

# Intradialytic Exercise To Improve The Dialysis Adequacy And Fatigue In Chronic Kidney Disease Patient

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## ABSTRACT

**Introduction** – Chronic Kidney Disease (CKD) patients require therapy to maintain their quality of life, one of which is to undergo hemodialysis regularly. However, CKD patients who undergo hemodialysis for a long time usually often complain of fatigue and muscle weakness. One of the intervention that can be done to overcome this problem is to do intradialytic exercises.

**Purpose** – To implement intradialytic exercise and to identify the effect of intradialytic exercise on dialysis adequacy and fatigue on patient with chronic kidney disease.

**Methodology/Approach** – This study was a case report of the implementation of intradialytic exercise twice a week to A 58-year-old man with chronic kidney disease and routinely undergoing hemodialysis twice a week with complaints of shortness of breath, fatigue, afternoon aches and swelling in both legs.

**Findings** – The data showed that given intradialytic exercise can improve dialysis adequacy and fatigue level on patient with chronic kidney disease.

**Originality/ Value/ Implication** – Intradialytic exercise can be integrated into routine procedures in hemodialysis unit for 4 to 8 weeks on patient with chronic kidney disease who routinely undergoes hemodialysis at least twice a week.

**Keywords** : *chronic kidney disease, dialysis adequacy, fatigue, intradialytic exercise*,

hemodialysis are the occurrence of muscle weakness and stiffness after hemodialysis due to activity restrictions during hemodialysis, muscle myopathy, muscle atrophy, neuropathy or a combination of the two (Firmansyah, 2014 in Rahayu, *et al.*, 2019). In addition, according to research conducted by Kring and Crane (2009) in Darmawan, *et al.* (2019) there are about 82% - 90% of CKD patients undergoing hemodialysis experience fatigue which can occur due to anemia which causes symptoms such as astiredness, fatigue, lethargy that makes the patient feel less energetic, feel tired in activities and feel less energy to do activities. According to the research of Yeun, *et al.* (2015) in Suparti, *et al.* (2020) said that general conditions such as weakness, thin body, high blood pressure, anemia, itchy skin, darker skin color, decreased appetite and experiencing dialysis are signs of poor dialysis. inadequate.

One way that can be done to increase the adequacy of dialysis and reduce the patient's level of fatigue is to do intradialytic exercise. Intradialytic exercise is an exercise performed during hemodialysis (HD) which aims to increase the patient's strength and endurance (Salhab, *et al.*, 2019). This exercise is also an exercise given to encourage the patient to be physically active. Previous research has shown that intradialytic exercise is effective in reducing the severity of fatigue, improving sleep quality, increasing exercise tolerance, improving quality of life and even psychological status of patients, besides that intradialytic exercise can also increase the efficacy of dialysis, reduce inflammation and improve nutrition in patients (Dobsak, *et al.*, 2012; Mohseni, *et al.*, 2013; Liao, *et al.*, 2016 in Pu J, *et al.*, 2019).

## LITERATURE REVIEW

Chronic renal failure (CKD) is defined as a progressive and irreversible loss of kidney function. Generally, most patients with CKD require replacement treatment including hemodialysis, peritoneal dialysis and kidney transplantation, among these therapies hemodialysis is the most common replacement modality therapy performed by patients suffering from CKD (Um-e-Kalsoom *et al.*, 2020).

The goal of HD therapy is to remove excess material, stabilize the system and eliminate toxins that cause permanent injury and even complications (Barzegar, *et al.*, 2016 in Utomo & Rochmawati, 2018). The standard parameter used to see the adequacy of hemodialysis therapy is through *clearance* (K) times time (t) and divided by the distribution of urea (V) Kt/V (Utomo & Rochmawati, 2018). The Kt/V value must reach the target of at least 1.2 (National Kidney Foundation, 2015). While the negative impact that most often occurs in patients with end-stage renal failure undergoing hemodialysis is fatigue (Maesaroh, *et al.*, 2020).

## INTRODUCTION

Chronic Kidney Failure (CKD) has been recognized as a leading public health problem worldwide. The estimated global prevalence of CKD is 13.4% and patients with end-stage renal disease requiring renal replacement therapy are estimated to be between 4,902 and 7,083 million. Therefore, CKD directly affects the global burden of morbidity and mortality worldwide (Lv JC & Zhang LX, 2019). Based on the Basic Health Research (RISKESDAS) (2018), the prevalence of CKD in Indonesia increased from 2.0% in 2013 to 3.8% in 2018. An increase in CKD cases also occurred in Temanggung Regency, Central Java Province, which was 273 cases in 2017. 2015 and increased to 433 cases in 2019 (Statistics of Temanggung Regency, 2020).

Loss of kidney function in end-stage CKD patients requires renal replacement therapy such as hemodialysis therapy to maintain the patient's quality of life (Rahmawati, *et al.*, 2019). Hemodialysis is a process of kidney replacement therapy using a semipermeable membrane that functions like a nephron so that it can remove metabolic waste products and correct fluid and electrolyte balance disorders in patients with kidney failure. Hemodialysis performed by patients can maintain survival while changing the patient's lifestyle (Agustin, *et al.*, 2022). Problems that are often complained of by patients who routinely undergo

According to research conducted by Darmawan, *et al* (2019), patients undergoing hemodialysis for a long time (> 24 months) can cause a decrease in body function, causing hemodialysis complications which result in reduced physical activity. Limitations in carrying out activities can cause a decrease in muscle strength and result in muscle atrophy in both the upper and lower extremities, so that patients undergoing hemodialysis often experience *fatigue*. (Salhab, *et al*, 2019). This is in line with the results of previous studies which showed that there was a significant relationship between the length of hemodialysis and the occurrence of fatigue in CKD patients (Darmawan, *et al.*, 2019). These results are also supported by other studies which show the results that most patients undergoing hemodialysis experience moderate levels of fatigue (Maesaroh, *et al* , 2020).

Physical exercise is an alternative that can be used to improve physical performance and reduce functional limitations. Physical exercise during the dialysis process can increase blood flow to the muscles and enlarge the number of capillaries, increase the surface area of the capillaries, and increase the transfer of toxins and urea from the tissues to the vascular system and then flow into the dialysis or hemodialysis machine (Rahayu, *et al* ., 2019). One of the physical exercises that can be done in patients undergoing hemodialysis is intradialytic exercise which is a structured and planned physical activity aimed at improving and maintaining physical fitness in patients with kidney failure (Orti, 2010 in Nurmansyah & Arofiati, 2019).

Intradialytic exercise has been shown to have a positive effect on HD patients. This is evidenced by the results of previous studies showing results where *intradialytic exercise* can increase the efficiency of dialysis (Kt/V) patients (Sheng, *et al*, 2014 in Salhab, *et al.*, 2019). Supported by the results of Adam, *et al* ., (2017) which showed that after the intervention there was an increase in the value of Kt/V from 1.2 to 1.4 after being compared with the control group which did not experience any change.

Based on the results of research by Nurmansyah & Arofiati (2019), structured intradialytic exercise is able to overcome *and reduce* fatigue levels in patients undergoing hemodialysis. Supported by the results of previous studies which showed that there were differences in the average values before and after being given intradialytic exercise in the intervention group, it can be concluded that intradialytic exercise is effective for reducing fatigue in hemodialytic patients (Sakitri, *et al*, 2017) . Based on the results of research by Salhab, *et al* (2019), it also shows that intradialytic exercise does not pose a health hazard to patients, so this intradialytic exercise can be used as a routine practice in hemodialysis units whose application needs to be adjusted to the patient's needs.

## METHOD

**Participant** The design of this study used the *case report method* . Researchers provide nursing care to male patients aged 58 years with chronic kidney failure who routinely undergo hemodialysis therapy 2 (two) times a week at Temanggung Hospital.

**Time** This research was conducted in 2 (two) meetings, namely on Wednesday and Saturday, May 11 and 14, 2022.

**Data collection** the data in this study were obtained through questionnaires and observations. The researcher gave the FACIT Fatigue Scale questionnaire to assess the level of patient fatigue. Observations were made to see the adequacy

of dialysis for patients with Kt/V parameters.

**Implementation** the intervention provided is in the form of *Intradialytic exercise* which is done 2 (two) times a week, for  $\pm 15$  minutes in the first 2 hours during the hemodialysis session. The inclusion criteria of patients in this study were: patients with CKD stage 5 who routinely undergo hemodialysis therapy at least 2 (two) times a week and have been >3 months, patients with systolic blood pressure <180 mmHg and diastolic <120 mmHg and are willing and able to perform intradialytic exercise. While the exclusion criteria were patients with comorbidities such as asthma and heart disease, patients who did not complete intradialytic exercise in one session.

Researchers approach and build a trusting relationship with patients prior to intervention. Then the patient was asked to fill out the FACIT Fatigue Scale questionnaire contains 13 questions , namely as follows: "I feel tired" "I feel my body feels weak" "I feel lethargic" "I feel my body is tired" "I find it difficult to start anything because my body is tired" "I find it difficult to finish anything because my body is tired" "I have energy" "I am able to carry out my routine activities" "I need to sleep during the day" "I cannot eat because I am too tired" "I need help to do my routine activities" "I am frustrated because I am too tired to do the things I need to do. I want to do" "I have to limit my social activities because I am tired". FACIT Fatigue Scale uses a Likert scale consisting of: not at all (0), a little (1), moderate (2), a little bit (3), very much (4). After the patient's hemodialysis session ended, the researcher documented the patient's dialysis adequacy score (Kt/V) and evaluated the patient's level of fatigue using the FACIT Fatigue Scale questionnaire to see the effect of intradialytic exercise.

## RESULT AND DISCUSSION

Mr. S, 58 years old, was diagnosed with chronic kidney failure since  $\pm 2$  years and routinely undergoes hemodialysis 2 (two) times a week with each dialysis duration of  $\pm 4.5$  hours. Prior to the intervention, the patient complained of shortness of breath, fatigue , aches and swelling in both legs. After 2 times of intradialytic exercise , the results showed that there was a change in the results of the adequacy of dialysis (Kt/V) and also the level of fatigue felt by the patient. The comparison of Kt/V and fatigue levels before and after intervention in patients is shown in Table 1.

Data	Intervention 1		Intervention 2	
	before	After	before	After
Dialysis Adequacy (Kt/V)	-	1.58	-	1.6
Fatigue	30	34	35	38

(Primary Data Source, 2022)

Table 1. *Adequacy Dialysis and fatigue results before and after intervention*

### Adequacy Dialysis

Adequacy of dialysis (Kt/V) is an important indicator to evaluate the effectiveness of dialysis. Based on Table 1, it was found that there was a change in the results of dialysis adequacy (Kt/V) at the first meeting and the second meeting after intradialytic exercise where at the first meeting the patient's Kt/V value was 1.58 and increased at the second meeting to 1.6, so it can be concluded that intradialytic exercise performed 2 times a week can increase the value of Kt/V. This finding is in line with previous research which showed that there was an increase in Kt/V and URR after exercise twice a week for 4 weeks (Rochmawati, *et al* .,

2021). In addition, there are other studies which suggest that intradialytic exercise is carried out twice a week and the entire process lasts for at least 8 weeks (Pu, 2019). Intradialytic exercise can increase blood flow and widen the capillary surface so that urea clearance is more effective and this causes an increase in the value of the adequacy of dialysis (Sheng, *et al.*, 2014 in Rochmawati, *et al.*, 2021).

### Fatigue

Based on Table 1, it was found that there was an increase in scores before and after intradialytic exercise both at the first and second meetings. FACIT Fatigue Scale score results before intervention was 34 and after intervention was 38. The results indicates that the level of fatigue or Patient fatigue improves due to higher FACIT . score Fatigue Scale means that a person's quality of life is getting better and a value <30 indicates severe fatigue (Sihombing, *et al.*, 2016). This is in line with the research of Painri *et al* (2017) which showed that intradialytic exercise can reduce fatigue in patients undergoing hemodialysis. Intradialytic exercise can show an increase in body fitness, physiological function, reduce fatigue levels and increase the strength of the muscles of the lower extremities (Arismunandar, *et al.*, 2021).

### CONCLUSION AND RECOMMENDATION

The application of Intradialytic exercise 2 times a week is sufficient effective to increase the value of dialysis adequacy (Kt/V) and reduce the level of fatigue in patients undergoing hemodialysis.

Although the results of this study indicate that there is a difference between before and after intradialytic exercise, this research is still not optimal due to time constraints. This intradialytic exercise can be more effective if it is done twice a week for a period of 4 to 8 weeks in chronic kidney failure (CKD) patients who routinely undergo hemodialysis.

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