



To assess the effectiveness of cryotherapy on pain level related to AV fistula puncture among haemodialysis patients at selected hospital of Kalaburagi

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Abstract

The kidneys are highly efficient organs that eliminate waste and medicines from the body, regulate the body's fluid balance, secrete hormones to maintain blood pressure, and encourage the creation of red blood cells. They filter around 2 litres of fluid per day and return it to the bloodstream.

Objectives: To assess the effectiveness of cryotherapy on pain level related to AV fistula puncture among hemodialysis patients at selected hospital of Kalaburagi.

Methodology: A evaluative approach with quasi experimental two group pretest-posttest design was adopted for the study. The samples from the selected hospitals were selected using convenient sampling technique. The sample consisted of 60 patients undergoing hemodialysis (30 in each group). The tools used for data collection was Numerical pain scale.

Results: Among participants of experimental group, with regard to pre-test level of pain it shows that, maximum 22(73.3%) respondents were had moderate pain, 7(23.3%) respondents were had severe pain and remaining 1 (3.3%) respondents were had mild pain. During post-test maximum each 15 (50%) of respondents were had mild and moderate levels of pain. With regard control group to pre-test level of pain it shows that, maximum 17(56.7%) respondents were had moderate pain, 10(33.3%) respondents were had severe pain and remaining 3 (10%) respondents were had mild pain. During post-test maximum 16(53.3%) respondents were had moderate pain, 10(33.3%) respondents were had severe pain and remaining 4(13.3%) respondents were had mild pain. Experimental group, the statistical paired 't' implies that the difference in the pretest and post-test value was found statistically significant at 5% level ($p<0.05$) with a paired 't' value of 7.87. The control group he statistical paired 't' implies that the difference in the pretest and post-test value was not found statistically significant at 5% level ($p<0.05$) with a paired 't' value of 1.02.

Conclusion: The findings revealed that, level of pain among participants in both experimental groups during pretest was moderate to severe and is reduced as low in experimental group after cryotherapy and is remained same in control group.

Keywords: Hemodialysis, cryotherapy, renal failure, hospitals, evaluate

Introduction

The kidneys are highly efficient organs that eliminate waste and medicines from the body, regulate the body's fluid balance, secrete hormones to maintain blood pressure, and encourage the creation of red blood cells. They filter around 2 litres of fluid per day and return it to the bloodstream.

The kidney is a vital organ, yet many individuals possess limited knowledge regarding its essential function within the body. As a result, we inadvertently harm this crucial organ, primarily due to unhealthy lifestyle habits and decisions. The majority of individuals are born with a pair of kidneys, although it is feasible to live with just one fully functional kidney. These two formidable organs function continuously to eliminate detrimental poisons from the body.

Chronic Kidney Disease is a global medical issue that affects individuals regardless of social or economic boundaries. In underdeveloped nations, such as Africa and India, the combination of delayed diagnosis and lack of money has resulted in a situation that is equivalent to a

death sentence for many individuals diagnosed with End Stage Renal Disease.

The pain caused by the placement of a large cannula into the arteriovenous fistula (AVF) is a major concern for both paediatric and adult patients undergoing regular hemodialysis (HD). Despite the pain caused by AVF puncturing, local anaesthesia is not commonly administered due to concerns regarding vasoconstriction, burning sensation, scarring, and infection. Typically, a patient receiving maintenance hemodialysis requires 10 AV fistula punctures per month, which will continue indefinitely or until a successful kidney transplant is performed. The patient's level of comfort with the operation is crucial for ensuring long-term adherence to the treatment.

Hemodialysis (HD) is a process where waste products, such as creatinine and urea, as well as excess water, are removed from the blood outside the body when the kidneys are not functioning properly. Hemodialysis is a form of renal replacement therapy, along with kidney transplant and

peritoneal dialysis. Hemodialysis is a prevalent technique used for treating end-stage renal disease (ESRD) by replacing the function of the kidneys. In recent decades, there have been notable breakthroughs in dialysis equipment, drugs, and treatment guidelines, resulting in enhanced patient outcomes.

Cryotherapy is a form of cutaneous stimulation. This strategy is both uncomplicated and inexpensive, yet it has a significant position among non-pharmaceutical approaches to pain management. In India, the prevalence of chronic renal failure is 10% among adults. 17% of urban Indians suffer from Chronic Renal Failure (CRF). It is imperative to enhance awareness regarding the symptoms and motivate individuals at a greater risk.

Cryotherapy is a therapeutic technique that reduces pain by decreasing the rate at which nerves transmit signals and by inhibiting nerve impulses by the application of cold temperatures to the affected area. In addition, it induces muscle relaxation, reduces capillary permeability by vasoconstriction, and slows down cellular metabolism. It can be administered either through topical, percutaneous, or surgical means. The cold therapy can be administered through the use of cold packs, ice gel, ice massage, or spray. Cryotherapy, which involves the application of cold to the skin, is a cost-effective nursing intervention recommended for reducing pain in patients [6].

Objectives

1. To assess the pretest and posttest level of pain score during arteriovenous fistula puncture among patients undergoing hemodialysis in both experimental and control group.
2. To evaluate the effectiveness of cryotherapy on level of pain during AV fistula puncture among patients undergoing hemodialysis.
3. To find out the association between pretest levels of pain among patient undergoing hemodialysis with their selected socio demographic variables.

Hypotheses

H1: There will be significant difference in the mean pre-test pain scores among the haemodialysis patients between experimental and control group

H2: The mean post-test pain scores of the haemodialysis patients receiving cryotherapy will be significantly lower than the mean pre-test pain scores at 0.05 level of significance.

H3: There will be significant difference in the mean post-test pain scores among the haemodialysis patients between experimental and control group

H4: There will be a statistical association between pre-test pain scores of haemodialysis patients with their selected socio demographic variables at 0.05 level of significance.

Methodology

- **Research Approach:** Quantitative-evaluative approach.
- **Research Design:** Quasi experimental control group design.
- **Sampling technique:** Non-Probability, Convenient Sampling Technique
- **Sample size:** 60 samples (30 in each group)
- **Setting of study:** Selected hospitals, Kalaburagi, Karnataka
- **Population:** Hemodialysis patients

Tool used for data collection

- **Section I: Demographic data:** It consists of 6 items related to demographic data of participants
- **Section II:** Consists of Numerical Pain Assessment Scale in range of 1-10, in which 0–indicates no pain, 1-3 indicates mild pain, 4-6 indicates moderate pain, 7-10 indicates severe pain.

Procedure of data collection

A formal prior permission was obtained from the medical officer of selected Hospital, Kalaburagi. The study was conducted for period of six weeks. Since it was not possible to have the entire samples on one day, daily around 4 to 5 samples were selected based on the criteria for sample selection. The clients were assigned alternatively to the experimental group and control group. The clients were explained about the purpose of the study and written consent was obtained and assured of confidentiality of the data collected. On the first day of sample selection the demographic data and pain level were assessed for 10 minutes. The experimental group received cryotherapy which was started ten minutes before the venipuncture and continued throughout the AV Fistula puncture on the second sitting of dialysis. An evaluation was carried out soon after the procedure for the experimental group and control group without cryotherapy.

Results

Section I: Demographic Profile

Table 1: Frequency & percentage distribution of respondents by age, gender, religion, family type, duration of illness and frequency of dialysis N: 3 0+30=60

Sl. No.	Demographic variables	Exp. Gp		Control group	
		Frequency (f)	Percentage (%)	Frequency (F)	Percentage (%)
Age (In yrs.)					
1	a) 21-30	07	23.3	05	16.7
	b) 31-40	17	56.7	23	76.7
	c) Above 40	06	20	02	6.7
Gender					
2	a) Male	11	36.7	06	20
	b) Female	19	63.3	24	80
Religion					
3	a) Hindu	12	40	15	50
	b) Christian	16	53.3	13	43.3

	c) Muslim	02	6.7	02	6.7
	d) Other	00	00	00	00
	Type of family				
4	a) Nuclear	23	76.7	21	63.3
	b) Joint	07	23.3	09	36.7
	Duration of illness				
5.	a) < 1 years	22	73.3	19	63.3
	b) >1 years	08	26.7	11	36.7
	Frequency of dialysis per month				
6.	a) 1-3	16	53.3	13	43.3
	b) 3-6	10	33.3	11	36.7
	c) >6	04	13.3	06	20

Section II

Distribution Respondent’s Scores according To Their Pain level during pretest and post-test in experimental group and control group

Area wise and total distribution of pre-test and post-test pain scores of respondents.

Pre-test pain scores

Table 2: Mean, median, mode, standard deviation and range of pre-test pain scores of Respondents N: 30+30=60

Groups	Mean	Median	Mode	Standard deviation	Range
Experimental group	5.53	5	5	1.22	3-8
Control group	5.76	6	6	1.56	3-8

Table 2 reveals total pre-test pain score of respondents, it shows that-In experimental group respondent’s pain score mean was 5.53, median was 5, mode was 5with standard deviation 1.22 and score range was 3-8.In control group

respondent’s pain score mean was 5.76, median was 6, mode was 6 with standard deviation 1.56 and score range was 3-8.

Table 3: Mean, median, mode, standard deviation and range of post-test pain scores of Respondents N: 30+30=60

Groups	Mean	Median	Mode	Standard deviation	Range
Experimental group	3.46	3.50	4	0.86	2-5
Control group	5.56	6	7	1.50	3-8

Post-test pain scores

Table 3 reveals total post-test pain score of respondents, it shows that in experimental group respondent’s pain score mean was 3.46, median was 3.50, mode was 4 with standard deviation 0.86 and score range was 2-5. In control group

respondent’s pain score mean was 5.56, median was 6, mode was 7 with standard deviation 1.50 and score range was 3-8. Distribution Respondent’s Pretest And Post-test Scores According To Their Pain Level In Experimental Group And Control Group.

Table 4: Frequency and Percentage distribution of respondents according to level of pain in pretest and post-test N: 30+30=60

Groups	Pain level					
	Pre-test			Post-test		
	Mild f (%)	Moderate F (%)	Severe F (%)	Mild F (%)	Moderate F (%)	Severe F (%)
Exp gp	1 (3.3%)	22 (73.3%)	7 (23.3%)	15(50%)	15(50%)	00
Control gp	3 (10%)	17 (56.7%)	10 (33.3%)	4(13.3%)	16 (53.3%)	10 (33.3%)

The data presented in the Table 4 depicts the respondent’s pain level during pretest and post.

During post-test maximum 16(53.3%) respondents were had moderate pain, 10(33.3%) respondents were had severe pain and remaining 4(13.3%) respondents were had mild pain.

Experimental Group

With regard to pre-test pain level it shows that, maximum 22(73.3%) respondents were had moderate pain, 7(23.3%) respondents were had severe pain and remaining 1 (3.3%) respondents were had mild pain. During post-test maximum each15 (50%) of respondents were had mild and moderate levels of pain.

The statistical significance of the mean gain in pre-test pain score difference tested between the Experimental group and control group is not found significant at 0.05 level [$t'_{(58)} = 0.64$, ($p < 0.05$)]. Thus, the findings do not support the hypothesis H₁. Hence, it is inferred that, there will not be significant difference in the mean pre-test pain scores of participants of both groups and both groups have similar pain level in pretest.

Control group

With regard to pre-test pain level it shows that, maximum 17(56.7%) respondents were had moderate pain, 10(33.3%) respondents were had severe pain and remaining 3 (10%) respondents were had mild pain.

Effectiveness of Cryotherapy

Comparison of the pre-test and post-test pain scores in experimental group and control group.

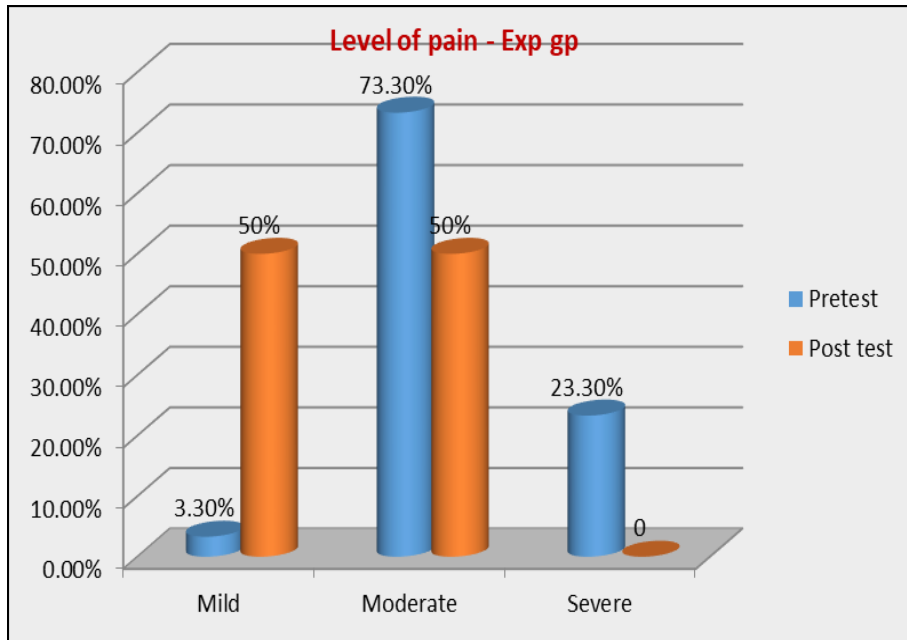


Fig 1: Pre-test and post-test pain level of respondents in experimental group

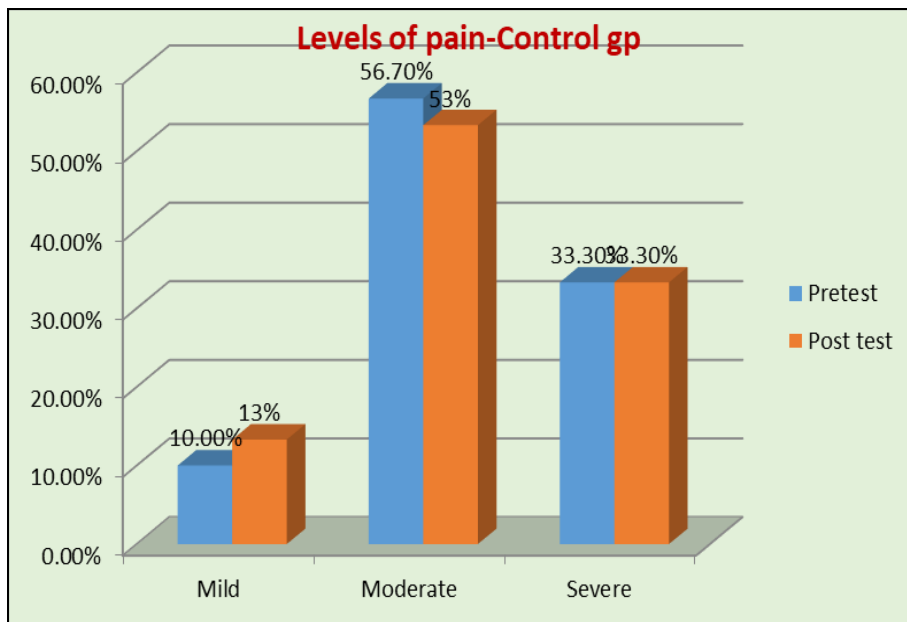


Fig 2: Pre-test and post-test pain level of respondents of control group

Comparing the pre-test scores between the experimental and control groups

Table 5: Mean difference, standard deviation of the difference and standard error of the mean difference and 't' value of pre-test pain scores of respondents between experimental group and control group N: 30+30=60

Groups	Mean D	SD _D	SEMD	Independent 't' test	Significance
Experimental group control group	0.23	0.34	0.36	0.64	NS

Independent 't'₍₅₈₎ = 2.00, (p<0.05), S=Significant

Table 6: Mean, standard deviation, standard error of difference and 't' value of pre-test and post-test pains cores of exp group and control group N: 30+30=60

Groups	Aspects	Mean	SD	SEMD	Paired T-Test
Exp Gp	Pre-test	5.53	1.22	0.26	7.87*
	Post-test	3.46	0.86		
Control gp	Pre-test	5.76	1.56	0.07	1.02
	Post-test	5.56	1.50		

T₍₂₉₎=1.75, (p=0.05), NS = Not Significant. * Significant at 5% level

Experimental group

The findings reveal that the post-test mean pain scores was found lower [mean=3.46, SD of 0.86] when compared with pre-test mean pain score value which was 5.53with SD of 1.22. The statistical paired ‘t’ implies that the difference in the pretest and post-test value was found statistically significant at 5% level (P<0.05) with a paired ‘t’ value of 7.87.

There exists a statistical significance in the difference of pain score indicating the positive impact of cryotherapy. Hence with respect to experimental group, the research hypothesis H₂ is supported. This indicates that the decrease in pain is not by chance and the participants who exposed to cryotherapy are significantly lowered in their pain level.

Control Group

The findings reveal that the post-test mean pain scores was found lower [mean=5.56, SD of 1.50] when compared with pre-test mean pain score value which was 5.76with SD of 1.56.

The statistical paired ‘t’ implies that the difference in the pretest and post-test value was not found statistically significant at 5% level (P<0.05) with a paired ‘t’ value of 1.02. There exists a no statistical significance in the difference of pain score indicating the no change of pain scores between pretest and post-test.

Hence with respect to control group, the research hypothesis H₂ is rejected. This indicates that there is no change of pain level among the participants who do not undergone any intervention program.

Table 7: Mean difference, standard deviation of the difference and standard error of the mean difference and ‘t’ value of post-test pain scores of respondents between experimental group and control group N: 30+30=60

Groups	Mean _D	SD _D	SEMD	Independent ‘T’ Test	Significance
Experimental group control group	2.10	0.64	0.31	6.64	S

Independent ‘t’₍₅₈₎ = 2.00, (p<0.05), S=Significant

Comparing the post-test scores between the two experimental groups

The statistical significance of the mean gain in post-test pain score difference tested between the Experimental group and control group is not found significant at 0.05 level [‘t’₍₅₈₎ = 6.64 , (p<0.05)]. Thus, the findings do support the hypothesis H₃. Hence, it is inferred that, there will be significant difference in the mean posttest pain scores of participants of both groups and both groups have differed with respect to pain level in post-test. As mean pain scores of experimental groups is lower than control group it is inferred that, cryotherapy was effective in reducing the pain level among the participants of experimental group.

Association between pain level and selected socio demographic variables

The computed Chi-square value for association between pain level of participants of both groups and their selected demographic variables is not found to be statistically significant at 0.05 levels for any selected socio demographic variables. Therefore, the findings do not support the hypothesis H₅, inferring that participants levels of pain is not significantly associated only with any of selected socio demographic variables.

Conclusion

Cryotherapy was effective to reduce pain of patients undergoing hemodialysis. Since a very few studies have been conducted regarding this topic in India, so the nurse researcher can take further studies on the same topic.

References

- Ryan, J. by CBS NEWS March 14, 2013, 3:26 PM Retrieved from website <https://www.cbsnews.com/news/world-kidney-day-kidney-disease-silentepidemic-in-us/>
- Do you take your kidney for granted. <http://www.comprehensive-kidneyfacts.Com>
- Managing Chronic Kidney Disease in Africa and India.

<http://renalbusiness.com/articles/2009/01>

- Mahajan S, Gupta S, Agarwal M, Yadav S, Sabitha P, Khakha D. Effect of cryotherapy on arteriovenous fistula puncture-related pain in hemodialysis patients; c2020. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2813537/>
- Abraham S, Ramachandran A. Estimation of quality of life in haemodialysis patients. *Indian Journal of Pharmaceutical Sciences.* 2012;74(6):583.
- Fareed MF, El-Hay AAH, El-Shikh AA. Cutaneous Stimulation: its effect on pain Relieving among Hemodialysis Patients. *Journal of Education and Practice.* 2014;5(1):12-16.
- Attia A, Hassan A. Effect of cryotherapy on pain management at the puncture site of arteriovenous fistula among children undergoing hemodialysis. *International Journal of Nursing Sciences.* 2017;4(1):46-51.
- Mari M, Al Amer H, Dator W, Abunab H. Cryotherapy intervention in relieving arteriovenous fistula cannulation related pain among hemodialysis patients at the King Khalid Hospital, Tabuk, Kingdom of Saudi Arabia. *Saudi Journal of Kidney Diseases and Transplantation.* 2017;28(5):1050.

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