

Effectiveness of intradialytic stretching exercises on muscle cramps among patients undergoing haemodialysis in a selected tertiary care hospital Kancheepuram district, Tamil Nadu, India.

## ABSTRACT:

**Background:** Chronic kidney disease is the vital and non-communicable disease epidemic that affects the world population including India. Muscle cramps are a common complication of haemodialysis treatments and they often result in the early termination of the session, it is an important priority to provide timely intervention to improve their muscle cramps of haemodialysis patients. **Material and Methods:** The aim of the study is to evaluate the effectiveness of intradialytic stretching exercises on muscle cramps among patients on haemodialysis. Time series quasi experimental design was conducted in dialysis unit of Chettinad Super Specialty Hospital, Kelambakkam at Chengalpeta District, Tamil Nadu, India. Total sample of 138 belong to 30 to 60 years were selected with the use of purposive sampling technique as per the statistical calculation and equally allocated to control 69 samples and to Study group 69. The structured questionnaire are demographic, Clinical variables & Modified cramps questionnaire chart was used to assess the effectiveness of intradialytic stretching exercises on level of muscle cramps.

**Results:** The majority finding of the study results that in pre test 32 (46.4 %) of the patients were in mild muscle cramps in post test 1. More than half of the patients 30 (43.5 %) of moderate muscle cramps in post test 2. And majority 40 (58 %) of the patients in moderate muscle cramps in post test 3. The effect of intradialytic stretching exercises in reducing the level of muscle cramps during haemodialysis. **Conclusion:** Intradialytic stretching exercises is an effective method which can be used as a preventive therapy in the treatment of muscle cramps.

**Key points:** Haemodialysis, Intradialytic stretching exercises, Muscle cramps, Effectiveness.

## INTRODUCTION:

Chronic kidney disease is an emerging worldwide public health problem<sup>1</sup>. Pathogenesis of chronic kidney failure challenges the functions of human body and puts irreversible progressive damage to renal mass and causing metabolic and hydro electrolytic imbalances<sup>2</sup>. "The overall global prevalence of CKD increased from 147, 598, in 1990 to 275,929,799.20 in 2016, representing an 86.95% increase in prevalence over the last 27 years"<sup>3</sup>. Haemodialysis is one of the universal treatments for patients with chronic renal failure. Manifestation of complications can occur throughout hemodialysis treatment such as nausea, vomiting, back pain, Headache, hypotension and muscle cramps. Among these muscle cramps are the most notable complication of haemodialysis treatment<sup>4</sup>. 33% to 86 % of patients had the complaints of muscle cramps

during haemodialysis<sup>5</sup>. Muscle Cramps occur suddenly and last from a few seconds to several minutes. Cramps influence calves, arms, hands, abdominal muscles and particularly lower limbs<sup>6,7</sup>. The severity of cramps occurring with dialysis treatment dreadfully high and as a result it has a significant negative impact on health-related quality of life. In some patients, it can be severe enough to cause termination of Haemodialysis<sup>8</sup>.

Muscle Cramps commonly occurs during the end of the haemodialysis<sup>9</sup> muscle cramps begin with fasciculation's or muscle twitches and are felt to be related to nerve conduction rather than the muscles themselves<sup>10</sup>. Copious factors such as volume contraction, hypotension, and changes in plasma osmolality, hyponatremia, tissue hypoxia, hypomagnesaemia, and elevated serum leptin influence the muscle cramps for patients undergoing haemodialysis. Painful contraction of the muscle could make psychological impact, yet Cramps have a trivial impact on patient's mood and quality of life which cause depression and contribute to lack of sleep. Non-pharmacological therapy forms the keystone of the management of muscle cramps.

## **MATERIAL AND METHODS:**

**Research approach and design:** Quantitative evaluative approach was followed, Time series quasi experimental design was found suitable for the study.

**Research setting:** The study was conducted in dialysis unit of Chettinad Super Specialty Hospital, Kelambakkam at Chengalpet District, Tamil Nadu.

**Population:** Total sample of 138 belong to 30 to 60 years were selected with the use of purposive sampling technique as per the statistical calculation and equally allocated to control 69 samples and to Study group 69.

**Sample:** In the present study the sample consists of the patients with muscle cramps while undergoing haemodialysis and who met inclusion criteria.

### **Criteria for sample selection:**

#### **Inclusion criteria:**

- ❖ Patients who are in the age group of 30 to 60 years
- ❖ Patients belong to male, female and trans gender
- ❖ Patients undergoing haemodialysis three times per week with muscle cramps.
- ❖ Patients who can understand Tamil or English language.

#### **Exclusion criteria:**

- ❖ Patients undergoing emergency haemodialysis.
- ❖ Patients on first cycle of haemodialysis.
- ❖ Patients with femoral catheter
- ❖ Patients with any lower limb disability

**Sample size estimation:** The sample size was calculated by using this formula:

**Sample size:**  $\beta n = 2^2 [Z\alpha/2 + Z^2/d^2] \alpha$  = Standard deviation.

$Z\alpha/2$  = Confidence interval of level of significance at 5% (0.05) = 1.96

$Z\beta$  = Power of the test of critical region is 80% are 0.84 d = Margin of error

At an attrition rate of 5% for each group, allowable error will be = 10%

$$n = 2(5.12)^2 [1.96 + 0.84]^2 / 2.5^2$$

$$= 52.4 (7.84) / (2.5)^2$$

$$= 410.8 / 6.25$$

$$= 65.72 + 3.2$$

$$= 68.92$$

**Sampling technique:** All patients who met the inclusion criteria were selected by using the purposive sampling technique.

**Research tool: The research tool consisted of two sections**

**Section A:** Questionnaire to collect demographic and clinical variables

**Section B:** Tool to assess muscle cramps

**Part I:** Demographic Variables: It includes age, gender, education and occupation of the patient.

**Part II:** Clinical variables: It includes, duration of haemodialysis treatment, experience of muscle cramps during haemodialysis, muscle cramps restrict activities and movements during haemodialysis, location of muscles cramps, muscles involved in cramps, co morbid illness.

**Section B: Tool to assess muscle cramps:**

Cramp questionnaire chart was used to assess the muscle cramps. The cramp questionnaire chart developed by Base math.S.S.Morris, permission was obtained. The cramp questionnaire chart designed to assess the level of muscle cramps during haemodialysis, before and after intervention. It contains various features of muscle cramps such as the frequency of muscle cramps, duration of muscle cramps, and level of pain, temperature and discomfort which was comprehensively scored as level of muscle cramps ranging from (0-13).

**Data analysis:** The data was analyzed and interpreted by descriptive and Inferential statistics by using SPSS-20 software. Descriptive analysis Frequency and percentage used for describing demographic and clinical variables. Mean and standard deviation used and Inferential Statistics Paired't' test used to find out the effectiveness of intradialytic stretching exercises by comparing pre test and post test on muscle cramps among patients undergoing haemodialysis. Chi square test used to find out an association between the post tests levels of muscle cramps with selected demographic and clinical variables among patients undergoing haemodialysis.

**Findings:**

**Table 1: Frequency and percentage distribution of demographic variables in both groups.**  
N=138

S.NO	Demographic Variables	Group 1 control (n=69)		Group 2 study (n=69)		$\chi^2$	P value
		f	%	f	%		
1	<b>Age in years</b>					0.280	0.963 NS
	30-39	16	23.3	15	21.6		
	41-49	21	30.4	23	33.4		
	50-59	17	24.6	15	21.6		
	≥ 60	15	21.7	16	23.4		
2.	<b>Gender</b>					2.895	0.088 NS
	Male	54	78.3	45	65.2		
	Female	15	21.7	24	34.8		
3.	<b>Education</b>					0.827	0.934 NS
	No formal education	13	18.8	11	15.9		
	Primary	15	21.7	12	17.4		
	Secondary	16	23.3	17	24.6		
	higher secondary	12	17.4	14	20.3		
	Graduate &	13	18.8	15	21.8		

	Post graduate						
4.	Occupation						
	Skilled worker	5	7.3	6	8.8	0.882	0.643 NS
	Unskilled worker	13	18.8	17	24.6		
	Unemployed	51	73.9	46	66.6		
P at 0.05 level							

**Table 2: Frequency and percentage distribution of patients according to their Clinical variables in group 1& 2.N=138**

S. No	Variables	Group 1 control ( n=69)		Group 2 Study (n=69)		X <sup>2</sup>	P value	
		f	%	f	%			
1.	Duration of your haemodialysis treatment						0.725	0.695 NS
	less than 12 months	23	33.3	20	28.9			
	1-2 years	14	20.4	18	26.2			
	> 2 years	32	46.3	31	44.9			
2.	Experience the muscle cramps during haemodialysis						1.167	0.557 NS
	First hour	14	20.3	19	27.5			
	Middle hour	22	31.9	22	31.9			
	Last hour	33	47.8	28	40.6			
3.	Muscle cramps restrict activities and movements during heamodialysis						0.031	0.858 NS
	Yes	45	65.2	44	63.8			
	No	24	34.8	25	36.2			
4.	Location of muscle cramps						3.466	0.176 NS
	Right leg	31	44.9	34	49.3			
	Left leg	31	44.9	22	31.9			
	Both legs	7	10.2	13	18.8			
5.	Muscles involved in Cramps						1.434	0.488 NS
	Calf muscle	34	49.3	41	59.4			
	Hamstring muscle	24	34.8	19	27.5			
	Soleus muscle	11	15.9	9	13.1			
6.	Co morbid illness						0.332	0.564 NS
	Systemic hypertension	52	75.4	49	71.0			

	Diabetes Mellitus with Systemic Hypertension	17	24.6	20	29.0		
P at 0.05 Level							

**Table 3: Effectiveness of Intradialytic stretching exercises on level of muscle cramps among patients undergoing haemodialysis in Group 2.**

PARAMETER	GROUP	PRETEST		3 <sup>rd</sup> POST TEST		Mean Difference	t Value	P Value
		MEAN	SD	MEAN	SD			
Level of Muscle Cramps	Group 2	3.464	0.719	2.101	0.769	1.362	10.185	0.000 S

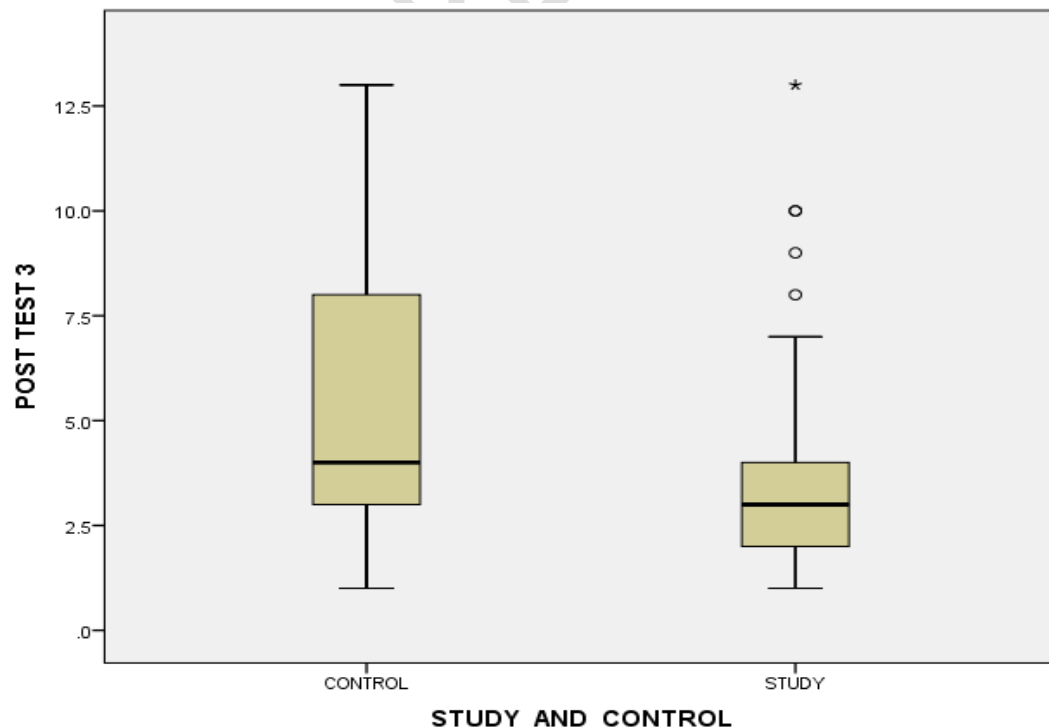
S-significant

**Table 4: Comparison of Intradialytic stretching exercise on level of muscle cramps among patients undergoing hemodialysis in group 1 and group 2.**

Sl. No	Groups	Post test		Mean difference	Calculated 't' value	P Value
		Mean	SD			
1	Group 1	2.652	.854	0.666	5.002	0.000
2	Group 2	2.101	.769	1.362	10.185	0.000

Statistically Significant-\*p<0.000

**FIGURE 1: BOX PLOT COMPARES THE POST TEST -3 STUDY AND CONTROL GROUP:**



Figures 1: The figure depicts that the thick middle is the median. Post test -3 mean score was reduced from 0.769 to 0.854 among study and control group.

## DISCUSSION:

This study was carried out to assess the Effectiveness of Intradialytic Stretching Exercises on Muscle Cramps Among Patients Undergoing Haemodialysis in a Selected Tertiary Care Hospital Kancheepuram District, Tamil Nadu, India. Since the p-value was small ( $< 0.05$ ) the findings to the acceptance of the hypothesis that there was a significant reduction in muscle cramps after performance of intradialytic stretching exercises.

Among 69 of the patients having muscle cramps majority 32 (46.4 %) of the patients were in mild muscle cramps in post test 1. More than half of the patients 30 (43.5 %) of moderate muscle cramps in post test 2. And majority 40 (58 %) of the patients in moderate muscle cramps in post test 3. The results revealed that the effect of intradialytic stretching exercises in reducing the level of muscle cramps during haemodialysis. The study supported by **Lekha.J** (2016) conducted on performing intradialytic stretching exercises reduces the level of muscle cramps were statistically significant with the level of significance at  $p < 0.05$ . The data shows that there was no significant difference between the intradialytic stretching exercises and the routine treatment during the post test I, 11 and 111<sup>(11)</sup>. The reduction of Muscle Cramps from pre test to post test, the mean was 9.8 to 3.5 and in standard deviation 1.62 to 1.51. The mean difference was statistically significant [ $t = 30.34$  df = 59 and  $P < 0.05$ ]. The study results shows that intradialytic stretching exercise was effective in reducing Muscle Cramps during dialysis.

The present study results shows that percentage distribution of age revealed that in Group 1 majority 21 (30.4 %) of the patients belong to 41-49 years, group 2 23 (33.4 %) of the patients above the same years. The study was supported by **Sasirekha. C** (2017) who conducted a study to assess effectiveness of intradialytic stretching exercise on muscle cramps among patients undergoing hemodialysis at selected hospitals, Salem. The study results revealed that majority 10 (33.34 %) of the patients were experimental group between the age group of 41-50 years<sup>(12)</sup>. In group 1 nearly half of the male patients 54 (78.3 %), education 16 (23.2 %) of the patients secondary education, and occupation 51 (73.9 %) of the patients unemployed comparing group 2 male majority 45 (65.2 %) of the patients, education 17 (24.6 %) of the patients secondary education, occupation 46 (66.6 %) of the patients unemployed. The presents study was supported by **Sasirekha.C** (2017) who conducted a study to assess effectiveness of intradialytic stretching exercise on muscle cramps among patients undergoing hemodialysis at selected hospitals, Salem. In gender revealed that nearly half of the male majority 18 (60 %) of the patients were experimental group 20 (66.66 %) of the patients were control group<sup>(12)</sup>. The present study supported that **Lekha.J** (2016) conducted a effectiveness of intradialytic stretching exercises on prevention and reduction of muscle cramps among patients undergoing hemodialysis at psg college of Nursing, Coimbatore. The results revealed that majority 16 (53.3 %) of the patients were secondary education in intervention group, the majority 15 (50 %) of the patients were suffered unemployed in intervention group and 21 (70 %) of the patients unemployed in comparison group<sup>(11)</sup>.

Percentage distribution duration of dialysis treatment revealed that majority 32 (46.3 %) of the patients are group 1 and 31 (44.9 %) of the patients are group 2 belong to  $\geq 2$  years, experience of muscle cramps during hemodialysis majority 33 (47.8 %) of the patients in group 1 and 28 (40.6 %) of the patients in group 2 from the last hour. Muscle cramps restrict activity and movements during hemodialysis majority 45 (65.2 %) of the patients were in group 1 and 44 (63.8 %) of the patients were in group 2 feeling says that yes. Location of the muscle cramps majority 31 (44.9 %) of the patients were suffered right and left leg in group 1 whereas majority 34 (49.3 %) of the patients were suffered only right leg in group 2. Most of the patients calf muscle involved in the majority 34 (49.3 %) of the patients were in group 1, 41 (59.4 %) of the patients were in group 2. Co morbid illness majority 52 (75.4 %) of the patients were in group 1, 49 (71 %) of the patients were group 2. The study supported that **Lekha.J** (2016) conducted a effectiveness of intradialytic stretching exercises on prevention and reduction of muscle cramps among patients undergoing

hemodialysis at psg college of Nursing, Coimbatore. The study results revealed that cramps occurred during hemodialysis majority 25(83.3 %) of the patients were intervention, 15 (50 %) of the patients were in comparison group suffered last hour. Muscle cramps restrict the activities and movements majority 30 (100 %) of the patients were equal in both groups says that yes. Location of muscle cramps majority 13 (43.3 %) of the patients in intervention group, 12(40 %) of the patients in comparison group. Muscles involved in cramps majority 15(50 %) of the patients are intervention group, 21 (70 %) of the patients are comparison group. The results of the present study revealed that there were no statistical significant differences in demographic and clinical variables between the study and control groups which included age, gender, education, occupation, and duration of haemodialysis treatment, restrict activity and movements during haemodialysis, location of muscle cramps, experience of muscle cramps, muscles involved in cramps, co morbid illness<sup>(12)</sup>.

During haemodialysis treatment most of the patients experience of muscle cramps. This study was taken up to assess the effectiveness of intradialytic stretching exercises to reduce the level of muscle cramps among patients undergoing haemodialysis at Chettinad Super Specialty Hospital, Kelambakkam Tamil Nadu, India.

## **CONCLUSION:**

The study was proven that intradialytic stretching exercises is an effective method which can be used as a preventive therapy in the treatment of muscle cramps. The study concluded that intradialytic stretching exercises can be performed regularly to reduce the level of muscle cramps among the patients undergoing haemodialysis.

## **ETHICAL CLEARANCE:**

Ethical Approval obtained Institutional Human Ethics Committee.

## **REFERENCE:**

1. Corinna Hawkes, Derek yoch, Clinn Gould et al. The global burden of chronic diseases: Overcoming impediments to prevention and control. *Journal of the American Medical Association*. 2009; 291, June 21(2): 2616-2622.DOI: 10.1001/jama.291.21.2616.
2. Csaba P Kovesdy, MD, FASN et al. Pathogenesis, consequences, and treatment of metabolic acidosis in chronic kidney disease; Feb 2020.
3. Yan Xie et al. Analysis of the Global Burden of Disease study highlights the global, regional, and national trends of chronic kidney disease epidemiology from 1990 to 2016;2018 Sep; 94(3):567-581. Doi: 10.1016/j.kint.2018.04.011.
4. Guy H. Neild et al. Life expectancy with chronic kidney disease: an educational review. *Journal of the Pediatric Nephrology (Berlin Germany)*. 2016; 26 Apr 32(2): 243–248 .PMC5203814. Doi: 10.1007/s00467-016-3383-8.
5. Mohammad Reza Asgari et al. Incidence and severity of nausea and vomiting in a group of maintenance hemodialysis patients. *Journal of Renal Injury prevention*. 2017; Sep 3 6(1): 49–55. Doi: 10.15171/jrip.2017.09.
6. Yong GL, D Jewell M.D et al. Intervention for leg cramps in pregnancy. *Cochrane database system Review*. 2002 ;(1):CD000121.Doi:10.1002/14651858.
7. Vishal Kwatra, Muhammad Adnan Khan , Syed A Quadri et al. Differential diagnosis and treatment of Restless leg syndrome. *Literature Review*. 2018 Sep; 10(9):e3297. Doi:10.7759/cureus.3297.

8. Beladi-Mousavi SS, Alemzadeh-Ansari MJ, Alemzadeh-Ansari MH, Beladi-Mousavi M et al. Long-term survival of patients with end-stage renal disease on maintenance hemodialysis. Iran Journal Kidney Disease. 2012 Nov; 6(6):452-6.
9. Ahmad S, Robertson HT, Golper TA, et al. Multicenter trial of L-carnitine in maintenance hemodialysis patients. II. Clinical and biochemical effects. Kidney Int. 1990 Nov; 38(5):912-8. Doi:10.1038/ki.1990.290.
10. Rocco MV, Burkart JM et al. Prevalence of missed treatments and early sign-offs in hemodialysis patients. J Am Soc Nephrol .1993; 4:1178 – 83.
11. Lekha J et al. Effectiveness of Intradialytic Stretching Exercises on Prevention and Reduction of Muscle Cramps among Patients undergoing Haemodialysis at Coimbatore. Journal of Nursing and Health Science (IOSR-JNHS e-ISSN: 2320–1959.p- ISSN: 2320–1940. Mar. - Apr. 2017; 6(2): 47 - 53.
12. Samah Saad Salem<sup>1</sup> et al. Effectiveness of intra-dialytic stretching exercises on leg muscle cramp among hemodialysis patients at Kasr El-Einy Center Salem. Journal of Nursing and Health Science. Mar. – Apr 2017; 6(2): 47-53. Doi: 10.9790/1959-0602094753.

UNDER PEER REVIEW