

Original Research Article

## Effectiveness of Moist Heat Therapy on Visibility, Palpability, Pricks and Pain Experienced While Undergoing Peripheral Intravenous Cannulation of Patients

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### ABSTRACT

Peripheral intravenous cannulation is frequently or commonly used invasive procedure to administer any fluids or drugs. An insertion is technically easy but causes distress or pain to the patients. Various non pharmacological methods are used to improve the visibility and palpability of veins which in turn reduces pain experienced and number of attempts taken to insert IV cannula. Several literatures had proven that application of moist heat had effect on visibility and palpability of veins and in turn reducing the pain. A Quasi experimental study was used to assess the effectiveness of moist heat therapy on visibility, palpability, pricks and pain experienced while undergoing peripheral intravenous cannulation of patients admitted in SGRD Hospital, Vallah, Amritsar. 100 patients were selected by using purposive sampling technique (50 in experimental group and 50 in control group). The results reveals that there was effectiveness of moist heat therapy on visibility and palpability of veins in experimental group with pretest mean and SD were  $1.640 \pm 0.598$  and post test mean and SD were  $3.500 \pm 1.035$  which was found to be significant at  $p \leq 0.01$  level of significance. Post test visibility and palpability of veins in experimental and control group was found to be significant at  $p \leq 0.01$  level of significance. The number of attempts taken to insert IV cannula and pain experienced by patients while undergoing peripheral IV cannulation in experimental and control group were found to be significant at  $p \leq 0.01$  level of significance. The study concludes that the moist heat therapy was effective in improving the visibility and palpability of veins, reducing the number of attempts taken to insert IV cannula and reduce the pain while undergoing peripheral intravenous cannulation

**Key words:** visibility, palpability, pricks and pain.

### INTRODUCTION

Peripheral venous cannulation is crucial in the practice of modern medicine.

<sup>[1]</sup> It is the insertion of a Vascular Access Device (VAD) into a peripheral vein (RCN, 2010). Venous access allows sampling of blood, as well as administration of fluids, medication, parenteral nutrition, chemotherapy and blood products. <sup>[1]</sup>

The patient's intravenous therapy requirements should determine the most appropriate intravenous device to be utilized. Selection of cannula and the

decision on cannula length/size may change when examining the condition of the patients veins. As a general rule, the cannula selected should have the smallest diameter for the purpose to allow blood flow around the cannula thereby lessening the risk of phlebitis. Two points are particularly important when selecting the gauge and type of cannula are size of the vein and type of fluid to be infused. <sup>[2]</sup>

Insertion of intravenous cannulas is probably the most commonly performed invasive medical procedure. Insertion is

usually technically easy and causes patients only mild distress, but sometimes it is problematic and time consuming. [3]

There are mainly two routes of drug administration that are classified as systemic route and local route. Systemic route consist enteral route and parenteral route. Parental route is more preferred in hospitals i.e. intravenous Cannulation. [4]

Palpation of the vein is important in determining the condition of the vein. The criteria for good vein are; bouncy and soft, well supported, refill when depressed visible and straight, have a large lumen [5]

Intravenous access was founded by Dr Thomas Latta of Leth during cholera treatment. This therapy was further developed by Hirschfeld, Hyman and Wanger. [5] As compare to the other routes of administration the intravenous route is the fastest way to deliver fluids and medication throughout the body. [6]

Most peripheral access devices are cannulas. They have an obturator inside the tube that is removed after placement of cannula in vein that is indicated by back flow of blood from the tube. Catheter and cannulas are terms that are used interchangeably. [7]

According to a report in 2006, there were 503,300 hospital stays with intravenous cannulated noted an increase of nearly 80% since 1993. More than 90% of the patients had intravenous cannula in general ward and in post-operative ward 100 % of patients had intravenous cannula line. In comparison 56.5% of male patients and rest of them were female and children. [8]

Peripheral veins are the veins in the arm, hands, legs and feet that includes: radial vein, basilica vein, cephalic vein, medial vein, cubital vein, superficial dorsal vein, dorsal venous arch, dorsal plexus and great saphenous vein. [9]

For peripheral venous cannulation, most suitable common veins are the veins of non-dominant forearm, in case the cannula has to be required for long time. Intravenous cannulation is easier in veins which are seen on the dorsal aspect of hand but it causes

more pain to the patient and it block the cannula very easily. The superficial veins of the lower limbs may also be cannulated, but these tend to be avoided as these are associated with a higher risk of infection and embolism. The metacarpal veins present on the dorsal aspect of hand are more easily seen by the person but it is difficult to stabilize, liable to clot and prone to vessel damage. So, if possible use basilic or cephalic veins of the lower forearm; or the dorsal venous arch located on the back of the hand. [10]

### **Problem Statement**

A Quasi Experimental study to assess the effectiveness of moist heat therapy on visibility, palpability, pricks and pain experienced while undergoing peripheral intravenous cannulation of patients admitted in SGRD hospital, Vallah, Amritsar.

### **Objectives of the Study**

1. To assess visibility and palpability of veins before peripheral intravenous cannulation of patients in experimental and control group.
2. To assess the effect of moist heat therapy on visibility, palpability of veins, pricks and pain experienced while undergoing peripheral intravenous cannulation of patients in experimental group.
3. To assess the pricks and pain experienced while undergoing peripheral intravenous cannulation of patients in control group.
4. To compare visibility, palpability of veins, pricks and pain experienced while undergoing peripheral intravenous cannulation of patients in experimental and control group.
5. To find out the association of visibility, palpability of veins, pricks and pain experienced while undergoing peripheral intravenous cannulation of patients in experimental group and control group with selected demographic variables.

### **Hypothesis:**

**H 1:-** There is significant effect of moist heat therapy on visibility, palpability of

veins, pricks and level of pain among patients undergoing peripheral intravenous cannulation.

## MATERIALS AND METHODS

### RESEARCH DESIGN

A quasi experimental study design, was adopted for this study

**Experimental group** – O<sub>1</sub> X O<sub>2</sub>

**Control group** - O<sub>1</sub> O<sub>2</sub>

O<sub>1</sub> -- Pretest

X -- Intervention (Moist heat therapy.)

O<sub>2</sub> -- Posttest

### Research variable:

**Independent variables:** Application of moist heat therapy.

**Dependent variables:** Visibility and palpability of veins, pricks and pain experienced by patients while undergoing peripheral intravenous cannulation.

### Research setting

The present study was conducted at medical wards and emergency unit of Sri Guru Ram Das Hospital, Vallah, Amritsar, Punjab

### Population

The population of the present study was patients admitted in medical wards and emergency unit at Sri Guru Ram Das Hospital, Vallah, Amritsar.

### Sampling Technique

Purposive sampling technique was used to draw sample from target population, after considering inclusion and exclusion criteria.

### Inclusion criteria:

The study includes the patients who are:-

- Undergoing peripheral intravenous cannulation on upper limb below the elbow.
- Having Vein assessment score of 1,2,3
- Above 18 years and below 60 years

### Exclusion criteria:

The study excludes the patients who are:-

- Having central venous cannulation, Peripherally inserted central line inserted.
- Having skin disease and bleeding disorders.
- Undergone upper limb amputation.
- Critically sick at time of peripheral intravenous cannulation.

- Below 18 years of age and above 60 years

### Description of tool:

**Part- A:** Socio demographic data and clinical profile of patient

- Socio demographic data includes age, gender, Educational status, family income, occupation and dietary habit of patient.
- Clinical profile of patient includes previous exposure to IV cannulation, type of admission, site of cannulation, cannula size, duration of illness and BMI of patient.

### Part- B: Vein assessment scale (Modified)

A five point vein assessment scale used to assess the visibility and palpability of peripheral veins before and after the application of moist heat therapy.

Characteristic of vein	Scores
Vein neither visible nor palpable	01
Vein visible but not palpable	02
Vein is barely visible and palpable	03
Vein is visible and palpable	04
Vein is clearly visible and palpable	05

### Part-C: Numeric Pain Rating Scale.

The numeric rating scale (NRS-11) is an eleven point rating scale for patient self reporting of pain, the patient is asked to indicate the numeric value on the segmented scale that best describes their pain intensity.

0 No pain

1-3 Mild pain

4-6 Moderate pain

7-10 severe pain

### Description of intervention

The Non pharmacological intervention was used i.e. moist heat was applied using a folded towel soaked in warm water at a temperature of 39-40° Celsius intermittently for 10 minutes on the selected vein before IV cannulation.

### Reliability of tool

The inter-rater and intra-rate reliability of Modified Vein Assessment Scale was determined by using Spearman's rho. Two raters independently observed the patients for assessment of visibility and palpability of vein. The inter-rater reliability was calculated by Spearman's rho and was

found 0.82. The intra-rater reliability was calculated by Spearman's rho and was found 0.95.

The inter-rater and intra-rate reliability of Numeric Pain Rating Scale was determined by using Pearson Correlation.

Two raters independently observed the patients for assessment of pain. The inter-rater reliability was calculated by Pearson Correlation and was found 1.00. The intra-rater reliability was calculated by Pearson Correlation and was found 1.00.

## RESULTS

Table.1: Association between frequency and percentage distribution of Demographic and Clinical variables in Experimental and Control group. N=100

Demographic and clinical variables		Experimental group		Control group		$\chi^2$ Test df p value
		f	%	F	%	
Age (In Years)	20-30	14	28	11	22	2.06
	31-40	9	18	11	22	3
	41-50	11	22	16	32	0.56 NS
	51-60	16	32	12	24	
Gender	Male	28	56	29	58	0.04
	Female	22	44	21	42	1 0.84 NS
Educational Status	Illiterate	11	22	12	24	5.94
	Primary	11	22	9	18	4
	Secondary	19	38	24	48	0.20NS
	Higher secondary	4	8	5	10	
	Graduate or above	5	10	0	0	
Family income (in rupees)	<10000	18	36	19	38	1.89
	10001-20000	4	8	8	16	3
	20001-30000	8	16	6	12	0.60 NS
	Above 30000	20	40	17	34	
Occupation	Working	28	56	26	52	0.16
	Non –Working	22	44	24	48	1 0.68 NS
Dietary habit	Vegetarian	29	58	28	56	0.041
	Non vegetarian	21	42	22	44	1 0.84 NS
Previous exposure to IV cannulation	Yes	31	62	26	52	1.020
	No	19	38	24	48	1 0.313 NS
Type of admission	Routine	37	74	32	64	1.169
	Emergency	13	26	18	36	1 0.280 NS

Demographic and clinical variables		Experimental group		Control group		$\chi^2$ Test df p value
		f	%	f	%	
Site of Cannulation	Dorsum of left hand	4	8	8	16	3.034
	Dorsum of right hand	22	44	16	32	3
	Left forearm	12	24	10	20	0.386 NS
	Right forearm	12	24	16	32	
Cannula Size	18G	1	2	1	2	3.843
	20G	13	26	12	24	3
	22G	27	54	34	68	0.279 NS
	24G	9	18	3	6	
Duration of illness	Less than 1 month	31	62	31	62	1.248
	2-6 months	8	16	7	14	3
	7-12 months	1	2	0	0	0.741 NS
	More than 1 year	10	20	12	24	
BMI	<18.5	11	22	12	24	0.627
	18.5-24.5	26	52	23	46	3
	25-29.9	9	18	9	18	0.890 NS
	>30	4	8	6	12	

\* p<0.05 Level of significance NS: - Non Significant

Table 2: Effectiveness of moist heat therapy on visibility and palpability of veins in Experimental Group.

N=50

Experimental group	Mean	SD	Mean Difference	'Z' value	'P' value
Pre test	1.640	0.598	1.860	-6.124	<0.001***
Post test	3.500	1.035			

Table 2 shows an effectiveness of moist heat therapy on visibility and palpability of veins in experimental group. The mean pre test score was 1.640 with SD 0.598 and mean posttest score was 3.500 with SD

1.035. The effectiveness was statistically tested by using Wilcoxon sign rank test which reveals that Z=-6.124 and the result was found to be significant at p=<0.001 level of significance.

Table 3: Comparison of post-test visibility and palpability of vein of patients undergoing peripheral intravenous cannulation in experimental and control group. N-100

Visibility and palpability of veins	Mean	SD	U value	P value
Experimental group	4.00	1.00	570.000	<0.001 ***
Control group	2.00	1.00		

p<0.05 \*\*p<0.01 \*\*\*p<0.001 NS-Non Significant

Table 3 shows the post test visibility and palpability of veins in experimental and control group. In experimental group the mean score was 4.00 with SD 1.00 and in control group the mean score was 2.00 with SD 1.00. The visibility and palpability of veins was assessed after application of moist heat therapy in experimental group and compared to control group which was

statistically analyzed by using Mann Whitney test with U=570.00 and the result was found to be significant at p=<0.001 level of significance indicates that moist heat therapy was effective in improving the visibility and palpability of veins among patients undergoing peripheral intravenous cannulation in experimental group as compared to control group.

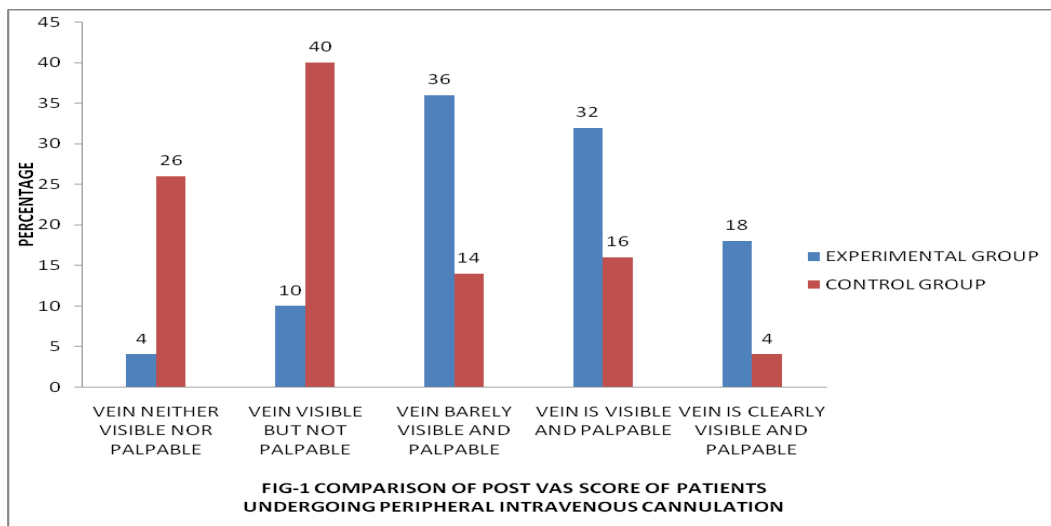


Table 4: Comparison of pricks of patients undergoing intravenous Cannulation in experimental and control group N=100

Level of Pain	Mean	SD	Z value	df	P value
Experimental Group	4.76	1.84	2.982	98	0.0036**
Control Group	5.92	2.05			

\* p<0.05 \*\*p<0.01 \*\*\*p<0.001 NS-Non Significant

Table 4 shows pricks of veins in experimental and control group. In experimental group the mean score was 1.22 with SD 0.42 and in control group the mean score was 1.56 with SD 0.73. The number of attempts taken to insert the IV cannula was assessed by using Wilcoxon sign rank test with Z=2.849 and the result was found

to be significant at  $p < 0.01$  level of significance indicates that moist heat therapy was effective in reducing the number of attempts taken to insert

peripheral intravenous cannula in experimental group as compared to control group.

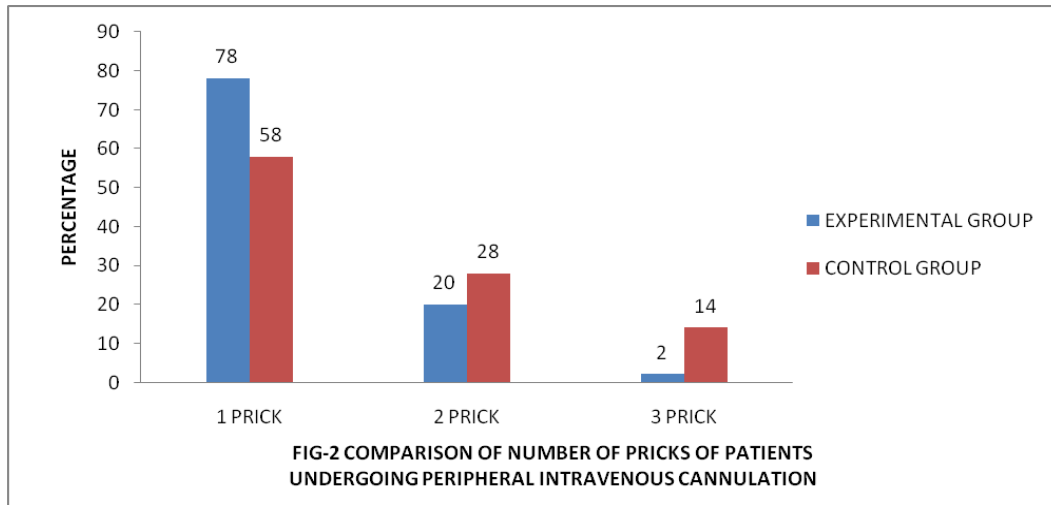


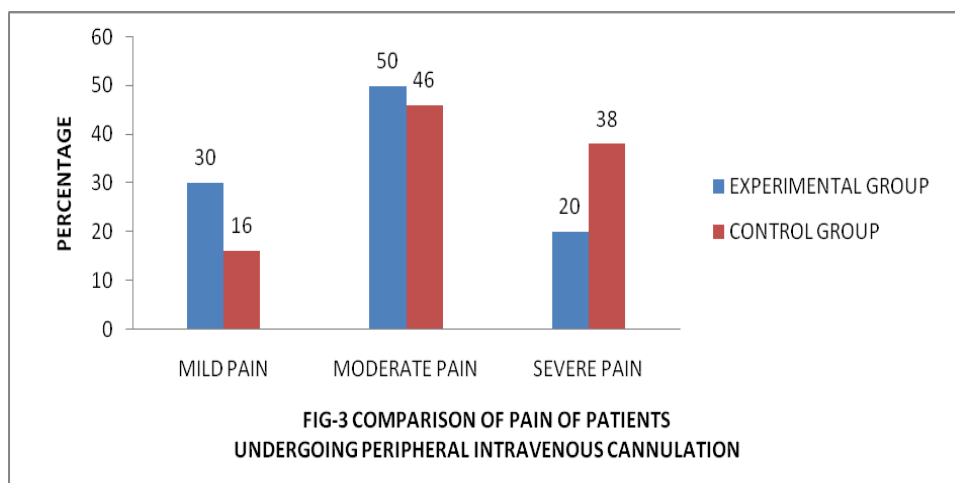
Table 5: Comparison of pain experienced while undergoing peripheral intravenous Cannulation of patients in experimental and control group N=100

PRICKS	Mean	SD	Z value	df	P value
Experimental Group	1.22	0.42	2.849	98	0.0053**
Control Group	1.56	0.73			

\*  $p < 0.05$  \*\* $p < 0.01$  \*\*\* $p < 0.001$  NS-Non Significant

Table 5 shows the pain experienced by patients while undergoing peripheral intravenous Cannulation in Experimental and Control group. In Experimental group

the mean score was 4.76 with SD 1.84 and in control group the mean score was 5.92 with SD 2.05. The level of pain was statistically tested by using Wilcoxon sign rank test with  $Z = 2.982$  and the result was found to be significant at  $p < 0.01$  level of significance indicates that moist heat therapy was effective in reducing the pain while undergoing peripheral intravenous cannulation of patients in experimental group as compared to control group.



## DISCUSSION

Insertion of IV cannula is the most common invasive procedure in the hospitalized patients. Usually the insertion

is easy and causes only mild distress in the patients.

The results of the present study reveals that mean pre test score was 1.640

with SD 0.598 and mean posttest score was 3.500 with SD 1.035. The effectiveness was statistically tested by using Wilcoxon sign rank test ( $Z=-6.124$ ) which was found to be significant at  $p<0.001$  level of significance.

The results of current study reveals that in experimental group the mean score was 4.00 with SD 1.00 and in control group the mean score was 2.00 with SD 1.00. The visibility and palpability of veins was assessed after application of moist heat therapy in experimental group and compared to control group which was statistically analyzed by using Mann Whitney test with  $U=570.00$  and the result was found to be significant at  $p<0.001$  level of significance indicates that moist heat therapy was effective in improving the visibility and palpability of veins among patients undergoing peripheral intravenous cannulation in experimental group as compared to control group.

Maninderdeep Kaur, Sukhpal Kaur, Firuza D. Patel (2011) conducted a similar study to assess the effect of moist heat therapy on visibility and palpability of peripheral veins before peripheral venous cannulation of patients. Purposive sampling technique was adopted. 60 patients whose veins neither visible nor palpable were included in the study. The results reveals that prior to intervention none of the patients vein was visible nor palpable. After application of small towel dipped in warm water at  $39.5^{\circ}\text{C}$ , 40% of patients' vein was clearly visible and palpable, 33.3% of patients' vein is visible and palpable, 20% of patients vein barely visible and palpable and 7% of patients' vein is visible but not palpable. It was statistically significant by fisher test ( $F=16.10$  and  $P=0.004$ ). The moist heat therapy was effective in improving the status of veins visibility and palpability. <sup>[11]</sup>

The current study findings had proven that moist heat application is easy and safe procedure which enhances visibility and palpability of veins, no of attempts taken to insert IV cannula and pain

during insertion had been reduced in experimental group as compared to control group.

## CONCLUSION

Insertion of intravenous cannulation is one of the most commonly performed medical procedures by the nurses to administer fluid and medicine. The number of attempts taken to insert IV cannula depends on visibility and palpability of veins which has impact on pain experienced by patients while undergoing peripheral intravenous cannulation. The results of the study concludes that the moist heat therapy was effective in improving the visibility and palpability of veins, reducing the number of attempts taken to insert IV cannula and reduce the pain while undergoing peripheral intravenous cannulation.

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