RESEARCH PAPER

Effectiveness of Moist Heat Therapy on Visibility, Palpability and Pain Experienced While Undergoing Peripheral Intravenous Cannulation of Patients Admitted in Selected Tertiary Care Hospital, Belagavi

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ABSTRACT

Objectives:

1) To assess visibility and palpability of veins before peripheral intravenous cannulation of patients in experimental and control group.

2) To determine the effectiveness of moist heat therapy on visibility and palpability of the vein during peripheral intravenous cannulation.

3) To Determine the effectiveness of moist heat therapy on reducing pain experienced by patients during peripheral intravenous cannulation.

4) To find out the association between visibility and palpability with selected demographic variables.

5) To find out the association between Pain score with selected demographic variables.

Background: The most common operations in hospital settings is peripheral intravenous cannulation, which is necessary for the injecting of intravenous medicine, drugs, blood items and therapeutic interventions. Even though cannulation is a common therapeutic practice, many patients find it uncomfortable. Furthermore, limited visibility and palpability make it difficult for medical personnel to find appropriate veins, which might result in repeated efforts, elevated patient anxiety, and postponed therapy. A straightforward, non-invasive treatment called moist heat therapy increases local blood circulation and vasodilation, which may improve vein clarity and palpability and lessen procedure-related pain. Thus, the ambition based on current research abide via check how moist heat therapy affected the patients. admitted to a particular tertiary care hospital in Belagavi in terms of visibility, palpability, and pain during peripheral intravenous cannulation.

Methodology: An early and later investigation non-experimental populations study take place used in this quasi-experimental investigation. There were 120 people for EG's and 120 for CG's over 240 career receiving peripheral IV cannulation in the study. To gather participant demographic information, a sociodemographic proforma was utilized. Vein vision and palpitation were rated by a vein evaluation scale, and the amount of pain felt during intravenous cannulation was measured applying an numeric ache degree rate. The experimental group underwent moist heat therapy prior to cannulation, during an CG got usual treatment.

Results: The results indicate distribution of genders was about equal and that most participants were between the ages of 31 and 40. The dorsum of the hand and forearm were the most often utilized cannulation sites, with a 20G cannula being the most regularly used size. The majority of participants had prior experience with intravenous cannulation.

The experimental group's vein sight and palpability considerably improved following the use of moist heat therapy, as per the outcomes. The results showed a significant increase from the mean preliminary exam vein evaluation score of 1.82 ± 1.17 to the post-test value of 2.36 ± 1.14. Vein assessment ratings were greater in the moist heat therapy group compared to the CG. Noticeable change in pain levels within the EG's and CG's. While several members in those who were under experimentation reported minimal or no pain throughout the operation, a majority of those who participated in CG reported significant pain. These finding show that peripheral intravenous cannulation pain was effectively reduced by moist heat therapy.

Conclusion: Results of this research showed so moist heating procedure is a straightforward, non-invasive, and successful strategy that enhances vein palpability and visibility while lowering pain while peripheral intravenous

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cannulation. Integrating moist heat therapy into standard nursing practice has the potential to improve patient comfort, increase intravenous cannulation success rates, and decrease the need for repeated tries.
Keywords: *Effectiveness, Most Heat Therapy, Vein vision, Vein palpability, Peripheral Intra Venous Cannulation, Pain.*
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INTRODUCTION

Pain during peripheral IV cannulation is a major concern for both patients and healthcare providers. It is influenced by physical, psychological, and procedural factors. Repeated attempts can increase anxiety, fear, and emotional distress, especially in patients requiring frequent IV access. Poor vein visibility and palpability often lead to failed attempts, tissue damage, and reduced patient satisfaction. Since nurses rely on visual and tactile cues for vein selection, improving visibility is essential. While pharmacological options exist, they are not always practical for routine use, making effective pain management strategies important in nursing care. [1]

Pain during peripheral IV cannulation is a significant concern. It varies between patients and is influenced by psychological, physical, and procedural factors. Repeated attempts can increase anxiety, avoidance behaviour, and emotional distress. Poor vein visibility and palpability often lead to failed cannulation, tissue damage, and reduced patient satisfaction. Since nurses rely on visual and tactile assessment, proper vein selection is essential. Although pharmacological pain relief exists, it is not always practical for routine use, making effective pain management strategies important. [2]

Pain management is a key part of nursing and patient-centered care, as even simple procedures like IV cannulation can cause significant discomfort if not managed well. Moist heat therapy may help by improving venous access and reducing pain through vasodilation and stimulation of thermoreceptors, which can lessen pain transmission. This can make cannulation easier, reduce tissue damage, and improve patient comfort and cooperation, especially for those needing frequent IV access. It supports holistic, non-pharmacological pain management and may improve overall patient satisfaction and treatment outcomes. [3]

Nurses play a crucial role in the success of peripheral IV cannulation, as they are primarily responsible for intravenous therapy and venous access. Their skills and use of evidence-based practices directly affect patient outcomes. Simple interventions like moist heat therapy may improve cannulation success, reduce patient discomfort, and save time by minimizing repeated attempts, allowing nurses to focus on other care needs. Standardizing such practices can improve consistency and quality of care. Nursing research is important in validating these methods, supporting evidence-based practice, improving patient experience, and promoting professional growth. [4]

This study aims to evaluate the effectiveness of moist heat therapy on vein visibility, palpability, and pain during peripheral IV cannulation. It seeks to strengthen evidence-based nursing practices that improve procedural success and patient comfort. The findings may help healthcare providers enhance IV therapy techniques, reduce complications, and improve patient satisfaction. Overall, the research highlights the value of simple, cost-effective non-pharmacological methods in improving clinical outcomes and advancing nursing practice. [5]

Among the most often carried out intrusive methods in medical settings across the globe is intravenous (IV) cannulation. Peripheral intravenous cannulation is thought to be necessary for the delivery of fluids, drugs, or blood products in approximately 80% of hospitalized patients.[6] Using an IV is a major concern in care for patients because, despite its frequent usage, it is linked to a variety of consequences.

Complications include phlebitis, infiltration, and infection are very common worldwide. According to studies, the rate of phlebitis varies greatly, ranging from 3.2% to 71.25%, based on clinical procedures and patient conditions. [7] Phlebitis affects 20% to 80% of patients undergoing IV therapy, according to certain publications, underscoring the severity of the issue. [8] Furthermore, phlebitis is among the most typical adverse effects of IV therapy, occurring in as much as 70% of individuals hospitals with peripherally injected catheters. [9] In addition to making patients more uncomfortable, these issues also lengthen hospital stays and increase medical expenses.

Studies also show a significant burden of problems due to IV cannulation at the national level (India). Phlebitis is very common among hospitalized patients, with many occurrences happening within the first 48–72 hours of cannulation, according to research done in tertiary care settings. [10] According to a different study, patients with peripheral IV cannulas had an incidence of phlebitis as high as 31.4%, highlighting the need for better clinical procedures. [11] Additionally, research has shown that within 72 hours of cannulation, more than 40% of patients may experience problems like redness, edema, or pain, particularly with repeated efforts. [12]

The load is still substantial at the regional level (South Asia and comparable healthcare systems). According to studies, the prevalence of phlebitis in hospitalized patients

is about 20%, with rates as high as 30% in intensive care units. [13] More over half of patients (up to 58%) experienced phlebitis in certain hospital-based trials in India, especially when risk factors such incorrect technique, catheter size, and extended duration were present. [14] These results show that there is still a need to standardize IV cannulation procedures and prevent complications.

Another significant issue influencing satisfaction among patients and compliance is pain during IV cannulation. Increased discomfort and anxiety are a result of repeated efforts brought on by inadequate vein visibility and accessibility. In this regard, moist heat therapy has been found to be an easy, affordable, non-pharmacological technique that enhances venous access, encourages vasodilation, and may lessen cannulation pain.

Moist heat treatment is not routinely used in therapeutic settings, despite evidence that it can increase success rates and lower problems. More organized proof of its efficacy in enhancing IV cannulation results is required.

Therefore, this study is crucial to assess how well moist heat therapy reduces discomfort, increases success rates, and minimizes problems during IV cannulation. The findings of this investigation will assist in the development of standardized, evidence-based nursing procedures and improve the quality of patient treatment.

MATERIAL AND METHODS

A quantitative approach with a quasi-experimental pre-test post-test control group design was adopted to conduct the study in the Critical Care Unit of KLE's Dr. Prabhakar Kore Hospital and MRC, Belagavi, after obtaining formal permission and ethical clearance. The study included patients undergoing peripheral intravenous cannulation, with a total sample size of 240 selected using purposive sampling. Patients aged 18–50 years undergoing PIVC were included, while those with skin diseases, peripheral vascular disorders, critically ill condition during cannulation, and emergency cases were excluded. The study variables included moist heat therapy as the independent variable and vein visibility, palpability, and pain during cannulation as dependent variables, along with demographic and clinical attributes. Data were collected using a structured tool consisting of demographic details, clinical variables, Modified Vein Assessment Scale, and Numerical Pain Scale, which was validated by experts and tested for reliability using ICC. After pre-test assessment of vein condition, moist heat therapy (50°C sterile moist application) was applied prior to cannulation, followed by post-test evaluation and pain assessment after cannulation. Data were analyzed using descriptive and inferential statistics including Wilcoxon signed-rank test, Mann–Whitney U test, and Chi-square test, with $p < 0.05$ considered significant.

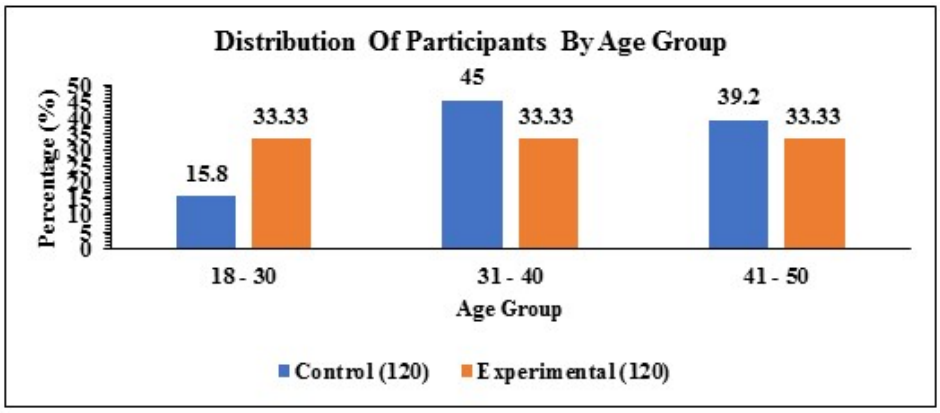
RESULTS

Table 1: Background characteristics of the study groups (n =240)

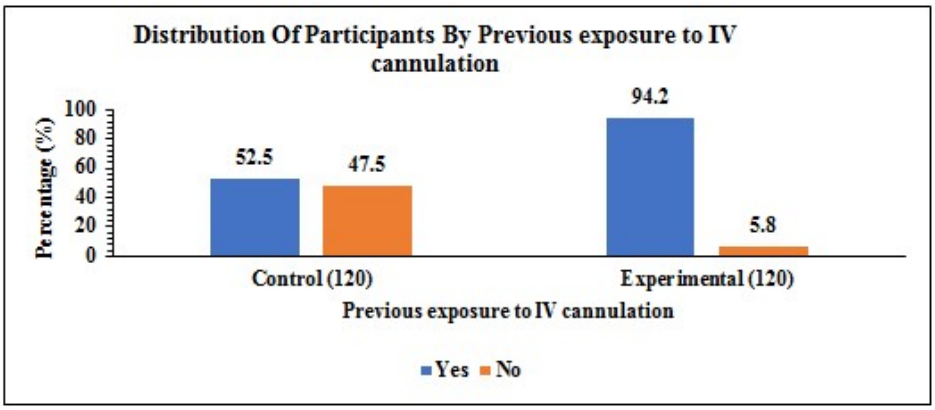
Variable		Total		Group				p value
				Control		Experimental		
		n	%	n	%	n	%	
Age in Years	**18 - 30**	59	24.6	19	15.8	40	33.33	0.006*
	31 - 40	94	39.1	54	45	40	33.33	
	41 - 50	87	36.3	47	39.2	40	33.33	
Gender	**Male**	119	49.6	59	49.2	60	50	0.897
	Female	121	50.4	61	50.8	60	50	
Previous exposure to IV cannulation	**Yes**	176	73.3	63	52.5	113	94.2	0.001*
	No	64	26.7	57	47.5	7	5.8	
Site of cannulation	**Dorsum of left hand**	63	26.2	32	26.6	31	25.8	0.996
	Dorsum of Right hand	59	24.6	29	24.2	30	25	
	Left Forearm	59	24.6	29	24.2	30	25	
	Right Forearm	59	24.6	30	25	29	24.2	
Cannula Size	**18 G**	66	27.5	37	30.8	29	24.2	0.059
	20 G	91	37.9	38	31.7	53	44.2	
	22 G	50	20.8	23	19.2	27	22.4	
	24 G	33	13.8	22	18.3	11	9.2	
Duration of Illness	**Less than 2 months**	239	99.6	120	100	119	99.2	0.316
	2 - 6 months	1	0.4	0	0	1	0.8	
	7 - 12 months	0	0	0	0	0	0	
	More than 1 Year	0	0	0	0	0	0	

***Note** - p value was computed using Chi-square test and Fisher's Exact test. (*) indicates statistical significance with p value < 0.05*

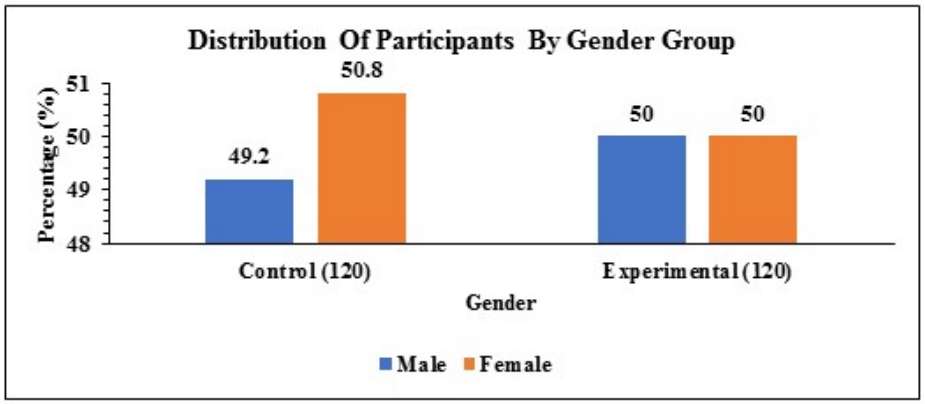
A total of 240 participants were included, with 120 each in the control and experimental groups. The majority were aged 31–40 years (39.1%), followed by 41–50 years (36.3%) and 18–30 years (24.6%), with a significant age difference between groups (p = 0.006). Gender distribution was nearly equal overall (49.6% male, 50.4% female) and comparable between groups (p = 0.897). Most participants (73.3%) had prior IV cannulation exposure, which differed significantly between groups (p = 0.001). Cannulation site and cannula size were similarly distributed and not significant (p = 0.996 and p = 0.059, respectively). Nearly all participants (99.6%) had illness duration under two months, with no significant group difference (p = 0.316). Overall, only age and prior IV exposure showed significant differences between groups.



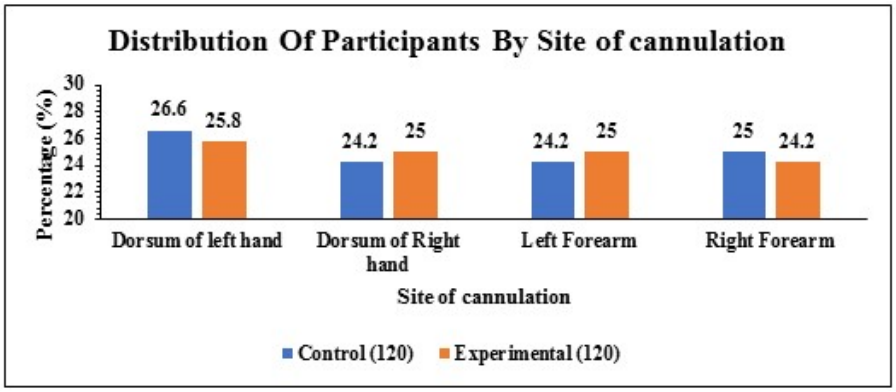
Graph No-1: Distribution of Participants by Age Group



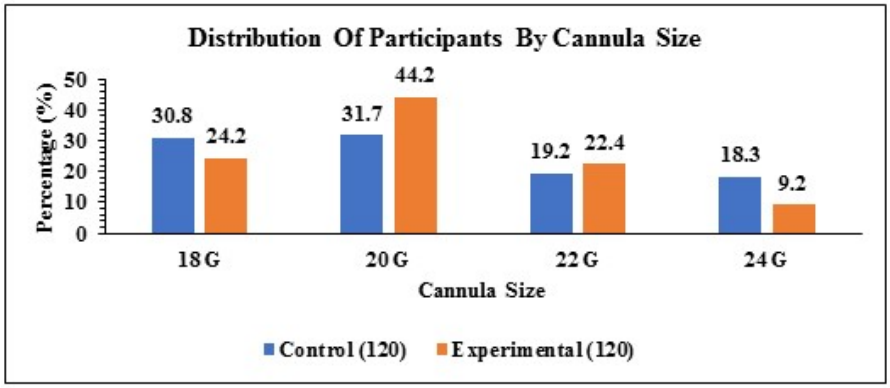
Graph No-2: Distribution of Participants by Gender Group



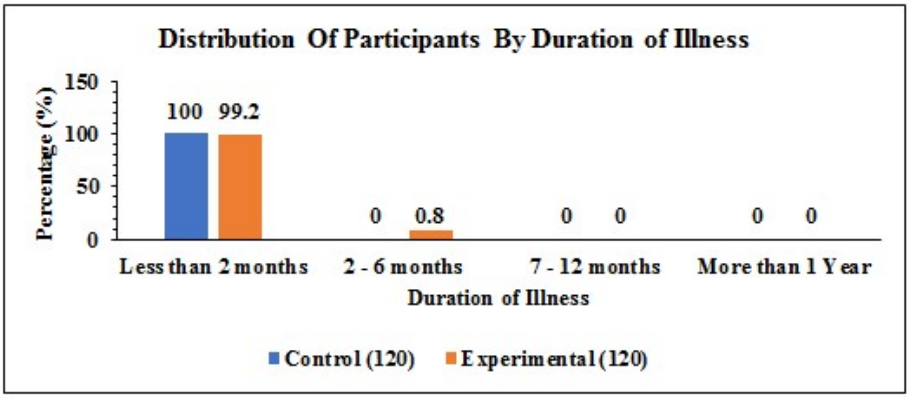
Graph No-3: Distribution of Participants by Previous Exposure to IV Cannulation



Graph No-4: Distribution of Participants by Site of Cannulation



Graph No-5: Distribution of Participants by Cannula Size



Graph No-6: Distribution of Participants by Duration of Illness

Table 2: Comparison of Pain Score and Vein assessment scores in Control and Experimental group

Variable	Overall		Control		Experimental		p value
	Mean (SD)	Median (IQR)	Mean (SD)	Median (IQR)	Mean (SD)	Median (IQR)	
Pain Score	6.97 (2.15)	7 (3)	3.45 (2.54)	3 (4)	5.21 (2.94)	6 (5)	0.001*
Pre-test Vein Assessment	1.89 (1.36)	2 (2)	1.75 (0.95)	2 (1)	1.82 (1.17)	2 (2)	0.001*
Post-test Vein Assessment	1.95 (1.31)	2 (2)	2.77 (0.74)	3 (1)	2.36 (1.14)	2.5 (1)	0.545

***Note** - p value was computed using Mann Whitney U test. (*) indicates statistical significance with p value < 0.05*

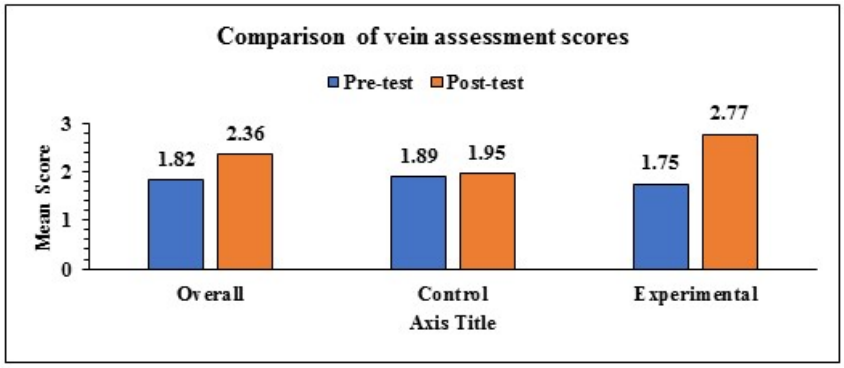
Table 2 shows that the experimental group had higher pain scores than the control group (5.21 ± 2.94 vs 3.45 ± 2.54), with a significant difference (p = 0.001). Pre-test vein assessment scores were also significantly different between groups (p = 0.001), while post-test vein assessment scores showed no significant difference (p = 0.545). Overall, only pain scores and pre-test vein assessment differed significantly between the groups.

Table 3: Comparison of pre and post vein assessment scores in control and experimental groups

Variable	Time	Mean	SD	Median	IQR	p value
Overall	Pre-test	1.82	1.17	2	2	0.001*
	Post-test	2.36	1.14	2.5	1	
Control	Pre-test	1.89	1.36	2	2	0.008*
	Post-test	1.95	1.31	2	2	
Experimental	Pre-test	1.75	0.95	2	1	0.001*
	Post-test	2.77	0.74	3	1	

***Note** - p value was computed using Wilcoxon Signed Rank test. (*) indicates statistical significance with p value < 0.05*

Table 3 shows a significant improvement in vein assessment scores from pre-test to post-test overall (1.82 ± 1.17 to 2.36 ± 1.14, p = 0.001). The control group showed a small but significant increase (1.89 ± 1.36 to 1.95 ± 1.31, p = 0.008), while the experimental group showed a much larger and highly significant improvement (1.75 ± 0.95 to 2.77 ± 0.74, p = 0.001). Overall, the intervention was associated with a greater improvement in the experimental group.



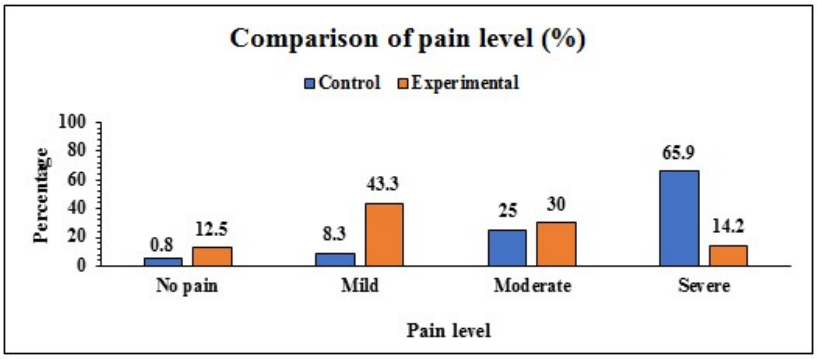
Graph No-7: Comparison of Vein Assessment Scores

Table 4: Pain level distribution of the study groups

Pain Level	Group				Total		p value
	Control		Experimental				
	n	%	n	%	n	%	
No pain	1	0.8	15	12.5	16	6.7	0.001*
Mild	10	8.3	52	43.3	62	25.8	
Moderate	30	25	36	30	66	27.5	
Severe	79	65.9	17	14.2	96	40	

***Note** - p value was computed using Chi-square test. (*) indicates statistical significance with p value < 0.05*

Table 4 shows a significant difference in pain distribution between groups (p = 0.001). Overall, most participants reported severe (40%) or moderate pain (27.5%). In the control group, severe pain was most common (65.9%), whereas in the experimental group most participants experienced mild pain (43.3%) or moderate pain (30%), with more reporting no pain (12.5%) and fewer reporting severe pain (14.2%). This indicates lower pain levels in the experimental group.



Graph No-8: Comparison of Pain Level (%)

Table 5: Association between pain level and demographic variables in the experimental group (n = 120)

Variable		Pain leve				p value
		None	Mild	Moderate	Severe	
		n (%)	n (%)	n (%)	n (%)	
Age in Years	18 - 30	0 (0)	4 (21.1)	5 (26.3)	10 (52.6)	0.162
	31 - 40	0 (0)	1 (1.9)	14 (25.9)	39 (72.2)	
	41 - 50	1 (2.1)	5 (10.6)	11 (23.4)	30 (63.8)	
Gender	Male	0 (0)	7 (11.9)	13 (22)	39 (66.1)	0.374
	Female	1 (1.6)	3 (4.9)	17 (27.9)	40 (65.6)	
Previous exposure to IV cannulation	Yes	1 (1.6)	3 (4.8)	16 (25.4)	43 (68.3)	0.382
	No	0 (0)	7 (12.3)	14 (24.6)	36 (63.2)	
Site of cannulation	Dorsum of left hand	1 (3.1)	3 (9.4)	5 (15.6)	23 (71.9)	0.266
	Dorsum of Right hand	0 (0)	1 (3.4)	11 (37.9)	17 (58.6)	
	Left Forearm	0 (0)	5 (17.2)	6 (20.7)	18 (62.1)	
	Right Forearm	0 (0)	1 (3.3)	8 (26.7)	21 (70)	
Cannula Size	18 G	0 (0)	0 (0)	8 (21.6)	29 (78.4)	0.001*
	20 G	1 (2.6)	7 (18.4)	19 (50)	11 (28.9)	
	22 G	0 (0)	0 (0)	1 (4.3)	22 (95.7)	
	24 G	0 (0)	3 (13.6)	2 (9.1)	17 (77.3)	
Duration of Illness	Less than 2 months	1 (0.8)	10 (8.3)	30 (25)	79 (65.8)	Not Applicable
	2 - 6 months	0 (0)	0 (0)	0 (0)	0 (0)	
	7 - 12 months	0 (0)	0 (0)	0 (0)	0 (0)	
	More than 1 Year	0 (0)	0 (0)	0 (0)	0 (0)	

***Note** - p value was computed using Chi-square test. (*) indicates statistical significance with p value < 0.05*

Table 5 shows that most demographic variables (age, gender, IV exposure, and cannulation site) were not significantly associated with pain levels in the experimental group ($p > 0.05$). However, cannula size had a significant association with pain ($p = 0.001$), with larger cannulas linked to higher pain levels. Duration of illness was not analyzed due to minimal variation. Overall, only cannula size influenced pain levels.

Table 6: Association between pain level and demographic variables in the control group (n = 120)

Variable		Pain level				p value
		None	Mild	Moderate	Severe	
		n (%)	n (%)	n (%)	n (%)	
Age in Years	18 - 30	6 (15)	20 (50)	8 (20)	6 (15)	0.648
	31 - 40	3 (7.5)	17 (42.5)	15 (37.5)	5 (12.5)	
	41 - 50	6 (15)	15 (37.5)	13 (32.5)	6 (15)	
Gender	Male	4 (6.7)	25 (41.7)	22 (36.7)	9 (15)	0.159
	Female	11 (18.3)	27 (45)	14 (23.3)	8 (13.3)	
Previous exposure to IV cannulation	Yes	14 (12.4)	49 (43.4)	34 (30.1)	16 (14.2)	0.999
	No	1 (14.3)	3 (42.9)	2 (28.6)	1 (14.3)	
Site of cannulation	Dorsum of left hand	3 (9.7)	13 (41.9)	11 (35.5)	4 (12.9)	0.394
	Dorsum of Right hand	3 (10)	12 (40)	10 (33.3)	5 (16.7)	
	Left Forearm	3 (10)	18 (60)	4 (13.3)	5 (16.7)	
	Right Forearm	6 (20.7)	9 (31)	11 (37.9)	3 (10.3)	
Cannula Size	18 G	2 (6.9)	14 (48.3)	10 (34.5)	3 (10.3)	0.837
	20 G	6 (11.3)	21 (39.6)	18 (34)	8 (15.1)	
	22 G	5 (18.5)	11 (40.7)	6 (22.2)	5 (18.5)	
	24 G	2 (18.2)	6 (54.5)	2 (18.2)	1 (9.1)	
Duration of Illness	Less than 2 months	15 (12.6)	51 (42.9)	36 (30.3)	17 (14.3)	0.725
	2 - 6 months	0 (0)	1 (100)	0 (0)	0 (0)	
	7 - 12 months	0 (0)	0 (0)	0 (0)	0 (0)	
	More than 1 Year	0 (0)	0 (0)	0 (0)	0 (0)	

***Note** - p value was computed using Chi-square test. (*) indicates statistical significance with p value < 0.05*

Table 6 shows that none of the demographic variables (age, gender, IV exposure, cannulation site, cannula size, or duration of illness) were significantly associated with

pain levels in the control group ($p > 0.05$). This indicates that pain perception during IV cannulation was not influenced by demographic factors in the control group.

Table 7: Association between pre-test vein assessment and demographic variables in the control group (n = 120)

Variable		Pre-test Vein Assessment in Control Group					p value
		0	1	2	3	4	
		n (%)	n (%)	n (%)	n (%)	n (%)	
Age in Years	18 - 30	6 (31.6)	4 (21.1)	2 (10.5)	3 (15.8)	4 (21.1)	0.026*
	31 - 40	4 (7.4)	19 (35.2)	15 (27.8)	7 (13)	9 (16.7)	
	41 - 50	13 (27.7)	5 (10.6)	11 (23.4)	11 (23.4)	7 (14.9)	
Gender	Male	16 (27.1)	15 (25.4)	10 (16.9)	10 (16.9)	8 (13.6)	0.149
	Female	7 (11.5)	13 (21.3)	18 (29.5)	11 (18)	12 (19.7)	
Previous exposure to IV cannulation	Yes	11 (17.5)	15 (23.8)	14 (22.2)	12 (19)	11 (17.5)	0.972
	No	12 (21.1)	13 (22.8)	14 (24.6)	9 (15.8)	9 (15.8)	
Site of cannulation	Dorsum of left hand	4 (12.5)	8 (25)	9 (28.1)	4 (12.5)	7 (21.9)	0.785
	Dorsum of Right hand	6 (20.7)	7 (24.1)	5 (17.2)	8 (27.6)	3 (10.3)	
	Left Forearm	5 (17.2)	6 (20.7)	7 (24.1)	4 (13.8)	7 (24.1)	
	Right Forearm	8 (26.7)	7 (23.3)	7 (23.3)	5 (16.7)	3 (10)	
Cannula Size	18 G	8 (21.6)	8 (21.6)	7 (18.9)	5 (13.5)	9 (24.3)	0.475
	20 G	7 (18.4)	13 (34.2)	8 (21.1)	5 (13.2)	5 (13.2)	
	22 G	3 (13)	3 (13)	9 (39.1)	6 (26.1)	2 (8.7)	
	24 G	5 (22.7)	4 (18.2)	4 (18.2)	5 (22.7)	4 (18.2)	
Duration of Illness	Less than 2 months	23 (19.2)	28 (23.3)	28 (23.3)	21 (17.5)	20 (16.7)	Not Applicable
	2 - 6 months	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	
	7 - 12 months	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	
	More than 1 Year	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	

Note *- p value was computed using Chi-square test. (*) indicates statistical significance with p value < 0.05*

Table 7 shows that age was significantly associated with pre-test vein assessment scores in the control group ($p = 0.026$), while all other variables (gender, IV exposure, cannulation site, cannula size, and duration of illness) showed no significant association ($p > 0.05$). This suggests that vein characteristics varied mainly with age.

Table 8: Association between post-test vein assessment and demographic variables in the control group (n = 120)

Variable		Post-test Vein Assessment in Control Group					p value
		0	1	2	3	4	
		n (%)	n (%)	n (%)	n (%)	n (%)	
Age in Years	18 - 30	5 (26.3)	5 (26.3)	2 (10.5)	3 (15.8)	4 (21.1)	0.08
	31 - 40	3 (5.6)	19 (35.2)	16 (29.6)	7 (13)	9 (16.7)	
	41 - 50	10 (21.3)	8 (17)	10 (21.3)	12 (25.5)	7 (14.9)	
Gender	Male	13 (22)	18 (30.5)	10 (16.9)	10 (16.9)	8 (13.6)	0.121
	Female	5 (8.2)	14 (23)	18 (29.5)	12 (19.7)	12 (19.7)	
Previous exposure to IV cannulation	Yes	10 (15.9)	16 (25.4)	14 (22.2)	12 (19)	11 (17.5)	0.99
	No	8 (14)	16 (28.1)	14 (24.6)	10 (17.5)	9 (15.8)	
Site of cannulation	Dorsum of left hand	3 (9.4)	8 (25)	10 (31.3)	4 (12.5)	7 (21.9)	0.517
	Dorsum of Right hand	5 (17.2)	8 (27.6)	4 (13.8)	9 (31)	3 (10.3)	
	Left Forearm	3 (10.3)	8 (27.6)	7 (24.1)	4 (13.8)	7 (24.1)	
	Right Forearm	7 (23.3)	8 (26.7)	7 (23.3)	5 (16.7)	3 (10)	
Cannula Size	18 G	8 (21.6)	8 (21.6)	7 (18.9)	5 (13.5)	9 (24.3)	0.482
	20 G	5 (13.2)	14 (36.8)	8 (21.1)	6 (15.8)	5 (13.2)	
	22 G	2 (8.7)	4 (17.4)	9 (39.1)	6 (26.1)	2 (8.7)	
	24 G	3 (13.6)	6 (27.3)	4 (18.2)	5 (22.7)	4 (18.2)	
Duration of Illness	Less than 2 months	18 (15)	32 (26.7)	28 (23.3)	22 (18.3)	20 (16.7)	Not Applicable
	2 - 6 months	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	
	7 - 12months	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	
	More than 1 Year	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	

***Note** - p value was computed using Chi-square test. (*) indicates statistical significance with p value < 0.05*

Table 8 shows that none of the demographic variables (age, gender, IV exposure, cannulation site, cannula size, or duration of illness) were significantly associated with post-test vein assessment scores in the control group ($p > 0.05$). This indicates that demographic factors did not influence post-test vein assessment outcomes.

Table 9: Association between pre-test vein assessment and demographic variables in the experimental group (n = 120)

Variable		Pre-test Vein Assessment in Experimental Group					p value
		0	1	2	3	4	
		n (%)	n (%)	n (%)	n (%)	n (%)	
Age in Years	18 - 30	1 (2.5)	10 (25)	21 (52.5)	8 (20)	0 (0)	0.184
	31 - 40	6 (15)	14 (35)	9 (22.5)	10 (25)	1 (2.5)	
	41 - 50	5 (12.5)	10 (25)	18 (45)	6 (15)	1 (2.5)	
Gender	Male	7 (11.7)	18 (30)	27 (45)	8 (13.3)	0 (0)	0.209
	Female	5 (8.3)	16 (26.7)	21 (35)	16 (26.7)	2 (3.3)	
Previous exposure to IV cannulation	Yes	9 (8)	32 (28.3)	46 (40.7)	24 (21.2)	2 (1.8)	0.043*
	No	3 (42.9)	2 (28.6)	2 (28.6)	0 (0)	0 (0)	
Site of cannulation	Dorsum of left hand	5 (16.1)	11 (35.5)	11 (35.5)	4 (12.9)	0 (0)	0.488
	Dorsum of Right hand	4 (13.3)	6 (20)	11 (36.7)	9 (30)	0 (0)	
	Left Forearm	3 (10)	9 (30)	13 (43.3)	4 (13.3)	1 (3.3)	
	Right Forearm	0 (0)	8 (27.6)	13 (44.8)	7 (24.1)	1 (3.4)	
Cannula Size	18 G	4 (13.8)	6 (20.7)	14 (48.3)	5 (17.2)	0 (0)	0.787
	20 G	4 (7.5)	19 (35.8)	18 (34)	11 (20.8)	1 (1.9)	
	22 G	3 (11.1)	6 (22.2)	13 (48.1)	4 (14.8)	1 (3.7)	
	24 G	1 (9.1)	3 (27.3)	3 (27.3)	4 (36.4)	0 (0)	
Duration of Illness	Less than 2 months	12 (10.1)	34 (28.6)	47 (39.5)	24 (20.2)	2 (1.7)	0.824
	2 - 6 months	0 (0)	0 (0)	1 (100)	0 (0)	0 (0)	
	7 - 12 months	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	
	More than 1 Year	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	

***Note** - p value was computed using Chi-square test. (*) indicates statistical significance with p value < 0.05*

Table 9 shows that only previous IV cannulation exposure was significantly associated with pre-test vein assessment scores in the experimental group ($p = 0.043$), with better scores among those with prior exposure. All other variables (age, gender, cannulation site, cannula size, and duration of illness) showed no significant association ($p > 0.05$).

Table 10: Association between post-test vein assessment and demographic variables in the experimental group (n = 120)

Variable		Post-test Vein Assessment in Experimental Group					p value
		0	1	2	3	4	
		n (%)	n (%)	n (%)	n (%)	n (%)	
Age in Years	18 - 30	0 (0)	0 (0)	9 (22.5)	22 (55)	9 (22.5)	0.122
	31 - 40	0 (0)	1 (2.5)	18 (45)	17 (42.5)	4 (10)	
	41 - 50	0 (0)	3 (7.5)	11 (27.5)	21 (52.5)	5 (12.5)	
Gender	Male	0 (0)	3 (5)	21 (35)	31 (51.7)	5 (8.3)	0.169
	Female	0 (0)	1 (1.7)	17 (28.3)	29 (48.3)	13 (21.7)	
Previous exposure to IV cannulation	Yes	0 (0)	2 (1.8)	35 (31)	59 (52.2)	17 (15)	0.001*
	No	0 (0)	2 (28.6)	3 (42.9)	1 (14.3)	1 (14.3)	
Site of cannulation	Dorsum of left hand	0 (0)	2 (6.5)	13 (41.9)	13 (41.9)	3 (9.7)	0.693
	Dorsum of Right hand	0 (0)	1 (3.3)	8 (26.7)	16 (53.3)	5 (16.7)	
	Left Forearm	0 (0)	0 (0)	11 (36.7)	15 (50)	4 (13.3)	
	Right Forearm	0 (0)	1 (3.4)	6 (20.7)	16 (55.2)	6 (20.7)	
Cannula Size	18 G	0 (0)	1 (3.4)	6 (20.7)	20 (69)	2 (6.9)	0.116
	20 G	0 (0)	1 (1.9)	21 (39.6)	19 (35.8)	12 (22.6)	
	22 G	0 (0)	2 (7.4)	7 (25.9)	14 (51.9)	4 (14.8)	
	24 G	0 (0)	0 (0)	4 (36.4)	7 (63.6)	0 (0)	
Duration of Illness	Less than 2 months	0 (0)	4 (3.4)	38 (31.9)	59 (49.6)	18 (15.1)	0.799
	2 - 6 months	0 (0)	0 (0)	0 (0)	1 (100)	0 (0)	
	7 - 12 months	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	
	More than 1 Year	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	

***Note** - p value was computed using Chi-square test. (*) indicates statistical significance with p value < 0.05*

Table 10 shows that previous IV cannulation exposure was significantly associated with post-test vein assessment scores in the experimental group ($p = 0.001$), with better outcomes among those with prior exposure. All other variables (age, gender, cannulation site, cannula size, and duration of illness) were not significantly associated ($p > 0.05$).

Hypothesis Acceptance

Hence, hypothesis H1 is accepted age groups which shows significant association with vein assessment in both Experimental Group and Control Group. And also, H1 is accepted in reduction of pain.

DISCUSSION

The study of 240 participants showed no gender difference between groups, but significant differences in age and prior IV exposure. The experimental group had better vein visibility, improved palpability, and significantly lower pain scores ($p = 0.001$). Moist heat likely improves venous access through vasodilation and increased blood flow, making cannulation easier and less painful. Overall, it is a simple, safe, and cost-effective method that enhances IV cannulation outcomes in nursing practice, though further large-scale studies are recommended.

CONCLUSION

Peripheral IV cannulation is a common but often painful procedure, and poor vein visibility can lead to repeated attempts and patient discomfort. This study with 240 participants found that moist heat therapy significantly improved vein visibility and palpability while reducing pain compared to standard care. The intervention works by increasing blood flow and vasodilation, making cannulation easier and more comfortable. The findings support its use in nursing practice and highlight its importance in education, clinical protocols, and further research. However, the study was limited to one setting, a short duration, and immediate outcomes, suggesting the need for larger and more diverse studies.

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