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Full Length Research Article

A Study To Evaluate The Effectiveness Of Cryotherapy On Aterio-Venous Fistula Puncture Related Pain Among Haemodialysis Patients In Jeyasekaren Hospital at Kanya kumari District, Tamil Nadu.

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ABSTRACT

This study was designed to evaluate the effectiveness of cryotherapy on Aterio venous fistula puncture site pain among patients on Hemodialysis. A true experimental design pre test -post test control group design was adopted to assess the effect of cryotherapy on pain due to AV Fistula in hemodialysis patients. A non-probability purposive sampling technique was used to obtain 60 patients. (30 were divided each in the experimental and control group) who are undergoing hemodialysis by using AV fistula. Objective and subjective pain score was done of hemodialysis treatment with cryotherapy for the experimental and without cryotherapy for the control group. The tools used were a structured interview questionnaire examines sample characteristics, numerical rating scale for subjective pain response. Descriptive statistics were used and deemed appropriate Chi-square, and paired t-test was used for inferential statistics. Pre and Post level of pain was assessed for both experimental and control group. Findings: In the pre test, in experimental group 18 (60%) had moderate and 12 (40%) had severe level of pain. In control group 7 (23.3%) had mild pain, 14 (46.7%) had moderate pain, 9 (30%) had severe level of pain. In the post test, in experimental group 20 (66.66%) had mild, 10 (33.3%) had moderate level of pain. In control group 21 (70%) had severe, 9 (30%) had moderate level of pain. Conclusion: This study indicates that cryotherapy is a simple non pharmacological and no cost effective method. It is effective in reducing pain among hemodialysis patients with AV fistula puncture site pain management in hospital settings.

Introduction

Kidney is such an important organ, yet most people have a little idea about its crucial role in the body. Consequently, we unknowingly distress this vital organ, mainly through poor lifestyle habits and choices. Most people are born with two, but it is possible to survive with only one healthy kidney. These two powerful organs work on a continuous basis, ridding the body of harmful toxins they are unbelievably important and if they become damaged or diseased, life will be changed significantly. They play a crucial role in maintaining homeostasis and overall health. Chronic Renal failure is a devastating medical, social and economic problem for both patients and families in India. Most chronic kidney disease patients reporting to tertiary care centers in India are in the final stage where renal replacement therapy (RRT) is the only option at that stage. Hemodialysis (H.D) is the most frequently used renal replacement therapy with the arterio venous fistula (AVF) being the gold standard for vascular access in HD patients.¹

Recent statistics indicate that renal failure is increasing. The

incidence of kidney failure (or Chronic Kidney Disease) has 850 million people are suffering with this kidney failure disease. It is estimated that currently there are over 3.7 million people worldwide who are alive on dialysis or with a functioning graft. Vascular access is required for hemodialysis. Long-term vascular access is internal for most patient is having long term-hemodialysis.² There are three different types of vascular access for hemodialysis arteriovenous fistula (AVF), arteriovenous graft (AVG), and central venous catheter (CVC).³ In comparison with arteriovenous graft and central venous catheters, the use of arteriovenous fistula are consistently associated with low rates of morbidity and mortality.⁴ AV fistula are formed by connecting (anastomosis) an artery to vein. The most commonly used vessels are the radial or brachial artery and the cephalic vein of the non-dominant arm.

Problem identification and its significance

Patient with end stage renal disease undergoing hemodialysis are repeatedly exposed to stress and pain from approximately 300 punctures per year to their arteriovenous fistula.

Considerable patient discomfort and stress can be associated with the insertion of large-gauge needles into an arteriovenous fistula.⁵ Pain inflicted by the insertion of large cannulae into the arteriovenous fistula is a significant cause of concern for both children and adults on regular hemodialysis. Although arterio venous puncturing causes pain,⁶ local anesthesia is not frequently used due to concerns of vasoconstriction, burning sensation, scarring, and infection.⁷

Cryotherapy is a form of therapy consisting in the local or general use of cold.⁸ It used for the treatment of pain and /or inflammation by lowering the temperature of the skin over the affected area. It can be applied topically (on the skin surface), percutaneously or surgically. Cold therapy can be delivered in three basic forms: cold packs, ice massage or vapocoolant spray.⁹ And cryotherapy is common and useful therapeutic modality often used in treating a wide range of conditions. It is easy to apply and if care is taken over cautions and contraindications it is very safe and patients can be instructed to self treat to manage their conditions. The use of cryotherapy prior to venipuncture as an easy and effective intervention for reducing venipuncture related pain.¹⁰

Pain during arteriovenous fistula (AVF) cannulation remains a common problem in hemodialysis (HD) patients that leads to noncompliance to lifetime maintenance HD. This study was performed 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. that cryotherapy intervention to relieve AVF cannulation-related pain among adult patients undergoing HD is effective. Therefore, it is recommended that cryotherapy should be considered as a complementary intervention to reduce pain related to AVF cannulation. (Hamad S Al Amer et al (2017)).

Objectives undertaken

1. To assess the A.V.Fistula puncture related pain among experimental and control group of hemodialysis patients.
2. To determine the effect of cryotherapy on A.V.Fistula puncture related pain in experimental group of hemodialysis patients.
3. To compare the A.V.Fistula puncture related pain in terms of difference in pain scores among experimental and control group.
4. To find out the association between the A.V.Fistula puncture

Materials and methods

Study area

The setting was chosen on the basis of availability of samples and the co-operation extended by the management and the health team. This study was conducted at Jeyasekaran Hospitals, Kanyakumari district, Tamil Nadu. It's a multi speciality hospital with bed strength of 250.

Population

The population under study constituted patients on A.V. Fistula access

Sample design

The research design adopted for the present study was the true experimental pre test and post test control group design.

Sample population

Sampling Criteria involves selecting cases that meet some predetermined criteria of importance. The criteria for sample

selection are mainly depicted under two heading, which includes the inclusion and exclusion criteria.

Inclusion criteria

- > Patients who have AV-fistula in hand and undergoing haemodialysis.
- > Patients who have AV-fistula and undergoing haemodialysis in Jeyasekaran Hospital.
- > Patients who are willing to participate in the study.
- > Both male and female patients between 20 to 60 years of age.
- > Patient who can understand English or Tamil.
- > Haemodialysis patients with AV Fistula in the Hands.

Exclusion criteria

- > Patients with neurological disorders who is not able to perceive pain.
- > Patients who are receiving analgesics such as opioid analgesics group.
- > Patients who have injuries and redness in hands.
- > Patients who are critically ill and not able to comprehend.
- > Patients who are not cooperative.
- > Patients who are not available during the period of data collection.
- > Patients who have Raynaud's syndrome and allergic to cold.

Study population

The sample size was 60 patients with A.V.Fistula access at Jeyasekaran Hospital who fulfilled the inclusion criteria. 30 patients were allocated in Experimental group and 30 patients were allocated in Control group.

Data collection methods

The data collection procedure was done for a period of 4 weeks during the month of May in Jeyasekaran Hospital, after receiving initial permission from the institution and formal permission from the Director of Jeyasekaran Hospital. The investigator had done the screening among the haemodialysis patients with AV Fistula in Jeyasekaran Hospital. A non-probability Purposive sampling technique will be used to select samples. The selected sample will be randomly assigned to experimental & control group. At first, a rapport was established with the patients and the purpose of the study was explained to them. It was assured to them that all data would be kept strictly confidential and used only for study purpose. After obtaining the verbal and written consent of the patients to participate in the study, demographic data was collected by the investigator.

The intervention was carried out by the investigator in the experimental group. The investigator applied ice cubes wrapped in gloves over the web of thumb and index finger on the contralateral arm of the hand having the AV Fistula for 10 minutes prior to the puncture and would continue applied till the end of AV Fistula puncturing procedure. The investigator assessed the post test level of pain of patients belonging to experimental group and Control group by Numerical rating scale.

Data analysis

Data collected was analyzed using both descriptive and inferential statistics such as mean, standard deviation chi square and paired 't' test.

Numerical rating scale

Numerical rating scale is a golden standard tool for assessing the Level of AV Fistula puncture related pain.

Scoring procedures

Numerical Rating Scale consists of 10 numerically scaled, 0 to 10 scores. The total maximum and minimum score were 10 and 0 respectively. The score on the numerical scale, 0 to 10 was interpreted as,

Score	Interpretation
0	- None
1-3	- Mild Pain
4-6	- Moderate Pain
7-10	- Severe Pain

Descriptive statistics

- > Frequency and percentage distribution of sample

according to demographic variables of haemodialysis patient.

- > Frequency and percentage distribution were used to assess the level of Pain.
- > Mean and standard deviation were used to assess the effectiveness of cryotherapy

Inferential statistics

- > Paired t-test was used to compare the post test level of pain between experimental group and control group.
- > Chi square test was used to find out the association of post test level of Pain of Haemodialysis patients with their selected demographic variables in experimental group.

Table 1 : Frequency and percentage distribution of patients according to their Demographic variables and related to illness in experimental and control groups.

Variables	Experimental group	Control group
Age (% years)	30 (21-30)	33.33 (21-30)
Sex (%)	66.66 (male)	66.66 (male)
Religion (%)	63.33 (hindu)	63.33 (hindu)
Marital status (%)	93.33 (unmarried)	90 (unmarried)
Education (%)	43.33 (under graduate)	43.33 (higher secondary)
Duration of illness (% years)	53.33 (0-3)	63.33 (0-3)
Period of hemodialysis (% years)	53.33 (0-3)	43.33 (0-3)
Frequency of attending hemodialysis session (% cycles)	56.66 (twice)	93.33 (twice)
Total number of hemodialysis attended (%)	56.66 (> 100 times)	66.66 (>100)
Health problems for hemodialysis (%)	46.66 (CKD)	53.33 (CKD)

Table 2: Frequency and percentage distribution of patients according to their pre test level of pain score observed by observation check list.

		Group			
		Experimental Group (n=30)		Control Group (n=30)	
S.NO	Level of Pain	f	%	f	%
1.	None	0	0	0	0
2.	Mild	0	0	07	23.3
3.	Moderate	18	60	14	46.7
4.	Severe	12	40	09	30.0

Table 3: Mean, Standard Deviation, Mean Difference and 't' value on pre test level of pain among experimental and control group.

S.NO	Groups	Mean	SD	MD	t-value	P -value
1.	Experimental Group	2.53	1.8	1.09	8.43	4.12
2.	Control Group	5.12	2.6			

Significant at (p< 0.05) (df= 58)

Table 4: Frequency and percentage distribution of patients according to their post test level of pain score observed by numerical pain scale.

		Group			
		Experimental Group		Control Group	
S.NO	Level of Pain	f	%	f	%
1.	None	0	0	0	0
2.	Mild	20	66.67	0	0
3.	Moderate	10	33.33	09	30
4.	Severe	0	0	21	70

Table 5: Mean, Standard Deviation, Mean Difference and 't' value on post test level of pain among experimental and control group.

n=60						
S.NO	Groups	Mean	SD	MD	t-value	P -value
1.	Experimental Group	3.5	0.67	3.9	5.17	2.00
2.	Control Group	7.4	1.14			

Significant at ($p < 0.05$) (df= 58)

Table 6: Data on association of post test level of pain among haemodialysis patients and selected demographic variables in experimental group

S.No	Demographic Variables	Level of pain						t- Value	χ^2 Value
		Mild		Moderate		Severe			
		f	%	f	%	f	%		
1.	Age(in years)								
	a) 21-30	9	30	0	0	0	0	12.59	30.04
	b) 31-40	8	26.6	0	0	0	0		df=6
	c) 41-50	0	0	8	26.6	0	0		S
	d) 51-60	0	0	5	16.6	0	0		
2.	Sex								8.2
	a) Male	15	50	5	16.6	0	0	5.99	df=2
	b) Female	2	6.6	8	26.6	0	0		S
3.	Religion								2.95
	a) Christian	5	16.6	4	13.3	0	0	12.59	df=6
	b) Hindu	12	40	7	23.33	0	0		NS
	c) Muslim	0	0	2	6.66	0	0		
	d) Others	0	0	0	0	0	0		
4.	Marital status								2.5
	a) Single	1	3.33	0	0	0	0	12.59	df=6
	b) Married	15	50	13	43.33	0	0		NS
	c) Widow	1	3.33	0	0	0	0		
	d) Seperated	0	0	0	0	0	0		
5.	Education								11.47
	a) Illiterate	2	6.6	1	3.3	0	0	12.59	df=6
	b) Higher secondary	10	33	1	3.3	0	0		
	c) Under graduate	3	10	10	33	0	0		
	d) Post graduate	2	6.6	1	3.3	0	0		
6.	Duration of illness								6.73
	a) 0-3 years	12	40	4	13.3	0	0	12.59	df=6
	b) 4-6 years	5	16.6	6	20	0	0		NS
	c) 7-9 years	0	0	3	10	0	0		
	d) 10 and above	0	0	0	0	0	0		
7.	Period of hemodialysis								27.63
	a) 0-3 years	16	53.3	0	0	0	0	12.59	Df=6
	b) 4-6 years	0	0	11	36.6	0	0		S
	c) 7-9 years	1	3.3	2	6.6	0	0		
	d) 10 and above	0	0	0	0	0	0		
8.	Frequency of attending hemodialysis								0
	a) Daily	0	0	0	0	0	0	12.59	Df=6
	b) Once	0	0	0	0	0	0		NS
	c) Twice	17	56.6	13	43.3	0	0		
	d) Thrice	0	0	0	0	0	0		
9.	Total number of hemodialysis attended								0
	a) < 20	0	0	0	0	0	0	12.59	Df=6
	b) 21-50	0	0	0	0	0	0		Ns
	c) 51-100	0	0	0	0	0	0		
	d) >100	17	56.6	13	43.3	0	0		
10.	Health problems for hemodialysis								13.43
	a) Acute renal failure	0	0	0	0	0	0	12.59	Df=6
	b) Chronic renal failure	14	46.6	2	6.6	0	0		S
	c) DM with renal filure	3	9.9	11	36.6	0	0		
	d) Any other	0	0	0	0	0	0		

Discussion

Results of the present study revealed total 60 participants, one third of the study participants fall under 21-30 years of age, 66.66% were male and nearly two third (66.66%) of them belongs to Hindu religion, most of the participants 93.33% were unmarried, 43.3% of the study participants were educated at the level of higher secondary and undergraduate, 63.33% of the study participants were having 0-3 years duration of illness. majority (93.33%) of them having dialysis twice in a week, and nearly two third (66.66%) of participants are attended >100 times dialysis, 53.33% of the study participants were having CKD. This study stated that renal functions gradually decreases the age from 21 years. The study was in line with Capt. Rubinder Kaur et al (2019) who found that more than half of their sample was male. In this study the result shows that the pre test level of pain in experimental and control group observed by Numerical Rating Scale. In experimental group it reveals that majority of patients 18(60%) were had moderate pain and 12(40%) were had severe pain. Where as in control group 7(23.3%) had mild pain, 14(46.7%) had moderate pain and 9(30%) had severe pain. In the post test level of pain in experimental and control group observed by Numerical Rating Scale. In experimental group it reveals that majority of patients 20(66.67%) were had mild pain in AV fistula assess after application of cryotherapy, and 10(33.33%) patients had moderate pain. Where as in control group majority of patients 21 (70%) had severe pain, 9(30%) patients had moderate pain. The findings of the study supported by Capt. Rubinder Kaur et al(2019) which revealed this both score either subjective or objective were significantly reduced after applying cutaneous stimulation (cryotherapy).

Mrs. Kalaivani et al (2016) in her study found the effectiveness of cryotherapy on AV Fistula puncture pain among patients undergoing hemodialysis the majority (88.3%) of them had mild pain with cryotherapy during AV Fistula puncture. The AV Fistula puncture pain score measured by Numerical Rating Scale of HD within the experimental and control group showed that the pain score among the experimental group were found to be significantly reduced ($p < 0.05$) from a mean of 3.5 among experimental group to 7.4 among control group. There was also significant reduction ($p < 0.05$) in the AV Fistula puncture pain score was measured by observation check list from mean of 2.53 among experimental group to 5.12 among control group. The findings of the study supported by Tinsy John et al (2019) which revealed that cryotherapy is effective in reducing A.V. Fistula puncture related pain among hemodialysis patients. It reveals that there is a significant difference between the level of pain in age (30.04), gender (8.2), period of hemodialysis (27.63), Health problems for Haemodialysis (CKD) (13.43) at 0.05 level of significance and the $df=58$. Whereas there is no significant difference between the level of pain such as religion (2.95), marital status (2.5), education (11.47), duration of illness (6.73) at 0.05 level of significance and the $df=58$. The findings of the present study supported by Rasha Rady Elsaid et al who found a highly statistical significant difference in relation to children's age and their level of pain at puncture sites of arteriovenous fistula. The present study findings are further illustrated by Patidar (2015) who found that health problem of CKD and the duration of AV fistula were found to have significant association with pain level during AV Fistula puncture among hemodialysis

patients.

Conclusion

Based on the current study findings it was concluded that cryotherapy was effective on reducing pain intensity at puncture sites of arteriovenous fistula among patients undergoing hemodialysis. In the pre test, in experimental group 18 (60%) had moderate and 12 (40%) had severe level of pain. In control group 7 (23.3%) had mild pain, 14 (46.7%) had moderate pain, 9 (30%) had severe level of pain. In the post test, in experimental group 20(66.66%) had mild, 10(33.3%) had moderate level of pain. In control group 21 (70%) had severe, 9 (30%) had moderate level of pain. Cryotherapy has no complications, less cost effective, easily available and easy to administer to the patients. The investigator found that cryotherapy is the best technique to reduce the pain and patients satisfaction in the hemodialysis units.

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