouzouni et al., 2009).

Physical exercise during hemodialysis can maintain blood pressure stability. According to a researcher in 2009, physical exercise can improve muscle strength. A study in 2009 stated that physical exercise during hemodialysis can reduce anxiety. In muscle atrophy, there are several researchers in 2006 and 2005 reporting that resistance training significantly increases muscle strength (Frih et al., 2017).

Physical exercises include flexibility exercises to help joints work smoothly and help joints bend, touch and move objects more easily (Wahyuti et al., 2022). Flexibility exercises use smooth muscle stretches and slow movements. They are strengthening exercises to make muscles stronger (Sulistyaningsih, 2011). According to researchers, in 2009, there were several physical exercises for patients with kidney failure during hemodialysis. The first is strengthening exercises using resistance (weights, elastic bands, or the patient's body weight) to make the muscles more challenging and stronger (Picha et al., 2019).

Physical exercise is carried out when the patient is undergoing hemodialysis. Exercise can be done for 30 to 45 minutes. Exercise is performed in 2 sets, eight repetitions for the large muscle groups of the upper and lower extremities to increase muscle strength. According to a researcher in 2004, muscle strength is the power generated from maximal muscle contraction. Muscle strength is the basis for having other physical abilities. Muscle strength can be measured using a dynamometer (Aini, 2020). Dynamometer is a valid and reliable tool for measuring muscle strength. The measurement results are expressed in kg (Huang et al., 2022) .

Hemodialysis nurses have an essential role in the care of clients undergoing hemodialysis. Hemodialysis nurses provide overall nursing care by conducting assessments, enforcing nursing diagnoses, planning actions and implementing them, and conducting evaluations. As health workers who consistently work beside patients, nurses can help do physical exercise, which is a strategy to reduce fatigue and improve muscle strength, which is the basis for having other physical abilities

(Sakitri et al., 2017).

## CONCLUSION

Based on articles from several journals, physical exercise during hemodialysis can improve blood circulation due to bedressing within a few hours, thereby reducing cramps. In addition, physical exercise will relax the muscles so that they will feel more comfortable.

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