

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 ± 0.598 and post test mean and SD were 3.500 ± 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. [1] 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. [1]

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. [2]

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 – O₁ X O₂

Control group - O₁ O₂

O₁ -- Pretest

X -- Intervention (Moist heat therapy.)

O₂ -- 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 | | χ^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 | | χ^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.

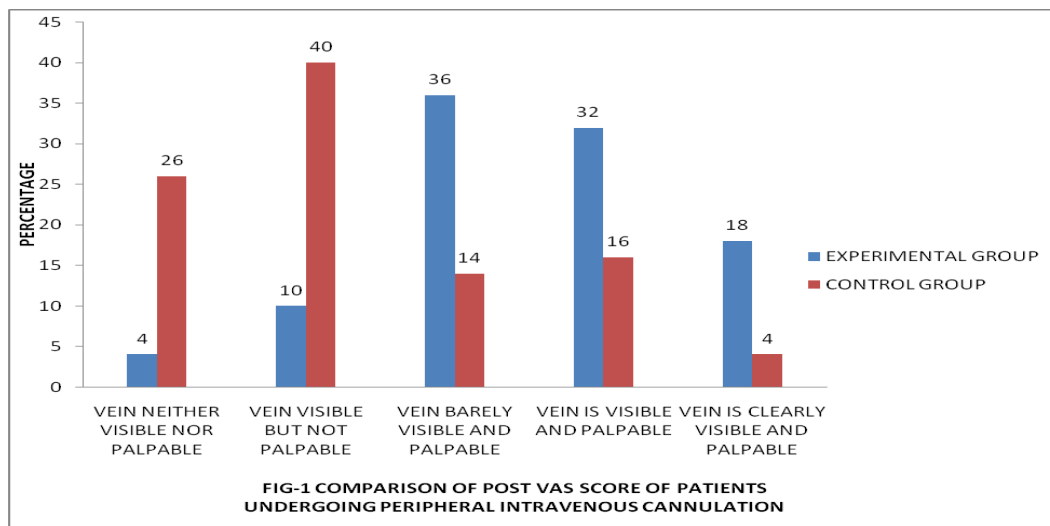


Table 4: Comparison of pricks of patients undergoing intravenous Cannulation in experimental and control group N=100

| 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.

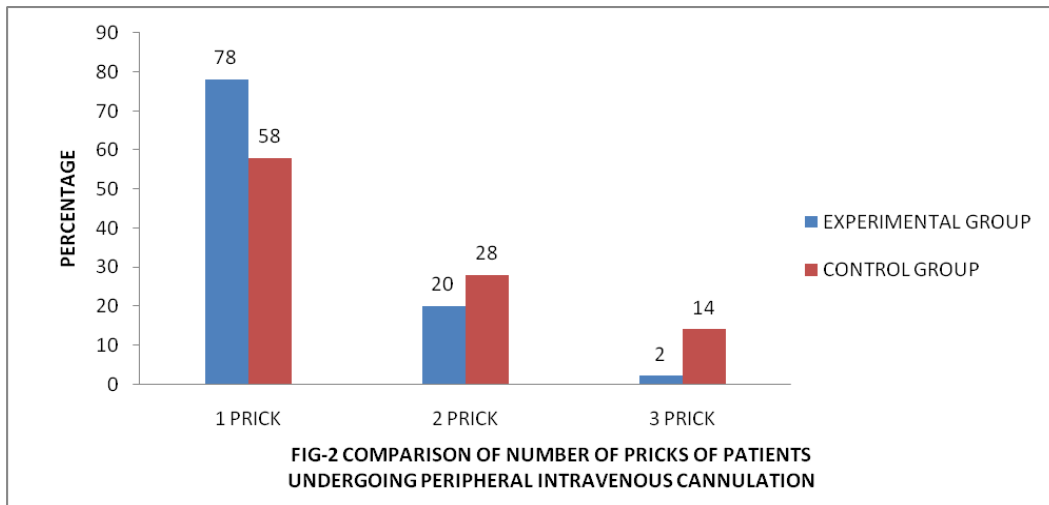


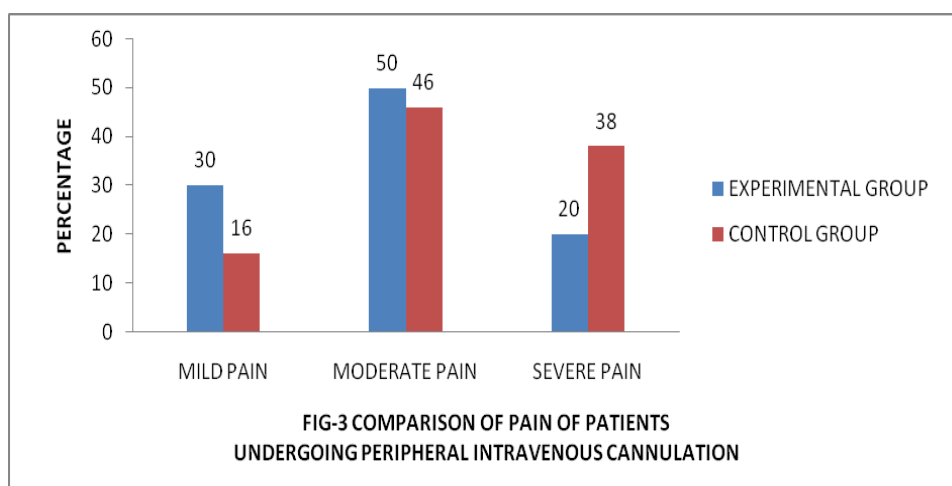
Table 5: Comparison of pain experienced while undergoing peripheral intravenous Cannulation of patients in experimental and control group N=100

| 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°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. ^[11]

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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