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Application of Swedish Massage Therapy for Lower Extremities to Alleviate Muscle Cramps in Chronic Kidney Disease Patients

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Abstract

Swedish Massage is a non-pharmacological therapy recommended to reduce muscle cramps for patients with chronic kidney disease during hemodialysis treatment.

Aims: To provide a nursing care with Swedish Massage of lower extremities therapy in order to reduce muscle cramps in patients with chronic kidney disease.

Methodology: This descriptive study aimed to characterise the use of Swedish massage for alleviating muscle cramps among hemodialysis patients.

Results: Mr. A's pain scale score after given Swedish massage decreased from 6 to 1 and Mr. S's score decreased from 4 to 0.

Scientific Novelty: It is significant for advancing theoretical understanding.

Conclusion: Swedish Massage therapy has been shown to alleviate muscle cramps.

Keywords: Intradialytic pain management, non-pharmacological interventions, Renal care, Hemodialysis complications, Manual therapy techniques.

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Introduction

Chronic kidney disease is characterised by persistent kidney damage over an extended period, resulting in a decline in glomerular filtration rate (GFR), which reflects the kidneys' ability to filter blood. Patients with chronic

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kidney disease often remain asymptomatic until their kidney function declines to less than 15%. Symptoms of kidney disease include reduced urine output, edema (swelling) in the feet and ankles, fatigue, nausea, vomiting, and dyspnea (shortness of breath) [1].

According to the United States Renal Data System (2020), The United States continues to have one of the highest rates of End Stage Renal Disease (ESRD) globally, with 2,242 cases per million population in 2018. In 2018, there was a 3.6% annual increase in the rate of kidney transplantation among patients on dialysis, marking a trend that started in 2014 following a period of steady decline. By the end of 2018, there were 554,038 patients on dialysis and 229,887 patients who had successful kidney transplants in the United States.[2].

According to data from the Indonesian Renal Registry, the incidence of chronic kidney disease in Indonesia is reported to be 0.38% of the total population of 252,124,458 people, indicating approximately 713,783 individuals affected by this condition. The provinces with the highest number of people suffering from chronic kidney disease include West Java, East Java and North Sumatra. According to the IRR report (2018), as many as 162,701 patients underwent kidney replacement therapy throughout Indonesia that year. Of this number, there are 129,764 active patients who are still undergoing kidney replacement therapy, while the rest are non-active patients. One of the main therapies for kidney replacement in people with chronic kidney failure is hemodialysis [3].

Hemodialysis is a medical procedure used to replace impaired kidney function. This intervention necessitates the utilisation of a unique apparatus that aids in purifying the blood by removing waste substances and surplus fluid that the malfunctioning kidneys are unable to effectively eliminate [4]. During the process of hemodialysis, patients may experience various acute complications. These complications include hypotension, hypertension, nausea and vomiting, muscle cramps, back pain, headache, chest pain, disequilibrium syndrome, itching, fever and chills, hemolysis, hemorrhage, air embolism, hypoglycemia, dysrhythmias, and cardiac arrest [5].

Muscle cramps, specifically, are painful contractions that can occur in one or multiple muscles. It is important to note that these cramps typically affect patients without myopathy or neuropathy. While they commonly occur in the calf muscles, they can also affect other skeletal muscles. The muscle cramps during hemodialysis can be problematic as they may lead to premature termination of the session, reducing the effectiveness of blood cleansing [6]. However, it is worth mentioning that only around 7% of patients experience muscle cramps after undergoing more than two hemodialysis sessions per week, based on available data [7].

Muscle cramps that occur during hemodialysis are often attributed to oxidative stress resulting from changes in osmolarity during the process, particularly within the initial 1-2 hours. The transfer of fluids between the body and the dialysate tube can lead to oxidative stress, causing a depletion of energy in the muscles, particularly Adenocyte Triphosphate. Therefore, nurses play a crucial role in preventing muscle spasms in hemodialysis patients by mitigating oxidative stress during the procedure [8].

Lower extremities cramping in hemodialysis patients is believed to be linked to metabolic alkalosis, which is considered a significant factor in the development of lower extremities cramps during the latter part of hemodialysis sessions. However, there are conflicting reports regarding the exact role of metabolic alkalosis in this condition [9]. Additionally, studies have indicated that it can increase neuromuscular excitability, decrease the cerebral blood flow, leading to symptoms such as paresthesia, spasms, and convulsions [10].

Patients with chronic kidney disease who experience muscle cramps during hemodialysis have the option of undergoing pharmacological or non-pharmacological therapy. One of the recommended non-pharmacological therapies is the Swedish Massage, a technique originating from Sweden. This gentle massage aims to relax muscles, alleviate pain, and improving the blood flow. The technique involves various movements such as rubbing, massaging, pressing, and squeezing the muscles to relieve cramps, enhance blood circulation, and promote relaxation. Previous studies have demonstrated the effectiveness of Swedish Massage in relieving cramps by increasing blood circulation and reducing muscle tension [11].

Swedish massage has been shown to lower both systolic and diastolic blood pressure levels. Researchers suggest incorporating massage as an additional treatment for individuals with hypertension [12]. However, there is a lack of information on the potential risks or side effects of Swedish massage for those with high blood pressure. Previous research indicates that Swedish massage can effectively reduce the blood pressure in both elderly and younger patients aged 20-54, with reductions ranging from 5-20 mmHg [13]. Additionally, a proof-of-concept study has highlighted the effectiveness of Swedish Massage Therapy (SMT) as a standalone treatment for Generalised Anxiety Disorder (GAD) [14].

Research Problem

Patients experiencing lower extremities cramps following hemodialysis therapy for chronic kidney failure require appropriate treatment to alleviate discomfort and enhance their well-being.

Research Focus

The focus of this research was to administer Swedish massage to patients experiencing lower extremities cramps following hemodialysis therapy.

Research Aim and Research Questions

This research aimed to provide nursing care with Swedish Massage of lower extremities therapy to reduce muscle cramps in patients with chronic kidney disease. Therefore, the research question is: How does nursing care apply Swedish massage therapy to reduce intradialysis muscle cramps in patients with chronic kidney disease?

Research Methodology

General Background

The descriptive quantitative study was conducted from June 20, 2023, to June 27, 2023, at Royal Prima Hospital in Medan, North Sumatra. The study involved patients who experienced lower extremities cramps after hemodialysis therapy and voluntarily participated, as indicated by their informed consent.

Sample / Participants / Group

The sampling method in this study used non-probability sampling with a purposive sampling technique, where subjects were selected based on special characteristics relevant to the research objectives, namely patients who often experienced muscle cramps during the intradialysis process. The research subjects consisted of two patients who were undergoing hemodialysis therapy at Royal Prima Hospital Medan and experienced muscle cramps during the dialysis process.

The eligibility requirements for participation in this research consisted of individuals receiving regular hemodialysis treatment 2-3 times weekly at Royal Prima Hospital Medan. Participants must exhibit intact cognitive function and proficient communication skills. Additionally, they must have either a Double Lumen Catheter or AV shunt inserted in their hand. Presence of muscle cramps is also a prerequisite for inclusion in the study. The exclusion criteria for this study include patients who are unconscious, patients who experience complications during hemodialysis such as hypotension and dizziness, patients with fractures, and patients with femoral access installed.

Instrument and Procedures

The instruments used in this case study included: the assessment sheet, observation sheet, Cramp Questionnaire chart and visual analogue scale questionnaire sheet. Standard operating procedures were used to describe Swedish Massage therapy procedures. The procedures was the application of Swedish Massage in order to reduce muscle cramps in chronic kidney disease in patients undergoing hemodialysis therapy. The intervention approach is based on evidence-based practice by referring to the results of previous research showing the effectiveness of Swedish Massage in reducing muscle cramps. Swedish Massage therapy uses movements consisting of rubbing, massaging, pressing and squeezing by the patient when undergoing the hemodialysis process and is applied for 15-20 minutes. Intradialytic stretching exercises were performed and the level of muscle cramps was measured using the Cramp Questionnaire chart and visual analogue scale.

Data Analysis

Firstly, data collection involved interviews where information was gathered on the patient's identity, chief complaint, current illness history, past medical history, family health history, and the patient's knowledge of managing cramps during hemodialysis. Secondly, observational techniques included monitoring muscle cramp measurements using a cramp questionnaire chart and visual analogue scale. Researchers directly observed the patient's clinical condition and their response to interventions. Data collection also involved reviewing and analyzing documents such as records in the hemodialysis room at Royal Prima Hospital Medan, as well as examining respondents' laboratory and diagnostic test results.

The presentation of information was carried out using a descriptive method where the research information was narratively described based on information obtained through the assessment to evaluation stages. This information can be subjective or objective information collected to be used and formulated as a nursing diagnosis. Once the diagnosis is established, nursing planning is carried out to deal with the problems that arise. Then, actions are taken in accordance with evidence-based practices and evaluation is carried out.

Research Results

Before receiving Swedish massage therapy, participants underwent an assessment using the Cramp Questionnaire chart and visual analogue scale developed by Basemath S. Smorris to measure the severity of cramps. Swedish massage therapy was administered during hemodialysis, with each session lasting 15-20 minutes and conducted over 3 sessions. Following the intradialytic stretching exercise, a post-test was conducted to evaluate cramp severity using the same tools as the pre-test: the Cramp Questionnaire chart and visual analogue scale.

Evaluation of the action of Swedish massage exercise therapy is:

Subjective (S) : The patient says he feels comfortable that leg cramps have reduced or improved

Objective (O) : the client looks comfortable, is not restless, has good body posture, and the results of the muscle cramp score is good.

Analysis (A) : Conclusions from subjective data and objective data.

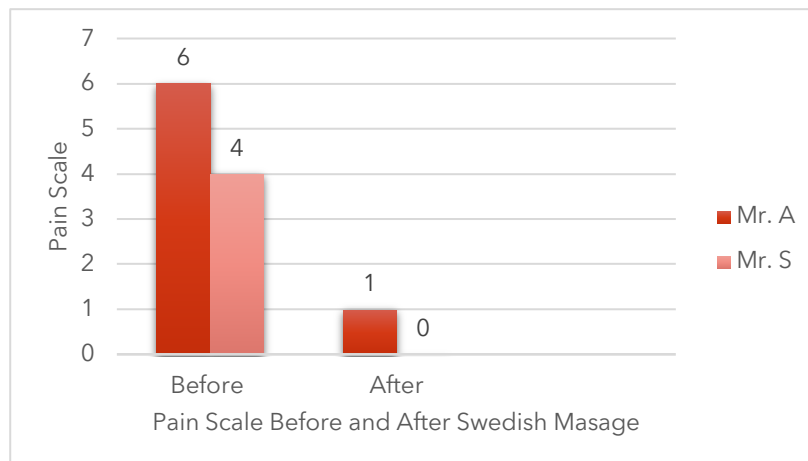
Plan (P) : Planning for the development of future intervention plans

Table 1. The quality of leg cramps

Table 1. The Quality of Leg Cramps Before and After Swedish massage

Swedish Massage	Mr. A	Mr. S
Pain Scale (Before)	6	4
Pain Scale (After)	1	0

After completing the intraday stretching routine, a post-test was carried out to assess the intensity of cramps. The same assessment tools, namely the Cramp Questionnaire chart and visual analogue scale, were utilised in the post-test as in the pre-test. Based on the pain scale provided in the table, the initial pain level of Mr. A was recorded as 6 before administering the Swedish massage. However, after receiving the massage, his pain level decreased to 1. Similarly, in the case of another patient, the pain scale of Mr. S dropped from 4 to 0 following the Swedish massage therapy.



Figures 1. The Quality of Leg Cramps Before and After Swedish Massage

The chart presented above provides a similar analysis to the table comparing the pain scale results of two hemodialysis patients before and after therapy. The data indicates a reduction in pain scale levels following Swedish massage treatment.

Discussion

Analysis of Emerging Nursing Problems

Two respondents frequently complained of muscle cramps lasting for an hour at the end of their dialysis sessions. The pain scored from the cramp questionnaire and visual analog scale indicated that the cramps were the cause of discomfort. Before receiving the Swedish Massage intervention, Mr. S had a pain score of 6 with

cramp intensity slightly affecting his activities, while Mr. S had a pain score of 4 with cramp intensity also slightly affecting his activities. The respondents mentioned that they often experienced cramps an hour before the conclusion of hemodialysis, leading to discomfort and pain. As a result, the author has identified nursing diagnoses including disturbance of comfort related to hemodialysis side effects (D0074) and acute pain related to physical injury agents (D.0077) stemming from these concerns.

Patients receiving hemodialysis frequently encounter muscle cramps that may lead to the premature cessation of dialysis sessions, consequently diminishing the efficiency of blood filtration [5]. Muscle cramps that arise during hemodialysis are caused by oxidative stress triggered by changes in osmolarity within the body. This stress is especially noticeable within the first 1-2 hours of the dialysis session. Variations in fluid levels between the body and the dialysate tube contribute to oxidative stress, resulting in a reduction of energy in the muscles, particularly in the form of Triphosphate Adenocytes [7]. An additional research study suggested that plantar reflexology may help alleviate fatigue, pain, and muscle cramps in individuals undergoing hemodialysis [15]. Reflexology helps alleviate cramping symptoms experienced by hemodialysis patients during the interval between two dialysis sessions [16].

Analysis of Nursing Actions in Nursing Diagnoses

SIKI-based references were employed, encompassing observation, therapy, education, and collaboration phases, to develop nursing interventions. Based on Evidence-Based Nursing Practice (EBNP), the nursing intervention involves administering a 15-20 minute Swedish massage. Implementation of this intervention involves patient and family participation. While Swedish massage therapy can typically encompass the entire body, some movements may not be feasible for the patients in this specific case study. Patients with chronic kidney failure often experience muscle cramps in their legs, therefore, the focus of the Swedish massage therapy in this study was primarily on the affected leg muscles. It is acknowledged in this study that the main mechanism of treatment in reflexology is its impact on the nervous system. By applying pressure to specific areas of the skin, nerve reflexes are stimulated, transmitting impulses to the brain. Additionally, this stimulation also affects the nervous chemical system, balances enzymes, and regulates endocrine function [17].

Nursing Evaluation Analysis

The nursing assessment was conducted following a Swedish Massage intervention lasting 15-20 minutes, one hour before the conclusion of the hemodialysis session. According to the conducted studies, it was observed that two participants experienced a decrease in muscle cramp pain as assessed by a visual analogue scale. Participant A saw a reduction from a score of 6 to 1, while Mr. S's score decreased from 4 to 0. The participants reported feeling a noticeable difference after receiving Swedish Massage therapy and expressed that they found relief from muscle cramps during hemodialysis through this intervention. A case study demonstrated that different massage techniques, such as sports massage and traditional Swedish massage, effectively alleviated muscle cramp symptoms, proving more effective than prescribed medications [18]. Furthermore, apart from alleviating muscle cramps, massage therapy has the potential to alleviate stress and anxiety, enhance the immune system, alleviate fatigue resulting from illness, enhance blood circulation, and mitigate insomnia [19]. Studies have shown that massage therapy can improve sleep quality in individuals with hypertension, cancer, ischemic heart disease, and those who have undergone coronary artery bypass graft surgery [20]. Based on the analysis carried out by nurses on patients undergoing hemodialysis, pain reduction results were seen in both patients.

Swedish massage therapy has been found to have multiple applications in healthcare. While it is commonly used to reduce leg cramps in patients undergoing hemodialysis, previous studies have also shown its effectiveness in pain reduction for cancer patients undergoing chemotherapy [21]. The main goal of Swedish massage is to promote relaxation and comfort in the patient. The tactile stimulation provided during the massage helps to decrease the production of cortisol, which is caused by increased corticotropin secretion from the HPA. As the body relaxes, the brain releases serotonin, which leads to physiological changes such as the dilation of capillaries and arterioles, resulting in improved microcirculation in the blood vessels [22]. This improved blood flow helps to relax stiff muscles [22].

The healthcare professionals can utilise non-pharmacological methods like Swedish massage to effectively reduce muscle-related symptoms. Not only are these methods beneficial, but they are also practical, well-tolerated, and easily integrated into treatment and care [23]. Additionally, studies have shown that the massage can block the transmission of pain signals to the brain through nerve pathways [24]. Swedish massage specifically can reduce pain by alleviating muscle cramps, increasing joint flexibility, and preventing joint dryness [25].

Limitations of the study

The limitations of this study include a small sample size, which prevents comparison with untreated samples. Moreover, there remains a scarcity of research on Swedish massage therapy, particularly for patients experiencing leg cramps during hemodialysis.

Conclusions and Implications

The study's findings were established after implementing Swedish Massage intervention for 15-20 minutes one hour before the conclusion of the hemodialysis session. Following the case studies, it was observed that two participants experienced a decrease in muscle cramp pain, assessed using a visual analogue scale. Mr. A's score decreased from 6 to 1, while Mr. S's score decreased from 4 to 0. The respondents acknowledged a positive change after undergoing Swedish Massage therapy and felt that it effectively alleviated muscle cramps during hemodialysis.

This alternative therapy can be considered by patients who desire to alleviate leg cramps during hemodialysis, thereby ensuring a seamless hemodialysis procedure. This treatment option is appropriate for patients who favor non-pharmacological approaches to pain relief, considering that medication use may affect the efficacy of hemodialysis.

Declarations

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Institutional Review Board Statement

This research obtained the ethical clearance from the Ethics Committee of the Nursing and Midwifery Faculty of Universitas Prima Indonesia on date 15 June 2023 with license number 929/UN.16.2/Kep-FKK/2023.

Informed Consent Statement

Informed consent was obtained from all individual participants included in this research and an informed consent was signed consciously.

Conflicts of Interest

There is no conflict interest statement in this research.

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