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Foot Massage Influences Circulation Fluctuations in the Event of Chronic Failure Edema of the Foot

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Abstract: Chronic Kidney Disease (CKD) is an irreversible kidney condition. One of the clinical symptoms of CKD is leg edema, which, if left untreated, causes discomfort, immobility, risk of falling, and skin problems. Foot edema in CKD patients can be alleviated using both pharmaceutical and non-pharmacological treatments, one of which is foot massage. The study aimed to investigate the effect of foot massage on the circumference of leg edema in CKD patients. It used quantitative methodologies with a quasi-experimental design for one group pretest-posttest. The sampling method employed was purposive sampling. A sample of 18 persons was taken from the Hemodialysis unit of RSUD Dr. M. Yunus Bengkulu. The data collection strategy consisted of documenting the results of measuring the circumference of leg edema using Medline before and after the intervention, which was carried out for 20 minutes on both legs over three days. Data will be evaluated univariately and bivariately with the Paired Test to determine the effect of foot massage on leg edema. The study found that 72.2% of respondents were female, and the average circumference of left leg edema before and after intervention was 21.66 cm and 21.02 cm, respectively. The average circumference of right leg edema before and after intervention was 21.74 and 21.07 cm. The study found that foot massage significantly influenced the circumference of leg edema before and after the intervention, with a P value of 0.000 (P<0.005) for both legs. The study's findings can be used by nurses to guide nursing interventions/actions, particularly for CKD patients with posthemodialysis edema.
Keywords: Cronic kidney disease; edema; foot massage.

INTRODUCTION

Chronic Kidney Disease (CKD) is an irreversible kidney disease that causes patients to experience a variety of issues and consequences, as well as changes in the shape and function of the body's systems[1]. According to Black and Hawk (2014), clinical indicators include electrolyte imbalance, gastrointestinal problems, a weakened immune system, cardiovascular system, respiratory system, and other vital biological functions[2].

The most visible and common clinical symptom in patients with terminal kidney failure is visible edema in the veins, limbs, and abdominal walls due to fluid accumulation caused by the kidney's inability to regulate body fluids by removing the remaining metabolism through urine formation[3]. Oedema is thought to be induced by fluid attraction via gravitational force[3]. The interstitial tissue can absorb several liters of fluid, accounting for up to 10% of the weight gain before pitting edema develops[4].

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Abandoned and unmanaged foot edema can cause discomfort, changes in posture, impaired mobility, higher risk of falling, disturbed feelings in the legs, and skin fainting[5]. Oedema in the legs of patients with chronic kidney failure can be reduced with pharmacological and non-pharmacological therapy. One way to provide pharmacological therapy is to administer diuretics[1]. One way to perform non-pharmacological therapy is to imitate the foot.

Research on the effects of the massage was conducted by Kasron (2018) and was carried out on CHF patients who suffered from leg edema. The results effectively and effectively reduced the circumference of edema in the patient's leg. Similar trials conducted (Çoban & Şirin, 2010) in pregnant women who suffered from physiological edema in the pregnant woman proved foot massage can decrease physiological edema in pesticide mothers[6]. The therapeutic effect of foot lumping accelerates venous blood flow and lymphatic drainage mechanisms and stimulates fluid release through the lymph canal to the more proximal portions.

The massage movements trigger a receptor stimulus, and the afferent nerve delivers the impulses to the central nervous system and provides feedback by releasing acetylcholine and histamine through the efferent nervous impulses to stimulate the body to act through the vasodilatation reflex mechanism of the blood vessels, i.e., reducing sympathetic nerve activity and increasing vasodilation of arterioles and veins, which causes peripheral vascular resistance to decrease, thereby decreasing the amount of fluid retained inside the intrastate[7]. Nurses can help treat patients with foot edema and prevent the unwanted consequences of chronic leg edema experienced by CKD patients[6].

According to the findings of interviews with patients/families of patients undergoing hemodialysis during the preliminary study in the hemodialytic room of Dr. M. Yunus Bengkulu Hospital, almost all patients who underwent hemodialysis experienced leg edema within 1-2 days of the completion of the hemodialysis until the subsequent hemodialysis. Most patients claim they just wait until the next hemodialysis appointment to deal with their problem. During the preliminary investigation, the researchers discovered that some patients continued to have leg edema after the hemodialysis session was completed, even though the edema was meant to disappear/reduce after the hemodialysis.

The effect of massage on edema cases has been proven, such as Kasron's research (2018) on the use of massage to reduce edema in the case of CHF leg edema patients and Çoban & Şirin's research, 2010, the use of massage for physiological edema in pregnant women exposed to pesticides is effective, but there is still limited research on foot massage performed on CKD patients who experience edema. So, this study aims to determine the effect of foot massage on the circumference of the edema legs in CKD patients.

MATERIALS AND METHODS

Type of research with quantitative methods with quasi-experimental design through one group pretest-posttest design approach. The study was conducted by measuring the edema circumference of the leg before and after the intervention. Massage was performed for 20 minutes over three consecutive days using the effleurage technique. Leg circumference measurements were taken from respondents at the ankle,

dorsum of the leg, and leg junction. At the same time, they were seated using a Medline (a measuring tape with controlled stretch properties). The ankle circumference was measured medially and laterally above the malleoli, where the diameter is the smallest. The dorsum circumference of the leg was measured above the cuboid bone distal to the heel, and the third circumference was measured at the distal end of the leg at the metatarsophalangeal joints (Figure 1).

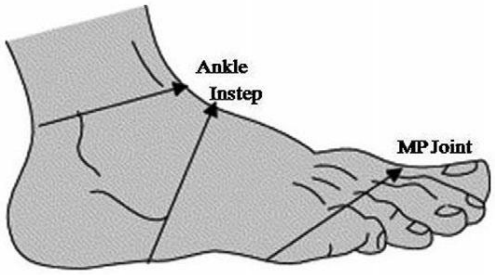

Figure 1. Lower leg circumference measurement. Malleoli, Cubiod, MP joint[6]

The population in this research was patients with chronic kidney failure in the Hemodialisa room of RSUD M. Yunus Bengkulu who suffered from foot edema post-hemodialysis. Purposive sampling methods are used to choose respondents who meet the following inclusion criteria: mental composite awareness, leg edema following hemodialysis, cooperativeness, and willingness to participate. There were 18 responders in this survey. The gathered data was analyzed using univariate analysis to examine the characteristics of the response and bivariate analysis using a Paired Test to determine the significance of the influence of foot massage on foot edema patients with chronic kidney disease. The research was conducted between August and October 2023 in the Hemodialisa room of M. Yunus Hospital in Bengkulu.
Declared to be ethically appropriate by 7 (seven) WHO 2011 Standards, 1) Social Values, 2) Scientific Values, 3) Equitable Assessment and Benefits, 4) Risks, 5) Persuasion/Exploitation, 6) Confidentiality and Privacy, and 7) Informed Consent, referring to the 2016 CIOMS Guidelines. The fulfillment of the indicators of each standard indicates this. Health Research Ethics Commission of Poltekkes Kemenkes Bengkulu with numbers No.KEPK.BKL/348/06/2023.

RESULTS AND DISCUSSION

Based on Table 1, the majority (72.2%) of respondents are female. The results of this study are similar to the results of Thanakitcharu, P (2014) in his research at the Hospital Rajavithi, Bangkok, Thailand, also women respondents than men respondents with leg edema due to CKD[8]. The result of the research by Prastika et al. (2019) obtained similar results, where the number of respondents with the most foot edema was women (66.6%)[9].

Tabel 1. Frequency Distribution of the Gender Type of the Respondent

Respondent Characteristics	Frequency	Persentase
Gender Type		
Male	5	27,8
Female	13	72,2

The condition is suspected to be related to the daily activity of female respondents who tend to sit a lot, do not do routine light activity, and are overweight/obese. Specifically, edema is associated with older age, female sex, weight/obesity, low activity, and limited mobility. People with obesity are 2.3 times more likely to have foot edema than those with normal weight[8].

Table 2. Distributed Frequency Age and Circumference of Foot Edema

Respondent characteristics	N	Min	Max	Mean	SD
Age	18	16	64	46.72	11.09
Oedema Circumference					
Left foot Pre Intervention	18	19.90	23.90	21.66	1.260
Left foot Post Intervention	18	19.53	23.06	21.02	1.119
Right foot Pre Intervention	18	20.12	23.89	21.74	1.099
Right foot Post Intervention	18	19.57	23.10	21.07	.993

According to Table 2, the age ratio of respondents is 46.72 years, which is consistent with data from the Directorate-General for Disease Prevention and Control, Kemenkes RI (2017), which shows that the prevalence of patients with kidney failure began to rise at the age of 35 years or older. Besharat's 2021 studies in the United States revealed similar results in cases where peripheral edema is connected with advanced age. Physiologically, as we age, the function of the body's cells declines, including the body's ability to manage the distribution of fluids[10].

In conclusion, from Table 2, it is known that the average circle of edema of the left foot before and after the intervention was 21.66 cm and 21.02 cm, respectively (difference 0.64 cm), whereas the average circumference of the right foot edema before and post-intervention was 21.74 and 21.07 cm, respectively. (a deviation of 0,66 cm). The measurement of leg edema circumference was obtained from specific points on the leg of CKD patients immediately after undergoing hemodialysis. These patients were visually identified as having edema with characteristic features. The study found the average edema circumference on the left foot. The difference in the average circle edema on the two legs is very small. Using Medline, these foot edema measurements are the average of three measurement points on each leg.

The results of these measurements have not yet been compared to the same research that measured the circumference of edema of the legs of patients with CKD post-hemodialysis. As far as the researchers know, the study and measurement of the edema in the feet of patients diagnosed with CKD is carried out only by classifying the degree of foot edema. Several studies on the measurement of edema circumference were

conducted in Chronic Heart Failure (CHF) patients who yielded average values of 27.6 – 27.7 cm[5].

Significant differences between CKD and CHF patients are likely related to the nutritional status of patients with relatively poorly diagnosed chronic diseases compared to those with CHF. According to Sedhain, A. (2015), mild to moderate malnutrition was found to occur in two-thirds of patients undergoing hemodialysis. Poor nutritional status in CKD patients resulted in decreased muscle mass, so the circumference of the patient's legs was relatively smaller[11].

The study also found that the circumference of the legs after the intervention on both legs also had a small difference. Similarly, the differences in the measurements before and after intervention in the two legs qualitatively showed relatively small differences.

Table 3. Effects of Foot Massaging on Edema Circumference Change in CKD Patients

Edema Circumference	Mean	SD	Min-Max	N	P_{value}
Circular Oedema Left Leg Pre-Post Intervention	0.64	0.30	0.49-0.79	18	.000

Table 3 shows a difference in the average circumference of the leg edema before and after the intervention, 0.64 and 0.66 cm on the left and right legs, respectively. The analysis of the test's paired samples produced a P value of 0.000 on both legs, indicating that foot massage had a significant effect on the edema circle of the foot in CKD patients who experienced edema in the leg prior to and after the intervention.

The results of the research showed similarities with several similar studies on the use of massage to reduce edema, such as in the case of CHF foot edema patients in Kasron (2018), who showed that foot massage was effective in reducing edema in CHF patients after day two and day three with p-value <0,001[5]. A similar study (Çoban & Şirin, 2010) found that reducing physiological edema in pregnant women affected by pesticides was effective[6].

In the case of foot edema caused by postoperative patients with cardiovascular disorders, a study conducted by Hattan, King, & Griffiths (2002) performed foot massages and guided imagination showed that such interventions could reduce the edema and anxiety of patients with postoperative heart systems[12]. In the case of postoperative edema, it is also possible to carry out an injection process, such as a study conducted by Haren, Backman, & Wiberg (2000), where a massage intervention process can decrease the edema caused by post-op[13].

Implementation of clotting on an edema leg can stimulate fluid discharge through the lymphatic tract to the more proximal part, thereby reducing the incidence of foot edema[14]. The cleansing process can improve blood circulation while improving lymphatic circulation in the tissue.

The process of pressurizing will affect the blood vessels, in which the blood veins will be pressurized and pushed by the process of massing so that the blood flow will go to the more proximal part, so will also be permeability of the walls of the veins[15].

Similarly, in the lymphatic vessels, the process of pressing on the digestion will stimulate the fluid flow from the interstitial part of the cell to the inner part of the lymph vessel, which will then be discharged to the proximal part of that lymph vessel. Subsequently, the fluid will be brought back to the vascular system in the mucous lympha in the atrium dextra of the heart. The mechanism that occurs in the lymphatic vessels makes the massage often referred to as lymph drainage[9].

Another source explains that when massage therapy is administered to soft and connective tissues, these local biochemical changes that will be stimulated help improve muscle flexibility and modulate local blood circulation and lymph gums. So the blood flow goes smoother[14]. Reflective massage on the palms of the legs with splicing in a particular area will stimulate and smooth the blood circulation, and when there are parts of the point that are painful when massaged, it can remove blocked crystals[13].

This study's limitations include the limited sample size and the inability to control the respondents' daily activities, which may have influenced the occurrence of leg edema.

CONCLUSION

As the respondents were female, the average age was 46.72 years, the median circumference of left foot edema pre-intervention was 21.66 cm, the post-intervention was 21.02 cm, and the average circle of edema of the right foot was 21.774 before intervention, and the post-intervention is 21.07 cm. The study's results showed a significant effect of foot massage on the circle edema of the leg of CKD patients who experienced foot edema before and after the intervention, with a P value of 0,000 (P<0,005) on both legs. The study results are a reference for nurses assigned as a special nursing intervention to CKD patients with post-hemodialysis edema.

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CONFLICT OF INTEREST

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