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Submission date: 05-Sep-2024 09:06AM (UTC+0700)

Submission ID: 2445302378

File name: REVISI_2_KIA_RENANDHA_FINAL_1.docx (48.56K)

Word count: 3668

Character count: 21023

Breathing and Range of Motion Exercises as Fatigue Intervention In Chronic Kidney Failure Patients: a Case Study

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Abstract. Background : One of the most prominent negative impacts in patients with kidney failure undergoing hemodialysis is fatigue. Breathing and range of motion exercises are therapies that can be applied to reduce fatigue in patients with chronic kidney failure. Objective: to provide breathing and range of motion exercise interventions in patients with chronic renal failure. Method: used in this study is a case study. Assessment of Mrs. S conducted for 3 consecutive days. Results: After the intervention for 3 days, the results showed that the level of fatigue and anxiety in Mrs. S decreased. Conclusions and suggestions: The interventions given have an effect on reducing the level of anxiety and fatigue of patients. It is expected that nurses can provide optimal nursing care to patients with chronic kidney failure to improve the quality of life of patients.

Keywords : Chronic kidney failure, breathing exercises, range of motion

1. INTRODUCTION

Chronic renal failure (CRF) occurs when both kidneys are no longer able to maintain an internal environment suitable for survival. Damage to both kidneys is irreversible and progressive loss of kidney function (Hamed & Aziz, 2022). Kidney failure disease is predicted to continue to increase. The prevalence of chronic kidney disease sufferers reaches 30 million people or 15% of the adult population and 96% of the population is unaware that mild kidney function impairment has occurred (Djupri et al., 2019). Based on the Basic Health Research (RISKESDAS, 2018), the prevalence of CKD increased from 2013 by 2.0% to 3.8% in 2018. The province with the lowest prevalence is West Sulawesi at 1.8% and the province with the highest prevalence is West Kalimantan at 6.4%. Meanwhile, the results of RISKESDAS (2019), the prevalence of the provinces of East Nusa Tenggara, South Sulawesi, Lampung, West Java, Central Java, DI Yogyakarta, and East Java were each 0.3%, North Sumatra province was 0.2%.

Chronic kidney disease is a general term that describes kidney damage or decreased glomerular filtration rate (GFR) for 3 months or more (Wayunah et al., 2023). End-stage chronic kidney disease with a glomerular filtration rate <15 ml/min requires dialysis. Hemodialysis is performed by a machine with an artificial semi-permeable membrane used to filter the blood (Rubio-López et al., 2023). Hemodialysis prevents death but does not cure kidney disease and does not compensate for the loss of endocrine or metabolic activity of the

kidneys (Clyne & Anding-Rost, 2021) . Patients undergoing hemodialysis may experience various problems such as bleeding, hypotension, arrhythmias, headaches, tremors, electrolyte disturbances and other symptoms such as nausea and vomiting (Nirmalasari et al., 2020) . One of the problems that often occurs faced by patients fail kidney chronic hemodialysis patients is fatigue . Fatigue is a condition where the *client* feels tired both physically and mentally (Alfikrie et al., 2020) .

In the research Sri et al (2020) around 60 – 97% of patients with disease fail kidney chronic in progress operate hemodialysis experience *fatigue* . In individuals undergoing hemodialysis, *fatigue* is one of the symptoms that is difficult to treat . In Johansen's (2020) study, it was stated that the level of *fatigue* experienced by hemodialysis patients was dominated by the level moderate and severe. The hemodialysis therapy process is long and takes less than more 5 hours causes the patient experience *fatigue* and stress (Sitoresmi et al., 2020) . Then in Sakitri, Makiyah & Khoiriyati (2022) explained that k fatigue or *fatigue* in hemodialysis patients results in *Dialysis Disequilibrium Syndrome* (DDS). If DDS is not detected, coma can occur which can result in death. 50% of hemodialysis patients experience decreased *fatigue* after performing *Intradialytic Exercise* .

P giving intervention For reduce level anxiety and fatigue experienced patient fail kidney chronic in progress operate Hemodialysis is highly recommended . This is supported by research from Sulistyaningsih (2019) stated that physical exercise during hemodialysis can reduce muscle weakness and increase muscle strength. Therapy that can be applied to reduce the level of fatigue in patients with failure kidney chronic is with give therapy breathing exercise . Breathing exercise is a natural healing technique and is part of a holistic self-care strategy to overcome various complaints such as fatigue , pain, sleep disorders, stress and anxiety (Utami et al., 2023) . One part of breathing exercise is pursed lip breathing . This exercise does not take a long time and can be done before, intradialysis and also after the hemodialysis process (Indriani, 2019) . Physiologically, the slow deep breathing relaxation technique will stimulate the parasympathetic nervous system so that it increases endorphin production, decreases heart rate, increases lung expansion so that it can develop optimally and the muscles relax (Anisah & Maliya, 2021) . Pursed lip breathing will maintain high intra-alveolar pressure and allow oxygen to be distributed to the alveolar capillaries so that the body gets adequate oxygen input (Hudiyawati & Prakoso, 2020) . The role of nurses in overcoming *fatigue* is to conduct an initial assessment and understand the level of *fatigue* in each patient to prepare the right intervention for the patient, so that *fatigue complaints can be reduced* in patients undergoing hemodialysis (Natashia et al., 2020) .

Interventions that can be carried out on patients undergoing hemodialysis with complaints of *fatigue* include providing relaxation exercises such as *pursed lip breathing* because this intervention is a technique that is easy to do, easy to learn, not harmful to patients and does not require large costs (Nurjanah, 2020) .

Seeing this problem, the author is interested in conducting a case study "Breathing Exercises and Range of Motion as Interventions for Chronic Kidney Failure Patients with *Fatigue* : Case Study" conducted at UNS Hospital, Sukoharjo City. This case study aims to obtain an overview and results of the implementation of breathing exercises and range of motion in chronic kidney failure patients.

2. METHOD

The type of design and approach used is a case study, using a nursing process approach . This study was conducted on November 2, 2023, on Mrs. S with a medical diagnosis of *CKD (Chronic Kidney Disease)* On Hemodialysis at UNS Hospital, Sukoharjo City. This study obtained patient data using interview methods, observation, documentation studies and literature studies. The research used in the interview was self-research with assessment guideline tools while other instruments used physical examination sheets, hemodialysis monitoring sheets , tensiometers, and nursing care documentation. Clients in the study were all patients undergoing hemodialysis therapy. However, those who met the inclusion criteria consisted of one patient. The inclusion criteria were having a regular hemodialysis schedule, namely 2 times / week, not having a disease in the nervous system, not experiencing complications of dialysis hypotension, no femoral access installed, willing to be a respondent and complete the treatment until completion. Exclusion Criteria: having uncontrolled hypotension, not suffering from Congestive Heart Failure (CHF), irregular hemodialysis schedule, having a risk of fracture.

Standard Operating Procedure (SOP) of Therapy given to chronic kidney failure patients who will undergo hemodialysis by researchers in the form of deep breathing exercises, conscious relaxation to regulate breathing deeply and slowly. This study is considered to be able to reduce the level of fatigue, namely from moderate to mild fatigue, which is given for 3 consecutive days before hemodialysis in one respondent. Deep breathing relaxation is carried out for 15 minutes on the patient, then the patient is evaluated.

3. RESULTS

Mrs. S is 56 years old, female, address in Boyolali, with a medical diagnosis of CKD on HD with pulmonary edema, anemia, hyperglycemia. The patient said that if she was sick, her family would take her to the nearest health service, the patient underwent an examination at the nearest doctor's clinic before being taken to Banyu Bening Hospital with the care of an internist, the patient underwent HD 1x last August. Then from Banyu Bening Hospital she was referred to UNS Hospital to continue treatment and HD on October 31, 2023. The patient said she had a history of hypertension since October 2023.

Subjective Data Results: The patient said that he had previously had a check-up at the internal medicine clinic at Banyu Bening Hospital (October 26, 2023) and had undergone HD 1x in August. The patient said that he had no allergies to drugs, food and drinks, the patient said that shortness of breath/dyspnea after doing activities (eg sitting, eating) decreased, the patient said that he was dizzy, the patient said that shortness of breath decreased, nausea, vomiting, the patient said that both feet and both hands were swollen, the patient said that he urinated 3-4x a day with DC, the patient said that he drank 1 small glass of water a day, the patient said that during his illness his weight increased by 4 kg, the patient said that he had just undergone the second hemodialysis.

Objective Data Results: PCO₂: 34.0 (low), pH: 7.300 (low), tachycardia as evidenced by vital signs: BP: 155/86 mmHg, N: 107x minutes, S: 36.5 C, RR: 20x/minute, SpO₂: 98%, the patient appears restless, cold sweat/diaphoresis appears, abnormal breathing pattern tends to be fast and shallow, both feet and both hands appear swollen and tight, the mucosa of the lips looks pale, JVP R +4 cm, fine wet pulmonic rhonchi (fine rales), HB: 8.6 (low), HT: 26 (low), pulse is felt to be slow/weak, pulse rate and body temperature increase as evidenced by vital signs measurements: BP (16.30): 155/86 mmHg, N: 107x minutes, S: 36.5 C, RR: 20x/minute, SpO₂: 98%. BP (20.00) : 183/91 mmHg, N : 134x min, S : 36.9oC, RR : 20x/min, SpO₂ : 98%. BW before illness : 56 kg, BW after illness : 60 kg, fluid balance per shift : (-) 340.5, urine output 300 ml. Hemoglobin : 8.6 g/dl, Hematocrit : 26, Urea 102 mg/dl, Creatinine 10.24 mg/dl, Sodium 139.35. Thorax X-ray showed Cardiomegaly (LV), accompanied by aortic arch classification. Pulmonary edema picture. No right and left hilar lymphadenopathy was seen.

Nursing diagnoses that appear in this case include: Fatigue related to long-term treatment programs, ¹³ Impaired gas exchange related to changes in the alveolar-capillary membrane characterized by dyspnea, diaphoresis, decreased PCO₂, tachycardia,

Hypervolemia related to excess fluid intake characterized by dyspnea, weight gain in a short time, and Fluid imbalance related to kidney and gland disease as evidenced by

Nursing Implementation carried out on Tuesday, September 30, 2023, the care collaborated on providing hemodialysis therapy, providing fluid intake as needed, monitoring breathing patterns and oxygen saturation, monitoring frequency, rhythm, depth and respiratory effort, closely monitoring infusion rates, raising the head of the bed 30-40 degrees, recording fluid intake-output and calculating fluid balance, documenting and informing monitoring results, recording intake-output and calculating fluid balance per shift, teaching fluid restriction, conducting laboratory tests . Patients were also given deep breathing relaxation techniques for 15 minutes, then all patients were evaluated. The average level of fatigue score before (50.18) and after the breathing relaxation technique was performed was (46.45) with a p value = 0.043 (<0.05). Patients were also given intradialysis ROM exercises in patients undergoing hemodialysis therapy can affect the level of fatigue. The first exercise had a fatigue value of pre 22 and post 29. The second exercise had a fatigue value of pre 24 and post 24. On the third day the fatigue value was pre 29 and post 31.

Next on Wednesday, October 1, 2023, monitor TTV and hemodynamic status, monitor pulse rate and strength, monitor respiratory rate, monitor blood pressure, check for signs and symptoms of hypervolemia, identify the cause of hypervolemia, collaborate on hemodialysis therapy, provide intravenous fluid intake, facilitate rest and sleep. On Thursday, October 2, 2023, monitor TTV and hemodynamic status, monitor skin elasticity or turgor, monitor heart rate infusion in a way strictly, monitor hydration status. Therapy given to patients during the treatment process in the inpatient room furosemide 10mg/hour, RL/12 hours, kidmin 1plabot/24 hours, amlodipine 1x10mg, ceftriaxone 2grams/24 hours, clopidogrel 1x1, ISDN 3x1, folic acid 3x1, and VIP albumin 3x1. Hemodialysis therapy on October 31, 2023 and November 2, 2023. Researchers performed deep breathing relaxation technique therapy and sat upright then bent forward and the patient was in a condition where 3 liters of oxygen were attached with a nasal cannula to reduce shortness of breath for 3x24 hours.

Nursing Evaluation consists of subjective data: the patient said that shortness of breath has decreased, dizziness has decreased, and nervousness because tomorrow will be HD again, the patient said that shortness of breath and nausea have decreased, the patient said that shortness of breath, weakness, pain in the stomach and swollen hands and feet have decreased and objective data: still visible cold sweat, restlessness, good general awareness, compos

mentis, BC per shift -665, urine output: 450 ml, BP: 168/92 mmHg, N: 83x / minute, RR: 20 x / minute, S: 36.8 °C, SpO₂: 99%.

4. DISCUSSION

Fatigue that occurs due to undergoing hemodialysis in PGK patients is a normal thing, they live with fear and the threat of death. This is a physical stressor that plays a role in various dimensions of the patient's life which include biological, psychological, social, spiritual (biopsychosocial) (Anisah & Maliya, 2021) . Until it causes symptoms that are usually in patients undergoing hemodialysis, namely muscle weakness, lack of energy and feeling tired (fatigue) (Agustin et al., 2020) . Fatigue and depression are symptoms that often occur in hemodialysis patients and can play a role in poor quality of life (Hudiyawati et al., 2019) .

Breathing and range of motion exercises as nursing interventions for patients with chronic kidney failure, Deep breathing exercises have many benefits, namely easy to do independently, cost-free and practical (Ganik Sakitri, Nurul Makiyah, 2018) . Other benefits that can be obtained from deep breathing exercises are increasing maximum alveolar inflation and muscle relaxation; relieving anxiety, eliminating ineffective and uncoordinated respiratory muscle activity patterns; slowing the respiratory rate; and reducing the work of breathing (Hamed & Aziz, 2022) . Slow, relaxed, and rhythmic breathing also helps control anxiety that occurs (Rahmawati et al., 2019) . Breathing exercises such as *pursed lip breathing* provide the body with adequate oxygen input, where oxygen plays an important role in the body's respiratory and circulatory systems (Pattikawa et al., 2020) . When doing breathing exercises, oxygen flows into the blood vessels and all body tissues, removing toxins and unused metabolic waste, increasing metabolism and producing energy which will then maximize the amount of oxygen that enters and is supplied to all tissues so that the body can produce energy and reduce fatigue levels (Muliani et al., 2021) . So there is a significant effect of breathing exercises to reduce fatigue in patients with kidney disorders with hemodialysis (Wisudayanti et al., 2023) . According to Jafar (2019), breathing exercises are carried out during hemodialysis or after the hemodialysis process. Meanwhile, according to Fajrianti (2019), breathing exercises can be done before, during, after the hemodialysis process and while the patient is at home.

Regular range of motion exercises in intradialysis can increase blood flow to the muscles, enlarge the number of capillaries and enlarge the area and surface of the capillaries so as to increase the transfer of urea and toxins from the tissue to the vasculature which is

then channeled to the dialyzer or HD machine (Sulistini et al., 2021) . Physical exercise can also show improvements in physical fitness, physiological function, agility, reduce fatigue levels, agility and increase lower limb muscle strength (Herabare et al., 2023) . The exercises performed stimulate the growth of small blood vessels (capillaries) in the muscles. This will help the body to more efficiently deliver oxygen to the muscles, can improve overall circulation and lower blood pressure and remove metabolic waste products such as lactic acid from the muscles. The type of physical exercise performed is *Range of Motion* (ROM) (Gregg et al., 2019) . Exercises performed to stimulate the growth of small blood vessels (capillaries) in the muscles. This helps the body to more efficiently deliver oxygen to the muscles, can improve overall circulation and lower blood pressure and remove irritating metabolic waste products such as lactic acid from the muscles. Adequate exercise increases the efficiency of blood flow, so the body excretes metabolic waste more effectively (Metekohy, 2021) .

5. CONCLUSION

Intradialysis ROM exercises and deep breathing relaxation exercises can reduce fatigue in heart failure patients undergoing hemodialysis.

SUGGESTION

The researcher hopes that this case study can be a reference for nursing students in providing nursing interventions with a comparison of non-pharmacological therapy, so that it can support the improvement of patient conditions in addition to collaboration with the use of drugs.

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