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EFFECTIVENESS OF INTRADIALYTIC STRETCHING EXERCISE ON MUSCLE CRAMPS AMONG PATIENTS UNDERGOING HEMODIALYSIS

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ABSTRACT

Renal failure is an important non-communicable disease that affects world population including India. The prevalence of End Stage Renal Disease is rising throughout the developed and developing countries. The main aim of this study was to evaluate the effectiveness of intradialytic stretching exercise on muscle cramps among patients undergoing hemodialysis in selected hospitals at Coimbatore, Tamil Nadu. A quasi experimental pre and post test with control group design was used in this study. A total sample of 60 was selected by using non probability purposive sampling technique and was divided equally to control and interventional groups. Intradialytic stretching exercise was given for interventional group. Data was collected before and after intervention by using Modified Brief Pain Inventory Scale. The study findings showed that the Intradialytic stretching exercise was effective to relieve the muscle cramps among patients undergoing hemodialysis.

KEYWORDS

Intradialytic stretching exercise, Muscle cramps and Hemodialysis.

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INTRODUCTION

Kidneys - the vital organ plays a main role in the maintenance of homeostasis mechanism in human body[1]. Healthy kidneys are the sophisticated reprocessing machine that cleans the blood by removing fluid, salt and wastes from the body. Deficit in blood supply to the kidney will lead to decreased function. Prolonged decrease in the blood supply or in the blood pressure will lead to acute or sudden kidney failure[2].

Renal failure is characterized by progressive destruction of renal mass with irreversible sclerosis and loss of nephrons over a period of at least few

months to years, depending upon the underlying etiology. Renal failure is classified into two; they are acute and chronic renal failure. Acute Renal Failure (ARF) is a rapid decrease in kidney function leading to collection of metabolic wastes in the body. When the Glomerular Filtration Rate (GFR) decreases Blood Urea Nitrogen (BUN) level increases, waste products build up in the blood causing uremia and azotemia. This acute syndrome may be reversible with prompt intervention. ARF may lead to Chronic Renal Failure (CRF)[3].

According to American Society of Nephrology (2005), review of discharge data on a projected total of 29,039,599 hospitalizations identified 558,032 cases of ARF, with a frequency of 19.2 per 1000 hospitalization. According to WHO (2012), global burden of CRF is approximately 11,010,107 and 850,000 deaths per year[4].

CRF is a common clinical syndrome characterized by decline in glomerular filtration, perturbation of extracellular fluid volume, electrolyte and acid base homeostasis and retention of nitrogenous waste from protein catabolism. Chronic renal failure (CRF) results from partial or total loss of renal function. It exists when residual renal function is less than 15% of normal. Renal failure can be treated by dialysis[3].

Dialysis is one of the main replacement therapies in patients with renal failure. It removes many of the toxins responsible for the uremic syndrome and prolongs survival. However, dialysis treatment doesn't fully cure the uremia. During Dialysis many complications may occur like tiredness, fatigue, hypotension and muscle cramps[5].

Jean L stated that muscle cramps are a common complication of hemodialysis treatment, occurring in 33 to 86 percent of patients; they often result in the early termination of hemodialysis session. A cramp is a prolonged involuntary muscle contraction that occurs in a muscle that voluntarily contracts when it is already in its most shortened position. The increased frequency of cramps at rest and during the night may be caused by the placement (by the plantar-flexed foot) of the calf and ventral foot muscles in the most shortened and vulnerable position during sleep. The exact aetiology of cramps in dialysis patients is unknown. Since cramps tend to occur most frequently near the end of hemodialysis treatment, changes in plasma osmolality and/or extracellular fluid volume have been implicated[6].

Muscle cramps can involve the legs, most commonly in the feet, but can also involve arms and hands, as well as abdominal muscles. It is estimated that 33% to 86% of patients receiving hemodialysis have experienced muscle cramps. Since cramps are a common intradialytic event, the discomfort leads to premature termination of the treatment, non-compliance with the prescription and therefore under dialysis. Thus interfering with the muscle cramps and even preventing the occurrence become a major responsibility of the patients. Since nurses are taking care of hemodialysis patients almost everywhere, it becomes predominantly the nurses' role[7].

Magda Mohamed *et al.*, conducted a study at Assiut University, Egypt on impact of stretching exercise protocol on reduction of muscle cramps during hemodialysis among CRF patients[8].

There are many uses of complementary therapies to reduce muscle cramps and it is becoming a significant part of modern day health care with millions of treatments taking place every year. The most used non pharmacological therapies are stretching exercise, strengthening exercise and oil massage[9].

Thus the investigator provided passive stretching exercise effective to relieve muscle cramps during hemodialysis session.

Objectives

1. To assess the level of muscle cramps among patients undergoing hemodialysis in interventional group and control group.
2. To determine the effectiveness of intradialytic stretching exercise on muscle cramps among patients undergoing hemodialysis in the interventional group.

Hypotheses

H_1: There is a significant difference in the level of muscle cramps among patients undergoing hemodialysis in the interventional group and control group.

H2: There is a significant difference in the level of muscle cramps before and after stretching exercise among patients undergoing hemodialysis in the interventional group.

MATERIAL AND METHOD

A quasi experimental design with control group pre test post test was adopted for this study. A sample size of 60 patients undergoing hemodialysis who experienced muscle cramps during dialysis was included into the study purposively out of which 30 were allotted to control group and 30 interventional group. Those who had history of diabetes, foot ulcer, sores, pitting oedema were excluded. The investigator performed stretching exercise to the interventional group in order to increase dorsiflexion of the ankle with knee slightly flexed and ankles extended and flexed for 60 times to contract and relax the gastrocnemius and soleus muscle. This procedure was done in the alternative days for five days. The data was collected through Modified Brief Pain Inventory Scale with structured questionnaire method before and after the intervention.

Demographic variables such as age, sex, education and occupation and clinical variables such as urea, creatinine, potassium, duration of dialysis, frequency of dialysis were included in this study.

RESULTS

The data obtained was analysed by using descriptive and inferential statistics on the basis of the objectives and hypotheses of the study.

Table No.1 shows that the pre test level of muscle cramps among 7(23%), 13(43.3%) and 17(56.6%) respectively were moderate and 23(77%), 17(56.6%) and 13(43.3%) respectively were severe in day 1,2 and 3, whereas majority of 20(66.6%) had moderate level of muscle cramps and minority of 1(3.33%) had no pain during 4^{th} day. In day 5, maximum 19(63.3%) had severe muscle cramps and 2(6.66%) had no pain and none of them had mild pain.

Table No.2 shows that, in the interventional group 6(20%), 10(33.3%), 10(33.3%), 7(23.3%), 11(3.3%) respectively during day 1, 2, 3, 4, and 5 had moderate muscle cramps and 24(80%), 20(66.6%), 16(53.3%), 20(66.6%), 17(56.6%) respectively had mild muscle cramps during 1^{st} to 5^{th} days of hemodialysis. During days 3, 4 and 5 about 4(13.3%), 3(10%) and 2(6.66%) respectively had no pain and none of them had severe pain during all days.

Figure No.1 Projects that the average mean level of muscle cramps during the 5 days of intervention was 6.66% and 3.16% respectively during pre test and post test which was significant at $p<0.05\%$ level.

Figure No.2 reveals that the average paired t test value of interventional group was 17.25, which was highly significant at $p<0.05$ level during 1^{st} to 5^{th} days of hemodialysis session. It is inferred that the stretching exercise was found to be effective on muscle cramps among patients undergoing hemodialysis. The average paired‘t’ test value of control group was 4.3 which was significant at $p< 0.05$ during 1st to 5th day of hemodialysis session due to usual nursing care provided to the patients in order to relieve muscle cramps. However the scores of interventional group were much higher than that of the control group, which is evident for the effectiveness of intradialytic stretching exercise to relieve muscle cramps.

Figure No.3 reveals that in the 5 days an average unpaired ‘t’ test value of 20.6 was found to be highly significant at $p<0.05$. Hence it is inferred that the intradialytic stretching exercise was effective among patients undergoing hemodialysis in reducing muscle cramps.

DISCUSSION

Stretching exercise is an excellent way of preparing the locomotor system for muscular efforts, which improve the movement capacity by the muscular elasticity and they help sooth the tiredness produced after an excessive training. Stretching exercise in which a specific muscle or tendon is deliberately flexed or stretched in order the improve the muscle’s felt elasticity and achieve comfortable muscle tone. It is also used therapeutically to alleviate cramps[10].

These findings were supported by Catherine sullivan, who conducted a study on the effectiveness of intradialytic massage on leg cramping among hemodialysis patients. A total number of 32 hemodialysis patients with frequent lower extremity cramps during treatment were included in this study. The results showed that the patients in the interventional group reported decreased incidence of cramping at dialysis than the control group. This study revealed that the intradialytic massaging was effective to reduce muscle cramps during dialysis[11].

The findings of this study revealed that the CRF patients on hemodialysis in the interventional group during the pre test, the level of muscle cramps among 7(23%), 13(43.3%) and 17(56.6%) respectively were moderate and 23(77%), 17(56.6%) and 13(43.3%) respectively were severe in day 1,2 and 3 whereas majority of 20(66.6%) had moderate level of muscle cramps and minority of 1(3.33%) had no pain during 4th day. In day 5, maximum 19(63.3%) had severe muscle cramps and 2(6.66%) had no pain and none of them had mild pain and the post test level of muscle cramps among 6(20%), 10(33.3%), 10(33.3%), 7(23.3%), 11(3.3%) respectively during day 1, 2, 3, 4, and 5 had moderate muscle cramps and 24(80%), 20(66.6%), 16(53.3%), 20(66.6%), 17(56.6%) respectively had mild muscle cramps during 1st to 5th days of hemodialysis. During days 3, 4 and 5 about 4(13.3%), 3(10%) and 2(6.66%) respectively had no pain and none of them had severe pain during all days.

The study findings are consistent with the results of a study done by Chatrath H, *et.al* on association of prevalence and morbidity with muscle cramps in patients during hemodialysis session. Sample size was 150 adult patients with muscle cramps who were selected by consecutive sampling technique. Cramps questionnaire and visual analogue scale were used to measure the muscle cramps. The result showed that 67% had muscle cramps during dialysis and this study concluded that the prevalence and morbidity associated with muscle cramps[12].

The results of this study revealed that among interventional group that the average paired ‘t’ test value of interventional group was 17.25 and the average paired‘t’ test value in control group was 4.3 during 1st to 5th days of hemodialysis session. This shows that the value was higher in Interventional group than in control group. Hence, it can be inferred that the stretching exercise was found to be effective on muscle cramps among patients undergoing hemodialysis. The average unpaired‘t’ test value of 20.6 was found to be highly significant at $p<0.05$. Hence it is inferred that the intradialytic stretching exercise was effective among patients undergoing hemodialysis in reducing muscle cramps.

These findings were supported by Gowthami, who conducted a study on the effectiveness of intradialytic stretching exercise on muscle cramps among patients undergoing hemodialysis in a selected hospital at Mangalore. A quasi experimental design was used in this study and purposive sampling technique was adopted. Sample size was 30 CRF patients. Modified Numerical Intensity Scale was used. The result revealed that there was a significant difference between the pre and post test muscle cramps score in the interventional group (50.297, $p<0.05\%$). This study concluded that intradialytic stretching exercise was effective in reducing muscle cramps among CRF patients undergoing hemodialysis[13].

Hence, the result revealed that muscle cramps highly reduced in the interventional group after intradialytic stretching exercise than in the control group.

Table No.1: Frequency and percentage distribution of pretest level of muscle cramps among patients undergoing hemodialysis in interventional group

S.No	Level of muscle cramps	Pre Test Value									
		DAY1		DAY2		DAY3		DAY4		DAY5	
		n	%	n	%	n	%	n	%	n	%
1	No pain	-	-	-	-	-	-	1	3.33	2	6.66
2	Mild	-	-	-	-	-	-	2	6.66	-	-
3	Moderate	7	23	13	43.3	17	56.6	20	66.6	9	30
4	Severe	23	77	17	56.6	13	43.3	7	23.3	19	63.3

Table No.2: Frequency and percentage distribution of post-test level of muscle cramps among patients undergoing hemodialysis in interventional group

S.No	Level of Muscle Cramps	Post Test Value									
		DAY1		DAY2		DAY3		DAY4		DAY5	
		n	%	n	%	n	%	N	%	N	%
1	No pain	-	-	-	-	4	13.3	3	10	2	6.66
2	Mild	24	80	20	66.6	16	53.3	20	66.6	17	56.6
3	Moderate	6	20	10	33.3	10	33.3	7	23.3	11	3.3
4	Severe	-	-	-	-	-	-	-	-	-	-

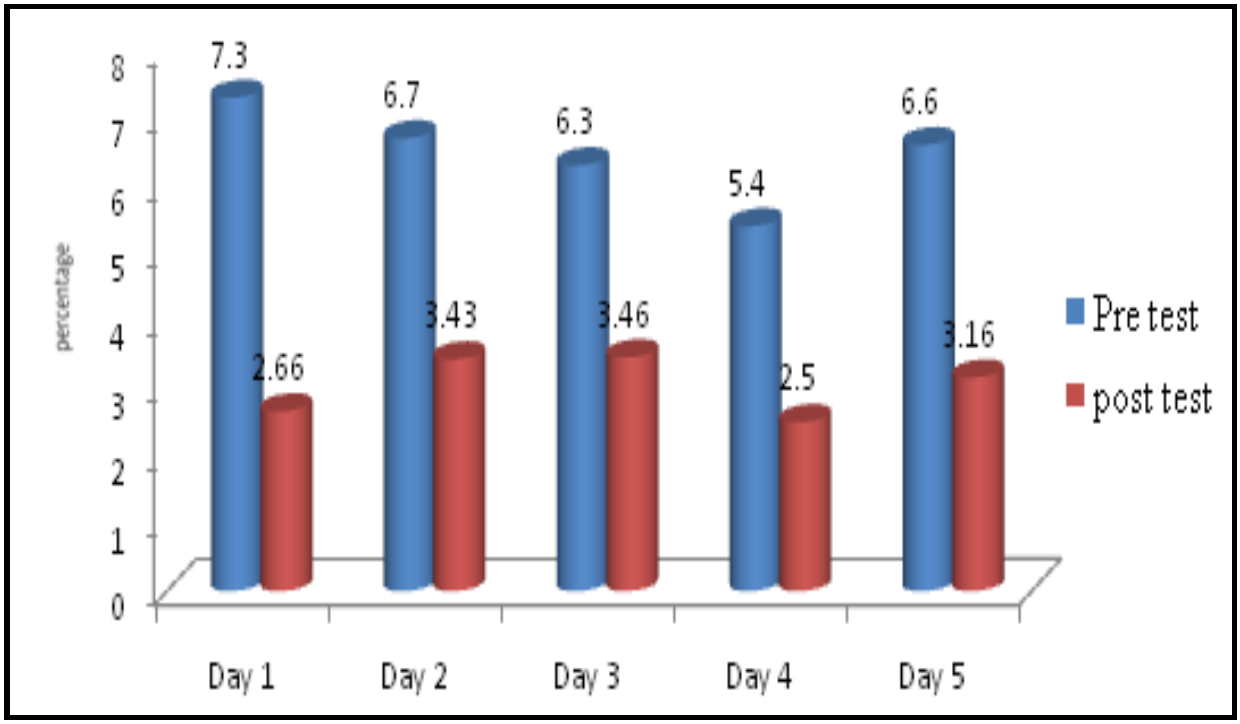

Figure No.1: Mean value of level of muscle cramps among patients undergoing hemodialysis in interventional group

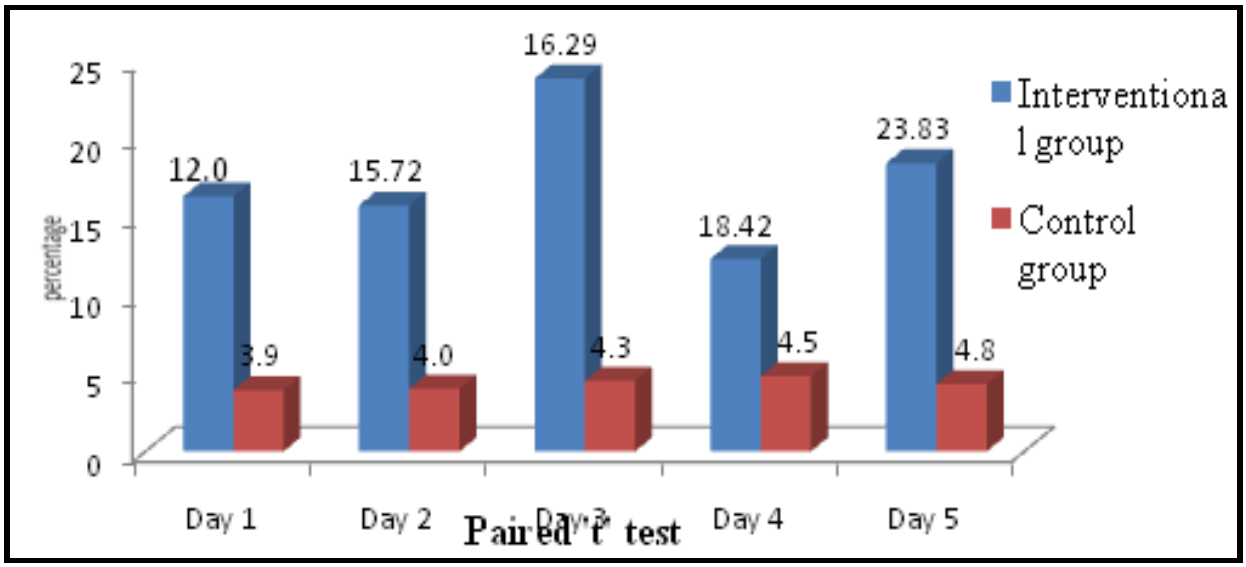

Figure No.2: Paired‘t’ test value level of muscle cramps among patients undergoing hemodialysis in Interventional and Control group

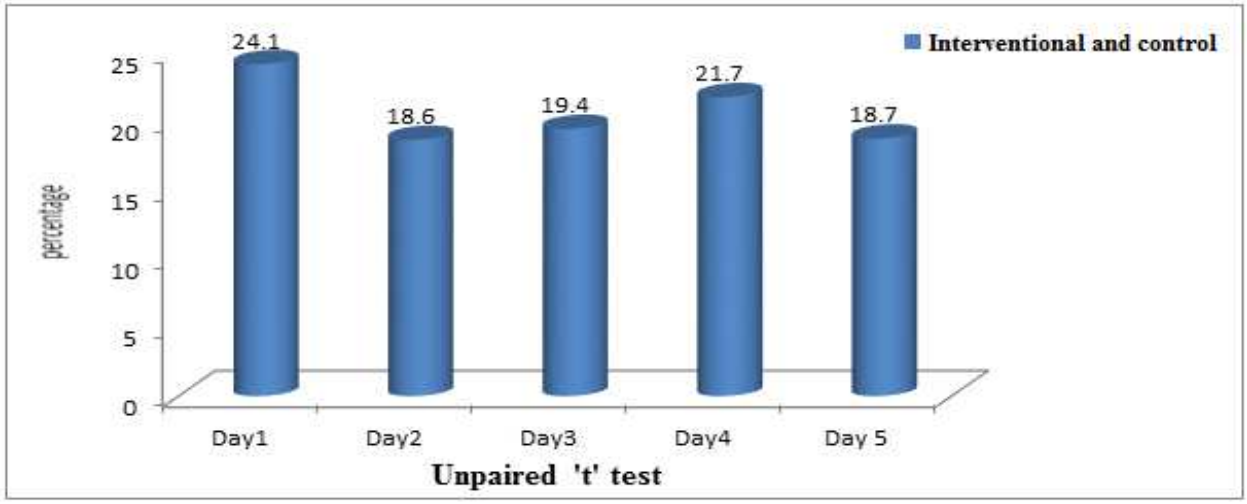

Figure No.3: Unpaired‘t’ test level of muscle cramps among patients undergoing hemodialysis in Interventional and Control group

CONCLUSION

The main conclusion drawn from this present study was that most of the patients undergoing hemodialysis had significant level of muscle cramps. After stretching exercise session, it was found that there had been a significant level of reduction in muscle cramps. Participants felt comfortable and also expressed high level of satisfaction towards administration of stretching exercise.

It is thus concluded that, intradialytic stretching exercise is an effective and simple strategy to reduce muscle cramps among patients undergoing hemodialysis.

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CONFLICT OF INTEREST

We declare that we have no conflict of interest.

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