Article published online: 2020-04-22

nuJHS
Nitte University Journal of Health Science

Original Article

A comparative study on impact of dry versus moist heat application on feasibility of peripheral intravenous cannulation among the patients of a selected hospital at Mangalore

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Received : 09.07.2017
Review Completed : 23.08.2017
Accepted : 28.08.2017

Keywords : Dry heat, moist heat, feasibility

Access this article online
Quick Response Code

Abstract

The present study was 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. Using randomized block sampling 60 patients were selected and equally allocated into 3 groups-dry heat (group I), moist heat (group II) and control group each with 20 samples. The baseline clinical data were collected from the patients by interview method. 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 (110-115^0 F) over the site for seven minutes. Numerical Pain scale was used to measure the level of pain experienced during peripheral intravenous cannulation. Data obtained in these areas were analysed by descriptive and inferential statistics. 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 like (time taken for cannulation and pain score) 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 (Median =1) and least pain (Median==1).No significant association was found between the level of pain and selected variables. This study proved that dry heat application reduces the time for cannulation and level of pain experienced by the clients during intravenous cannulation.

Introduction

The insertion of an intravenous cannula (IVC) is an essential skill that nurses use almost on a daily basis. Peripheral venous catheter is commonly used in hospitals to deliver intravenous therapy. The cannula is used for the administration of fluid/ medication directly into the venous system[1].

Intravenous cannulation is defined as the placement of a device within a vein to allow access to the venous system. These devices can then be used to deliver drugs and fluid to the patient. The main advantage of venous access is the speed with which the drug or fluid reaches systemic circulation. Insertion of intravenous cannula is probably the most commonly performed invasive medical procedure and also a potentially lifesaving intervention[2].

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[3].

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 consuming. The procedure is also difficult in infants and

children, obese patients, and black people. It is often complicated in patients who are afraid of needles or have had bad experiences because fear activates the sympathetic nervous system thereby provoking peripheral vasoconstriction. Once an initial attempt has failed, nearly all patients experience a degree of sympathetic activation that makes subsequent attempts increasingly difficult. Failed attempts are also embarrassing for the provider; hence it is important that a cannula is inserted quickly on the first attempt[4]

Local warming of the lower arm facilitates the insertion of peripheral venous cannula and reduces both the time and the number of attempts required. To facilitate insertion the hand and lower arm can be warmed with various techniques such as wrapping with towels moistened in hot water or applying hot water bag over the peripheral areas[5]. Warming during infusion can help to maintain venous patency, thus facilitating more reliable and effective infusion and greater patient comfort.[6]

Materials and Methods

The true experimental approach with post test only with control group design was adopted for the study. Population comprised of patients undergoing peripheral intravenous cannulation in selected hospital at Mangalore. Purposive sampling technique was used for selection of 60 samples and using randomized block design 20 samples each were allocated to experimental group 1, experimental group II and to control group.

The information regarding the baseline clinical data was collected from the patients by interview technique. Numerical pain scale was used to measure the level of pain during intravenous cannulation. The experimental group I was given dry heat application over the peripheral intravenous cannulation site for 7minutes with the temperature of 120-140 degree Fahrenheit and experimental group II received moist heat application with the temperature of 110-115 degree Fahrenheit for seven minutes. Post –test was done to assess the feasibility of cannulation and level of pain with the same tools- Baseline clinical data and Numerical Pain scale. Data obtained in these areas were analysed by descriptive statistics, Mann Whitney U test, Kruskal Wallis test and Fisher's exact test.

Results

The findings are discussed under the following headings.

Section 1 : Description of sample characteristics

- Majority of the samples -45% in experimental group I and 50% in experimental group II were in the age group of 21-30 yrs.
- Gender distribution shows that the experimental group I comprised of equal number of males and females (50%).In experimental group II (55%) of the samples were males and (45%) were females.
- Majority of subjects 11(55%) in experimental group I and 9(45%) in group II belonged to the Hindu religion.
- Based on marital status 85% were married in the experimental group I and 75 % in group II.
- Time taken for cannulation was less than1 minute for 85% of samples of experimental group I whereas in group II time for cannulation was 1-3 mts for majority (85%) of samples.
- 40% of group I and 35% of group II had IV cannulation in left forearm.
- Majority 75% were cannulated with the cannula of size 20 gauge.
- Majority -90% in both the groups were successfully cannulated in the first attempt.

Section 2 : Level of Pain in Experimental Groups and Control Group

Majority (95%) of the sample had mild level of pain in experimental group I and (75%) in group II had moderate level of pain during IV cannulation

Level of pain	Experimental group I	Experimental group	Control group II
None	5	0	0
Mild	95	5	0
Moderate	0	75	45
Severe	0	20	55

Section 3 : Table 1 - Impact of dry heat application (experimental group I) on feasibility of peripheral intravenous cannulation using Mann Whitney U test

(n=20+20=40)

Component	Group	Median	IQR	P-VALUE
Time taken for IV cannulation	Dry Heat	1	0	0.000
	Control	3	1	p<0.05 HS
Number of attempts	Dry Heat	1	0	0.218
	control	1	1	p>0.05 NS
Pain score	Dry Heat	1	1	0.000
	Control	7	2	p<0.05 HS

*Significant (p<0.05)

The above table shows the impact of dry heat application on feasibility of IV cannulation using 3 components .Since the p value for the 2 components - time and pain score is < 0.05 (p=0.001, p=0.001), the research hypothesis is accepted and there is a significant difference in feasibility of IV cannulation between experimental group I and control group and hence it is concluded that the dry heat has positive impact on feasibility of IV cannulation.

Section 4 : Table 2 - Impact of moist heat application (experimental group II) on feasibility of peripheral intravenous cannulation using Mann Whitney U test

(n=20+20)

Component	Group	Median	IQR	P-VALUE
Time taken for IV cannulation	Moist Heat	2	0	0.009
	Control	3	1	p<0.05 Significant
Number of attempts	Moist Heat	1	1	0.317
	control	1	1	p>0.05 NS
Pain score	Moist Heat	5	1	0.000
	Control	7	2	p<0.05 HS

*significant (p<0.05)

The median value of the 2 components - time taken and level of pain in the experimental groupII scored less than the control group (M=2, M=3 and M=5, M=7) and also the p value is <0.05 (p=0.009, p=0.001) hence there is a significant difference in the feasibility between the moist heat group and control group and the research hypothesis is accepted and it is concluded that moist heat has an impact on feasibility of peripheral IV cannulation.

Section 5 : Table 3 - Comparison of the impact of dry VS moist heat application on feasibility of peripheral intravenous cannulation using Kruskal Wallis test

(n=20+20+20)

Component	Group	Median	IQR	P-VALUE
Time Taken for IV Cannulation	Dry Heat	1	0	0.000
	Moist Heat	2	0	p<0.05
	Control	3	1	HS
Number of Attempts	Dry Heat	1	0	0.094
	Moist Heat	1	1	p>0.05
	Control	1	1	NS
Pain Score	Dry Heat	1	1	0.000
	Moist Heat	5	2	p<0.05
	Control	7	2	HS

The comparison of dry and moist heat application was done by kruskal Wallis test. Since the p value for the components of time taken and level of pain is <0.05, there is a significant difference on feasibility of IV cannulation between experimental group I and II and the research hypothesis is accepted and concluded that there is a significant difference in feasibility of IV cannulation between experimental group I and II. The comparison of the median values shows that the dry heat group has taken the least time for successful IV cannulation compared to experimental group II and control group (M=1, M=2, M=3) and the least pain was experienced by the patients in experimental group I compared to II and control group (M=1, M=5, M=7) hence it is concluded that dry heat is more effective than moist heat.

Section 6 : Association between level of pain in experimental group I and selected variable using Fishers exact test

Association between level of pain in experimental group I and selected variables like age in years, gender, religion, marital status, time taken for IV cannulation, site of IV cannulation, size of the cannula, number of attempt of successful cannulation, height and weight was analyzed by Fishers Exact test. As the p value for all the variables is >0.05 (0.139, 0.670, 0.958, 0.496, 0.092, 0.281, 0.617, 0.319, 0.925) the research hypothesis is rejected and concluded that there is no association between level of pain and selected variables.

Discussion

In this study dry heat application on peripheral intravenous cannulation site proved to reduce the time taken for IV cannulation and the level of pain during IV cannulation

The study findings are consistent with the findings of Regina M. Fink et.al who conducted a study to assess the effect of dry v/s moist heat application on peripheral intravenous cannulation. The main research variables were Number of attempts for IV insertion; time to achieve IV insertion post heating, patient anxiety levels pre - and post heating, and patient comfort. The finding of this research study was that Dry heat was 2.7 times more likely than moist heat to result in successful IV insertion on the first attempt, had significantly lower insertion times, and was more comfortable. Heat type had no effect on patient anxiety. ([7])

Conclusion

Peripheral cannulation provides access for the purpose of intravenous hydration or feeding and the administration of medications. Warming before the infusion can help to maintain venous patency, thus facilitating more reliable and effective infusion and greater patient comfort.

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