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Research Article

# The Effect of Giving Warm Compresses on Leg Muscle Cramps in Patients Undergoing Hemodialysis at Royal Prima General Hospital

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***Abstract***

*Muscle cramps are the most common complication in hemodialysis patients. Muscle cramps often occur in the calves, thighs, fingers, and toes. Warm compresses are a non-pharmacological therapy that is easy to do to help reduce leg muscle cramps. The aimed to determine the effect of giving warm compresses on leg muscle cramps in patients undergoing hemodialysis at the Royal Prima General Hospital. The method uses a quasi-experimental with a one-group pre-test post-test design, using the Wilcoxon test. The results before giving warm compresses were that leg muscle cramps had a frequency of 74.3% every week, the severity of leg muscle cramps was 97.1% very painful, the duration of leg muscle cramps 97.1% lasted 1-10 minutes, leg muscle cramps occurred 71.4% of the time during the day. After giving warm compresses, the frequency of leg muscle cramps was 100.0% every week, the severity of leg muscle cramps was 100.0% slightly painful, the duration of leg muscle cramps 100.0% lasted ≤1 minute, leg muscle cramps occurred 100.0% during the day. Based on the parameters p-value of the frequency of muscle cramps was 0.03<0.05, the p-value of the severity of muscle cramps was 0.00<0.05, the p-value of the duration of muscle cramps was 0.00<0.05, and the p-value of cramp time muscle 0.02<0.05. It was concluded that there was a significant difference in leg muscle cramps before and after giving warm compresses to patients undergoing hemodialysis.*

*Keywords: Hemodialysis, leg, muscle, cramps, warm compress*

## Introduction

Hemodialysis is a process carried out to remove metabolic waste substances from the body to optimize kidney function in patients with permanent kidney function failure (Riyadi et al., 2023). Hemodialysis therapy can stop the progression of chronic kidney failure improve disease complications, prolong life span, and improve the patient's quality of life (Sonya et al., 2023).

Based on Riskesdas 2018, the highest prevalence of hemodialysis patients with chronic kidney failure is in DKI Jakarta province at 38.71% followed by Bali province at 37.04% and the lowest prevalence is in Southeast Sulawesi province at 1.99% while the prevalence in North Sumatra province is 11.57% (Kementerian Kesehatan RI, 2018) . According to the Report of the Indonesian Renal Registry (IRR, 2018) , The number of patients currently receiving hemodialysis throughout Indonesia is 132,142 and new patients are 66,433.

Kusumaningrum and Sariono (2023) state that if hemodialysis patients receive sufficient hemodialysis doses according to the patient's needs, it is indicated by the patient feeling better, more comfortable, and living longer. Patients can experience various disorders such as shortness of breath, headaches, leg cramps, nausea and vomiting, hypotension, and pruritis if the hemodialysis dose is insufficient. A study

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Marianna and Astutik (2018)showed the impact of hemodialysis on hypotension (61.1%), and muscle cramps (74%).

Moderate and severe levels of Interdialytic Weight Gains (IDWG) result in muscle cramps during the fourth hour of hemodialysis fluid withdrawal, and IDWG levels are higher. There is a relationship between weight gain between the levels of the two dialysis periods and muscle cramps during hemodialysis in the fourth hour (Ramadhan et al., 2023) . Intradialysis massage therapy can be applied to reduce the scale of muscle cramps in hemodialysis patients (Rohmawati et al., 2020). Research Albadr et al. (2020) stated the effectiveness of intradialytic exercise in preventing and reducing muscle cramps during hemodialysis.

Complementary therapy is recommended to overcome this complication by applying warm or cold compresses to the extremities during hemodialysis treatment (Kesik et al., 2023) . Warm compresses are stated to be more comfortable by patients than cold compresses, non-pharmacological therapy given to patients is more effective and cheaper than pharmacological therapy (Fauji & Marlina, 2018).

Waryantini and Astri (2020) state that warm compresses are better at reducing pain than cold compresses. According to Puspita et al. (2023) state that nurses can use warm compresses as independent treatment for patients who experience pain. Giving warm compresses can be done independently, both at home and in the hospital, with the help of family and closest relatives

ResearchPuspita et al. (2023) stated that the use of warm compresses reduces the level of pain in hypertensive patients. Warm compresses can lower the patient's blood pressure, which can prevent strokes and improve people's health (Tampubolon et al., 2022) . Warm compresses and deep breathing relaxation both help reduce pain because they improve blood circulation and provide a sense of comfort for rheumatoid arthritis patients (Doliarn'do et al., 2018).

Several previous research results and based on surveys conducted before the research was conducted, patients said that they often experienced muscle cramps which caused the patient to feel uncomfortable. Warm compresses are an action that is often used to reduce pain, fever, and muscle cramps. Warm compresses are usually applied to hypertension patients to prevent stroke and to rheumatoid arthritis patients to reduce pain. Warm compresses are very easy to do and applied either at home or in other health facilities which can increase the feeling of comfort. Warm compresses have never been used on patients with leg muscle cramps in hemodialysis patients, so researchers want to know how warm compresses impact leg muscle cramps in patients undergoing hemodialysis at the Royal Prima General Hospital.

**Methods**

This research uses quantitative methods and uses a quasi-experimental design. This method uses a one-group pre-test and post-test approach (Polit & Beck, 2018) . *Pre-test*s and post-tests before and after intervention were used to conduct this research. The research will be conducted in March 2024 at the Royal Prima Medan Hospital, which has a large enough population and sufficient sample to be respondents. A population is a total of individuals or objects that have the same characteristics, certain qualities, and characteristics (Polit & Beck, 2018) . The population of this study was 35 respondents, and the research was carried out in March 2024 on patients undergoing hemodialysis at the Royal Prima General Hospital. The sample is a component of the population to be studied. In this study, the samples taken were respondents who underwent hemodialysis at the Royal Prima General Hospital with 35 patients. The entire population is taken as a sample in a saturated sampling technique, which is used when the number of population members is too small (Sahir, 2022). The sample used for the research was 35 patients.

The observation sheet is a tool used to collect data for this research. The research began with the Faculty of Nursing and Midwifery

sending an initial survey permission letter to Royal Prima General Hospital, to obtain research permission. After the researcher obtained permission, the researcher first provided an explanation to the patient about the aims, benefits, procedures, and conditions of the research. After the respondent has received information about the research, the researcher gives Informed Consent to the patient and the patient has the right to accept or refuse to become a research respondent.

After the patient agrees to be a research sample, the patient will sign an Informed Consent letter which has been given to the respondent by ethical suitability test number 061/KEPK/UNPRI/I1/2024. The pretest was carried out using the Cramp Questionnaire instrument which was slightly modified from the published questionnaire (Wong & Baker, 1988; Chatrath et al., 2012; Hu et al., 2022) . When the researcher observed the leg muscle cramps felt by the respondents before the intervention.

The researcher then intervened with the respondents. The intervention begins by explaining the benefits of a warm compress to reduce leg muscle cramps, which is done twice a week for 15–20 minutes (Alisabella et al., 2023). Actions are taken starting from arranging the patient's position as comfortably as possible then lying down or sitting with his back on the bed, assessing the patient's legs in the area where the leg muscle cramps occur, and giving a warm compress is carried out by the SOP from the Indonesian National Nurses Association and encourage the patient to relax. reduces muscle cramps in the legs.

Next, in the posttest stage, researchers used an observation sheet with the Cramp Questionnaire instrument as a measuring tool used to measure muscle cramps.(Wong & Baker, 1988; Chatrath et al., 2012; Hu et al., 2022) . Where the results of the two observations were compared before and after administering warm compresses to reduce leg muscle cramps.

Aspects of measuring the provision of warm compresses using warm/hot exposure. of cloth or. towel on the area experiencing muscle cramps. Name, age, religion, gender, and occupation are the demographic data used by this researcher. Measurement before giving a warm compress (pretest) with the Cramp Questionnaire(Wong & Baker, 1988; Chatrath et al., 2012; Hu et al., 2022) . After the respondent is given intervention, a warm compress will be given to the leg area experiencing muscle cramps for 15-20 minutes (Alisabella et al., 2023) . The time can be set according to the agreement between the researcher and the respondent, and given once every day according to the researcher's direction, giving a warm compress. After that, the measurement (post-test) was carried out by the Cramp Questionnaire.

The Cramp Questionnaire assessment includes several categories such as frequency, severity, duration, and time. Additional observations include muscle cramps in the last 3 months, where the cramps are located, what factors make the cramps worse, whether the patient takes medication, what is done to relieve muscle cramps, and whether the patient's quality of life decreases due to cramps. muscle.

In this study, univariate and bivariate data analysis was used; Univariate analysis was used to examine respondents' demographic data. Whereas. Bivariate analysis is an analysis carried out to analyze the relationship between two variables. The data normality test was carried out before conducting bivariate analysis. Normality test using Shapiro-Wilk. Then, if the distribution is normal, the researcher will use the Paired Simple T-Test statistical test. If data. is not normally distributed, then the normality test is used Wilcoxon test. If significant $p > 0.05$, then. Ho is accepted, and if $p<0.05$, then. Ho was rejected (Polit & Beck, 2018).

## Research result

### Univariate Analysis

Results. Study. The effect of giving warm compresses on leg muscle cramps in patients undergoing hemodialysis at Royal Prima General Hospital was surveyed to determine the effectiveness of giving warm compresses on leg muscle cramps.

Based on the results shown in Table 1, it can be concluded that those aged 42-49 years and those aged 66-73 years have a majority of 8 respondents (22.9%), and those aged 25-33 years have a minority of 3 respondents (8.6%). Based on. majority gender. there were 19 men (54.3%), and 16 women minorities (45.7%). The majority of respondents were married as many as 34 respondents (97.1%) and the minority were unmarried as many as 1 respondent (2.9%). It is known from the latest educational background that the majority are in high school as many as 17 respondents (48.6%) and the minority is in elementary school as many as 4 respondents (11.4%). Judging from the characteristics, the majority of respondents were housewives with 14 respondents (40.0%) and fewer were self-employed with 3 respondents (8.6%). Based on the duration of illness, the majority were >2 years with a total of 28 respondents (80.0%) and the minority was 1-2 years with a total of 7 respondents (20.0%).

Based on Table 2, before giving a warm compress, the majority of patients experienced muscle cramps. The majority of respondents often experience muscle cramps every week with a total of 26 respondents (74.3%) and a minority of respondents often experience muscle cramps every month with a total of 9 respondents (25.7%). Judging from how painful the pain felt due to muscle cramps, the majority of patients said it was very painful with 34 respondents (97.1%) and the minority said it was a little painful with 1 respondent (2.9%). The majority of patients said the cramps lasted 1-10 minutes, 34 respondents (97.1%). The majority of patients often experience cramps during the day with 22 respondents (71.4%) and the majority of patients experience cramps during the day and night as many as 10 respondents (28.6%).

Based on Table 3 above, after giving warm compresses, the majority of respondents often experience muscle cramps every week with a total of 35 respondents (100%). Judging from how painful the pain felt due to muscle cramps, all respondents said it was a little painful. The majority of patients said the cramps lasted ≤1 minute, 35 respondents (100%) and patients said they often experienced cramps during the day.

Based on the results of the analysis shown in Table 4, it can be seen that 35 people between the cramp variables before (Pre-test) and after (Post-test) were given warm compresses for leg muscle cramps and obtained a Z frequency value of -3,000 with a Sig value. (2-tailed) namely 0.03<0.05, severity Z value -5.831 with Sig value. (2-tailed) namely 0.00<0.05, the Z duration value is -5.831 with a Sig value. (2-tailed) namely 0.00<0.05, and the Z time value is -3.162 with a Sig value. (2-tailed) namely 0.02<0.05. Based on the results of the table above, it can be concluded that there is a significant difference in leg muscle cramps before and after giving warm compresses to patients undergoing hemodialysis.

**Discussion**

**Leg Muscle Cramps Before Giving Warm Compresses in Patients Undergoing Hemodialysis**

The results of research on leg muscle cramps before giving warm compresses showed that the majority of patients experienced muscle cramps. Muscle cramps are a complication that often occurs during hemodialysis and can cause very severe pain in patients (Akkabut et al., 2021) . Muscle cramps are also associated with low blood pressure. However, some muscle cramps continue even after blood pressure returns to normal. Severe muscle cramps experienced near the end of dialysis and lasting for some time after dialysis are often caused by

dehydration (Chowdhury & Sharma, 2022).

The research results showed that the majority of patients said they often experienced muscle cramps in the calves, thighs, fingers, and toes. Study(Naz et al., 2024)showed that muscle cramps in hemodialysis patients often occur in the legs. According to Chowdhury and Sharma (2022) patients receiving hemodialysis often experience muscle cramps which result in discomfort, shortened treatment time, and inadequate dialysis doses. Up to 50% of chronic kidney failure sufferers undergoing dialysis suffer from muscle cramps, especially in the lower extremities. In patients undergoing hemodialysis, complications of muscle cramps generally occur in the muscles of the calves, feet, toes, and thighs (Bagchi, 2020).

Researchers provided a warm compress intervention that refers to Standard Operating Procedures (SOP) based on the Indonesian National Nurses Association which was implemented for one week. The researcher approached respondents using therapeutic communication starting with a time contract with the respondent where the researcher also explained the implementation of activities, objectives, benefits, procedures, and terms of action for carrying out the research. Researchers identify the location of the leg muscle cramps felt by the patient so that a warm compress can be given for 15-20 minutes. Researchers also positioned the patient as comfortably as possible and encouraged the patient to relax to reduce muscle cramps.

Based on the researchers' assumptions, the average respondent was 42-49 years old and 66-73 years old and male. The majority of respondents experience cramps every week where the muscle cramps are very painful and last 1-10 minutes. Muscle cramps often occur during the day when patients undergo hemodialysis. The patient also said that he did not take any action to relieve muscle cramps so his quality of life was greatly affected.

**After Giving Warm Compresses Against Leg Muscle Cramps in Patients Undergoing Hemodialysis**

After the intervention was carried out, the research results showed that the majority of patients said that leg muscle cramps had reduced. The intensity of muscle cramps shows that giving compresses is very good for reducing muscle cramps given to hemodialysis patients. This is because warm compresses deliver heat exposure which can reduce muscle tension and increase blood circulation and the results after giving warm compresses are that the majority of patients say leg muscle cramps are a little painful. and the duration of muscle cramps lasts less than 1 minute. The patient is given a warm compress according to directions.

Warm compress therapy has been known as a practical approach to dealing with pain problems (Menga et al., 2023) . According to research Cantika P et al. (2022) , non-pharmacological therapy gives warm compresses an act of stimulating the skin and tissue to reduce pain, increase comfort, and obtain other therapeutic effects through exposure to warmth/heat. Give warm compresses to provide comfort, reduce pain, and prevent muscle spasms. With warm compress therapy, the blood vessels widen, thereby reducing the level of pain (Laiya & Abdullah, 2023).

Warm compresses can warm certain areas because the heat they produce can dilate blood vessels, allowing blood flow and oxygen supply to run more smoothly, relieving muscle tension, and reducing pain (Zulwafid, 2020). By relaxing muscles, warm compresses increase circulation to the tissues (Nazar et al., 2023).

Based on researchers' assumptions, giving warm compresses is very helpful in reducing leg muscle cramps felt by patients. The patient said he was very comfortable with the warm exposure from the warm compress given so that blood flow and oxygen supply would not be disrupted.

**The Effect of Giving Warm Compresses on Leg Muscle Cramps in Patients Undergoing Hemodialysis**

The results of the study showed that there was a big difference between leg muscle cramps

before and after applying warm compresses. Based on the parameters, the frequency p-value is 0.03, the severity 0.00, the duration 0.00 and the time 0.02. Warm compresses can reduce leg muscle cramps in patients undergoing hemodialysis. According to the researchers' observations, this change occurred because the patient followed the warm compress procedure correctly and the patient actively discussed it so that the patient could practice it independently. Warm compresses have an effect on leg muscle cramps in patients undergoing hemodialysis from very painful to slightly painful, from lasting 1-10 minutes to lasting less than a minute and improving the patient's quality of life.

The results of this study showed that before giving warm compresses for muscle cramps, the frequency of muscle cramps was 74.3%, and muscle cramps occurred every week, after giving warm compresses, the frequency of muscle cramps was 100.0%, 100.0% experienced cramps every week. Before giving a warm compress the severity level of muscle cramps was 97.1% very painful and after giving the warm compress the severity level was 100.0% slightly painful. Before giving a warm compress for muscle cramps, the duration of 97.1% of muscle cramps lasts 1-10 minutes, and after giving a warm compress the duration of muscle cramps 100.0% of muscle cramps lasts less than one minute. Before administering the warm compress, muscle cramps occurred 71.4% of the time during the day and after administering the warm compress occurred 100.0% of the day. So this shows that there is an effect of giving warm compresses on leg muscle cramps in patients undergoing hemodialysis.

According to research Sitorus and Sari (2022) giving a warm compress on the principle of delivering heat by conduction will reduce muscle tension and increase blood circulation. Warm compresses are a very easy and cheap way to deal with pain (Trifani et al., 2024) . Applying a warm compress is better used to reduce muscle cramps (Kesik et al., 2023).

**Conclusion**

Based on research that has been carried out, the impact of the intervention of giving warm compresses on leg muscle cramps provides a feeling of comfort, reduces muscle tension, and improves blood circulation. Before giving warm compresses to leg muscle cramps in respondents, data was obtained that the majority of patients undergoing hemodialysis experienced muscle cramps that were very painful and lasted for several minutes. After giving a warm compress to the leg muscle cramps, the respondent felt the muscle cramps were slightly painful and lasted for a few seconds. Warm compresses are a non-pharmacological treatment method that can be used to reduce muscle cramps and pain, this therapy can also increase comfort. The researchers can conclude that there is an effect of giving warm compresses on leg muscle cramps in patients who undergoing hemodialysis at the Royal Prima General Hospital.So the hospital can provide warm compresses to patients as a non-formaological therapy which is very helpful in reducing leg muscle cramps.

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**Table 1. Frequency Distribution of Respondent Characteristics**

| No | Respondent Characteristics | Frequency($f$) | Percentage (%) |
|---|---|---|---|
| 1. | **Age (years old)** | | |
| | 25-33 | 3 | 8.6 |
| | 34-41 | 4 | 11.4 |
| | 42-49 | 8 | 22.9 |
| | 50-57 | 5 | 14.3 |
| | 58-65 | 7 | 20.0 |
| | 66-73 | 8 | 22.9 |
| 2. | **Gender** | | |
| | Man | 19 | 54.3 |
| | Woman | 16 | 45.7 |
| 3. | **Marital status** | | |
| | Not married yet | 1 | 2.9 |
| | Marry | 34 | 97.1 |
| 4. | **Last education** | | |
| | Elementary school | 4 | 11.4 |
| | Junior high school | 7 | 20.0 |
| | Senior high school | 17 | 48.6 |
| | College | 7 | 20.0 |
| 5. | **Work** | | |
| | Housewife | 14 | 40.0 |
| | Self-employed | 3 | 8.6 |
| | Private sector employee | 9 | 25.7 |
| | Other | 9 | 25.7 |
| 6. | **Suffering from illness for a long time** | | |
| | 1-2 year | 7 | 20.0 |
| | >2 years | 28 | 80.0 |

**Table 2. Frequency Distribution Leg Muscle Cramps Before Giving Warm Compresses in Patients Undergoing Hemodialysis**

| No | Cramp Questionnaire | Frequency ($f$) | Percentage (%) |
|---|---|---|---|
| 1. | **Frequency** | | |
| | Each month | 9 | 25.7 |
| | Every week | 26 | 74.3 |
| | Once in the last 3 months | 0 | 0.0 |
| 2. | **Severity level** | | |
| | VAS>3 | 34 | 97.1 |
| | VAS≤3 | 1 | 2.9 |
| 3. | **Duration** | | |
| | Lasts ≤1 minute | 1 | 2.9 |
| | Lasts 1-10 minutes | 34 | 97.1 |
| | Lasts ≥10 minutes | 0 | 0.0 |
| 4. | **Time** | | |
| | Afternoon | 25 | 71.4 |
| | Evening | 0 | 0.0 |

| No | Cramp Questionnaire | Frequency (*f*) | Percentage (%) |
|---|---|---|---|
| | Day and night | 10 | 28.6 |

**Table 3. Frequency Distribution Leg Muscle Cramps After Giving Warm Compresses in Patients Undergoing Hemodialysis**

| No | Cramp Questionnaire | Frequency (*f*) | Percentage (%) |
|---|---|---|---|
| 1 | **Frequency** | | |
| | Each month | 0 | 0.0 |
| | Every week | 35 | 100.0 |
| | Once in the last 3 months | 0 | 0.0 |
| 2 | **Severity level** | | |
| | VAS >3 | 0 | 0.0 |
| | VAS ≤3 | 35 | 100.0 |
| 3 | **Duration** | | |
| | Lasts ≤1 minute | 35 | 100.0 |
| | Lasts 1-10 minutes | 0 | 0.0 |
| | Lasts ≥10 minutes | 0 | 0.0 |
| 4 | **Time** | | |
| | Afternoon | 35 | 100.0 |
| | Evening | 0 | 0.0 |
| | Day and night | 0 | 0.0 |

**Bivariate Analysis**

**Table 4. Effect of Giving Warm Compresses on Leg Muscle Cramps in Patients Undergoing Hemodialysis**

| Variable | N | *Mean* | *Std. Deviation* | *Z* | *Sig. (2-tailed)* |
|---|---|---|---|---|---|
| **Frequency** | | | | | |
| Pre-test | 35 | 1.74 | 0.443 | -3,000 | 0.03 |
| Post-test | 35 | 2.00 | 0,000 | | |
| **Severity Level** | | | | | |
| Pre-test | 35 | 1.03 | 0.169 | -5,831 | 0.00 |
| Post-test | 35 | 2.00 | 0,000 | | |
| **Duration** | | | | | |
| Pre-test | 35 | 1.97 | 0.169 | -5,831 | 0.00 |
| Post-test | 35 | 1.00 | 0,000 | | |
| **Time** | | | | | |
| Pre-test | 35 | 1.57 | 0.917 | -3,162 | 0.02 |
| Post-test | 35 | 1.00 | 0,000 | | |