Advanced International Journal for Research (AIJFR)
E-ISSN: 3048-7641 ● Website: www.aijfr.com ● Email: editor@aijfr.com

A Quasi-Experimental Study to Assess the Combine Effect of Intradialytic Leg Stretching Exercises and Lavender Oil Massage On Reduction of Muscle Cramps Among Patients Undergoing Hemodialysis at Selected Hospitals.

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ABSTRACT

INTRODUCTION: Chronic kidney disease is a major global health problem, with hemodialysis being the most common renal replacement therapy in India. Muscle cramps are a frequent and distressing complication of hemodialysis, often leading to discomfort and premature termination of dialysis sessions. Non-pharmacological interventions such as intradialytic leg stretching exercises and lavender oil massage may help reduce muscle cramps and improve patient comfort. **OBJECTIVES OF THE STUDY:** 1. To assess the level of muscle cramps among patients undergoing hemodialysis in the experimental and control group. 2. To compare muscle cramp scores between experimental and control groups among patients undergoing hemodialysis. 3. To find out the association between muscle cramp scores and selected demographic variables in both experimental and control groups. **MATERIAL AND METHOD:** An experimental study was conducted among 92 hemodialysis patients (46 experimental and 46 control) selected using a non-probability purposive sampling technique. A self-structured Numerical Rating Scale was used to assess muscle cramps. The experimental group received intradialytic leg stretching exercises followed by lavender oil massage, while the control group received routine care. Post-test assessment was done after the dialysis session.

RESULT: Post-test mean muscle cramp score in the experimental group was significantly lower (Mean = 2.95 ± 3.21) compared to the control group (Mean = 7.08 ± 4.21). The difference was statistically significant ($t = 5.28$, $p = 0.001$), indicating the effectiveness of the combined intervention. **CONCLUSION:** The combined therapy of intradialytic leg stretching exercises and lavender oil massage was effective in reducing muscle cramps among patients undergoing hemodialysis and can be safely

incorporated into routine nursing care.

KEYWORDS: Hemodialysis, Muscle Cramps, Intradialytic Stretching, Lavender Oil Massage.

1. INTRODUCTION

The kidneys are vital organs responsible for maintaining internal homeostasis. They filter waste products and excess fluids, regulate electrolyte and acid–base balance, control blood pressure, and secrete hormones such as erythropoietin, renin, and calcitriol, which are essential for red blood cell production and bone health.[1]

Chronic kidney disease (CKD) is a major global public health concern affecting more than 850 million people worldwide and is projected to become the fifth leading cause of years of life lost by 2040. The burden of CKD is particularly high in low- and middle-income countries, including India, where limited healthcare resources and financial constraints often lead to delayed treatment and progression to end-stage kidney disease (ESKD). Hemodialysis is the most commonly used kidney replacement therapy; however, the increasing demand has placed considerable strain on dialysis services.[2]

End-stage kidney disease is an expanding global health challenge, especially in resource-limited settings where access to kidney replacement therapy remains inadequate. Global data indicate significant disparities in treatment availability, and the demand for kidney replacement therapy is expected to more than double by 2030, highlighting the need for effective and accessible management strategies.[3]

Hemodialysis, although life-sustaining, is associated with several complications such as hypotension, nausea, disequilibrium syndrome, and muscle cramps. Muscle cramps are among the most common and distressing complications, affecting 33% to 86% of patients and often resulting in premature termination of dialysis sessions.[4]

Muscle cramps significantly impair patient comfort, dialysis tolerance, and quality of life. They remain one of the most frequent intradialytic complications reported among patients undergoing hemodialysis.[5]

Exercise therapy has been identified as an effective non-pharmacological intervention for patients with CKD. Intradialytic stretching exercises improve muscle flexibility, circulation, dialysis adequacy, and health-related quality of life, and are recommended as low-intensity interventions for patients with ESKD.[6]

Lavender oil, derived from Lavandula angustifolia, possesses analgesic, anti-inflammatory, and muscle-relaxant properties and has been widely used to relieve pain, stress, and muscle discomfort. Studies have demonstrated its effectiveness in reducing muscle cramps and improving overall well-being among patients undergoing hemodialysis.[7]

Massage therapy using lavender oil has been shown to reduce neuromuscular discomfort and improve quality of life in hemodialysis patients. This intervention is simple, cost-effective, non-invasive, and free from adverse effects, making it suitable for routine nursing practice.[8]

Lavender oil massage has also been found to be effective in reducing muscle cramps among hemodialysis patients and can be safely incorporated as a complementary therapy alongside routine dialysis care.[9]

In view of the high prevalence of muscle cramps and the benefits of non-pharmacological nursing interventions, the present study was undertaken to evaluate the effectiveness of combined intradialytic leg stretching exercises and lavender oil massage in reducing muscle cramps among patients undergoing

hemodialysis.

2. SUBJECTS AND METHODS

An experimental research design was adopted for the present study. Non-probability purposive sampling technique was used to select 92 patients undergoing hemodialysis (46 in the experimental group and 46 in the control group) from the dialysis unit of selected hospitals of the city. A Numerical Rating Scale was used to assess the level of muscle cramps among the study participants. The experimental group received combined intradialytic leg stretching exercises and lavender oil massage, while the control group received routine care.

3. RESULTS AND DISCUSSION

Result shows in this study that in the experimental group majority of the samples 22 (47.83%) experienced no muscle cramps, 11 (23.91%) had mild cramps, 8 (17.39%) had moderate cramps, and 5 (10.87%) had severe cramps, whereas none of the samples experienced very severe cramps. In the control group, majority of the samples 16 (34.78%) experienced moderate cramps, 14 (30.43%) experienced severe cramps, 8 (17.39%) experienced no cramps, 5 (10.87%) experienced mild cramps, and 3 (6.52%) experienced very severe cramps. The post-test mean muscle cramp score in the experimental group was 2.95 with a standard deviation of 3.21, whereas in the control group the mean score was 7.08 with a standard deviation of 4.21. The calculated t value was 5.28 at the level of $p < 0.05$, indicating that the combined intradialytic leg stretching exercises and lavender oil massage were effective in reducing muscle cramps among patients undergoing hemodialysis.

There was no statistically significant association found between post-test muscle cramp scores and selected demographic variables in both experimental and control groups.

Section I: Table No. 1 Frequency and percentage distribution of patients undergoing hemodialysis according to their socio demographic characteristics in experimental and control group.
N=92

Sr. No	Demographic variables	Category	Experimental group (N=46)		Control group (N=46)	
			Frequency	Percentage %	Frequency	Percentage %
1	Age	<=30	2	4.35	8	17.39
		31-40	10	21.74	6	13.04
		41-50	8	17.39	7	15.22
		>50	26	56.52	25	54.35
2	Gender	Male	32	69.57	28	60.87
		Female	14	30.43	18	39.13
3	Religion	Hindu	39	84.78	43	93.48
		Muslim	1	2.17	0	0.00
		Christian	0	0.00	1	2.17
		Other	6	13.04	2	4.35
4	Marital status	Married	42	91.30	40	86.96

		Single	4	8.70	6	13.04
		Widow	0	0.00	0	0.00
		Divorce	0	0.00	0	0.00
5	**Personal habits**	Smoking	3	6.52	2	4.35
		Alcoholism	2	4.35	2	4.35
		Tobacco use	12	26.09	11	23.91
		Other	29	63.04	31	67.39
6	**Dietary pattern**	Vegetarian	9	19.57	14	30.43
		Mixed	32	69.57	26	56.52
		Vegan	3	6.52	4	8.70
		Ovo-vegetarian	2	4.35	2	4.35
7	**Sleeping pattern**	4-6 hours sleep per day	8	17.39	12	26.09
		6-8 hours sleep per day	22	47.83	16	34.78
		8-10 hours sleep per day, irregular schedule with disturbance	10	21.74	7	15.22
		8-10 hours sleep per day, regular schedule with no disturbance	6	13.04	11	23.91
8	**Occupation**	Home maker	14	30.43	24	52.17
		Daily wages	9	19.57	9	19.57
		Services	6	13.04	6	13.04
		Business	7	15.22	4	8.70
		Farmer	10	21.74	3	6.52
9	**Family income in rupees per month**	<10000	10	21.74	14	30.43
		10000-20000	14	30.43	14	30.43
		20001-30000	8	17.39	11	23.91
		>30000	14	30.43	7	15.22
10	**Educational status**	No formal education	4	8.70	6	13.04
		Primary school education	10	21.74	10	21.74
		Secondary school education	8	17.39	12	26.09
		Higher	15	32.61	5	10.87

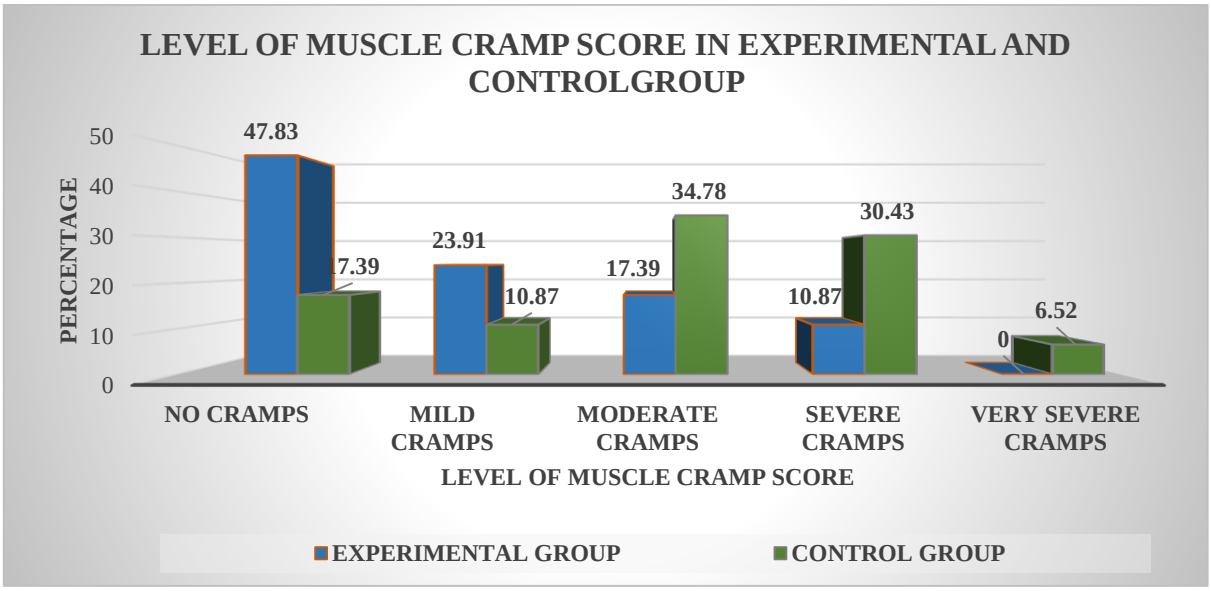
		secondary education				
		Graduate and above	9	19.57	13	28.26
11	**Duration of kidney failure diagnosis in months**	<=6	6	13.04	10	21.74
		7-12	7	15.22	8	17.39
		13-18	6	13.04	6	13.04
		19-24	9	19.57	6	13.04
		>=25	18	39.13	16	34.78
12	**Duration of dialysis treatment for kidney failure in months**	<=6	13	28.26	16	34.78
		7-12	7	15.22	4	8.70
		13-18	7	15.22	9	19.57
		19-24	3	6.52	4	8.70
		>=25	16	34.78	13	28.26
13	**Frequency of haemodialysis per month**	1-2	0	0.00	0	0.00
		3-4	2	4.35	1	2.17
		5-6	3	6.52	0	0.00
		7-8	29	63.04	30	65.22
		>=9	12	26.09	15	32.61
14	**Comorbid illnesses**	Diabetes	1	2.17	0	0.00
		Hypertension	31	67.39	33	71.74
		Diabetes with hypertension	14	30.43	13	28.26
		Vascular disorders	0	0.00	0	0.00
		Other comorbid illness (specify if any)	0	0.00	0	0.00
15	**Medication regimen**	Analgesics drugs	0	0.00	0	0.00
		Anti-hypertensive drugs	31	67.39	33	71.74
		Anti-diabetic drugs	2	4.35	0	0.00
		Anti-hypertensive drugs and anti-diabetic drugs	12	26.09	8	17.39

		Combination of analgesic, anti-hypertensive and anti-diabetic drugs	1	2.17	5	10.87
		Other drugs (specify if any)	0	0.00	0	0.00

Section II: Table no. 2 – Frequency and Percentage distribution of post- test level of muscle cramp score in experimental and control group immediately after hemodialysis session.
N=92

Level of muscle cramp score	Score	Experimental group		Control group	
		Frequency	Percentage	Frequency	Percentage
No cramps	0	22	47.83	8	17.39
Mild cramps	1-4	11	23.91	5	10.87
Moderate cramps	5-8	8	17.39	16	34.78
Severe cramps	9-12	5	10.87	14	30.43
Very severe cramps	13-16	0	0.00	3	6.52

Above table shows, frequency and percentage distribution of post- test level of muscle cramp score in experimental and control group immediately after hemodialysis session. In experimental group majority of samples 22(47.83%) experienced no cramps, 11(23.91%) experienced mild cramps, 8(17.39%) experienced moderate cramps, 5(10.87%) experienced severe cramps and none experienced very severe cramps, whereas in control group majority of samples 16(34.78%) experienced moderate cramps, 14(30.43%) experienced severe cramps, 8(17.39%) experienced no cramps, 5(10.87%) experienced mild cramps and 3(6.52%) experienced very severe cramps.



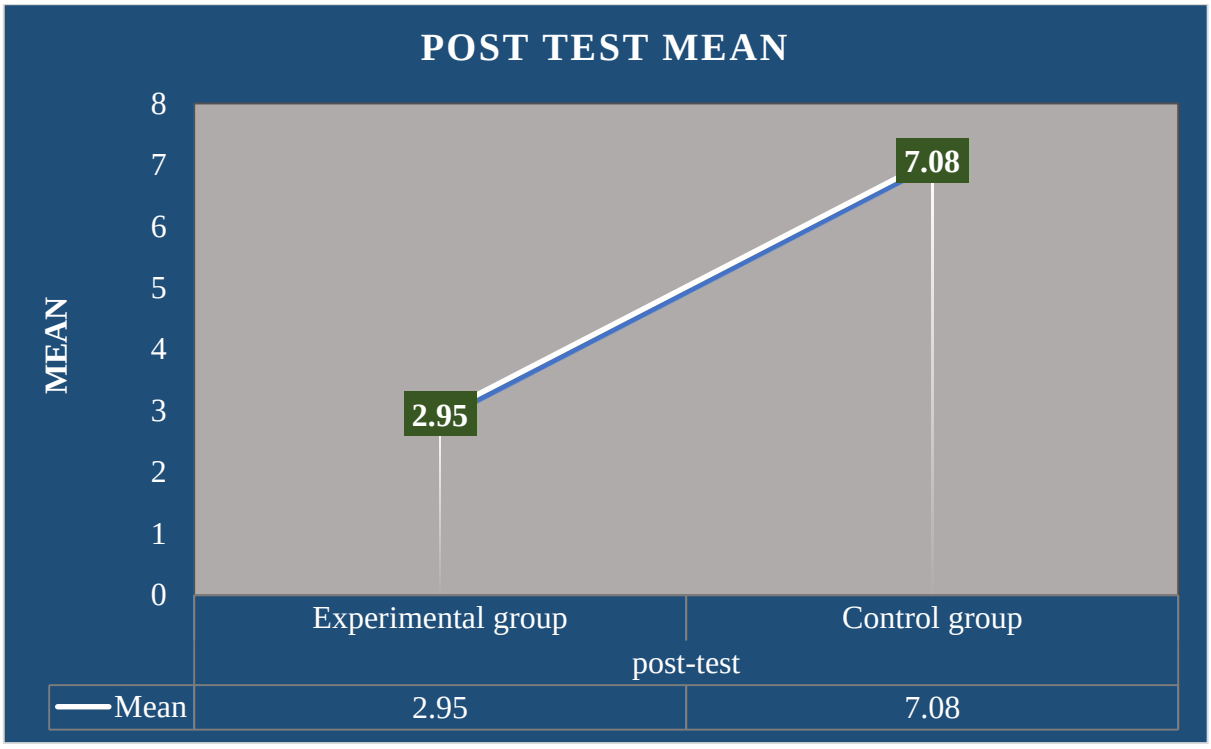
Percentage distribution of post- test level of muscle cramp score in experimental and control group.

Section III: Table no. 3 - Effectiveness of combined therapy including intradialytic leg stretching exercises and lavender oil massage on post-test level of muscle cramps among patients undergoing hemodialysis.

N=46 + 46 = 92

Sr.no.	Group	Mean	SD	SEM	t	Df	P	Result
1	**Experimental group**	2.95	3.21	0.47	5.28	90	0.001	**Significant**
2	**Control group**	7.08	4.21	0.62				

The table shows that the experimental group post-test mean score was 2.95 (SD 3.21; SEM 0.47), while the control group mean score was 7.08 (SD 4.21; SEM 0.62). The calculated t value was 5.28 at the 0.05 level of significance with 90 degrees of freedom. As the p value was less than 0.05, it is concluded that intradialytic leg stretching exercises combined with lavender oil massage were effective in reducing muscle cramps among patients undergoing hemodialysis. Therefore, the null hypothesis was rejected and the research hypothesis was accepted.



Post Mean value of Experimental and Control group

Section IV: Table no. 4 - Association of level of muscle cramp with selected demographic variables of patients undergoing hemodialysis in experimental group.

Demographic variables	Level Of Muscle Cramp					Df	chi Square	p Value	Result
	No cramp	mild cramp	moderate cramp	severe cramp	very severe cramp				

1. AGE IN YEARS									
<=30	1	0	1	0	0	9	8.68	0.46	Not Significant
31-40	6	1	3	0	0				
41-50	5	1	1	1	0				
>50	10	9	3	4	0				
2. GENDER									
Male	15	7	8	2	0	3	5.76	0.12	Not Significant
Female	7	4	0	3	0				
3. RELIGION									
Hindu	19	8	7	5	0	6	8.49	0.20	Not Significant
Muslim	0	0	1	0	0				
Christian	0	0	0	0	0				
Other	3	3	0	0	0				
4. MARITAL STATUS									
Married	20	10	7	5	0	3	6.92	0.89	Not Significant
Single	2	1	1	0	0				
Widow	0	0	0	0	0				
Divorce	0	0	0	0	0				
5. PERSONAL HABITS									
Smoking	1	2	0	0	0	9	13.41	0.14	Not Significant
Alcoholism	0	0	1	1	0				
Tobacco use	5	3	4	0	0				
Other	16	6	3	4	0				
6. DIETARY PATTERN									
Vegetarian	6	2	1	0	0	9	12.93	0.16	Not Significant
Mixed	13	7	7	5	0				
Vegan	3	0	0	0	0				
Ovo-vegetarian	0	2	0	0	0				
7. SLEEPING PATTERN									

4-6 hours' sleep per day	2	2	1	3	0	9	25.01	0.00	Significant
6-8 hours' sleep per day	13	2	5	2	0				
8-10 hours' sleep per day, irregular schedule with disturbance	3	7	0	0	0				
8-10 hours' sleep per day, regular schedule with no disturbance	4	0	2	0	0				
8. OCCUPATION									
Home maker	8	4	0	2	0	12	16.00	0.19	Not Significant
Daily wages	5	0	4	0	0				
Services	2	2	0	2	0				
Business	3	2	2	0	0				
Farmer	4	3	2	1	0				
9. FAMILY INCOME IN RUPEES PER MONTH									
<10000	4	2	3	1	0	9	7.16	0.62	Not Significant
10000-20000	8	3	2	1	0				
20001-30000	3	4	1	0	0				
>30000	7	2	2	3	0				
10. EDUCATIONAL STATUS									
No formal education	1	2	0	1	0	12	12.44	0.41	Not Significant
Primary school education	6	3	1	0	0				
Secondary school education	4	0	3	1	0				
Higher secondary	5	4	4	2	0				

education									
Graduate and above	6	2	0	1	0				
11. DURATION OF KIDNEY FAILURE DIAGNOSIS IN MONTHS									
<=6	4	1	1	0	0	12	17.24	0.14	Not Significant
7-12	6	0	1	0	0				
13-18	1	3	1	1	0				
19-24	6	3	0	0	0				
>=25	5	4	5	4	0				
12. DURATION OF DIALYSIS TREATMENT FOR KIDNEY FAILURE IN MONTHS									
<=6	8	2	2	1	0	12	15.27	0.22	Not Significant
7-12	5	0	0	2	0				
13-18	2	4	1	0	0				
19-24	2	1	0	0	0				
>=25	5	4	5	2	0				
13. FREQUENCY OF HAEMODIALYSIS PER MONTH									
1-2	0	0	0	0	0	9	12.06	0.21	Not Significant
3-4	1	1	0	0	0				
5-6	1	0	1	1	0				
7-8	17	5	3	4	0				
>=9	3	5	4	0	0				
14. COMORBID ILLNESSES									
Diabetes	0	0	1	0	0	6	12.30	0.05	Not Significant
Hypertension	18	5	6	2	0				
Diabetes with hypertension	4	6	1	3	0				
Vascular disorders	0	0	0	0	0				
Other comorbid illness (specify if any)	0	0	0	0	0				
15. MEDICATION REGIMEN									

Analgesics drugs	0	0	0	0	0	9	11.98	0.21	Not Significant
Anti-hypertensive drugs	18	5	6	2	0				
Anti-diabetic drugs	0	1	1	0	0				
Anti-hypertensive drugs and Anti-diabetic drugs	4	4	1	3	0				
Combination of analgesic, anti-hypertensive and anti-diabetic drugs	0	1	0	0	0				
Other drugs (specify if any)	0	0	0	0	0				

Above table shows, association between post-test level of muscle cramp with selected demographic variables of patients undergoing hemodialysis in experimental group. To calculate the association with demographic variables chi square was applied and level of significance was observed at 0.05. The chi value of sleeping pattern was 25.01 with degree of freedom 9 was found to be significant. And there were no other selected demographic variables found association with post-test level of muscle cramp.

Table no. 5 - Association of level of muscle cramp with selected demographic variables of patients undergoing hemodialysis in control group.

Demographic variables	**Level Of Muscle Cramp**					**Df**	**chi Square**	**P Value**	**Result**
	No cramp	mild cramp	moderate cramp	severe cramp	very severe cramp				
1. AGE IN YEARS									
<=30	2	2	1	3	0	12	9.13	0.69	Not Significant
31-40	1	0	4	1	0				
41-50	1	1	2	3	0				
>50	4	2	9	7	3				

2. GENDER									
Male	5	3	11	7	2	4	1.16	0.88	Not Significant
Female	3	2	5	7	1				
3. RELIGION									
Hindu	8	4	15	13	3	8	6.26	0.61	Not Significant
Muslim	0	0	0	0	0				
Christian	0	0	1	0	0				
Other	0	1	0	1	0				
4. MARITAL STATUS									
Married	7	3	16	11	3	4	6.92	0.14	Not Significant
Single	1	2	0	3	0				
Widow	0	0	0	0	0				
Divorce	0	0	0	0	0				
5. PERSONAL HABITS									
Smoking	0	1	1	0	0	12	12.98	0.37	Not Significant
Alcoholism	1	0	0	1	0				
Tobacco use	1	0	7	3	0				
Other	6	4	8	10	3				
6. DIETARY PATTERN									
Vegetarian	5	0	4	3	2	12	13.86	0.31	Not Significant
Mixed	3	4	10	8	1				
Vegan	0	0	2	2	0				
Ovo-vegetarian	0	1	0	1	0				
7. SLEEPING PATTERN									
4-6 hours sleep per day	2	1	5	4	0	12	13.32	0.34	Not Significant
6-8 hours sleep per day	3	0	8	4	1				
8-10 hours	0	1	1	4	1				

sleep per day, irregular schedule with disturbance									
8-10 hours sleep per day, regular schedule with no disturbance	3	3	2	2	1				
8. OCCUPATION									
Home maker	5	2	8	7	2	16	13.05	0.66	Not Significant
Daily wages	2	1	3	3	0				
Services	1	1	2	2	0				
Business	0	1	3	0	0				
Farmer	0	0	0	2	1				
9. FAMILY INCOME IN RUPEES PER MONTH									
<10000	2	1	7	4	0	12	15.39	0.22	Not Significant
10000-20000	3	1	6	2	2				
20001-30000	2	1	1	7	0				
>30000	1	2	2	1	1				
10. EDUCATIONAL STATUS									
No formal education	1	0	2	3	0	16	9.81	0.87	Not Significant
Primary school education	1	2	3	3	1				
Secondary school education	4	1	3	3	1				
Higher secondary education	0	1	2	1	1				
Graduate and above	2	1	6	4	0				
11. DURATION OF KIDNEY FAILURE DIAGNOSIS IN MONTHS									

<=6	3	1	2	2	2	16	19.52	0.24	Not Significant
7-12	0	0	3	5	0				
13-18	2	1	3	0	0				
19-24	0	2	3	1	0				
>=25	3	1	5	6	1				
12. DURATION OF DIALYSIS TREATMENT FOR KIDNEY FAILURE IN MONTHS									
<=6	3	1	5	5	2	16	20.39	0.2	Not Significant
7-12	0	0	1	3	0				
13-18	2	1	6	0	0				
19-24	0	2	0	2	0				
>=25	3	1	4	4	1				
13. FREQUENCY OF HAEMODIALYSIS PER MONTH									
1-2	0	0	0	0	0	8	9.3	0.31	Not Significant
3-4	0	0	1	0	0				
5-6	0	0	0	0	0				
7-8	3	3	11	12	1				
>=9	5	2	4	2	2				
14. COMORBID ILLNESSES									
Diabetes	0	0	0	0	0	4	3.58	0.46	Not Significant
Hypertension	7	3	12	10	1				
Diabetes with hypertension	1	2	4	4	2				
Vascular disorders	0	0	0	0	0				
Other comorbid illness (specify if any)	0	0	0	0	0				
15. MEDICATION REGIMEN									
Analgesics drugs	0	0	0	0	0	8	4.78	0.78	Not Significant
Anti-hypertensive drugs	7	3	12	10	1				

Anti-diabetic drugs	0	0	0	0	0				
Anti-hypertensive drugs and Anti-diabetic drugs	1	1	3	2	1				
Combination of analgesic, anti-hypertensive and anti-diabetic drugs	0	1	1	2	1				
Other drugs (specify if any)	0	0	0	0	0				

Above table shows, association between post-test level of muscle cramp with selected demographic variables of patients undergoing hemodialysis in control group. And there were no significant association found between post-test level of muscle cramp with selected demographic variables.

CONCLUSION

The study was conducted with the objectives to assess the effectiveness of combined intradialytic leg stretching exercises and lavender oil massage on muscle cramps among patients undergoing hemodialysis and to find out the association between muscle cramp scores and selected demographic variables. The study findings revealed that in the experimental group majority of the samples experienced no or mild muscle cramps, whereas in the control group most of the samples experienced moderate to severe muscle cramps. The post-test muscle cramp scores were significantly lower in the experimental group compared to the control group, indicating that the combined therapy was effective in reducing muscle cramps among patients undergoing hemodialysis. There was no significant association found between muscle cramp scores and selected demographic variables. The study suggests that combined intradialytic leg stretching exercises and lavender oil massage can be safely incorporated into routine nursing care. The following recommendations are made: similar studies can be conducted on a larger sample to generalize the findings; multicentre studies can be undertaken to enhance external validity; and comparative studies can be carried out to evaluate the effectiveness of other non-pharmacological interventions in reducing muscle cramps among hemodialysis patients.

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