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EFFECTIVENESS OF INTRADILAYTIC STRETCHING EXERCISES ON THE LEVEL OF MUSCLE CRAMPS AND COMFORT AMONG PATIENTS UNDERGOING HAEMODIALYSIS.

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Abstract
Background: Chronic kidney disease (CKD) is a widespread and universal health problem due to its increasing prevalence globally. Kidney function is essential and once it fails, life sustains with kidney dialysis or transplantation. Muscle cramps are the common complications observed among hemodialysis patients. This study aimed to evaluate the efficacy of intradialytic stretching exercises in reducing or preventing muscle cramps among hemodialysis patients, Vellore.
Objectives: This study aimed to determine the efficiency of intradialytic stretching exercises in decreasing muscle cramps to enhancing comfort, a randomized control study among the study group and control group.
Methodology: A pre-experimental one-group pre-test-post-test design was adopted with 60 hemodialysis patients. Pre-tests and post-tests were conducted before and after the intradialytic stretching exercises.
Results: Before the intervention, 73.3% of patients experienced moderate muscle cramps, and 26.7% had severe cramps. After Post-intervention, 50% had moderate muscle cramps, and none reported severe cramps. Statistically significant outcomes were observed in the level of muscle crap and comfort level in comparison to the pre and post-test interventions.
Conclusion: Intradialytic stretching exercises are simple yet effective intervention to reduce muscle cramps and enhance comfort during hemodialysis and is recommended, the incorporation of these exercises will significantly improve the well-being of the patients.

Keywords: Muscle cramps, Hemodialysis, Intradialytic stretching exercises, Nursing intervention.

INTRODUCTION

Chronic kidney disease (CKD) is the fifth leading cause of death by 2040, affecting more than 850 million people globally. It is often diagnosed at its advanced stage, especially in India, mainly due to the lack of awareness and failure to notice the symptoms, especially in cases of interstitial nephritis and CKD of unknown origin. Approximately 210,000 new cases are reported annually due to kidney failure [1, 2]. Dialysis and Kidney transplantation is relayed by approximately 2 million people for their survival so that 10% would require life-saving treatment [3,4].

The common problem or complain among the patients enduring dialysis is muscle cramps that are usually managed in hospital using normal saline and 25% dextrose.[5] When we look into the statically data around 90% of dialysis patients suffer from muscle cramps that require therapeutic interventions and proper medical like massage and exercise.[6] The part mainly affected in muscle cramps is the legs, most particularly the feet, but other regions like arms, hands, and abdominal muscles are also affected frequently. Muscle cramp is mainly due to the hypoperfusion, imbalance in the electrolyte, and depletion in carnitine causing the shortening of calf muscle.[7] A pharmacological intervention like pain management medications includes opioids, non-steroidal anti-inflammatory drugs (NSAIDs) and acetaminophen are commonly prescribed but these drugs have limitations and Sid effects.

Recent researches states that prophylactic muscular stretching is an effective method to prevent muscle cramps. Certain exercises like body Stretching exercise, strengthening of muscles and proper oil massage are believed to be the popular and widely used non-pharmacological therapeutic methods to tackle muscle cramp[8]. Exercises to increase the body flexibility and muscle strengthening are normally good for maintaining and improving better physical functions and also help to relieve cramps. Leg stretch exercises conducted during dialysis, like quadriceps knee strengthening exercises, hamstring exercises, and gluteal strengthening exercises, boost muscular protein synthesis and breakdown can greatly help in increasing the body function and strength as well. Many studies have reported on the beneficial effect of Intradialytic stretching exercises among dialysis patients[9].

This study is farmed and is conducted among the dialysis patient attending the KVR kidney and diabetic centre, Vellore to evaluate the efficiency of Intradialytic stretching exercises in confronting muscle cramp among dialysis patients.

METHODOLOGY

Research Approach: This study was conducted at the hemodialysis KVR kidney and diabetic centre, Vellore with a total of 60 patients, aged 20–70 years, hemodialysis patients. A quantitative approach was employed with a pre-experimental one-group pretest- posttest design to assess the level of Muscle Cramps and comfort among patients undergoing dialysis from May 4 to May 11, 2024, after obtaining necessary approvals. They underwent 20 minutes of intradialytic stretching exercises at the second hour of dialysis.

Ethical Considerations:

Ethical approval was obtained from the Institutional Review Board (IRB) of Meenakshi College of Nursing. Permission was procured from the Managing Director of KVR Kidney and Diabetic Centre, Vellore and a written consent form was also obtained from the participants in the study.

Variables:

Age, education, occupation, religion, dietary patterns, habits, duration of dialysis treatment, and experience of muscle cramps during dialysis were considered as the Demographic and Clinical Variables. The pre and post-test results after the intradialytic stretching exercises interventions were noted.

Inclusion and Exclusion Criteria:

Patients aged 20–70 years, experiencing moderate to severe muscle cramps and patients who were alert and cooperative and Patients interested to take part in this study were inclusion criteria. Exclusion Criteria includes Patients undergoing emergency or first-time hemodialysis and Patients unwilling to participate.

Muscle Cramp & Comfort Assessment

A structured questionnaire was prepared and circulated among the participants; level of muscle cramp was assessed in Modified Ashworth Scale. Similarly a structured questionnaire was used to evaluate the comfort levels before and after the intervention. The factor included was alertness, calmness, physical movement, heart rate and facial tension.

Data Analysis:

Data were analysed using descriptive and inferential statistics with SPSS software. Frequency and percentage distribution were used for demographic and clinical variables; Mean and standard deviation were calculated to compare pre-test and post-test scores. Paired t-test was used to compare pre-test and post-test scores of muscle cramps and comfort.

Results

As it is a known fact that Kidney is one of the vital organ and it plays a major role in helping to keep a healthy balance of water, salts and minerals in our body. Due to the modified lifestyle the most important organs that suffers damage is the Kidney. The two main ways to overcome kidney damage is to perform a transplantation or heamodialysis in regular bases. Dialysis patients suffer some unavoidable effects the major factor is the muscle cramp.

In the present study we have tried the effectiveness of intradialytic stretching exercises interventions to have a control on the muscle cramp that greatly affect the quality of life. The Table 1 shows the demographic variables of patients recorded in the study. A total of 60 were involved based on the inclusion and exclusion criteria out of which muscle cramps was very high among the patients of age 26-50 with 61.7% and 31.7% were above 50. Male constituted the highest of 78.3%, whereas female accounted for only 21.7%. There were any other interesting criteria the diet pattern it was noted that non vegetarians occupied the highest percentage of 86.7% while vegetarians was 13.3%. There are other factors assessed for details refer Table 1.

Table 1: Frequency and percentage distribution of demographic variables among hemodialysis patients with the level of muscle cramps.

Demographic variables	Frequency	Percentage (%)

1. **Age in years**		
a. 20 – 25 years	4	**6.7**
b. 26 – 50 years	37	**61.7**
c. > 50 years	19	**31.7**
2. **Gender**		
a. Male	47	**78.3**
b. Female	13	**21.7**
3. Marital status		
a. Married	57	**95.0**
b. Unmarried	2	**3.3**
c. Widower	1	**1.1**
4. Educational status		
a. Illiterate	13	**21.7**
b. High school	22	**36.7**
c. Hr. Sec.	20	**33.3**
d. Graduate	4	**6.7**
e. Post graduate	1	**1.7**
5. Occupational status		
a. Un-skilled worker	55	**91.7**
b. Professional	4	**6.7**
c. Unemployed	0	**0.0**
d. Homemaker	1	**1.7**
6. Religion		
a. Hindu	43	**71.7**
b. Muslim	10	**16.7**
c. Christian	7	**11.7**
7. Diet pattern		
a. Vegetarian	8	**13.3**
b. Non Vegetarian	52	**86.7**
8. Habits		
a. Smoking	3	**5.0**
b. Alcoholism	5	**8.3**
c. Drug Abuse	0	**0.0**
d. Tobacco Chewing	0	**0.0**
e. No bad habits	52	**86.7**

Table 2 summarizes the clinical variables of the 60 hemodialysis patients in this study with majority of 68.3% undergo haemodialysis for months and they receive dialysis for at least 6 hrs per day with twice in a week. The muscle cramp is experienced during the middle hrs. Nearly all (98.3%) experienced muscle cramps restricting daily activities affected both legs (76.7%), particularly the calf muscles (93.3%). The 85% of the patient are associated with medical condition Diabetes Mellitus (85%) and 80% reported that they can live a normal life resulting in a deteriorated quality of life for other clinical features refer table 2

Table 2: Distribution of Clinical Variables among Hemodialysis Patients.

Clinical variables	Frequency	Percentage (%)
1. Duration of Dialysis		
a. Days	3	**5.0**
b. Months	41	**68.3**
c. Year	16	**26.7**
2. Hours of Dialysis		
a. 4 hours	5	**8.3**
b. 6 hours	49	**81.7**
c. 8 hours	6	**10.6**
3. No. of Sittings/week		
a. Once	4	**6.7**
b. Twice	51	**85.0**
c. Thrice	5	**8.3**
4. Experience of Muscle Cramps		
a. First hour	5	**8.3**
b. Middle hour	42	**70.0**
c. Last hour	3	**21.7**
5. Restriction of activities		
a. Yes	59	**98.3**
b. No	1	**1.7**
6. Location of muscle cramps		
a. Right leg	7	**11.7**
b. Left leg	7	**11.7**
c. Both leg	46	**76.7**
7. Where do you feel the cramps		
a. Calf	56	**93.3**
b. Hamstring	4	**6.7**
c. Soleus	0	**0.0**
8. Associated medical condition		
a. Diabetes Mellitus	51	**85.0**
b. Hyper tension	1	**1.7**
c. Peripheral Artery Disease	0	**0.0**
d. Cirrhosis of Liver	0	**0.0**
e. Neurological Disorder	8	**13.3**
9. Deterioration of Quality of Life		
a. Very much	48	**80.0**
b. Somewhat	12	**20.0**
c. Not at all	0	**0.0**

Table 3 present the data on the level of muscle cramp of the participants in the study under different domains like Muscle Tone, Muscle Strength and range of motion. The values were noted as Pre-test and Post-test data and it was interesting to note that all the level of muscle cramp criteria showed significant results pre and post interventions with a $p<0.001$**. Especially while analysing the overall muscle cramp status showed highly significant with 4.48±1.68 pre-test and 5.43±0.81 post-test.

Table 3: Difference between the level of muscle cramps before and after administering intradialytic stretching exercises among hemodialysis patients

Domains of Muscle Cramp	(Pre\ Post Test score)		P value
	Mean/SD	Mean/SD	
Muscle Tone	1.47±1.07	1.88±0.59	**0.000 *****
Muscle Strength	1.73±0.97	1.88±0.42	**0.000 *****
Range of Motion	1.28±0.94	1.67±0.51	**0.000 *****
Overall Muscle Cramp	**4.48±1.98**	**5.43±0.81**	**0.000 *****

Note: * - p<0.001 Level of Significant**

Table 4 present a comparative analysis data of level of comfort before and after administering intradialytic stretching exercises among hemodialysis patients. The level of comfort was assessed under five domains namely Alertness, Calmness, Physical Movement, Heart Rate and Facial Expression. The pre-test and the post-test results showed that all the domains showed a significant improvement after intradialytic stretching exercises interventions and while observing the overall comfort level the pre-test showed 5.67±1.75 and while the post-test showed 9.10±0.99 value having a significant p<0.001** and for other criteria refer table 4.

Table 4: Difference between the level of comfort before and after administering intradialytic stretching exercises among hemodialysis patients

Domains of Comfort	(Pre \ Post Test score)		P value
	Mean/SD	Mean/SD	
Alertness	1.42±0.53	1.45±0.50	**0.000 *** **
Calmness	1.10±0.24	1.77±0.50	**0.000 *** **
Physical Movement	1.87±0.12	2.17±0.38	**0.000 *** **
Heart Rate	1.80±0.30	2.08±0.28	**0.000 *** **
Facial Expression	1.20±0.28	1.95±0.50	**0.000 *** **
Overall Comfort	**7.39±1.47**	**9.10±0.99**	**0.000 *** **

Note: * - p<0.001 Level of Significant**

Table 5 shows the comparison of the pre-test and post-test levels of muscle cramps and overall comfort among hemodialysis patients. For level of muscle cramp the pre-test score is 4.48±1.98 and after the intervention the post-test score has greatly improved to 5.43±0.81. Similarly for level of comfort the pre-test value was 7.39±1.45 whereas the post-test value was 9.10±0.99. Both the major criteria showed significant improvement with a statistically significant p<0.001**

Table 5: Descriptive statistics of pre-test and post-test level of muscle cramps / level of comfort among hemodialysis patient in the study group

Descriptive statistics	Study group N= 60		p-value
	Pre-test	Post-test	
Mean/SD(Muscle Cramps)	4.48±1.98	5.43±0.81	**p= 0.000*** **
Mean/SD(level of Comfort)	7.39±1.45	9.10±0.99	**p= 0.000*** **

Note: * - p<0.001 Level of Significant**

DISCUSSION:

Chronic Kidney disease is a disease condition that progressively affects the function of the kidney; it is commonly seen in case of diabetes and hypertension[10]. Once it stops working life can be sustained by dialysis, haemodialysis is a stressful and painful procedure for those who take it frequently. Physical activity along with exercise can help in muscular activity that can help in circulation of blood[11]. In the present study we have presented the demographical data of the patient and it had no correlation with the dialysis condition. It agrees with the study of [12] who has reported that there is no significant correlation between the demographic data comparing pre-and post-test and No significance was reported. Many studies has reported on the effectiveness of intradialytic stretching exercises in tackling muscle cramp like Ipsita Bagchi[13] stated that intradialytic stretching interventions have a very potential impact on the muscle cramp among dialysis patients.

Furthermore, in a study conducted in Egypt by Soliman, H[14] and group engaging 30 patients where 18 of them were instructed to practice exercise for 15 minutes per day for two months, the intradialytic exercise with special care to the legs showed a tremendrous improvement in the electrolytes levels like calcium, creatinine, urea and haemoglobin[15]. These findings give us a proof that the intradialytic exercise had helped in clearing urea and thus

improving the dialysis efficacy. This study had helped us to understand that it not only improve the muscle cramp but all help in clearing the balancing the elecrolytes like creatinine, calcium and haemoglobin as well.
In all these studies[16, 17, 18] they have reported on the level of pain during muscle cramp per and Post-test and in the present study we have rated the muscle cramp and level of discomfort using various criteria. It was really interesting to note that all the inferences related to muscle cramp and level of discomfort had significant correlation physically as well as statically.
Lekha[19] and her colleagues had reported on the efficacy intradialytic stretching exercises in controlling the muscle cramps in haemodialysis patients of the PSG Hospitals Coimbatore. In which the experimental group was under intradialytic stretching intervention for 20 minutes. Assessment was performed using cramp questionnaire and the study it was observed that intradialytic stretching interventions helped greatly in reducing muscle cramp among haemodialysis patient. This study is similar to the present study conducted at the KVR kidney and diabetic centre, Vellore with a total of 60 patients and in this study the intervention was for 20 min during the second hour of dialysis. Though many studies report on the efficiency of intradialytic stretching exercises among dialysis patient with muscle cramp all studies are for a short period of time and the population size is minimal so to statistically and clinically evaluate the study has to be expanded in a larger population and with regular follow up is suggested.

CONCLUSION

The findings suggest that intradialytic stretching exercises can be used as an effective intervention method to reduce muscle cramps and increase the comfort level among hemodialysis patients. These studies have evaluated the statistical significance of the intervention and suggest that, implementing such exercises into clinical practice could enhance the quality of life for individuals undergoing hemodialysis and also suggest the study be expanded into a larger population.

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