

Effectiveness of moist heat therapy on the visibility and palpability of peripheral veins before peripheral venous cannulation among patients undergoing intravenous cannulation

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Abstract

Background: A peripheral intravenous cannula is the most frequent invasive medical treatment used to give fluids or medications. Patients who have a fear of needles or have had bad experiences with them generally have complications because it activates the sympathetic nervous system and causes peripheral vasoconstriction. Pain alleviation, muscle relaxation, blood vessel dilation, and connective tissue relaxation are the four major effects of heat on bodily tissues.

Objectives: This study aims to compare the visibility and palpability of veins in the control and experimental groups of individuals undergoing intravenous cannulation, Evaluate the impact of moist heat treatment on the patients in the experimental group's capacity on visibility and palpability of their veins, Comparing the veins' post-test palpability and visibility in the experimental and control groups of patients having peripheral intravenous cannulation, determine if the sociodemographic information of participants undergoing intravenous cannulation in the control and experimental groups correlates with the visibility and palpability of peripheral veins, find the correlation between the clinical information of patients having intravenous cannulation in the control and experimental groups and the palpability and visibility of peripheral veins.

Materials and methods: In the Parul Sevashram hospital in Vadodara, quasi-experimental research was planned to evaluate the impact of moist heat treatment on the visibility and palpability of peripheral veins. A non-probability convenience sampling technique was used for chosen 80 patients undergoing iv cannulation. A socio-demographic and clinical data questionnaire prepared by the investigators and a standardized vein assessment tool (VAT) were used to collect the data from the patients. Using SPSS version 25, inferential and descriptive statistics were utilized for analysing the data.

Results: Given that the pre-test mean and SD in the experimental group were 1.38 ± 0.490 and the post-test mean and SD were 2.55 ± 0.504 at the 0.05 level of significance, the findings showed that moist heat treatment considerably enhanced the vein visibility and palpability. Also, a significant association was found between selected clinical characteristics such as cannula size (p-value 0.000*) and duration of illness (p-value 0.010*) with their VAT scores in the control group. Other characteristics such as diagnosis, type of admission during hospitalization, any previous IV cannulation exposure, number of times of IV cannulation, site of cannulation, and BMI had no association with VAT scores in the control group. In the experimental group, no substantial correlation between clinical variables was discovered. The overall correlation of clinical variables of both groups with the VAT scores indicated a significant association with only one clinical variable, which is the size of the cannula.

Conclusion: According to the study, moist heat treatment was successful in increasing the palpability and visibility of peripheral veins before peripheral venous cannulation among subjects undergoing intravenous cannulation.

Keywords: Peripheral Intravenous Cannula, Moist heat therapy, IV cannulation, Visibility, Palpability, Patients.

1. INTRODUCTION

Patients may visit the hospital for a variety of reasons, including routine tests or examinations, operations, or surgery;

emergency medical care; medication delivery; or to stabilize or monitor an existing condition. [1]

A cannula is inserted into a vein during an intravenous (IV) cannulation, which provides venous access. Cannulation allows for blood collection, fluid delivery, drug administration, parenteral nourishment, chemotherapy, and the administration of blood or blood products. [2]

The peripheral vascular system is a part of the circulatory system that includes the arteries as well as veins. The veins in the arms, hands, legs and feet are known as peripheral veins. The dorsal plexus, superficial dorsal vein, cephalic vein, median cubital vein, basilic vein, median vein, great saphenous vein, and radial vein are among the body's peripheral veins. In disparity to peripheral arteries, which circulate blood to provide nutrients and oxygenated blood to the body's cells, deoxygenated blood is returned to the heart through peripheral veins from the capillaries in the extremities. Peripheral intravenous (IV) lines for intravenous therapy are most typically accessible through peripheral veins in both hospitals and paramedic services.[3]

The suitable intravenous device will be determined by the patient's intravenous treatment needs. When assessing the state of the patient's veins, the choice of cannula length/size may alter. As a guideline, choose the lowest diameter cannula which is possible to permit blood to flow around it and reduce the risk of phlebitis. The vein's size, and the fluid type being injected, these two factors to consider while choosing the gauge and type of cannula.[4]

Peripheral intravenous catheters are the invasive devices that are used in hospitals the most often. According to conservative estimates, between 15% and 20% of all patient days in acute care institutions are PVC days, which are required for up to 70% of patients who are hospitalized.[5] Despite its reputation as one of the least intrusive procedures, mastering this potentially life-saving treatment needs honed skills and expertise. [6]

The application of heat increases soft tissue resilience, quickens the healing process, improves circulation, and reduces pain. Application of heat aids in achieving these objectives by improving pain threshold, vasodilation, decreasing alpha motor neuron firing rate, metabolic activity, and oxygen availability to tissue. [7]

The most often performed procedure in the ward, emergency room, and ICU is intravenous cannulation. It is an extremely painful and stressful treatment; thus, feelings may sometimes become exaggerated and cause a vasovagal response. Patients' anxieties and worries related to needles are genuine, and they could even keep them from seeking medical attention.[8]

Every year, about a thousand million PIVCs (peripheral intravenous catheters) are implanted in hospitalized patients worldwide.[9] Intravenous catheters are a crucial aspect of medical therapy for acute illness, cancer, surgery, anesthesia, and trauma because they allow drugs to reach the area of the body where they work as fast and efficiently as possible through the bloodstream.[10].

About 33 to 67 percent of hospitalized subjects need at least one peripheral vein implant.[11] Up to 90% of patients who visit the emergency room (ER) would need a PIVC at some point throughout their treatment.[12]

Cannula selection and placement are increasingly in the hands of nurses, especially in specialized settings including oncology units, emergency rooms, critical care units, and medical imaging. Peripheral intravenous cannulation is estimated to take 2.5 to 13min on average, with problematic IV access taking up to 30min.[13]

Patients admitted to the hospital for treatment, need long-duration intravenous cannulation for administering medication but to avoid infection from cannulation, the CDC ("Centres for Disease Control") (2011) recommendations avoiding intravenous catheters recommend changing the cannula every 72–96 hours. So, the patient has to go through frequent re-insertion of the cannula and it makes it difficult to identify the vein due to repeated vein punctures. [14]

HYPOTHESES

- H1- There will be a statistically significant change in the degree of palpability and visibility of peripheral veins among subjects having peripheral venous cannulation in the experimental group after receiving moist heat treatment, (0.05 level of significance).
- H2 - There will be a substantial correlation between the visibility and palpability of peripheral veins and

sociodemographic information of subjects undergoing intravenous cannulation in both groups at a significance level of 0.05.

- H3 - There will be a substantial correlation between the clinical information of patients having intravenous cannulation in the control and experimental groups and the visibility and palpability of peripheral veins at the 0.05 level of significance.

2. Material and Methods

The current study was conducted using a quasi-experimental design and a quantitative research methodology. The convenience sampling approach, a kind of non-probability sampling, was employed to choose the sample for the current investigation, which included 80 patients. The study was performed at the medicine, emergency department, and surgery wards of Parul Sevashram Hospital, Vadodara. Before gathering the data, the ethics committee and the study participants both granted the necessary authorization. A Socio-demographic and clinical data Questionnaire prepared by the investigators and a standardized Vein assessment tool (VAT)[15] were utilized for collecting the information from the patients. The inter-rater reliability of the vein evaluation tool value is 0.83. The data was analysed using SPSS version 25 for inferential and descriptive statistics.

3. RESULTS

According to the study's goal, the data were collated in a Microsoft Excel spreadsheet and then analyzed using descriptive and inferential statistics in SPSS. The following parts include the data that has been arranged and demonstrated:

Section I: Patient distribution based on clinical data and sociodemographic.

Section II: Effectiveness of moist heat treatment in the experimental group among patients undergoing IV cannulation.

Section III: Association between visibility and palpability of peripheral veins with socio-demographic and clinical data

SECTION I: Patient distribution based on clinical data and sociodemographic.

Table 1: Frequency & percentage patient distribution based on sociodemographic data in control and experimental group

| Sr. No | Variables | Characteristics | Control Group | | Experimental Group | | x ² Test df | p-value |
|--------|----------------|---------------------|---------------|-------|--------------------|-------|------------------------|---------|
| | | | F | % | F | % | | |
| 1 | Age (in-years) | 20-30 | 6 | 15% | 7 | 17.5% | 2.891 4 | 0.576 |
| | | 31-40 | 5 | 12.5% | 5 | 12.5% | | |
| | | 41-50 | 12 | 30% | 8 | 20% | | |
| | | 51-60 | 9 | 22.5% | 12 | 30% | | |
| | | 61-70 above | 8 | 20% | 8 | 20% | | |
| 2 | Gender | Male | 24 | 60% | 18 | 45% | 1.186 1 | 0.276 |
| | | Female | 16 | 40% | 22 | 55% | | |
| 3 | Education | No formal education | 13 | 32.5% | 11 | 27.5% | 0.002 1 | 0.961 |
| | | Formal education | 27 | 67.5% | 29 | 72.5% | | |
| 4 | Occupation | Labourer | 11 | 27.5% | 12 | 30% | 2.144 4 | 0.709 |
| | | Private employee | 4 | 10% | 3 | 7.5% | | |
| | | Govt employee | 1 | 2.5% | 3 | 7.5% | | |
| | | Self-employee | 13 | 32.5% | 12 | 30% | | |
| | | Unemployed | 11 | 27.5% | 10 | 25% | | |

| | | | | | | | | |
|---|---------------------------|---------------|----|-------|----|-------|------------|-------|
| 5 | Family income (in rupees) | <5000 | 4 | 10% | 4 | 10% | 1.251 3 | 0.741 |
| | | 5001-10,000 | 24 | 60% | 27 | 67.5% | | |
| | | 10,001-15,000 | 9 | 22.5% | 6 | 15% | | |
| | | Above 15,000 | 3 | 7.5% | 3 | 7.5% | | |
| 6 | Physical activity levels | Inactive | 10 | 25% | 4 | 10% | 2.083 3 | 0.555 |
| | | Low | 12 | 30% | 17 | 42.5% | | |
| | | Medium | 15 | 37.5% | 17 | 42.5% | | |
| | | High | 3 | 7.5% | 2 | 5% | | |

* “p≤0.05 level of significance”

Table 1: Out of 80 patients, 30% of the subjects in the experimental group were between the ages of 51 and 60 years, whereas the majority (30%) in the control group were between the ages of 41 and 50 years. In the experimental group, female patients made up 55% of the total patients, whereas male patients made up 60% of the total subjects in the control group. Both the experimental (72.5%) and the control group (67.5%) had most of the participants with formal education. In the experimental group, 30% of patients were laborers and 30% were self-employed, whereas 32.5% of subjects in the control group were self-employed. Patients in the experimental (67.5%) and control group (60%) both came from families with an annual income of between 5001 and 10,000 rupees. The majority of patients in the experimental group (42.5%) could do low- to moderate-intensity physical exercise, whereas in the control group only 37.5% were able to do medium physical activity.

Table 2: Frequency & percentage of patient distribution based on clinical data in control and experimental group

| Sr. No | Variables | Characteristics | Control Group | | Experimental Group | | x ² Test df | p-value |
|--------|--|--------------------------|---------------|-------|--------------------|-------|------------------------|---------------|
| | | | F | % | f | % | | |
| 1 | Diagnosis | Endocrine disease | 7 | 17.5% | 9 | 22.5% | 2.513 4 | 0.642 |
| | | Urinary disease | 8 | 20% | 9 | 22.5% | | |
| | | Cardiovascular disease | 11 | 27.5% | 9 | 22.5% | | |
| | | Gastrointestinal disease | 8 | 20% | 6 | 15% | | |
| | | Others | 6 | 15% | 7 | 17.5% | | |
| 2 | Type of admission during hospitalization | Emergency | 19 | 47.5% | 17 | 42.5% | 0.370 1 | 0.543 |
| | | Routine | 21 | 52.5% | 23 | 57.5% | | |
| 3 | Any previous exposure of iv cannulation | Yes | 26 | 65% | 26 | 65% | 1.923 1 | 0.165 |
| | | No | 14 | 35% | 14 | 35% | | |
| 3A | No of times inserted iv cannulation | 0 | 14 | 35% | 14 | 35% | 1.927 3 | 0.588 |
| | | 1-2 | 14 | 35% | 11 | 27.5% | | |
| | | 3-4 | 11 | 27.5% | 14 | 35% | | |
| | | 5-6 | 1 | 2.5% | 1 | 2.5% | | |
| 4 | Site of cannulation | Dorsum of left hand | 8 | 20% | 9 | 22.5% | 1.930 3 | 0.587 |
| | | Dorsum of right hand | 11 | 27.5% | 6 | 15% | | |
| | | Left forearm | 14 | 35% | 15 | 35.5% | | |
| | | Right forearm | 7 | 17.5% | 10 | 25% | | |
| 5 | Cannula size | 18G | 0 | 0% | 6 | 15% | 14.187 2 | 0.001* |
| | | 20G | 24 | 60% | 20 | 50% | | |

| | | | | | | | | |
|---|---------------------|--------------|----|-------|----|-------|------------|-------|
| | | 22G | 16 | 40% | 14 | 35% | | |
| 6 | Duration of illness | (in Days) | | | | | 4.221 3 | 0.239 |
| | | 0-30 | 17 | 42.5% | 17 | 42.5% | | |
| | | 31-60 | 7 | 17.5% | 9 | 22.5% | | |
| | | 61-90 | 11 | 27.5% | 8 | 20% | | |
| | | Above 90 | 5 | 12.5% | 6 | 15% | | |
| 7 | BMI | Normal | 14 | 35% | 16 | 40% | 4.430 3 | 0.219 |
| | | Under weight | 12 | 30% | 5 | 12.5% | | |
| | | Obese | 4 | 10% | 3 | 7.5% | | |
| | | Over weight | 10 | 25% | 16 | 40% | | |

* “ $p \leq 0.05$ level of significance”

Table 2: It indicates that subjects in the experimental group had the same percentage (22.5%) of cardiovascular, urinary, and endocrine illness, whereas patients in the control group (27.5%) had cardiovascular disease. Most subjects in the experimental (57.5%) and control groups (52.5%) were admitted to the hospital regularly. In both groups, 65 percent of the 80 patients had prior experience with IV cannulation. Most patients in the control (35.5%) and experimental group (35%) were cannulated on the left forearm. Most subjects in the control (60%) and experimental group (50%) were cannulated using a 20G cannula. Both the control and experimental group's majority of patients (42.5%) experienced diseases that lasted 0 to 30 days. In contrast to the control group's (35%) majority of subjects with a normal BMI, 40% of those in the experimental group were overweight.

SECTION II: Effectiveness of moist heat treatment in the experimental group among patients undergoing IV cannulation.

Table 3: Comparison of post- and pre-test vat scores in the experimental group in the context of SD, mean, mean difference, and p-value

| Experimental group | SD | Mean | Mean Difference | P-value |
|--------------------|-------|------|-----------------|---------|
| Per-test | 0.490 | 1.38 | 1.175 | 0.000* |
| Post-test | 0.504 | 2.55 | | |

Table 4: Comparison of post-test vat score in the control and experimental groups in the context of SD, mean, and P-value (n=80)

| Visibility and palpability of veins | SD | Mean | P-value |
|-------------------------------------|-------|------|---------|
| Control group | 0.464 | 1.70 | 0.016* |
| Experimental group | 0.504 | 2.55 | |

* “ $p \leq 0.05$ level of significance”

Table 3 demonstrates the impact of moist heat treatment on the experimental group's veins' palpability and visibility. In contrast to mean pre-test score of 1.38 with an SD of 0.490, the mean post-test score was 2.55 with an SD of 0.504. The efficacy was statistically evaluated using a paired t-test, with a p-value of 0.000* specifying significance level of 0.05.

Table 4: reveals a comparison of the post-test vein palpability and visibility between the control and experimental groups. The mean score for the experimental group was 2.55 with an SD of 0.504 whereas for the control group was 1.70 with an SD of 0.464. The palpability and visibility of veins in the experimental group were assessed after the application of moist heat treatment, and they were contrasted with those in the control group. An independent t-test was used to statistically analyse this data, and it was determined that the p-value of 0.016 was significant at the $p=0.05$ level of significance.

SECTION III: Association between visibility and palpability of peripheral veins with socio-demographic and clinical data

Table 5: Association between VAT scores of patients with their socio-demographic data in the control group. (n=40)

| Sr. No | Variables | Characteristics | Frequency (f) | VAT scores | | x ² Test df | p-value |
|--------|---------------------------|---------------------|---------------|------------|------|------------------------|---------|
| | | | | Poor | Fair | | |
| 1 | Age (in-years) | 20-30 | 6 | 2 | 4 | 1.548 4 | 0.818 |
| | | 31-40 | 5 | 2 | 3 | | |
| | | 41-50 | 12 | 4 | 8 | | |
| | | 51-60 | 9 | 3 | 6 | | |
| | | 61-70 above | 8 | 1 | 7 | | |
| 2 | Gender | Male | 24 | 7 | 17 | 0.20 1 | 0.888 |
| | | Female | 16 | 5 | 11 | | |
| 3 | Education | No formal education | 13 | 3 | 10 | 0.440 1 | 0.507 |
| | | Formal education | 27 | 9 | 18 | | |
| 4 | Occupation | Labourer | 11 | 2 | 9 | 2.404 4 | 0.662 |
| | | Private employee | 4 | 2 | 2 | | |
| | | Govt employee | 1 | 0 | 1 | | |
| | | Self-employee | 13 | 5 | 8 | | |
| | | Unemployed | 11 | 3 | 8 | | |
| 5 | Family income (in rupees) | <5000 | 4 | 2 | 2 | 3.690 3 | 0.297 |
| | | 5001-10,000 | 24 | 5 | 19 | | |
| | | 10,001-15,000 | 9 | 3 | 6 | | |
| | | Above 15,000 | 3 | 2 | 1 | | |
| 6 | Physical activity levels | Inactive | 10 | 4 | 6 | 1.984 3 | 0.576 |
| | | Low | 12 | 3 | 9 | | |
| | | Medium | 15 | 5 | 10 | | |
| | | High | 3 | 0 | 3 | | |

* “p≤0.05 level of significance”

Table 6: Association between VAT scores of patients with their clinical data in the control group.

| Sr. No | Variables | Characteristics | Frequency (f) | VAT scores | | x ² Test df | p value |
|--------|--|--------------------------|---------------|------------|------|------------------------|---------|
| | | | | Poor | Fair | | |
| 1 | Diagnosis | Endocrine disease | 7 | 4 | 3 | 6.819 4 | 0.146 |
| | | Urinary disease | 8 | 0 | 8 | | |
| | | Cardiovascular disease | 11 | 4 | 7 | | |
| | | Gastrointestinal disease | 8 | 3 | 5 | | |
| | | Others | 6 | 1 | 5 | | |
| 2 | Type of admission during hospitalization | Emergency | 19 | 6 | 13 | 0.043 1 | 0.836 |
| | | Routine | 21 | 6 | 15 | | |
| 3 | Any pervious exposure of iv cannulation | Yes | 26 | 9 | 17 | 0.754 1 | 0.385 |
| | | No | 14 | 3 | 11 | | |
| 3A | No of times inserted iv cannulation | 0 | 14 | 3 | 11 | 2.059 3 | 0.560 |
| | | 1-2 | 14 | 6 | 8 | | |

| | | | | | | | |
|---|---------------------|-------------------|----|----|----|-------------|--------|
| | | 3-4 | 11 | 3 | 8 | | |
| | | 5-6 | 1 | 0 | 1 | | |
| 4 | Site of cannulation | Left hand dorsum | 8 | 3 | 3 | 6.613 3 | 0.085 |
| | | Right hand dorsum | 11 | 2 | 9 | | |
| | | Left forearm | 14 | 7 | 7 | | |
| | | Right forearm | 7 | 0 | 7 | | |
| 5 | Cannula size | 18G | 0 | 0 | 0 | 13.413 1 | 0.000* |
| | | 20G | 24 | 2 | 22 | | |
| | | 22G | 16 | 10 | 6 | | |
| 6 | Duration of illness | (in-days) | | | | 11.312 3 | 0.010* |
| | | 0-30 | 17 | 2 | 15 | | |
| | | 31-60 | 7 | 3 | 4 | | |
| | | 61-90 | 11 | 7 | 4 | | |
| | | Above 90 | 5 | 0 | 5 | | |
| 7 | Body mass index | Normal | 14 | 3 | 11 | 5.839 3 | 0.120 |
| | | Underweight | 12 | 2 | 10 | | |
| | | Obese | 4 | 3 | 1 | | |
| | | Overweight | 10 | 4 | 6 | | |

* “p≤0.05 level of significance”

Table 5: indicates an association of VAT score with Socio-demographic data of the control group which was found significantly not associated at 0.05 levels. Gender, age, occupation, education, monthly family income, and levels of physical activity did not significantly correlate with any of the sociodemographic factors.

Table 6: indicates the correlation between clinical variables and vein assessment tool (VAT) Scores in the control and experimental group. There was a significant correlation between chosen clinical variables like cannula size (p-value 0.000*) and duration of illness (p-value 0.010*). In the control group, other variables like diagnosis, type of admission during hospitalization, any previous exposure to IV cannulation, no. of times inserted iv cannulation, site of cannulation, and BMI have no significant association with VAT scores. Therefore, the study hypothesis that there would be a substantial correlation between the visible and palpable veins and chosen clinical variables was accepted partially.

Table 7: Association between VAT score of patients with their socio-demographic data in experimental group

| Sr. No | Variables | Characteristics | Frequency (f) | VAT scores | | x ² Test df | P-value |
|--------|----------------|---------------------|---------------|------------|------|------------------------|---------|
| | | | | Poor | Fair | | |
| 1 | Age (in-years) | 20-30 | 7 | 5 | 2 | 3.114 4 | 0.539 |
| | | 31-40 | 5 | 4 | 1 | | |
| | | 41-50 | 8 | 3 | 5 | | |
| | | 51-60 | 12 | 8 | 4 | | |
| | | 61-70 above | 8 | 5 | 3 | | |
| 2 | Gender | Male | 18 | 10 | 8 | 0.673 1 | 0.412 |
| | | Female | 22 | 15 | 7 | | |
| 3 | Education | No formal education | 11 | 8 | 3 | 0.677 | 0.411 |

| | | | | | | | |
|---|---------------------------|------------------|----|----|----|------------|-------|
| | | Formal education | 29 | 17 | 12 | 1 | |
| 4 | Occupation | Labourer | 12 | 8 | 4 | 4.373 1 | 0.358 |
| | | Private employee | 3 | 2 | 1 | | |
| | | Govt employee | 3 | 3 | 0 | | |
| | | Self-employee | 12 | 5 | 7 | | |
| | | Unemployed | 10 | 7 | 3 | | |
| 5 | Family income (in rupees) | <5000 | 4 | 2 | 2 | 0.336 3 | 0.953 |
| | | 5001-10,000 | 27 | 17 | 10 | | |
| | | 10,001-15,000 | 6 | 4 | 2 | | |
| | | Above 15,000 | 3 | 2 | 1 | | |
| 6 | Physical activity levels | Inactive | 4 | 2 | 2 | 0.973 3 | 0.808 |
| | | Low | 17 | 10 | 7 | | |
| | | Medium | 17 | 12 | 5 | | |
| | | High | 2 | 1 | 1 | | |

* “ $p \leq 0.05$ level of significance”

Table 7: indicates an association of VAT score with Socio-demographic data of the experimental group which was found significantly not associated at 0.05 levels. Selected sociodemographic factors such as gender, age, occupation, education, monthly family income, as well as physical activity levels did not significantly correlate with one another.

Table 8: Association between VAT scores of patients with their clinical data in the experimental group

| Sr. No | Variables | Characteristics | Frequency (f) | VAT scores | | x ² Test df | p value |
|--------|--|--------------------------|---------------|------------|------|------------------------|---------|
| | | | | Poor | Fair | | |
| 1 | Diagnosis | Endocrine disease | 9 | 6 | 3 | 3.564 4 | 0.468 |
| | | Urinary disease | 9 | 7 | 2 | | |
| | | Cardiovascular disease | 9 | 5 | 4 | | |
| | | Gastrointestinal disease | 6 | 2 | 4 | | |
| | | Others | 7 | 5 | 2 | | |
| 2 | Type of admission during hospitalization | Emergency | 17 | 12 | 5 | 0.825 1 | 0.364 |
| | | Routine | 23 | 13 | 10 | | |
| 3 | Any previous exposure to iv cannulation | Yes | 26 | 18 | 8 | 1.436 1 | 0.231 |
| | | No | 14 | 7 | 7 | | |
| 3.A | No of times inserted iv cannulation | 0 | 14 | 7 | 7 | 2.016 3 | 0.569 |
| | | 1-2 | 11 | 7 | 4 | | |
| | | 3-4 | 14 | 10 | 4 | | |
| | | 5-6 | 1 | 1 | 0 | | |
| 4 | Site of cannulation | Left hand dorsum | 9 | 5 | 4 | 1.363 3 | 0.714 |
| | | Right hand dorsum | 6 | 5 | 1 | | |
| | | Left forearm | 15 | 9 | 6 | | |
| | | Right forearm | 10 | 6 | 4 | | |

| | | | | | | | |
|---|---------------------|-------------|----|----|----|------------|-------|
| 5 | Cannula size | 18G | 6 | 4 | 2 | 2.921 2 | 0.232 |
| | | 20G | 20 | 10 | 10 | | |
| | | 22G | 14 | 11 | 3 | | |
| 6 | Duration of illness | (in-days) | | | | 1.060 3 | 0.787 |
| | | 0-30 | 17 | 12 | 5 | | |
| | | 31-60 | 9 | 5 | 4 | | |
| | | 61-90 | 8 | 5 | 3 | | |
| | | Above 90 | 6 | 3 | 3 | | |
| 7 | BMI | Normal | 16 | 6 | 10 | 0.336 3 | 0.953 |
| | | Underweight | 5 | 3 | 2 | | |
| | | Obese | 3 | 1 | 2 | | |
| | | Overweight | 16 | 6 | 10 | | |

Table 8: demonstrates the association between clinical variables and vein assessment tool (VAT) Score in the experimental group. Clinical factors did not significantly correlate with one another.

4. DISCUSSION

Before conducting peripheral IV cannulation on patients, the current research was conducted to determine the impact of moist heat treatment on the visibility and palpability of peripheral veins.

The outcomes indicated that mean pre-test score was 1.38 with an SD of 0.490 in the experimental group whereas the post-test score was 2.55 with an SD of 0.504. A paired t-test was utilized to statistically assess the efficacy of moist heat treatment, and the outcomes were significant at a significance level of 0.05 (p-value 0.000*).

Amardeep Singh Samra and C. Naveen Kumar's research (2019) for evaluating the efficiency of moist heat treatment on visibility, pricks, palpability, and pain reported by patients during peripheral intravenous cannulation supports these findings. Purposive sampling was used to choose a sample of 100 subjects (both groups have 50 subjects each). With a pre-test mean score of 1.640 and an SD of 0.598 and a post-test mean score of 3.50 and an SD of 1.035, which was significant at a $p \leq 0.01$ significance level, the findings showed that moist heat treatment was successful in increasing the visibility and palpability of veins in the experimental group.[16]

The present study's findings show that the experimental group's mean post-test score was 2.55 with an SD of 0.504 whereas the control group's mean post-test score was 1.70 with an SD of 0.464. The palpability and visibility of veins were evaluated in the experimental group following the application of moist heat therapy, and these results were compared to those in the control group. These comparisons were statistically analysed using independent t-tests, and the significance level at which they were found to be significant was set at $p \leq 0.05$.

To determine the impact of moist heat treatment on the palpability and visibility of veins before peripheral intravenous cannulation in chemotherapy subjects, K. Simarpreet et al. undertook a randomized control trial (2017). The findings indicated that the experimental group had a higher mean vein evaluation score than the control group (3.92 ± 0.60 versus 2.28 ± 0.72 , $t=12.27$, $p=0.001^{**}$). It indicates that taking moist heat treatment has improved the palpability and visibility of veins which is demonstrated by $p=0.000$. [17]

This current study showed a significant association between clinical variables and vein assessment tool (VAT) Scores in the control group. Significant correlations between certain clinical factors were found like cannula size (p-value 0.000*) and duration of illness (p-value 0.010*) but there is no significant association with other clinical variables such as diagnosis, type of admission during hospitalization, any previous exposure to IV cannulation, no. of times inserted iv cannulation, site of

cannulation, and BMI.

The efficiency of moist heat treatment before intravenous cannulation was examined by PC Lalnunpui et al. in an experimental study (two-group post-test only design) in Guwahati, Assam, in 2019. Study findings indicated that the efficiency of moist heat treatment was significantly correlated with one of the chosen extraneous variables, i.e., number of pricks during cannulation, but there was no significant association found with other variables i.e., size of cannula, site of cannulation, use of the same site of cannulation and time of cannula insertion. [18]

5. CONCLUSION

The study's findings indicated that moist heat treatment was successful in increasing patients' capacity to see and feel their veins during IV cannulation. The use of moist heat therapy at the insertion site in patients who had difficulty with IV cannulation such as elderly, obese, and prolonged hospitalized patients undergoing IV cannulation is an efficient and cost-effective approach that can be carried out with a few basic tools and is advised for all members of the medical staff.

DISCLAIMER

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CONSENT AND ETHICAL APPROVAL

From the institutional research and ethical committee, the necessary ethical approvals were acquired to conduct a study (PUIECHR/PIMSR/00/081734/4105), and the patient's specific informed permission was also acquired.

CONFLICT OF INTERESTS

Authors have declared that no competing interests exist.

AUTHORS CONTRIBUTION:

Author 1- Approval and finalizing of study conception and design, Drafting of manuscript.

Author 2- Data collection and analysis, Interpretation of results.

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