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Effectiveness of dry heat application on pain among patients undergoing intravenous cannulation in a selected hospital

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Abstract

The present study was conducted to assess the effectiveness of dry heat application on pain among patients undergoing intravenous cannulation in a selected hospital, Perinthalmanna. Objectives of the study were to evaluate the effectiveness of dry heat application on pain among patients undergoing intravenous cannulation and to associate the selected variables with pain among patients undergoing intravenous cannulation. The investigator adopted post-test only control group design for this study. The investigator has chosen 80 samples from patients undergoing intravenous cannulation in MES Medical College Hospital. A structured interview schedule and an assessment data sheet were used to collect data about selected variables and control group was given all routine cares prior to intravenous cannulation and pain was assessed using a numerical pain scale. Whereas experimental group was given dry heat application for 10 minutes by using a hot water bag along with other routine cares, on the selected site prior to intravenous cannulation. Pain was assessed after insertion of IV cannula using the same scale. Descriptive and inferential statistics were used for data analyses and the level of significance was set at ≤ 0.05. The study result was that mean pain score of experimental group was 2.40 and the mean pain score of control group was 3.88. And the Mann Witney's U test score for effect of dry heat on pain was 329 at p-value <0.001. Based on the present study, the researcher concluded that there was a significant difference in the mean score of pain between the experimental group and control group of patients undergoing intravenous cannulation and hence, dry heat application was found effective in reducing pain during IV cannulation.

Key words: Dry heat; Intravenous cannulation; Pain.

Introduction

Pain is an unpleasant and highly personal experience that is imperceptible to others, while consuming all parts of an individual's life. The international association for the study of pain defines, Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage1. First do no harm. It can be argued that causing unnecessary pain during medical procedures is doing harm. Inadequate pain relief is unpleasant for the patient but may also increase anxiety about future treatment and deter patients from seeking help in the future. One example is the routine insertion of peripheral venous cannula. This procedure is a common experience for thousands of patients and to be painful2. Peripheral intravenous catheterization is required in a broad range of clinical applications, including intravenous drug administration, intravenous hydration, and transfusion of blood or blood components, as well as during surgery, during emergency care, and in other situations in which direct access to the bloodstream is needed. Insertion is usually technically easy and the pain associated with PIVC is common. The painful experience is full of fears and distress, but sometimes it is problematic and time consuming3. The failure to treat pain is inhumane and constitutes professional negligence4. Over the years many strategies have been developed to reduce the pain of peripheral venous cannulation involving both pharmacological agents and non- pharmacological techniques with variable results. Sometimes combinations of techniques are practiced to produce the desired result15. Using heat before insertion of peripheral venous cannulas is one of the easiest, most convenient, and least expensive ways to facilitate accessing blood vessels6. It also improves vein visualization. Heat causes vasodilation of the blood vessels, which increases blood flow to the area of application. Cutaneous blood flow increases up to 70% during periods of heating because of an increase in sympathetic vasodilator activity and thus improves the visibility and palpability of the veins which in turn aids in ease of venepuncture. Heat also reduces the pain perceived by the patient and causes some degree of muscle and connective tissue relaxation7.

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Statement of the problem

A study to assess the effectiveness of dry heat application on pain among patients undergoing intravenous cannulation in a selected hospital, Perinthalmanna.

Aim and objective Aim

The study aims to assess the effectiveness of dry heat application on pain among patients undergoing intravenous cannulation.

Objectives

1. Evaluate the effectiveness of dry heat application on pain among patients undergoing intravenous cannulation.
2. Associate the selected variables with pain among patients undergoing intravenous cannulation

Hypotheses

H1: There is a significant difference in the mean score of pain between the experimental group and control group of patients undergoing intravenous cannulation.

H2: There is a significant association between selected variables and pain among patients undergoing intravenous cannulation.

Materials and methods

Quantitative research approach with post-test only control group design was adopted for the study. Using convenient sampling technique , 80 patients who are in need of iv cannulation were selected from different in patient departments of MES Medical College Hospital , Perinthalmanna. Inclusion criteria was patients who are willing to participate, who are conscious and oriented and patients between the age group of 18 to 50 years . Exclusion criteria was patients with bleeding disorders, sensory impairment, who requires emergency treatment , who are contraindicated for local heat application such as diabetes mellitus, wound or fracture on hands, hyperthermia, and dry skin , who receive analgesics 2 hours prior of cannulation and patients who are hemodynamically unstable.

The data were collected using a structured interview schedule, assessment data sheet and pain was assessed using a numerical pain scale. Data was collected after getting permission from the concerned authorities at MES Medical College hospitals, Perinthalmanna. The study participants were selected by convenient sampling technique. A total of 80 patients who were in need of intravenous cannulation were selected (40 samples in experimental group and 40 samples in the control group). After self-introduction, purpose of study was explained to study participants to gain cooperation from their part. Informed consent was obtained from each patient before data collection and confidentiality was assured. Information on selected variables was collected using a structured interview schedule and an assessment data sheet which took almost 10 to 15 minutes. Control group was given all routine cares prior to intravenous cannulation and then pain was assessed using a numerical pain scale. Whereas experimental group was given dry heat application (1200 F) for 10 minutes by using a hot water bag along with other routine cares, on the selected site prior to intravenous cannulation. Pain was assessed few minutes after insertion of IV cannula using the same scale. The sizes of cannulas used were matched in control group and experimental group.

The collected data were arranged and tabulated to represent the finding of the study. Both descriptive and inferential statistical methods were used for analysing the data. A Chi-Square test was used to find out the association between selected variables and pain level. A non- parametric test, Mann–Whitney U test was used to evaluate the effectiveness of dry heat application on pain level during intravenous cannulation.

Results

The analysis of the study were presented in the form of following headings

Section I: Distribution of selected variables of patients undergoing intravenous cannulation. Section II: Effectiveness of dry heat application on pain among patients undergoing intravenous cannulation.

Section III: Association between selected variables of patients and the level of pain among patients undergoing intravenous cannulation.

Table 1: Distribution of selected variables of patients undergoing intravenous cannulation.

Selected variables	Percentage distribution Control group	Percentage distribution Experimental group
Age group • 20-30 • 30-40 • 40-50	17.5% 25 % 57.5%	20% 30 % 50%
Gender • Female • Male	55% 45%	62.5% 37.5%
Chronic pain due to chronic illness • Yes • No	35.5 % 65%	37.5 % 62.5%
Skin turgor • Normal • Poor	80% 20%	87.5% 12.5 %
Previous experience of intravenous cannulation • Yes • No	52.5% 47.5%	75% 25%
Site of cannulation • Dorsal surface of hand • Inner arm of hand	72.5 % 27.5%	77.5% 22.5 %
Visibility and palpability of thevein • Visible and palpable • Visible but not palpable • Not visible but palpable • Not visible and not palpable	42.5% 32.5 % 22.5 % 2.5 %	65% 22.5% 10% 2.5 %

Size of cannula selected • **18 gauge** • **20 gauge** • **22 gauge**	**50%** **25%** **25%**	**50%** **25%** **25%**
fatigue due to present illness • **Yes** • **No**	**35%** **65%**	**30%** **70%**

Table 1 shows that in the control group 57.5% of the patients belong to 40-50 years of age. And in the experimental group 50% of patients were in the group of 40 -50 years of age group. 55% of the patients in the control group were females and 45% were males, where as 62.5% of patients in the experimental group were females and 37.5% of patients were males. 35.5 % of the patients were with chronic pain due to chronic illness in the control group and 37.5 % of the patients in experimental group were with chronic pain due to chronic illness. 80% of the patients in the control group were with normal skin turgor and whereas 87.5% of the patients from the experimental group had normal skin turgor .52.5% of patients in the control group were with previous experience of intravenous cannulation and 75% of the patients in the experimental group were with previous experience of intravenous cannulation. 72.5 % of patients in the control group had their site of cannulation on dorsal surface of hand and 77.5% of patients in the experimental group had their site of cannulation on dorsal surface of hand.

In the control group 42.5% of patients had visible and palpable vein whereas 65% of the patients in the experimental group had visible and palpable vein. 18 gauge cannulas were inserted for 50% of patients in the control group, 20 gauge cannulas were inserted for 25% of them and 22 gauge cannulas for 25% respectively. 50% of patients were inserted with 18 gauge cannulas, 20 gauge cannulas were inserted for 25% patients and 25% of them were inserted with 22 gauge cannulas in the experimental group. 65% of the patients in the control group didn‘t have any fatigue related to present illness and in the experimental group 70 % of patients didn‘t have any fatigue related to present illness.

77.5 % of the patients of the control group had their intravenous cannulation in the first attempt itself, in the experimental group 82.5 % of the patients had a successful IV cannulation in the first attempt

Table: 2: Effectiveness of dry heat application on pain among patients undergoing intravenous cannulation.

Pain score						
Groups	**n**				**Mann-whitney Utest**	**p value**
		Mean	**SD**	**Median(IQR)**		
Experimental	40	2.40	1.19	2(2-4)		
				329		**<0.001*****
Control	40	3.88	1.22	4(3.25-5)		

Table 2 shows that mean pain score of control group was 3.88 and the mean pain score of experimental group was 2.40 .This indicates that the mean pain score of experimental group was lower than the mean pain score of control group and the Mann Witney‘s U test score for effect of dry heat on pain was 329 at p-value <0.001. Hence, it was evident that dry heat application was effective in reducing pain among patients undergoing intravenous cannulation.

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Table: 3 Association between selected variables of patients and the level of pain among patients undergoing intravenous cannulation.

Selected variables	Categories	Pain level		Total	$\chi 2$ Value	P value
		Mildn (%)	Moderaten (%)			
Gender	Female	4 (40.0)	18 (60.0)	22	0.539	0.30
	Male	6 (60.0)	12 (40.0)	18		
Chronic pain due to Chronic illness	Yes	4 (40.0)	10 (33.3)	14	0.147	0.718
	No	6 (60.0)	20 (66.7)	26		
Previous experience	Yes	6 (60.0)	15 (50.0)	21	0.033	0.721
	No	4 (40.0)	15 (50.0)	19		
Site of Cannulation	Inner arm	2 (20.0)	9 (30.0)	11	0.042	0.696
	Dorsal surface of hand	8 (80.0)	21 (70.0)	29		
Visibility& palpability of the vein	Visible & palpable	5 (50.0)	12 (40.0)	17	4.128	0.248
	Visible but not palpable	3 (30.0)	10 (33.3)	13		
	Not visible but palpable	1 (10.0)	8 (26.7)	19		
	Not visible &not palpable	1(10.0)	0 (0.0)	1		
Size of cannula selected	18 gauge	4 (40.0)	16 (53.3)	20	1.60	0.449
	20 gauge	2 (20.0)	8 (26.7)	10		
	22 gauge	4 (40.0)	6 (20.0)	10		
Fatigue	Yes	3 (30.0)	11 (36.7)	14	0.147	0.702
	No	7 (70.0)	19 (63.3)	26		
No: of cannulation attempt	First Attempt	7 (70.0)	24 (80.0)	31	0.048	0.665
	Second Attempt	3 (30.0)	6 (20.0)	9		

Table 3 shows that there was no association between any of the selected and pain among patients undergoing during intravenous cannulation .

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Discussion

The present study was aimed to assess the effectiveness of dry heat application on pain among patients undergoing intravenous cannulation, admitted to MES Medical college hospital, Perinthalmanna. In this study, the mean pain score of experimental group was 2.40 and the mean pain score of control group was 3.88. This indicates that the mean pain score of experimental group was lower than the mean pain score of control group and the Mann Witney's U test score for effect of dry heat on pain was 329 at p-value <0.001. It also reveals that there was a significant difference between the pain level of experimental and control group. And hence the research hypothesis (H1) was accepted. No significant association was found between the level of pain and selected variables

The study finding was well supported by a study conducted to assess the impact of dry v/s moist heat application on feasibility of peripheral intravenous cannulation. The study design adopted was true experimental - post -test only with control group design. Dry heat with a hot water bag at temperature of 120-140 degree Fahrenheit was applied to the peripheral cannulation site in experimental group I and moist heat was applied to group II by wrapping a moist towel over the site for seven minutes. Numerical Pain scale was used to measure the level of pain experienced during peripheral intravenous cannulation. A significant difference was found between experimental group and control group. The Mann Whitney U test scores for Impact of dry heat and moist heat on feasibility showed that the p value for the components of feasibility is < 0.05, and both dry heat and moist heat is effective in improving the feasibility of IV cannulation. Comparison of dry heat and moist heat by Kruskal Wallis test revealed that dry heat is more effective than moist heat(least time for cannulation and least pain). No significant association was found between the level of pain and selected variables3.

The findings of both studies displayed that the dry heat application reduces the level of pain experienced by the patients during intravenous cannulation.

Conclusion

The present study concludes that the mean pain score of experimental group was 2.40 and the mean pain score of control group was 3.88. And the Mann Witney's U test score for effect of dry heat on pain was 329 at p-value <0.001, hence it is evident that there was a significant difference in the mean score of pain between the experimental group and control group of patients undergoing intravenous cannulation and dry heat application was found effective in reducing pain during IV cannulation.

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