

A Study to Assess the Effectiveness of Selected Nursing Interventions on Levels of Pain and Cramps among Patient with Av Fistula Undergoing Hemodialysis at Selected Dialysis Units of Bagalkot

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Abstract

Original Research Article

Background: Chronic kidney disease (CKD) is a long-term progressive disorder characterized by a gradual decline in renal function, often necessitating renal replacement therapy such as hemodialysis. Although hemodialysis sustains life in patients with end-stage renal disease, it is accompanied by various discomforts. Pain during arteriovenous (AV) fistula cannulation and intradialytic muscle cramps are common complications that affect patient comfort and adherence to treatment. Repeated puncturing of the AV fistula leads to tissue and vascular irritation, while fluid and electrolyte imbalances during dialysis contribute to muscle cramps. Non-pharmacological nursing strategies have been found effective in managing these issues. **Aim:** The study aimed to evaluate the effectiveness of cutaneous stimulation and intradialytic massage on pain and muscle cramp levels among patients with AV fistula undergoing hemodialysis. **Methodology:** A randomized pre-test post-test design was adopted. A total of 100 hemodialysis patients with AV fistula were selected from dialysis units at HSK Hospital, Bagalkot, and randomly divided into experimental and control groups. Data were analyzed using descriptive and inferential statistics, including mean, standard deviation, t-test, and chi-square test. **Results:** The mean AV fistula puncture pain score in the experimental group (2.16 ± 0.73) was significantly lower than in the control group (3.14 ± 0.83) ($t = 11.13$, $p < 0.0001$). Similarly, the mean leg cramp score was lower in the experimental group (11.9 ± 1.68) compared to the control group (13.8 ± 1.44) ($t = 7.025$, $p < 0.0001$). **Conclusion:** The study proved that administration of selected nursing interventions – cutaneous stimulation and intradialytic massage on reduction of pain and cramps among hemodialysis patients with the AV Fistula was effective, scientific, logical and cost-effective strategy.

Keywords: Assess, Effectiveness, Cutaneous stimulation, Intradialytic massage.

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INTRODUCTION

Chronic Kidney Disease (CKD) is a progressive condition in which the kidneys lose their ability to eliminate metabolic waste and maintain fluid and electrolyte balance [1]. As the CKD advances to end-stage renal failure, patients require renal replacement therapies, among which haemodialysis is most frequently used. Hemodialysis depends on a reliable vascular access, and the arteriovenous fistula (AVF) is remains the preferred method due to its longevity and fewer complications compared to other access types [2].

Despite its clinical advantages, repeated cannulation of the AVF during dialysis sessions often needs to considerable discomfort and pain for patients [3]. In addition to puncture pain, many patients experience muscle cramps during hemodialysis, which are associated with rapid fluid shifts, changes in blood flow and electrolyte imbalances. Thia complications can interrupt the treatment process, reduce tolerance to dialysis and adversely affect overall wellbeing and quality of life [4].

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Recently, non-pharmacological nursing interventions have gained importance in promoting patient comfort during hemodialysis. Cutaneous stimulation, such as transcutaneous nerve stimulation, can reduce pain by modifying sensory nerve transmission to the brain [5]. Likewise, intradialytic exercises and massage techniques have been shown to lessen the frequency and intensity of muscle cramps by enhancing circulation and muscle relaxation [6].

Considering these findings, the present study was undertaken to assess the effectiveness of selected nursing interventions such as cutaneous stimulation and intradialytic massage may play a meaningful role in reducing pain and cramps among patients undergoing hemodialysis.

MATERIAL AND METHODS

A Quantitative research approach was adopted for this study. The research design selected for the present study is Randomized control trial post - test only design. A sample of 100 hemodialysis patients with AV Fistula were selected from HSK Hospital Bagalkot. Written consent was taken from participants for the study. Socio-demographic variables, Clinical data, Categorical Pain Scale and Modified Muscle Cramp Assessment tool was used for data collection. The data was analyzed by using descriptive and inferential statistical in terms of frequency, percentage, mean, and standard deviation, paired “t” test and Chi square test.

Study Design

The research design selected for the present study is Randomized control trial post - test only design. Here experimental group and control group of hemodialysis patients with AV Fistula were selected from randomization.

Setting of the study

The present study was conducted at HSK Hospital, Bagalkot. The study setting was selected according to the availability of hemodialysis patients at HSK Hospital, Bagalkot.

Participants

In the present study, the participants were hemodialysis patients with AV fistula. The sample consisted of 100 hemodialysis patients who met the inclusion criteria, segregated 50 in each experimental and control group respectively.

Instruments

The study was conducted using a self-structured questionnaire that included items related to socio-demographic variables, clinical data, and personal characteristics of hemodialysis patients. The Categorical Pain Scale was used to assess AV fistula puncture pain, and the Modified Muscle Cramp Assessment Tool was used to assess muscle cramps.

Description of Data Collection Instruments

PART I: SOCIO-DEMOGRAPHIC DATA

The first part of the tool consisted of 13 items designed to obtain information on selected background factors such as age, gender, education, religion, income, marital status, type of family, duration of night sleep, dietary pattern, personal habits, recreational activities during AV fistula puncture, hydration level, and pre-dialysis weight.

PART II: CLINICAL DATA

The second tool consists of eight items for obtaining information about the clinical data such as comorbid conditions, period of hemodialysis in months, duration of presence of arteriovenous fistula in an arm, site of arteriovenous fistula, frequency of attending dialysis in a week, number of dialysis per month, techniques of arteriovenous cannulation, size of arteriovenous cannula used.

PART III: CATEGORICAL PAIN SCALE

The Categorical Pain Scale was used to assess the intensity of AV fistula puncture pain. It requires patients to rate their pain on a defined scale ranging from 1 to 5, where a score of 1 indicates mild pain, 2 indicates discomforting pain, 3 indicates distressing pain, 4 indicates horrible pain, and 5 indicates excruciating pain.

PART IV: MODIFIED MUSCLE CRAMP ASSESSMENT TOOL

The Modified Muscle Cramp Assessment Tool was used to assess the severity of muscle cramps. It requires patients to rate their cramps on a defined scale ranging from 1 to 4, where 1 indicates no cramps, 2 indicates mild cramps, 3 indicates moderate cramps, and 4 indicates severe cramps.

Data Collection Procedure:

The data collection was carried out from [date] to [date] among hemodialysis patients with arteriovenous (AV) fistula at BVVS HSK Hospital and Research Centre, Bagalkot. Permission for data collection was obtained from the Medical Superintendent of BVVS HSK Hospital prior to the commencement of the study. Written informed consent was obtained from all 100 participants. Hemodialysis patients with AV fistula were selected using a purposive sampling technique.

For the experimental group, cutaneous stimulation was administered for 10 minutes before puncturing the AV fistula cannula. For the management of leg cramps, intradialytic massage was provided for 20 minutes after one to one and a half hours of the hemodialysis procedure. The intradialytic massage included both active and passive movements of the upper and lower extremities performed during the hemodialysis session.

Following the intervention, the post-test levels of AV fistula puncture pain and muscle cramps were assessed using the Categorical Pain Scale and the Modified Muscle Cramp Assessment Tool, respectively.

Variables under Study:

Independent Variable: Cutaneous stimulation, Intradialytic massage.

Dependent Variable: Level of AV fistula puncture pain, Level of leg cramps among hemodialysis patients.

Sociodemographic Variables:

Age, Gender, Education, Religion, Income, Marital status, Type of family, Duration of sleep at night, Dietary pattern, Personal habits, Recreational activities during AV fistula puncture, Hydration level, Pre-dialysis weight.

Clinical Variables:

Comorbid conditions, Duration of hemodialysis (in months), Duration of presence of arteriovenous fistula in the arm, Site of arteriovenous fistula, Frequency of dialysis sessions per week, Number of dialysis sessions per month, Technique of arteriovenous cannulation, Size of arteriovenous cannula used.

Statistical Analysis:

The obtained data were statistically analyzed in accordance with the objectives of the study using both descriptive and inferential statistics. A master data sheet was prepared based on the responses provided by the study participants. Frequency and percentage were used to analyze the sociodemographic and clinical variables. The t-test was applied to determine the significance of the difference between the experimental and control group scores for arteriovenous fistula puncture pain and muscle cramps among hemodialysis patients with AV fistula. The chi-square test was used to find the association between selected sociodemographic and clinical variables and the post-test levels of pain and cramps among hemodialysis patients.

Ethical Approval:

Ethical clearance was obtained from the Human Ethics Committee of the Surgical Institute of Nursing Sciences, Bagalkot prior to the commencement of the study.

RESULTS

Part I: Socio-demographic Variables

In the experimental group, the majority of patients (27; 54%) were aged 36–50 years, followed by 21 (42%) above 50 years and 2 (4%) aged 20–35 years, whereas in the control group, the majority (27; 54%) were above 50 years, 20 (40%) were 36–50 years, and 3 (6%) were 20–35 years. Most participants were male in both groups (34; 68% experimental and 32; 64% control). Religion-wise, Hindus predominated (43; 86%

experimental and 37; 74% control), followed by Muslims (7; 14% and 13; 26% respectively). Educationally, the majority in the experimental group had completed P.U.C (25; 50%), 18 (36%) had 10th standard education, and 7 (14%) had no formal education, whereas in the control group, 24 (48%) were educated up to 10th standard, 19 (38%) up to P.U.C, and 5 (10%) had no formal education. Regarding occupation, homemakers were 18 (36%) and 12 (24%), agricultural workers 13 (26%) and 11 (22%), employed 9 (18%) and 12 (24%), unemployed 4 (8%) and 12 (24%), self-employed 2 (4%) in both groups, and coolie workers 4 (8%) and 1 (2%) respectively. The majority of experimental patients (32; 64%) had a monthly income between ₹10,000–₹20,000, while most in the control group (18; 36%) earned ₹20,000–₹30,000. Most participants were married (47; 94% experimental and 46; 92% control) and belonged to nuclear families (27; 54%) in the experimental group and joint families (29; 58%) in the control group. Dietary patterns showed that 41 (82%) experimental patients were vegetarians, whereas 33 (66%) in the control group were non-vegetarians.

A total of 27 (54%) experimental and 23 (46%) control group participants practiced regular exercise. The squeeze-ball technique was the most common activity (42; 84% experimental and 44; 88% control), followed by watching television (8; 16% and 2; 4%), and cloth spin activity was reported only by 4 (8%) in the control group. Regarding hydration, mild hydration was seen in 20 (40%) and 21 (42%), moderate in 28 (56%) and 29 (58%), and severe in 2 (4%) and none respectively. Based on pre-dialysis weight, 30 (60%) of experimental and 10 (20%) of control participants weighed 45–55 kg, 14 (28%) and 15 (30%) weighed 56–65 kg, 2 (4%) in each group weighed 66–75 kg, and 4 (8%) and 1 (2%) were above 75 kg. Hypertension was the most common comorbidity (36; 72% experimental and 31; 62% control), followed by diabetes mellitus (12; 24% and 19; 38%) and asthma (2; 4%) in the experimental group, while tuberculosis was not reported in either group.

Most experimental group patients (43; 86%) had undergone hemodialysis for 6–12 months and 7 (14%) for less than 6 months, while in the control group, 23 (46%) had dialysis for 6–12 months, 21 (42%) for 1–2 years, 5 (10%) for less than 6 months, and 1 (2%) for more than 2 years. Regarding duration of AV fistula, 22 (44%) experimental group patients had it for 6–12 months, 17 (34%) for more than 2 years, 5 (10%) for 1–2 years, and 5 (10%) for less than 6 months, whereas in the control group, 24 (48%) had fistulas for 1–2 years, 16 (32%) for 6–12 months, 9 (18%) for less than 6 months, and 1 (2%) for more than 2 years. All experimental group patients (50; 100%) had brachiocephalic fistulas, while in the control group 42 (84%) had brachiocephalic and 8 (16%) had radiocephalic fistulas. Dialysis frequency was mainly twice weekly (36; 72% experimental and 35; 70% control), with 9 (18%) and 9 (18%) having once-weekly

dialysis, and 5 (10%) and 6 (12%) thrice weekly. Area puncture was the predominant AV cannulation technique (42; 84%) in the experimental group, followed by the buttonhole technique (8; 16%), while in the control group area puncture (49; 98%) and rope ladder (1; 2%) were used. Most participants used a 16-gauge cannula

(38; 76% experimental and 47; 94% control), and the rest used a 17-gauge cannula (12; 24% and 3; 6%).

PART II: Comparison of the Post test score of Experimental and Control group of Arteriovenous Fistula Puncture Pain and leg cramps.

Table 2: Depicts the Mean and Standard Deviation of Pre-test and Post test score of Experimental and Control group of Arteriovenous Fistula Puncture Pain and leg cramps

	Experimental group				Control group			
	Pretest		Post test		Pretest		Post test	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
AVF PP	3.14	0.63	2.16	0.73	2.84	0.61	1.92	0.62
Leg cramp	13.8	1.44	11.9	1.68	12.8	1.54	9.08	1.65

Table 1 depicts the mean scores and standard deviation of arteriovenous fistula puncture pain and leg cramps among the experimental and control groups during the pre test and post-test assessment. The experimental group showed a mean pain score of 2.16 (SD = 0.73), whereas the control group reported a mean pain score of 1.92 (SD = 0.62). Similarly, the mean score for leg cramps was 11.9 (SD = 1.68) in the experimental group and 9.08 (SD = 1.65) in the control group. The findings indicate that there is a significant reduction in arteriovenous fistula puncture pain and leg cramps in the experimental group when compared to the control group, suggesting the effectiveness of the intervention.

PART III: Evaluate the effectiveness of cutaneous stimulation on level of AV fistula puncture pain among Haemodialysis patients.

Objective No.1: Assess the effectiveness of cutaneous stimulation on level of AV fistula puncture pain among haemodialysis patients in experimental group and control group.

H₁: The mean post-test score of AV fistula puncture pain in the experimental group is significantly lower than that of the control group among haemodialysis patients.

Table 3: Depicts the effectiveness of cutaneous stimulation on level of AV fistula puncture pain among Haemodialysis patients

AVF PP	Mean	SD	t value	p value
Pretest	3.14	0.63	11.13	0.0001
Post test	2.16	0.73		

Findings related to the significance of the difference between Pre-test and Post-test scores of Haemodialysis patients shows that, difference between Mean Pre-test (3.14) and Mean Post-test (2.16) scores, found to be statistically difference at (0.98) level of significant [$t=11.13$ (p value =0.0001) $p < 0.98$]. As Hypothesis states, H₁: There will be significant difference between mean Pre-test and Post-test score of Experimental group of patients with Arteriovenous Fistula Puncture Pain undergoing Haemodialysis. Hence it is clear that there is statistically difference between mean post-test level and mean pre-test level of Arteriovenous Fistula Puncture Pain among the patients undergoing Haemodialysis. Hence H₁ is accepted.

PART IV: Assessment of the effectiveness of intradialytic massage on level of cramps among haemodialysis patients.

Objective No.2: To assess the effectiveness of intradialytic massage on level of cramps among haemodialysis patients.

H₂: The mean post test scores of leg cramps in experimental group is significantly lower than the mean post-test scores of leg cramps in control groups among haemodialysis patients.

Table 4: Depicts the Effectiveness of intradialytic massage on Level of cramp among Haemodialysis patients

Leg Cramps	Mean	SD	t value	p value
Pretest	13.8	1.44	-7.025	0.0001
Post test	11.9	1.68		

Findings related to the significance of the difference between Pre-test and Post-test scores of Haemodialysis patients shows that, difference between Mean Pre-test (13.8) and Mean Post-test (11.9) scores,

found to be statistically difference at (1.9) level of significant [$t=-7.025$ (p value =0.0001) $p < 1.9$]. As Hypothesis states, H₂: There will be significant difference between mean Pre-test and Post-test score of

Experimental group of patients with Leg Cramps undergoing Haemodialysis. Hence it is clear that there is statistically difference between mean post-test level and mean pre-test level of Leg Cramps among the patients undergoing haemodialysis. Hence H₂ is accepted.

PART V: Evaluation of the association of Pre-test score of Arteriovenous fistula Puncture pain with their Socio

demographic Variable and clinical variables among haemodialysis patients.

H₃: There is significant association between the post-test AV fistula puncture pain scores and the selected socio-demographic and clinical variables among haemodialysis patients.

Table 5: Depicts the association of Pre-test score of Arteriovenous fistula Puncture pain with their Socio demographic Variable and clinical variables of among haemodialysis patients

Sl.no	Socio demographic variables	Chi square test	p value	S/NS
1	Age	0.0213	0.9894	NS
2	Gender	2.804	0.9402	NS
3	Religion	7.6148	0.0057	NS
4	Education	0.0016	0.9992	NS
5	Occupation	0.0312	0.8598	NS
6	Monthly Income	0.5518	0.0758	NS
7	Marital Status	2.3669	0.1239	NS
8	Type of family	5.06	0.244	S
9	Duration of sleep at night	0.206	0.6498	NS
10	Dietary pattern	1.4722	0.224	NS
11	Exercise	0.0773	0.7809	NS
12	Recreational Activities	0.4264	0.5137	NS
13	Hydration	0.6448	0.724	NS
14	Pre Dialysis Weight	5.8177	0.1208	NS
15.a	Hypertension	0.0031	0.9552	NS
15.b	Diabetes Mellitus	0.7594	0.3835	NS
15.c	Asthma	0.4344	0.5098	NS
15.d	Tuberculosis	0.0031	0.955	NS
16	Period of Haemodialysis	0.7594	0.3835	NS
17	Duration of AV Fistula	1.1108	0.7744	NS
18	Site of AV Fistula	1		NS
19	No.of dialysis in a week	0.2866	0.8664	NS
20	Techniques of AV cannula	2.2865	0.1305	NS
21	Size of cannula	0.0705	0.7906	NS

Findings related to the association between pre-test scores of Haemodialysis patients with their selected socio-demographic variables reveals that, there was no significant association found between the pretest level score of Haemodialysis patients of Age ($\chi^2=0.0213$, $P=0.9894$), Gender ($\chi^2=2.804$, $P=0.9402$), Religion ($\chi^2=7.6148$, $P=0.0057$), Educational status ($\chi^2=0.0016$, $P=0.9992$), occupation ($\chi^2=0.0312$, $P=0.8598$), monthly income ($\chi^2=0.5518$, $P=0.0758$), Marital status ($\chi^2=2.3669$, $P=0.1239$), Type of family ($\chi^2=5.06$, $P=0.244$), Duration of sleep at night ($\chi^2=0.206$, $P=0.6498$), Dietary pattern ($\chi^2=1.4722$, $P=0.224$), Exercise ($\chi^2=0.0773$, $P=0.7809$), Recreational Activities ($\chi^2=0.4264$, $P=0.5137$), Hydration ($\chi^2=0.6448$, $P=0.724$), Predialysis weight ($\chi^2=5.8177$, $P=0.1208$), co morbid Hypertension ($\chi^2=0.0031$, $P=0.9552$), co morbid DM ($\chi^2=0.7594$, $P=0.3835$), co morbid Asthma ($\chi^2=0.4344$, $P=0.5098$), co morbid Tuberculosis ($\chi^2=0.0031$, $P=0.955$), co morbid Period of Haemodialysis ($\chi^2=0.7594$, $P=0.3835$), co

morbid Duration of AV Fistula ($\chi^2=1.1108$, $P=0.7744$), co morbid site of AV Fistula ($\chi^2=1$, $P=$), co morbid No of dialysis in week ($\chi^2=0.2866$, $P=0.8664$), co morbid Techniques of AV Fistula ($\chi^2=2.2865$, $P=0.1305$), co morbid size of cannula ($\chi^2=0.0707$, $P=0.790$). Hence H₃: There is no significant association between pre-test scores of Haemodialysis patients with their selected socio-demographic variables, except type of family. Hence, H₃ is rejected

PART VI: Evaluation of the association between pre-test scores of leg cramps and their selected socio-demographic variable and clinical variable among haemodialysis patients.

H₄: There is significant association between the post-test Muscle cramp scores and the selected socio-demographic and clinical variables among haemodialysis patients.

Table 6: Depicts the association of Pre-test score of Leg cramps with their Socio demographic Variable and clinical variable among haemodialysis patients

Sl.no	Socio demographic variables	Chi square test	p value	S/NS
1	Age	1.156	0.5610	NS
2	Gender	0.6844	0.4080	NS
3	Religion	3.2958	0.0694	NS
4	Education	2.1969	0.3333	NS
5	Occupation	2.9811	0.8424	NS
6	Monthly Income	2.45	0.294	NS
7	Marital Status	1.11	0.293	NS
8	Type of family	4.1543	0.0415	S
9	Duration of sleep at night	0.6807	0.7115	NS
10	Dietary pattern	0.4034	0.525	NS
11	Exercise	0.1285	0.7199	NS
12	Recreational Activities	0.0613	0.8043	NS
13	Hydration	1.087	0.2971	NS
14	Pre Dialysis Weight	1.5087	0.6802	S
15.a	Hypertension	0.8282	0.3628	NS
15.b	Diabetes Mellitus	0.0324	0.8572	NS
15.c	Asthma	0.4404	0.5069	NS
15.d	Tuberculosis	0.00	1	NS
16	Period of Haemodialysis	1.5231	0.6769	NS
17	Duration of AV Fistula	1.5383	0.6734	NS
18	Site of AV Fistula	0.036	0.85	NS
19	No.of dialysis in a week	0.4384	0.8031	NS
20	Techniques of AV cannula	0.277	0.5986	NS
21	Size of cannula	0.1194	0.7297	NS

Findings related to the association between pretest scores of Haemodialysis patients with their selected socio-demographic variables reveals that, there was no significant association found between the pretest level score of Haemodialysis patients of Age ($\chi^2=1.156$, $P=0.5617$), Gender ($\chi^2=0.6844$, $P=0.4080$), Religion ($\chi^2=3.2958$, $P=0.0694$), Educational status ($\chi^2=2.1969$, $P=0.3333$), occupation ($\chi^2=2.9811$, $P=0.8424$), monthly income ($\chi^2=2.45$, $P=0.294$), Marital status ($\chi^2=1.11$, $P=0.293$), Type of family ($\chi^2=4.1543$, $P=0.0415$), Duration of sleep at night ($\chi^2=0.6807$, $P=0.7115$), Dietary pattern ($\chi^2=0.4034$, $P=0.525$), Exercise ($\chi^2=0.1285$, $P=0.7199$), Recreational Activities ($\chi^2=0.0613$, $P=0.804$), Hydration ($\chi^2=1.087$, $P=0.2971$), Predialysis weight ($\chi^2=1.5087$, $P=0.6802$), co morbid Hypertension ($\chi^2=0.8282$, $P=0.3628$), co morbid DM ($\chi^2=0.0324$, $P=0.8572$), comorbid Asthma ($\chi^2=0.4404$, $P=0.5069$), comorbid Tuberculosis ($\chi^2=0.00$, $P=1$), Period of Haemodialysis ($\chi^2=1.5231$, $P=0.6769$), Duration of AV Fistula ($\chi^2=1.5383$, $P=0.6734$), site of AV Fistula ($\chi^2=0.036$, $P=0.85$), No of dialysis in week ($\chi^2=0.4384$, $P=0.8031$), Techniques of AV Fistula ($\chi^2=0.277$, $P=0.5986$), size of cannula ($\chi^2=0.1194$, $P=0.7297$).

This means that the level of muscle cramp experienced after the intervention was not influenced by any of the selected socio-demographic or clinical characteristics of the patients except type of family and pre-dialysis weight. The hypothesis stating that there will be a significant association between post-test muscle

cramp scores and selected socio-demographic and clinical variables is rejected. Hence, H_0 is rejected.

DISCUSSION

The findings of the present study are discussed in this chapter in relation to previous research, and are interpreted based on the objectives and hypothesis of the study. The study was conducted to determine the effectiveness of selected nursing interventions such as cutaneous stimulation and intradialytic massage on levels of pain and muscle cramps among haemodialysis patients with an arteriovenous (AV) fistula at BVVS HSK Hospital and Research Centre, Bagalkot.

The present study revealed that significance of the difference between the mean scores of hemodialysis patients show that the mean AV fistula puncture pain score in the control group was 3.14 ± 0.83 , and in the experimental group was 2.16 ± 0.73 . The calculated t-value (11.13) at $p < 0.0001$ was found to be statistically significant at the 0.001 level.

Findings related to the significance of the difference between the mean scores show that the mean leg cramp score in the control group was 13.8 ± 1.44 , and in the experimental group was 11.9 ± 1.68 . The effectiveness of cutaneous stimulation was statistically tested by using paired t- test which revealed that t value is 11.13 and result was found to be significant at $p < 0.000$ level of significance was statistically significant at the 0.001 level. The effectiveness of intradialytic

massage was statistically tested by using paired t- test which revealed that t value is 7.025 and result was found to be significant at $p < 0.000$ level of significance was statistically significant at the 0.001 level.

The results of the study revealed that the selected interventions were effective in reducing AV fistula-related pain and muscle cramps during haemodialysis. Thus, the study concludes that cutaneous stimulation and intradialytic massage can be considered as beneficial non-pharmacological nursing interventions for improving the comfort and well-being of patients undergoing haemodialysis with an AV fistula.

The current study findings consistent with the randomised control trial by Mastnardo *et al.*, (2016) conducted a pilot randomized controlled trial to evaluate the effectiveness of intradialytic massage on leg cramps among patients undergoing haemodialysis. The findings revealed that patients who received intradialytic massage experienced a notable reduction in the frequency and intensity of leg cramps compared to the control group. The authors concluded that intradialytic massage is a feasible, safe, and effective non-pharmacological intervention that can be implemented by nursing professionals to enhance patient comfort during dialysis [7].

The current Study findings consistent with Quasi-Experimental research by Manal Fareed (2014) to evaluate the effectiveness of cutaneous stimulation on Arteriovenous Fistula puncture pain among patients undergoing haemodialysis. The findings revealed that patients who received cutaneous stimulation experienced that the pain is reducing during arteriovenous fistula puncture. The authors concluded that Cutaneous stimulation is safe, effective non- pharmacological intervention that can be carried out routinely for managing arteriovenous fistula puncture related pain among haemodialysis patients [8].

Limitations

The study limited to the sample of 100 haemodialysis patients with AV Fistula puncture pain and cramps undergoing haemodialysis in dialysis unit, B.V.V.S HSK Hospital, Bagalkot

CONCLUSION

Effectiveness of cutaneous stimulation on levels of pain among patient with AV fistula undergoing haemodialysis was shown by comparison of means scores of pain in experimental and control group the post-test mean score is 2.16 and 3.14 respectively. Effectiveness of intradialytic massage on levels of muscle cramp among patient with AV fistula undergoing haemodialysis was shown by comparison of means scores of muscle cramp in experimental and control group the post-test mean score is 11.9 and 13.8 respectively. This shows that there is a significant

reduction in the pain and cramps among patient with AV fistula undergoing haemodialysis in experimental group when compared to control group and it is found to be statistically significant.

DECLARATION BY AUTHORS

Ethical Approval: Institutional ethical clearance approved.

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REFERENCES

1. Jha V, Garcia-Garcia G, Iseki K, Li Z, Naicker S, Plattner B, *et al.*, chronic kidney disease: global dimension and perspectives. *Lancet*. 2013;382(9888):260-272.
2. Santoro D, Benedetto F, Mondello P, Pipitò N, Barillà D, Spinelli F, *et al.*, Vascular access for hemodialysis: current perspectives. *Int J Nephrol Renovasc Dis*. 2014; 7:281-294. doi:10.2147/IJNRD.S46643.
3. Kosmadakis G, Amara I, Costel G. Pain on arteriovenous fistula cannulation: A narrative review. *Semin Dial*. 2021;34(4):275-284. doi:10.1111/sdi.12979.
4. Ulu, M. S., & Ahsen, A. (2015). Muscle Cramps During Hemodialysis: What can we Do? New Approaches for Treatment and Preventing. *Electronic Journal of General Medicine*, 12(3), 277-281. <https://doi.org/10.15197/ejgm.01391>
5. Báez-Suárez A, Martín-Castillo E, García-Andújar J, García-Hernández JÁ, Quintana-Montesdeoca MP, Loro-Ferrer JF. Evaluation of different doses of transcutaneous nerve stimulation for pain relief during labour: a randomized controlled trial. *Trials*. 2018;19(1):652. doi: 10.1186/s13063-018-3036-2.
6. Amira E. Elsadawy[1], Magda M. Mohsen [2], Tawheda M. El-Saidy [3], Hanady S. Shehata⁴. Effect of Intradialytic Stretching Exercises on Muscle Cramps among Elderly Patients Undergoing Hemodialysis. Available from: <https://medjournals.ekb.eg/>
7. Mastnardo, D., Lewis, J. M., Hall, K., Sullivan, C. M., Cain, K., Theurer, J., Huml, A., & Sehgal, A. R. (2016). Intradialytic massage for leg cramps among hemodialysis patients: A pilot randomized controlled trial. *International Journal of Therapeutic Massage & Bodywork*, 9(2), 3–8. <https://doi.org/10.3822/ijtmb.v9i2.305>
8. Fareed ME, Abd El-Hay AH, El-Shikh AA. Cutaneous Stimulation: its Effect on pain Relieving

among Hemodialysis Patients. *Journal of Education and Practice*. 2014;5(1)