



## EFFECTIVENESS OF WARM COMPRESS IN THE MANAGEMENT OF COMPLICATIONS AMONG PATIENTS WITH PERIPHERAL INTRAVENOUS INFUSION

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### ABSTRACT

When patients get admitted in the hospital for treatment; 90% of cases receive peripheral intravenous (PIV) therapy to treat various conditions. The patients are prone to get peripheral intravenous complications (PIVC). Health professionals should be vigilant of the right interventions to expedite comfort for the patients on intravenous therapy and take measures to reduce the complications. The objectives of the study were effect of warm compress in the management of PIVC, associate the management of PIVC scores with the selected demographic variables. One group pretest and posttest design was adopted in this study. 30 samples were selected with inclusive criteria by non-probability purposive sampling technique. Warm compress was applied twice a day for three days. The findings of the study presented that the calculated paired 't' value of PIVC such as superficial thrombophlebitis, pain and intravenous infusion were 11.5, 13.07 and 5.7, respectively, statistically significant at  $p < 0.001$  of pretest with posttest. Hence, warm compress was effective to treat PIVC which is cheapest, feasible to adopt, to save money and material.

**KEYWORDS:** Warm compress, PIVC, Superficial thrombophlebitis, pain, intravenous infusion



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## INTRODUCTION

Patients with minor or major ailments need to be treated and observed by the medical team which requires hospitalization. Peripheral intravascular catheterization (PIVC) is a common feature of acute hospitalization, with the majority of patients requiring the intravenous administration of fluid or medication at some time during their hospital stay<sup>1-2</sup>. The administration of fluids via intravenous (IV) infusion is common and very safe. When the patient is hospitalized, the nurses should be vigilant enough to monitor the patient's disease progress and also intravenous lines. Infusion Nurses Society recommend that the intravenous infusion site should be monitored for 48 hours and if any signs of infection, infiltration, pain or extravasations were identified at the early stage, it is better to remove and re-site the intravenous cannula<sup>3</sup>. The patients are prone to get intravenous complications such as superficial thrombophlebitis, pain over the IV site, infiltration and extravasation etc.<sup>4</sup> The administration of intravenous fluids is an integral part of patient care in hospital allowing for the delivery of parental fluids, medications and additives. In modern medical practice up to 80% of hospitalized patients receive IV therapy at some point during their admission.<sup>5</sup> In a study of 168 peripheral cannulas, it was found that the incidence of infiltration and phlebitis was as high as 31.5% and 29.8%<sup>6</sup>. The preventive measures of superficial thrombophlebitis such as anchor the needle or catheter securely at the insertion site change the cannula every 72 hours in adult patients. The nursing interventions moist warm compress will help to relieve inflammation. The treatment for superficial thrombophlebitis is broadly categorized into pharmacological and non-pharmacological therapy. The non-pharmacological therapy used to reduce inflammation includes elevation of affected extremity, dry heat (warm water bottles) and moist heat such as warm compress.<sup>7</sup> Infiltration and extravasation can be caused by mechanical, physiological or pharmacological factors. Mechanical factors occurring either during initial catheter insertion or while the catheter is in place and physiological factors relating to preexisting or emerging vein problem can be contributing factors.<sup>8</sup> Abolfotouh *et al.*<sup>9</sup> conducted a prospective study on incidence and predictors of peripheral intravenous catheter-induced complications. Campell conducted study on IV related phlebitis, complications and length of hospital stay. The study concluded that although there were multiple risk factors for the development of phlebitis, routine IV site observation and the use of phlebitis severity

measurement scales could reduce incidence and severity of phlebitis.<sup>10</sup> Oliveira *et al.* had conducted study on incidence of phlebitis in patients with peripheral intravenous catheters. A total of 1,244 catheters were observed, and 317 were removed or inserted. Incidence of phlebitis was 11.09%. The finding of the study showed that the risk factors are related to the use of prescribed medication and the catheterized limb.<sup>11</sup> Xie<sup>12</sup> conducted study on clinical evaluation of effects different treatment to prevent from phlebitis induced Chansu injection. The study reported that the incidence of phlebitis ranges from 10% to 90% of peripheral IV catheterization.<sup>12</sup> Hence, the present study aimed to evaluate the effectiveness of warm compress in the management of complications among patients with peripheral intravenous infusion. The investigator realized the burden of the condition, and has interest to minimize in the level of superficial thrombophlebitis, pain and intravenous infiltration, and carried out this study.

## MATERIALS AND METHODS

Quantitative research approach was used in this study. One group pre-test, post-test design was adopted in this study. After obtaining the ethical permission from the Institutional Ethical Committee of Sri Muthukumaran Medical College Hospital and Research Institute Chennai, (R. No: 33/ IEC- SMMCHRI/ p. no. 6/2016) and Institutional Review Board of Meenakshi College of Nursing, the investigator conducted the study in Sri Muthukumaran Medical College Hospital and Research Institute. Thirty study participants were selected based on purposive sampling technique of those who fulfill the criteria such as both male and female patients with peripheral intravenous infusion, patients in the age group of above 20 years and below 60 years, willing to participate, patients with IV cannula on minimum of 2 to 3 days (48 – 72 hours), patients who get the minimum score of 0-4 in infiltration scale patients who get the score of visual infusion phlebitis scale (1-5). A formal informed consent was obtained from the study participants. The investigator collected the data of peripheral intravenous infusion complications by using standardized tool such as Jackson's Visual Infusion Phlebitis scale (to assess superficial thrombophlebitis), visual analog scale (to assess pain), Infiltration scale (to assess intravenous infiltration). Pretest (O1) was conducted. Application of warm compress, gauze soaked in 39.5°C of warm water on infiltrated site twice a day for three days. Posttest was conducted at the end of each day and documented as posttest 1 (O2), 2 (O3) and 3 (O4).

**RESULTS & DISCUSSION**

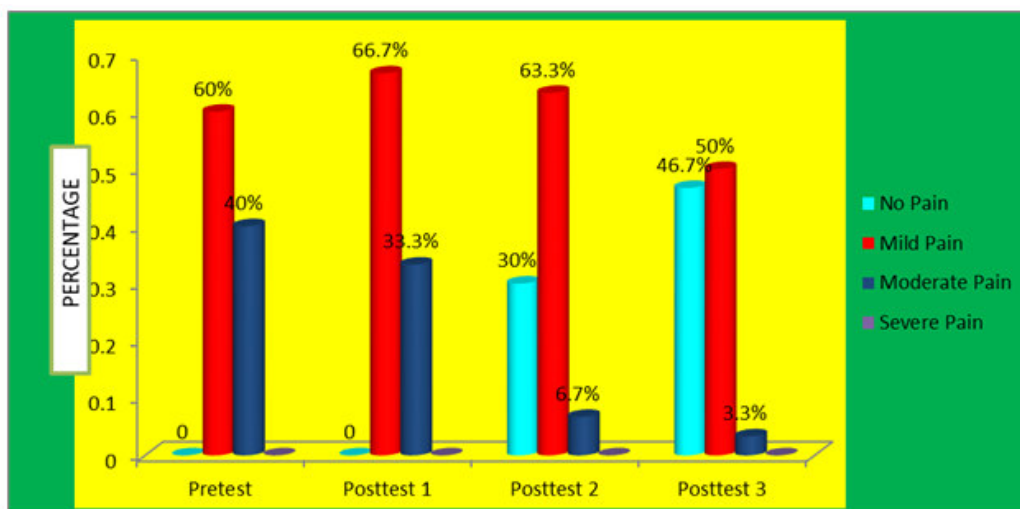
**Table 1**  
*Distribution of level of superficial thrombophlebitis among patients with PIVC in pre and posttest of study group (N=30)*

Sl No	Superficial thrombophlebitis	No Phlebitis (0 score)		First sign of phlebitis (1)		Early stage of phlebitis (2)		Medium stage of phlebitis (3)		Advanced stage of phlebitis (4-5)	
		n	%	n	%	n	%	n	%	n	%
1	Pretest	0	0	8	26.7	13	43.7	6	20	3	10
2	Posttest 1	0	0	8	26.7	13	43.7	6	20	3	10
3	Posttest 2	9	30	12	40	5	16.7	2	6.7	2	6.7
4	Posttest 3	12	40	13	43.3	4	13.3	1	3.3	0	0

*PIVC – Pheripheral intravenous complications*

The distribution in management of superficial thrombophlebitis among patients with peripheral intravenous infusion evident that nearly half of the

samples 13 (43.7%), developed early stage of phlebitis in pretest. 12 (40%) samples had no phlebitis in posttest 3.



**Figure 1**  
*Distribution of level of Pain among patients with PIVC in pre and posttest of study group (N=30)*

The distribution in management of pain among patients with peripheral intravenous infusion enumerated that more than half of the samples 18 (60%) experienced

mild pain in pretest and nearly half of the samples 14 (46.7%) had no pain in posttest 3.

**Table2**  
*Distribution of grades of Intravenous infiltration among patients with PIVC in pre and posttest of study group (N=30)*

Sl. No	Intravenous infiltration	No Infiltration (0 Score)		Mild Infiltration (1-2)		Moderate Infiltration (3-6)		Severe Infiltration (7-10)	
		n	%	n	%	n	%	n	%
1.	Pretest	14	46.7	16	53.3	0	0	0	0
2.	Posttest 1	24	80	6	20	0	0	0	0
3.	Posttest 2	27	90	3	10	0	0	0	0
4	Posttest 3	30	100	0	0	0	0	0	0

*PIVC–Pheripheral intravenous complications*

The distribution in management of Intravenous infiltration among patients with peripheral intravenous infusion half of the samples 16 (53.3%) samples had

mild infiltration in pretest and all the 30 (100%) had no infiltration in posttest.

**Table 3**  
**Comparison of scores of management of complications among patients with PIVC in pre and posttest (N=30)**

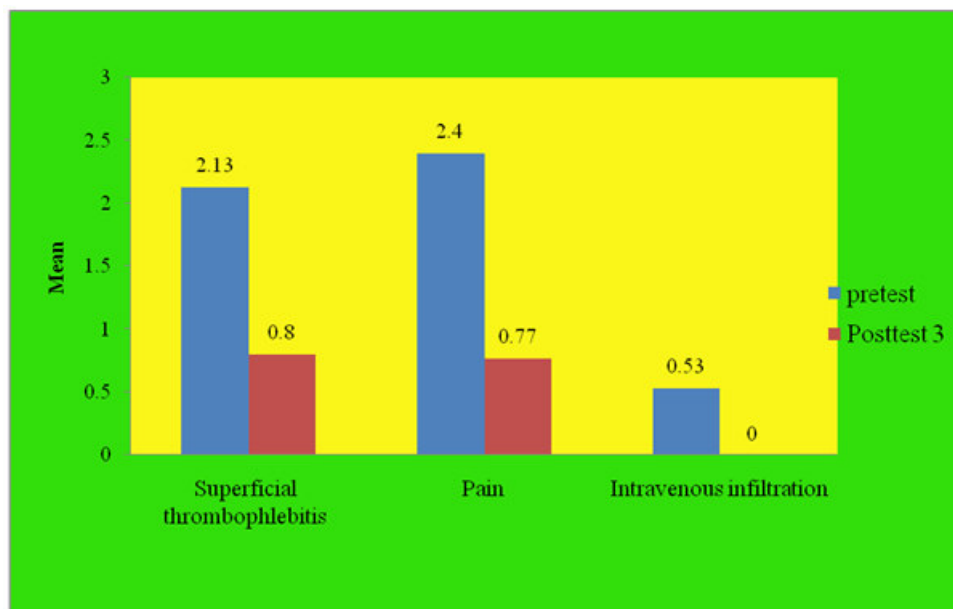
S. No	Observations	Superficial Thrombophlebitis				Pain				Intravenous Infiltration			
		Mean	SD	MD	Paired 't' value	Mean	SD	MD	Paired 't' value	Mean	SD	MD	Paired 't' value
1.	Pretest	2.13	0.94	0	NS	2.4	1.1	0.13	2.024 (NS)	0.53	0.51	0.33	3.8 (S) ***
	Posttest 1	2.13	0.94			2.27	0.98			0.2	0.41		
2.	Posttest 1	2.13	0.94	0.93	13.77 (S)***	2.27	0.98	1.07	11.27 (S) ***	0.2	0.41	0.1	1.7 (NS)
	Posttest 2	1.2	1.16			1.2	1.03			0.1	0.31		
3.	Posttest 2	1.2	1.16	0.4	3.5 (NS)	1.2	1.03	0.43	4.71 (S) ***	0.1	0.31	0.1	1.7 (NS)
	Posttest 3	0.8	0.8			0.77	0.86			0	0		
4.	Pretest	2.13	0.94	1.33	11.5 (S)***	2.4	1.1	1.63	13.07 (S) ***	0.53	0.51	0.53	5.7 (S)***
	Posttest 3	0.8	0.8			2.4	1.1			0.53	0.51		

\*\*\*-  $p < .001$

NS = Non Significant

The change in mean score in the management of superficial thrombophlebitis in pretest with posttest 1 and pretest with posttest 3 was 0 and 1.33 respectively and the paired 't' value was 13.77 found to be statistically significant at  $p < .001$ . The difference in mean score in the management pain in pretest with posttest 3 was 1.63

and calculated paired 't' value was 13.07 found to be statistically significant at  $p < .001$ . The mean difference in the management of Intravenous infiltration in pretest with posttest 3 was 0.53 and calculated paired 't' value was 5.7 found to be statistically significant at  $p < .001$ .



PIVC – Pheripheral intravenous complications

**Figure 2**  
**Comparison of mean scores in the management of PIVC among patients between pre and posttest on application of warm compress.**

The complication of PIVC includes superficial thrombophlebitis, pain and intravenous infusion.

**Superficial Thrombophlebitis**

The comparison scores in management of superficial thrombophlebitis among patients with peripheral intravenous infusion within the group 1 of pretest with posttest 3 presented the mean difference as  $2.13 \pm 0.94$ ;  $0.8 \pm 0.8$  and 1.33, respectively. The calculated paired 't' value was 11.5 which was statistically highly significant at  $p < 0.001$  (Table 3, Fig. 2). The findings substantiate that warm compress can be effectively used in the management of superficial thrombophlebitis among patients with peripheral intravenous infusion. This study result is consistent with the study conducted by Kaur<sup>13</sup>. The mean pretest grade of phlebitis in experimental & control group were  $2.02 \pm 0.61$  and  $1.32 \pm 0.47$  respectively. The mean posttest grade of phlebitis in

experimental & control group were  $0.95 \pm 0.59$  and  $1.5 \pm 0.71$  respectively. It was found that there was significant reduction in grade of phlebitis among patients on intravenous therapy in experimental group as compared to control group at  $p < 0.05$ .<sup>13</sup>

**Pain**

The comparison scores in the management of Pain among patients with peripheral intravenous infusion within the group 1 computed the pretest and posttest 3 mean difference were  $2.4 \pm 1.1$ ;  $0.77 \pm 0.86$  and 1.63 respectively. The calculated paired 't' value was 13.07 and found to be statistically highly significant at  $p < 0.001$  (Table 3, Fig. 2). The findings revealed that warm compress was effective in the management of pain among patients with peripheral intravenous infusion. This present study finding is consistent with the study conducted by Sriwahyuni<sup>14</sup>. The results revealed that 18

respondents (90%) experienced moderate pain and 2 respondents (10%) experienced severe pain before treatment. While after treatment (post-test), it was found out that 7 respondents (35%) experienced moderate pain, and 13 respondents experienced (35%) mild pain.<sup>14</sup> This finding of the present study is consistent with the study result conducted by Gauttam<sup>15</sup>. The above data showed that application of moist heat has significantly reduced the severity of pain as the computed chi square value between pre-test and post-test Om1d1 Vs Om2d2 (10.64 P< 0.05), Om1d1 Vs Om3d2 (19.07 P< 0.05), & Om1d1 Vs Om4d2 (33.62 P< 0.05), were found to be significant at 0.05 level of significance.<sup>15</sup>

### **Intravenous infiltration**

The comparison score in management of Intravenous infiltration among patients with peripheral intravenous infusion within the group 1, pretest and posttest 3 and mean difference was  $0.53 \pm 0.51$ ;  $0 \pm 0$  and  $0.53$  respectively. The calculated paired 't' value was 5.7 found to be statistically highly significant at  $p < 0.001$  (Table 3, Fig. 2). The findings illustrated that warm compress can be effectively used in the management of complication 3 (intravenous infiltration) among patients with peripheral intravenous infusion. The finding of this present study is consistent with the study result conducted by Anjum<sup>16</sup>, the results evident that the pre-treatment mean score of degree of infiltration was 7.16 reduced to 0.70 on the third day of treatment with hot fomentation which indicates warm compress effectively reduces the grade of infiltration.<sup>16</sup> The finding of the present study is also comparable with the study result conducted by Babu<sup>17</sup> which was significant at 0.05 level. The results strongly supported and revealed the significant decrease in the level of intravenous infiltration. The finding of the present study is also comparable with the study result conducted by Hastings MT. The study showed that a significant ( $p < .001$ ) difference in the volume of infiltrate remaining when warmth was applied.<sup>18</sup> The demographic variables sex

and education found to be statistically significant association in the management of superficial thrombophlebitis and intravenous infiltration at  $p < 0.05$ . Identification of superficial thrombophlebitis, pain and intravenous infiltration at the early stage can reduce the pain and stress for the patient. Since re-cannulation is expensive, painful to the patient and also increase the length of hospital stays. Nurse educator should orient about the visual infusion scale on IV infusion to the student nurse and should be taught to implement in practice. Nurse educator should help the student nurse to gain confidence in early identification of superficial thrombophlebitis and to treat the patients with simple measures. Nurse administrator should prepare a checklist for peripheral intravenous infusion to reduce intravenous related complication. Nurse administrator can arrange and implement IV infusion related short term course and to be mandate for every nurse to certify to work as staff nurse. Clinical research can be arranged to implement simple nursing intervention.

### **CONCLUSION**

Warm compress can effectively use to treat the PIVC such as superficial thrombophlebitis, pain and intravenous infiltration. Warm compress was cheapest, feasible to adopt, to save man, money and material. Nurses have a pivotal role in maintaining and rendering the quality patient care. Keeping in view "**Prevention is better than cure**" nurses should be prepared to assess and identify early complication of peripheral intravenous infusion. But in Indian scenario most of the hospitals patient nurse ratio is not appropriate. Considering the cost and time clinically, warm compress is easy to practice.

### **CONFLICT OF INTEREST**

Conflict of interest declared none.

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