

A Study to Assess the Effectiveness of Cold Application on Arteriovenous Fistula Puncture Pain among Hemodialysis Patients at Erode and Namakkal District

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ABSTRACT

Chronic kidney disease is now recognized as a major medical problem worldwide. Dialysis effectively treats the signs and symptoms of uremia and fluid overload (some of which may be life threatening), it is a lifelong therapy that is associated with discomfort. Arteriovenous Fistula punctures cause pain; the aim of this study is to assess the effectiveness of cold application on arteriovenous fistula puncture pain among hemodialysis patients at Erode and Namakkal district. The conceptual frame work adopted for this study was Modified Orlando's Nursing Process of research use. The research approach adopted for the study was non-randomized control group post-test only design. Quasi experimental design is the powerful tool for testing of hypothesis, causes, effect and relationship between the variables. The study was conducted in Dr. K. M. Nallasamy Hospital, Erode and VMCH hospital, Namakkal District, Tamil Nadu. Non-purposive sampling technique was used to select the sample. After that, the samples were equally divided into experimental and control group. The samples consisted of 25 in experimental group and 25 in control group. The tool used for data collection was semi structured interview schedule. Findings related to sociodemographic variables. About 13(52%) subjects belong to the age group of 41-60 years. Most of the subjects 19(76%) were males. About 14(56%) subjects studied up to primary education. Chi-square test was used to assess the post-test score of pain in experimental and control group with socio demographic variables. It was concluded that age, gender, educational status, occupational status, marital status, type of family, duration of sleep at night time, dietary pattern, personal habits recreational activities during dialysis procedure were non-significant at 0% level.

Keywords: Arteriovenous, Fistula puncture, Hemodialysis, Sociodemographic

INTRODUCTION

Each kidney dialysis was first utilized in 1960 by means of an artificial kidney with chronic intermittent hemodialysis, when the irreversibility of renal damage was established, treatment was withdrawn. Dialysis occurs with the movement of fluids and particles across a semi permeable membrane [1]. This treatment is used to restore fluid and electrolyte balance and acid base balance and to remove wastes and toxic materials from the body. This treatment is an augmentation of renal function to sustain life in acute and chronic situations.

In hemodialysis, blood is removed from a vascular access site. The blood is heparinized, pumped, through a dialyzer and then returned to the patient's circulation, diffusion and ultra-filtration occurs allowing the blood to be filtered [2].

AV fistula or graft is surgically prepared to access the client's circulatory system. A fistula is created by a joining an artery and a vein. The most common site for an AV fistula is in the fore arm. This type of fistula is created by anastomosing the radial or brachial artery to the cephalic

vein. A graft is created by using synthetic material to join an artery to a vein. A fistula is preferred over a graft because a graft has a higher incidence of blood clotting and rejection of the synthetic material [3].

Dialysis prevents the waste products and removes excessive fluids from blood when the kidneys cannot do the job properly that reaching to hazardous levels. It can also remove toxins or drugs from the blood in an emergency setting [4].

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A study to assess the effectiveness of cold application on arteriovenous fistula punctures pain among hemodialysis patients at Erode and Namakkal district.

OBJECTIVES

- To assess the arteriovenous fistula puncture pain among hemodialysis patients in experimental and control group
- To compare the effectiveness of cold application on arteriovenous fistula puncture pain among hemodialysis patients between experimental and control group
- To find out the post-test score of arteriovenous fistula puncture pain with socio-demographic variables in experimental and control group
- To find out the post-test score of arteriovenous fistula puncture pain with selected clinical data in experimental and control group.

HYPOTHESIS

H₁: There is a significant difference in the arteriovenous fistula puncture pain among hemodialysis patients in experimental group.

H₂: There is a significant association between the post-test score of arteriovenous fistula puncture pain with socio-demographic variables in experimental and control group.

H₃: There is a significant association between the post-test score of arteriovenous fistula puncture pain with selected clinical data in experimental and control group.

The conceptual frame work adopted for this study was Modified Orlando’s Nursing Process of research use, which addresses the implementation of existing research

knowledge [5]. The research approach adopted for the study was non-randomized control group post-test only design. Quasi experimental design is the powerful tool for testing of hypothesis, causes, effect and relationship between the variables [5].

MATERIALS AND METHODS

The study was conducted in Dr. K. M. Nallasamy Hospital, Erode and VMCH hospital, Namakkal district, Tamil Nadu. Non-purposive sampling technique was used to select the sample. After that, the samples were equally divided into experimental and control group. The samples consisted of 25 in experimental group and 25 in control group. The tool used for data collection was Semi structured interview schedule. It has 3 sections.

Section A consists of socio demographic variables. Section-B consists of clinical data. Section C consists of Numerical Pain Assessment Scale to assess the pain response of subjects during arteriovenous fistula cannulation.

The data gathered were analyzed and interpreted in terms of objectives. Descriptive and inferential statistics were used in data analysis. The result of the study revealed that, after cold application, the mean pain score in the experimental group was 2.4 where as in control group the mean pain score was 3.6. In the experimental group, maximum pain score was 5, where in control group the maximum pain score was 9. Chi-square test was used to assess the post-test score of pain in experimental and control group with socio demographic variables (**Figure 1**). Chi-square test was used to assess the post-test score of pain in experimental and control group with selected clinical data (**Tables 1-3**).

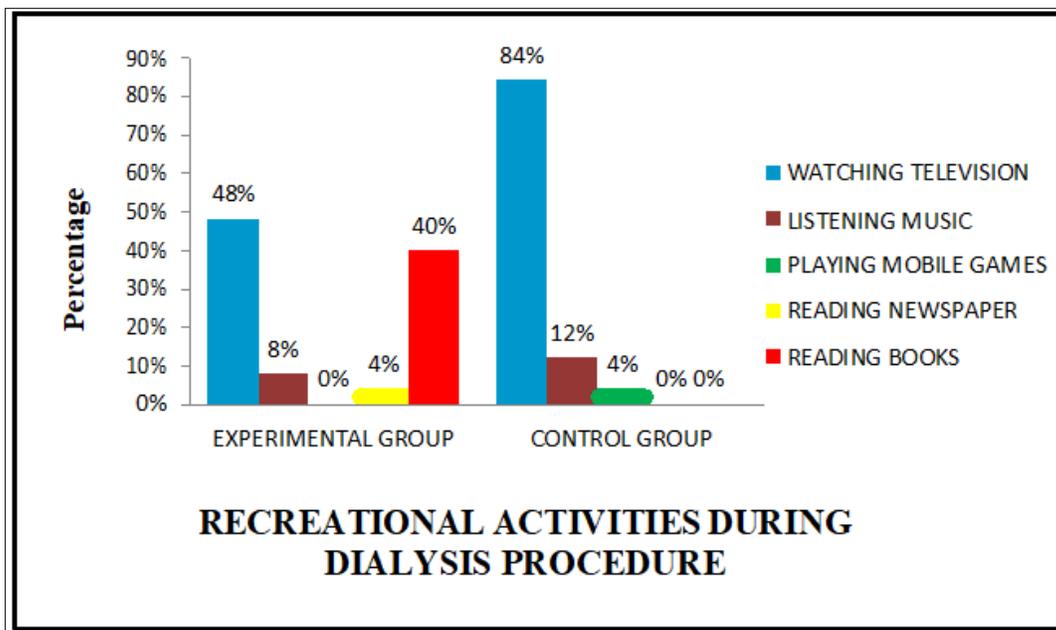


Figure 1. Distribution of subjects according to recreational activities during dialysis procedure.

Table 1. Distribution of socio-demographic variables among hemodialysis patients in experimental and control group undergoing arteriovenous fistula cannulation.

S. no.	Variables	Subject				Total	
		Experimental group (n=25)		Control group (n=25)		No	%
		No	%	No	%		
Age							
1	20-40 years	8	32%	7	28%	15	30%
	41-60 years	12	48%	13	52%	25	50%
	61-80 years	5	20%	5	20%	10	20%
Gender							
2	Male	12	48%	19	76%	31	62%
	Female	13	52%	6	24%	19	38%
Educational Status							
3	Illiterate	7	28%	7	28%	14	28%
	Primary education	14	56%	9	36%	23	46%
	Secondary education	2	8%	4	16%	6	12%
	Higher secondary	0	0%	1	4%	1	2%
	Diploma	0	0%	0	0%	0	0%
	Upper graduate	2	8%	2	8%	4	8%
	Post graduate	0	0%	2	8%	2	4%
Occupational status							
4	Government employee	0	0%	1	4%	1	2%
	Private employee	2	8%	1	4%	3	6%
	Business	5	20%	3	12%	8	16%
	Daily wage	1	4%	2	8%	3	6%
	Unemployed	17	68%	18	72%	35	70%
Marital status							
5	Single	5	20%	1	4%	6	12%
	Married	20	80%	22	88%	42	84%
	Widow/Widower	0	0%	2	8%	2	4%
	Separated	0	0%	0	0%	0	0%
	Divorced	0	0%	0	0%	0	0%
Type of family							
6	Nuclear	24	96%	24	96%	48	96%
	Joint	0	0%	1	4%	1	2%

	Extended	1	4%	0	0%	1	2%
7	Duration of sleep at night time						
	0-3 h	3	12%	3	12%	9	18%
	4-6 h	16	64%	18	72%	34	68%
	7-9 h	6	24%	4	16%	10	20%
	Above 10 h	0	0%	0	0%	0	0%
8	Dietary pattern						
	Vegetarian	6	24%	5	20%	11	22%
	Non-vegetarian	19	76%	20	80%	39	78%
9	Personal habits						
	Alcohol	0	0%	3	12%	3	6%
	Smoking	1	4%	1	4%	2	4%
	Chewing tobacco	1	4%	4	16%	5	10%
	Supari pan/betal nut	20	8%	1	4%	3	6%
	Using harmful drugs	0	0%	0	0	0	0%
	Multiple habits	7	28%	6	24%	13	26%
	No habits	14	56%	10	40	24	48%
10	Recreational habits during dialysis						
	Watching television	12	48%	21	84%	33	66%
	Listening to music	2	8%	3	12%	5	10%
	Playing mobile games	0	0%	1	4%	1	2%
	Reading newspapers	1	4%	0	0%	1	2%
	Reading books	10	40%	0	0%	10	20%

Table 2. Distribution of clinical data among hemodialysis patients in experimental and control group undergoing arteriovenous fistula cannulation.

S. no.	Variables	Subject				Total	
		Experimental group (n=25)		Control group (n=25)		No	%
		No	%	No	%		
Clinical causes for undergoing hemodialysis							
1	Chronic renal failure	24	96%	24	96%	48	96%
	Congenital diseases	1	4%	0	0%	1	2%
	Poisoning	0	0%	0	0%	0	0%
	Snake bite	0	0%	1	4%	1	2%
	Any other	0	0%	0	0%	0	0%
Co-morbid conditions							
2	Hypertension	11	44%	17	68%	28	56%
	Diabetes	2	8%	3	12%	5	10%
	Both HTN and DN	5	20%	1	4%	6	12%
	Nil	7	28%	4	16%	11	22%
Duration of illness							
3	Less than 1 year	2	8%	1	4%	3	6%
	1-3 years	9	36%	18	72%	27	54%
	3-5 years	7	28%	3	12%	10	20%
	More than 5 years	7	28%	3	1%	10	20%

Table 3. Distribution of clinical data among hemodialysis patients in experimental and control group with respect to different variables.

S. no.	Variables	Subject				Total	
		Experimental group (n=25)		Control group (n=25)		No	%
		No	%	No	%		
Time duration of hemodialysis procedure							
1	2 h	1	4%	0	0%	1	2%
	4 h	24	96%	25	100%	49	98%
	6 h	0	0%	0	0%	0	0%
Frequency of attending dialysis in a week							
2	Once	1	4%	3	12%	4	8%
	Twice	22	88%	20	80%	42	84%
	Thrice	2	8%	2	8%	4	8%
	Daily	0	0%	0	0%	0	0%
Amount of fluid clearance							
3	100-1000 ml	0	0%	1	4%	1	2%

	1001-2000 ml	1	4%	4	16%	5	10%
	2001-3000 ml	10	40%	6	24%	16	32%
	3001-4000 ml	12	48%	9	36%	21	42%
	4001-5000 ml	2	8%	5	20%	7	14%
	Patient weight in kilograms						
4	Less than 40 kg	2	8%	0	0%	2	4%
	40-60 kg	14	56%	15	60%	29	58%
	61-80 kg	8	32%	8	32%	16	32%
	81-100 kg	1	4%	2	8%	3	6%

Figure 2 shows the post-test score of pain among subjects in the experimental group and control group. Majority of the subjects in the experimental group, 4 (16%) experienced no pain, 16 (64%) experienced mild pain, 5 (20%) experienced moderate pain. Well, none of them experienced severe and worst pain during arteriovenous fistula puncture

(cannulation). Majority of subjects in the control group 2 (8%) experienced no pain, 12 (48%) experienced mild pain, 8 (32%) experienced moderate pain, 3 (12%) experienced severe pain and none of them experienced worst pain during arteriovenous fistula puncture.

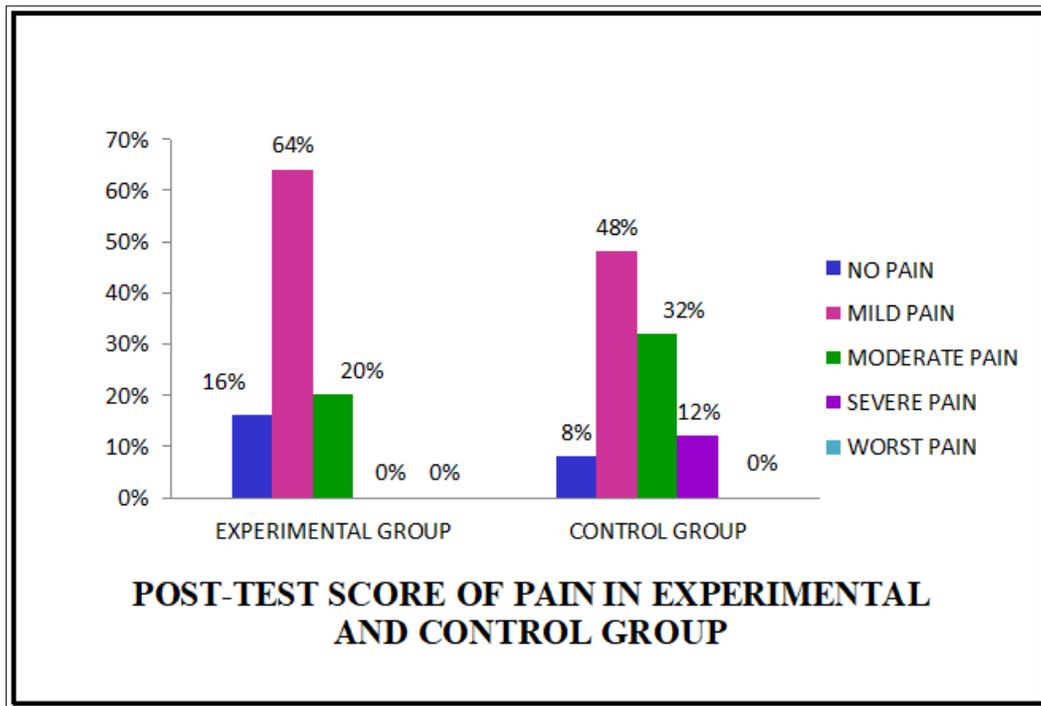


Figure 2. Post-test score of pain in experimental and control group.

RESULTS AND DISCUSSION

Findings based on objectives

1. To assess the arteriovenous fistula puncture pain among hemodialysis patients in experimental and control group

The post-test score of pain among subjects in the experimental group and control group. Majority of the

subjects in the experimental group 4 (16%) experienced no pain, 16 (64%) experienced mild pain, 5 (20%) experienced moderate pain. None of them experienced severe and worst pain during arteriovenous fistula puncture (cannulation). Majority of subjects in the control group 2 (8%) experienced no pain, 12 (48%) experienced mild pain, 8 (32%) experienced moderate pain, 3 (12%) experienced severe pain and none of them experienced worst pain during arteriovenous fistula puncture.

2. To compare the effectiveness of cold application on arteriovenous fistula puncture pain among hemodialysis patients between experimental and control group

H₁: There is a significant difference in the arteriovenous fistula puncture pain among hemodialysis patients in experimental group.

It shows that the mean, mean %, standard deviation pain score of patients during arteriovenous fistula puncture (cannulation) in the experimental group found 2.4(9.230%) with standard deviation 1.46. In control group, was found 3.6(13.846%) with standard deviation 2.37. The calculated t' test value 2.14 was significantly greater than the table value 1.96 at $p \leq 0.05$. It was evident that cold application is effective on arteriovenous fistula puncture pain. Hence the hypothesis H₁ was accepted. This study was supported by the experimental study conducted by Amer et al. [6] to determine the effect of cryotherapy on reducing pain during AVF cannulation among HD patients in the King Khalid Hospital, Tabuk, Kingdom of Saudi Arabia. The sample size was 62 patients. Randomization was used to assign the patients into the experimental (received cryotherapy) and control (no cryotherapy) groups. Descriptive and retrospective methods were used. The Arabic version of Wong-Baker pain rating scale was used to determine the pain score. The t-test result revealed that no significant difference in the three-paired observations with the $P=0.476$, 0.202 and 0.103, respectively, at 0.05 level of confidence. The result implies that cryotherapy administered before the procedure is effective in reducing the level of pain experienced during AVF cannulation among the patients undergoing hemodialysis 0.05 level of confidence. The result implies that cryotherapy administered before the procedure is effective in reducing the level of pain experienced during AVF cannulation among the patients undergoing hemodialysis [6].

Findings related to socio demographic variables

About 13 (52%) subjects belong to the age group of 41-60 years. Most of the subjects 19 (76%) were males [7-10]. About 14 (56%) subjects studied up to primary education. Most of the 18 (72%) subjects were unemployed [11-16]. Majority of subjects 24 (96%) were known case of chronic renal failure. Majority 21 (84%) of the subjects having arteriovenous fistula in their left arm. Nearly half of the subjects 14 (56%) had brachio-cephalic site of arteriovenous fistula. For all of subjects 25 (100%), attending duration of hemodialysis is 4 h. Chi-square test was used to assess the post-test score of pain in experimental and control group with socio demographic variables [12-14]. It was concluded that age, gender, educational status, occupational status, marital status, type of family, duration of sleep at night time, dietary pattern, personal habits and recreational activities during dialysis procedure were non-significant at 0% level. Chi-square test was used to assess the post-test score of pain

in experimental and control group with selected clinical data. It was concluded that co-morbid conditions, period of hemodialysis in months, presence of arteriovenous fistula in an arm, site of arteriovenous fistula, duration of present arteriovenous fistula site use, frequency of attending dialysis in a week, number of dialysis per month, patients weight in kilograms, techniques of arteriovenous cannulation, size of arteriovenous cannula used were non-significant at $P \leq 0.05$ level.

RECOMMENDATIONS OF THE STUDY

In the light of the above study the following recommendations are put forth.

- A similar study can be conducted for a large sample to draw more conclusive generalization.
- A comparative study can be conducted with two different age groups.
- A study can be conducted by using cold application as a pain relief measure before intravenous cannula insertion.
- A similar study can be conducted by using cold application as a pain relief measure for stomach cramps for peritoneal dialysis patient.

LIMITATIONS

- The study is limited to assessment of specific aspect i.e. score of arteriovenous fistula puncture pain of the patients undergoing hemodialysis.
- The study is limited to two hospitals.
- The study is limited to the sample size of 50.
- The study is limited to five weeks.

CONCLUSION

The present study showed that samples in the control group had pain up to severe pain during post-test, but after the cold application there was a significant reduction up to moderate pain in experimental group. The pain scores remains same and even some clients' pain level got increased among control group. This implies that cold application is effective on arteriovenous fistula puncture pain among hemodialysis patients. And this effect was demonstrated through numerical pain assessments scale.

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