

# Effect of Moist Heat Therapy on the Visibility and Palpability of Peripheral Veins Before Peripheral Venous Cannulation among Patients Undergoing Intravenous Cannulation- A Quasi Experimental Study

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## Abstract

Hospitalization rate in India is increasing over years and treatment is given mostly via intravenous route. Moist heat therapy for identifying vein before cannulation will reduce number of attempts for cannulation, supply costs and will improve patient satisfaction. AIM: To assess the efficacy of moist heat therapy on visibility and palpability of peripheral veins prior to intravenous cannulation. SETTINGS: Day care unit (chemotherapy ward), Medicine and Orthopaedic wards of GGS hospital, Faridkot. MATERIAL AND METHODS: Using Quasi experimental research design and convenient sampling 60 patients undergoing I.V.cannulation whose veins were not visible and palpable were randomly assigned to experimental (n=30) and conventional group (n=30). In experimental group moist heat therapy with conventional tourniquet technique and in conventional group only tourniquet was used then post assessment was checked by Vein Assessment Scale in both the groups. RESULTS: In experimental group, the post intervention vein assessment score improved from pre intervention score 1-2 to 3-5 and in conventional group from score 1-2 to 1-4. After intervention, in experimental group majority of subjects had vein score 4(vein visible and palpable), whereas in conventional group majority scored vein score 3(vein barely visible and palpable). 7(23.3%) subjects of experimental group scored vein score 5(vein clearly visible and palpable) whereas in conventional group no subject scored 5 vein score. Also, 2(6.7%) subjects of this group had vein score 1 that remained unchanged despite of routine technique. Difference between post intervention scores of experimental and conventional group was found to be significant ( $\chi^2= 20.06$  and p-value 0.00) at p-value <0.05. CONCLUSION: Moist heat with conventional tourniquet technique used in experimental group was significantly effective than only conventional technique used in conventional group.

*Key Words: Moist heat, conventional tourniquet technique, Vein Assessment scale*

## Introduction

Fluids, medication, nutrition and blood products can be given via the intravenous (I.V) route which can be either peripheral or central. In modern practice, up to 80% of hospitalized patients get infusion therapy at

some point during their admission and about 330 million peripheral catheters are sold every year in America. According to a study, hospitalization rate in India has increased from 1661 in 1995 to 3699 in 2014 (per 100,000 population). In all the age groups it has crossed over the double.<sup>1-3</sup>

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Being a skilled procedure peripheral intravenous cannulation involves number of stages. Insertion is quite easy but needs skill in performance. It cause mild distress to the patients while cannulation but we do see patients with failed I.V insertions that may be due to skill

incompetence in cannulation by new nurses but higher degrees of difficulty arising from vein variables like vein resistant to puncture, vein rolled and patient variables tough or dark skin and patient movement.<sup>4</sup>

Being an invasive procedure, I.V Cannulation make patient prone to infections. So, Centers for Disease Control and Prevention (CDC) (2011)<sup>5</sup> recommended I.V catheter infection prevention Guidelines. As per these guidelines, upper extremities (hands and arms) are the preferred sites for insertion. If a lower extremity is used, remove and re-site the PIVC in the upper extremities as soon as possible due to the incidence of thrombophlebitis and thrombosis. PIVC should be replaced every 72 to 96 hours to prevent infection and phlebitis in adults or even early within 48 hours when adherence to aseptic technique cannot be ensured (i.e., catheters that are inserted during a medical emergency)

Various strategies for identifying vein suitable for venous cannulation are gentle tapping of the skin overlying the vein, warm water compress for at least 2–3 minutes, topical application of 4% nitroglycerine ointment, milking of the vein from proximal to distal, venous tourniquet, manual proximal circumferential compression of the limb, sphygmomanometer cuff, making and releasing fist repeatedly<sup>6-9</sup>, local warming facilitates the insertion of peripheral venous cannulas that reduce the time and number of attempts required for cannulation<sup>10</sup>, betadine and alcohol swabs, Transillumination: Landry light may help visualization of the vein due to the reflection of the light off the skin changes.<sup>7,11</sup>

In cases where visibility and palpability of veins has decreased due to factors like repeated cannulation, on-going treatment that have damaged veins by extravasation or infiltration, being obese due to sedentary lifestyle; we need a sound practice that is more effective than the conventional techniques used in hospitals for increasing visibility and palpability of veins, thereby decreasing number of attempts for intravenous cannulation and preserving patients skin integrity and one of the good method is application of moist heat for the visualization of the veins and resultant easy insertion of intravenous cannula have been reported but there is lack of information whether traditional techniques like tourniquet technique is more efficient or poor than moist

heat in visualizing and making veins palpable.

Thus, the researcher undertook this study to assess effectiveness of moist heat therapy on the visibility and palpability of peripheral veins prior to peripheral venous cannulation.

## Materials and Methods

A quasi experimental research approach was used for the study. The study settings were day care unit (chemotherapy ward), medicine and orthopaedic wards of GGS hospital, Faridkot. Inclusion criteria for sample selection was patients above 18 years having vein assessment score 1, 2 checked by Vein Assessment Scale<sup>10</sup> and undergoing PIVC on upper limb. Exclusion criteria was patients whose veins were visible and palpable, obese, having critically ill at time of PIVC. Using convenient sampling 60 patients undergoing I.V cannulation whose veins were not easily visible and palpable were randomly assigned to experimental (n=30) and conventional group (n=30). Firstly, in both groups the peripheral vein score of selected subjects was checked by Vein Assessment Scale (VAS). Then, in experimental group moist heat therapy with conventional tourniquet (Towel soaked in 39.5-40°C warm water and applied for five minutes in vein continuously then again dipped in 39.5-40°C warm water and reapplied for another 5 minutes. Total time was 10 minutes for the application of moist heat. After then tourniquet was applied 5-10 cm proximal to selected cannulation site) and in conventional group only tourniquet was used then post assessment was checked by VAS in both the groups.

### Research tool:

**Vein Assessment Scale** was used to check visibility and palpability of veins. This scale was developed by Rainer lenhardt.<sup>10</sup> The permission to use his tool in present study was taken from the author. Vein chosen for cannulization was evaluated as vein score 1-5 before and after the treatment and scores were interpreted and analyzed.

Vein Score-

- 1-Vein neither visible nor palpable,
- 2 -Vein visible but not palpable
- 3-Vein barely visible and palpable

4-Vein visible and palpable

5-Vein clearly visible and palpable

**Content validity of the tool:**

The content validity of the tool was taken from nine experts i.e. one in medical and eight in nursing profession.

Methods used for analysis of study:

Statistical analysis was performed by using SPSS version 22.0 statistical packages by using descriptive and inferential statistics. Chi square test was applied to check the homogeneity of demographic variables in both of the groups and to check whether there is significant difference between post intervention scores of experimental and conventional group. Fisher’s exact test was applied where cells had expected count less than 5. p value <0.05 was considered significant.

**Results**

Table 1 shows in experimental group, the post intervention vein assessment score improved from pre intervention score 1-2 to the range of 3-5 and in conventional group from score 1-2 to 1-4. After intervention, in experimental group majority of subjects had vein score 4(vein visible and palpable), whereas in conventional group majority scored vein score 3(vein barely visible and palpable). Also, 7(23.3%) subjects of experimental group scored vein score 5(vein clearly visible and palpable) whereas in conventional group no subject scored 5 vein score. Also, 2(6.7%) subjects of this group had vein score 1 that remained unchanged despite of routine technique used for increasing visibility and palpability of veins. Difference between post intervention scores of experimental and conventional group was found to be significant ( $\chi^2= 20.06$  and p-value 0.00) at p-value <0.05.

**Table 1- Visibility and palpability of peripheral veins before and after application of moist heat therapy and conventional tourniquet technique. N=60**

| Characteristics                   | Peripheral Vein score          | Experimental Group f(%) | Conventional group f(%) | $\chi^2/$ p value           | df |
|-----------------------------------|--------------------------------|-------------------------|-------------------------|-----------------------------|----|
| VeinScore Before intervention     | 1-Neither visible nor palpable | 22(73.3)                | 23(76.7)                | 0.08/<br>0.76 <sup>NS</sup> | 1  |
|                                   | 2-Visible but not palpable     | 8(26.7)                 | 7(23.3)                 |                             |    |
|                                   | 3- Barely visible and palpable | 0                       | 0                       |                             |    |
|                                   | 4- Visible and palpable        | 0                       | 0                       |                             |    |
|                                   | 5-Clearly visible and palpable | 0                       | 0                       |                             |    |
| VeinScore After intervention      | 1-Neither visible nor palpable | 0                       | 2(6.7)                  | 20.06/<br>0.00*             | 4  |
|                                   | 2-Visible but not palpable     | 0                       | 8(26.7)                 |                             |    |
|                                   | 3- Barely visible and palpable | 9(30)                   | 13(43.3)                |                             |    |
|                                   | 4- Visible and palpable        | 14(46.7)                | 7(23.3)                 |                             |    |
|                                   | 5-Clearly visible and palpable | 7(23.3)                 | 0                       |                             |    |
| $\chi^2$ value/<br>p value/<br>Df |                                | 60.00/<br>0.02*<br>df-2 | 37.70/<br>0.00*<br>df-3 |                             |    |

Non significant<sup>NS</sup>, Significant\* at  $p < 0.05$

## Discussion

Findings of present study revealed in experimental group, moist heat with tourniquet technique was significantly effective than conventional technique used in conventional group by checking difference of post intervention scores of both the groups ( $\chi^2 = 20.06$  and  $p$ -value 0.00) at  $p$  value  $< 0.05$ .

These findings are supported by study done by Amardeep Singh, Naveen kumar (2019)<sup>12</sup>, moist heat used to increase visibility and palpability of veins in experimental group was significantly more effective when compared to conventional group ( $U = 570.00$  at  $p = < 0.001$ )

Another study done by Ajay Singh Sarsar, VinayKumari(2019)<sup>13</sup> et al reported the post intervention mean rank of visibility and palpability score of peripheral vein in experimental group 38.75 was significantly greater than mean rank score of conventional group 22.25 ( $U = 202.50$ ,  $p = 0.001$ ).

K. Simarpreet, R. Ruchika et al (2018)<sup>14</sup> assessed the effect of moist heat on visibility and palpability of veins before peripheral intravenous cannulation and found the post intervention mean vein assessment score in experimental group was significantly higher than control group ( $3.9 \pm 0.60$  vs.  $2.28 \pm 0.7$ ,  $t = 12.27$ ,  $p = 0.001$ )

BiyikBayram S, Caliskan N (2016)<sup>15</sup> also supports present study results. According to study, the local application of heat to the cannulation site selected increased venous distension and visibility, significantly increased successful catheter placement at first attempt ( $p = 0.004$ )

Maninderdeep kaur, Sukhpal kaur et al (2011)<sup>16</sup> conducted a study on effect of moist heat therapy on visibility and palpability of veins of patients undergoing cancer chemotherapy. Before the intervention none patient was having veins visible and palpable. After moist heat application 40% of study subjects had veins clearly visible and easily palpable

Rainer lenhardt, Tanja Seybold et al (2002)<sup>10</sup> Local warming of hand and lower arm using a carbon fibre ‘warming mitt’, produces reproducible amounts of heat that significantly increased vein scores  $> 3$ .

Perry S, Tepperman M (1986)<sup>17</sup> supported the study by stating heat applications dilates the blood vessels by increasing the blood flow to the part.

## Conclusion

Moist heat with conventional tourniquet technique used in experimental group was significantly effective than only conventional technique used in conventional group for increasing visibility and palpability of veins.

## Implications

Moist heat combined with tourniquet technique should be incorporated as a method of increasing the visibility and palpability of veins in case where veins are neither visible nor palpable that will eventually decrease the time of cannulation, increase patient satisfaction and decrease the skin breakdown by repeated pricks.

**Conflict of Interest:** None

**Source of Funding:** Self

**Ethical Clearance:** Ethical clearance was taken from institutional research and ethical committee of University College of nursing, BFUHS, Faridkot for the study to be conducted.

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