



EFFECTIVENESS OF WARM COMPRESS VERSUS GLYCERIN MAGNESIUM SULFATE APPLICATION ON PERIPHERAL INTRAVENOUS INFUSION COMPLICATIONS.

Nursing

K. Packialakshmi* M.Sc., N, Nursing Tutor, Faculty of Nursing, Dr.MGR Educational and Research Institute, Chennai, India. *Corresponding Author

Dr. Vidhya Thirunavukkarasu M Sc (N), Ph.D, Assistant Professor, King Faisal University, KSA

ABSTRACT

Background: 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 PIV complications (PIVC). Nurses should be vigilant of the right interventions to expedite comfort for the patients on intravenous therapy and take measures to reduce the complications such as 1. Superficial thrombophlebitis, 2. Pain, 3. Intravenous infusion.

Objectives: compare the effect of warm compress versus glycerin magnesium sulfate on PIVC, and associate the PIVC scores with the selected demographic variables.

Methods: A quasi- experimental pretest and posttest with comparative group design was adopted in this study. 60 samples were selected with purposive sampling technique. Warm compress (group 1- 30 samples) and Glycerine magnesium sulfate (group 2- 30 samples) was applied twice a day for three days. Findings: The comparison of change in mean score between group 1 and group 2 inferred that the difference was comparatively high in group 2 than group 1.

Conclusion: This strongly exemplified that application of glycerin magnesium sulfate was comparatively more effective than application of warm compress to treat superficial thrombophlebitis, pain and intravenous infiltration.

KEYWORDS

Warm compress, Glycerin magnesium sulfate, PIVC, Superficial thrombophlebitis, pain, intravenous infusion

INTRODUCTION

Patients with minor or major ailments need to be treated and observed by the medical team which requires hospitalization. The administration of fluids via intravenous (IV) infusion is common and very safe. It is estimated that in U.K 20- 80% of patients with peripheral venous cannula develop phlebitis¹. According to Infusion Nurses Society recommend that the intravenous infusion site should be monitored for 48 hours and if any signs of infection, infiltration, pain or extravasation were identified at the early stage, it is better to remove and re-site the intravenous cannula. The patients are prone to get intravenous complications such as superficial thrombophlebitis, pain over the IV site, infiltration and extravasation etc². 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 inflammation³. Mostafa A Abolfotouh, et al conducted a prospective study on incidence and predictors of peripheral intravenous catheter-induced complications. The finding revealed that the onset time of PIVC complications is 30.7 hours to 52.64 hours. If, vigilance over the intravenous infusion sites it may lengthen the hospital stay, increase cost of treatment, pain when the cannula re-sites⁴. Anabela Salgueiro Oliveira et al had conducted study on incidence of phlebitis in patients with peripheral intravenous catheters was 11.09. The finding of the study showed that the risk factors are related to the use of prescribed medication and the catheterized limb⁵. The phlebitis is rarely infectious and usually resolves quickly after catheter removal. Elevate the extremity to promote reabsorption of fluid into vasculature. Apply warm compress, moist heat and administer topical, oral NSAID's to relieve pain and inflammation⁶.

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 either peripheral or central at some point during their admission for medication, fluids, nutrition etc. The risk of complication dwells in the aspects such as choice of cannula, selection of vein, obtaining venous access, duration of peripheral cannula use etc⁷. Thrombophlebitis is the most common complication associated with peripheral intravenous catheters (PIVCs) and accounts for considerable iatrogenic morbidity⁸. The reported incidence of phlebitis ranges from ten percent (10%) to ninety percent (90%) of peripheral intravenous catheterization⁹. Hence the investigator realized the burden of the condition and aimed to evaluate the effectiveness of glycerine magnesium sulfate on peripheral intravenous complications.

OBJECTIVES

- Compare the effect of warm compress versus glycerin magnesium sulfate on peripheral intravenous infusion complications.
- Associate the peripheral intravenous infusion complication scores with the selected demographic variables.

HYPOTHESES

- **H1:** There will be significant difference between warm compress versus glycerin magnesium sulfate application on superficial thrombophlebitis
- **H2:** There will be significant difference between warm compress versus glycerin magnesium sulfate application on pain
- **H3:** There will be significant difference between Warm Compress and Glycerin Magnesium Sulfate application on intravenous infiltration.

MATERIALS AND METHODS

A Quantitative research approach of quasi experimental pretest and posttest with comparative group 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), the investigator conducted the study. 60 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 to 5). A formal informed consent was obtained from the study participants. The investigator collected the data of PIVC by using standardized tool such as Jackson's Visual Infusion Phlebitis scale (superficial thrombophlebitis), visual analog scale (pain), Infiltration scale (intravenous infiltration).

Pretest (O1) was conducted. The warm compress was given to group 1 for 10 minutes twice a day for three days, where the gauze was soaked in 39.5°C warm water; when the gauze was dry it was dipped again in warm water and reapplied over the infiltrated site in order to maintain the warmth, moisture and temperature. Group 2 received glycerin magnesium sulfate application for 10 minutes twice a day for three days. This application was prepared by the investigator by mixing 20 gram of magnesium sulfate in 100 ml of glycerin. Posttest scores were documented as 1, 2 and 3 after the second, fourth and sixth application respectively by using selected tools.

FINDINGS**Table 1: Distribution of PIVC1- Superficial Thrombophlebitis in pre and posttest of group 1 & 2 (N= 60)**

Sl. No	Complication 1 (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	Warm compress (Group 1, N=30)										
	Pretest	0	0	8	26.7	13	43.7	6	20	3	10
	Posttest 1	0	0	8	26.7	13	43.7	6	20	3	10
	Posttest 2	9	30	12	40	5	16.7	2	6.7	2	6.7
	Posttest 3	12	40	13	43.3	4	13.3	1	3.3	0	0
2	Glycerin Magnesium Sulfate (Group 2, N=30)										
	Pretest	0	0	5	16.7	11	36.7	11	36.7	3	10
	Posttest 1	2	6.7	10	33.3	12	40	6	20	0	0
	Posttest 2	10	33.3	15	50	5	16.7	0	0	0	0
	Posttest 3	27	90	3	10	0	0	0	0	0	0

Table 2: Distribution of PIVC 2- Pain in pre and posttest of group 1 & 2 (N= 60)

Sl. No	Complication 2 (Pain)	No Pain (0 Score)		Mild Pain (1-2)		Moderate Pain (3-6)		Severe pain (7-10)	
		N	%	n	%	n	%	n	%
1.	Warm Compress (Group 1, N=30)								
	Pretest	0	0	18	60	12	40	0	0
	Posttest 1	0	0	20	66.7	10	33.3	0	0
	Posttest 2	9	30	19	63.3	2	6.7	0	0
	Posttest 3	14	46.7	15	50	1	3.3	0	0
2.	Glycerin Magnesium Sulfate (Group 2, N=30)								
	Pretest	0	0	6	20	24	80	0	0
	Posttest 1	0	0	11	36.7	19	63.3	0	0
	Posttest 2	5	16.7	24	80	0	0	0	0
	Posttest 3	24	80	6	20	0	0	0	0

Table 3: Distribution of PIVC3 – Intravenous infiltration in pre and posttest of group 1 & 2 (N= 60)

Sl. No	Complication 3 (Intravenous infiltration)	No Infiltration (0 Score)		Mild Infiltration (1-2)		Moderate Infiltration (3-6)		Severe Infiltration (7-10)	
		N	%	n	%	n	%	N	%
1.	Warm Compress (Group 1, N=30)								
	Pretest	14	46.7	16	53.3	0	0	0	0
	Posttest 1	24	80	6	20	0	0	0	0
	Posttest 2	27	90	3	10	0	0	0	0
	Posttest 3	30	100	0	0	0	0	0	0
2.	Glycerin Magnesium Sulfate (Group 2, N=30)								
	Pretest	8	26.7	20	66.7	2	6.7	0	0
	Posttest 1	18	60	12	40	0	0	0	0
	Posttest 2	30	100	0	0	0	0	0	0
	Posttest 3	30	100	0	0	0	0	0	0

Table 4: Effectiveness of Warm compress and glycerin magnesium sulfate in the management of complications 1 (superficial thrombophlebitis) N= 60

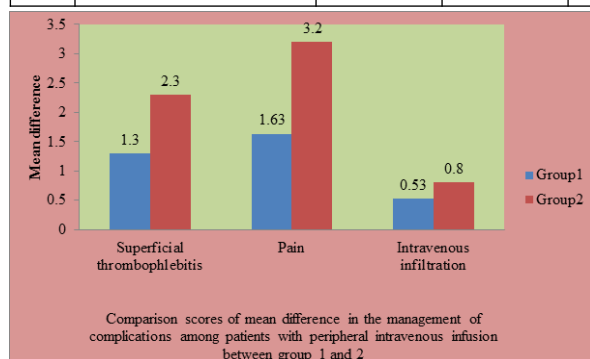
Sl. No	Complication 1 (Superficial thrombophlebitis)	Warm compress (Group 1) n=30			Glycerin magnesium sulfate(Group 2) n=30			'T' value and significance
		Mean	SD	MD	Mean	SD	MD	
1.	Pretest	2.13	0.94	0	2.4	0.89	0.67	5.34 (S)*
	Posttest 1	2.13	0.94		1.73	0.87		
2.	Posttest 1	2.13	0.94	0.93	1.73	0.87	0.9	0.23 (NS)
	Posttest 2	1.2	1.16		0.83	0.7		
3.	Posttest 2	1.2	1.16	0.4	0.83	0.7	0.73	1.7 (NS)
	Posttest 3	0.8	0.8		0.1	0.31		
4.	Pretest	2.13	0.94	1.33	2.4	0.89	2.3	4.76 (S)*
	Posttest 3	0.8	0.8		0.1	0.31		

Table 5: Effectiveness of Warm compress and glycerin magnesium sulfate in the management of complications 2 (Pain) N= 60

Sl. No	Complication 2 (Pain)	Warm compress (Group 1) n=30			Glycerin magnesium sulfate(Group 2) n=30			'T' value and significance
		Mean	SD	MD	Mean	SD	MD	
1.	Pretest	2.4	1.1	0.13	3.4	1.08	1.2	5.36 (S)*
	Posttest 1	2.27	0.98		2.2	0.71		
2.	Posttest 1	2.27	0.98	1.07	2.2	0.71	1.13	0.34 (NS)
	Posttest 2	1.2	1.03		1.1	0.69		
3.	Posttest 2	1.2	1.03	0.43	1.1	0.69	0.9	2.3 (S)*
	Posttest 3	0.77	0.86		0.2	0.41		
4.	Pretest	2.4	1.1	1.63	3.4	1.08	3.2	6.29 (S)*
	Posttest 3	0.77	0.86		0.2	0.41		

Table 6: Effectiveness of Warm compress and glycerin magnesium sulfate in the management of complications 3 (Intravenous infiltration) N= 60

Sl. No	Complication 3 (Intravenous infiltration)	Warm compress (Group 1) n=30			Glycerin magnesium sulfate(Group 2) n=30			'T' value and significance
		Mean	SD	MD	Mean	SD	MD	
1.	Pretest	0.53	0.51	0.33	0.8	0.55	0.4	0.39 (NS)
	Posttest 1	0.2	0.41		0.4	0.49		
2.	Posttest 1	0.2	0.41	0.1	0.4	0.49	0.4	1.95 (NS)
	Posttest 2	0.1	0.31		0	0		
3.	Posttest 2	0.1	0.31	0.1	0	0	0	0.017 (NS)
	Posttest 3	0	0		0	0		
4.	Pretest	0.53	0.51	0.53	0.8	0.55	0.8	1.24 (NS)
	Posttest 3	0	0		0	0		

**Fig. 1 Comparison scores of mean difference in the management of complications among patients with peripheral intravenous infusion between group 1 and 2**

The demographic variable sex and education found to be statistically significant association in the management of complication 1 (superficial thrombophlebitis) and complication 3 (Intravenous infiltration) at $p < .05$ in group 1.

DISCUSSION:

The management of complication 1 (superficial thrombophlebitis) among patients with peripheral intravenous infusion between the group 1 and group 2 of pretest with posttest 3 the change in mean score were 1.33 and 2.3. The calculated 'T' value was 4.76 found to be statistically significant at $p < 0.05$. The comparison scores of paired 't' value in between pretest and posttest 3 was 11.5 and 14.99 respectively in group 1 and 2. These findings prove that the glycerin magnesium sulfate was effective than warm compress in management of complication 1 (superficial thrombophlebitis) among patients with peripheral intravenous infusion. **Ravindra HN, (2015), Yambem M, et al. (2013)** Study results prove that there was statistically highly significant difference at $p < .001^{10,11}$. Hence **H₁** was **accepted**.

In the management of complication 2 (Pain) among patient with peripheral intravenous infusion mean difference score of pretest with posttest 3 between the group 1 and group 2 were 1.63 and 3.2 respectively. The calculated 'T' value was 6.29 found to be statistically significant at $p < 0.05$. The comparison scores of paired 't' value in between pretest and posttest 3 was 13.07 and 15.9 respectively in group 1 and 2. These findings evidenced that the glycerin magnesium sulfate was effective than warm compress in management of complication 2 (Pain) among patients with peripheral intravenous infusion.

This study finding is similar to the result of the study conducted by **Anil Sharma (2016)** proved that the calculated mean score were 16.62, 15.06 and 15.04 respectively. The mean score of magnesium sulfate application was more effective than heparinoid application and cold application¹². Hence **H₂** was **accepted**.

The management of complication 3 (Intravenous infiltration) among patients with peripheral intravenous infusion between the group 1 and group 2 of pretest with posttest 3 mean difference scores were 0.53 and 0.8 respectively. The calculated 'T' value was 1.24 found to be statistically not significant. The comparison scores of paired 't' value in between pretest and posttest 3 was 5.7 and 7.96 respectively in group 1 and 2. Hence **H₃** was **rejected**.

Though the intravenous infiltration score showed no statistically

significant difference, the comparison of difference in mean scores between group 1 and group 2 elicited that the difference in mean score was high in group 2 than group 1. This illustrated that the application of glycerin magnesium sulfate was effective in reducing the level of intravenous infiltration than the warm compress comparatively. **Shinde Mahadeo B, et al., (2015)**, that findings indicate that the magnesium sulfate fomentation is slightly better than the cold compress in reducing of intravenous therapy related infiltrations¹³.

The demographic variable sex and education found to be statistically significant association in the management of complication 1 (superficial thrombophlebitis) and complication 3 (Intravenous infiltration) at $p < .05$ in group 1.

CONCLUSION

The comparison of change in mean score between group 1 and group 2 inferred that the difference was comparatively high in group 2 than group 1. This strongly exemplified that application of glycerin magnesium sulfate was comparatively more effective than application of warm compress to treat complications of peripheral intravenous infusion such as superficial thrombophlebitis, pain and intravenous infiltration.

The above findings strongly exemplified that application of glycerin magnesium sulfate was comparatively more effective than application of warm compress to treat superficial thrombophlebitis, pain and intravenous infiltration. Considering the cost and time clinically warm compress is cheapest, easy to implement and without any side effects and readily available than glycerin magnesium sulfate. The signs and symptoms of superficial thrombophlebitis, intravenous infiltration will be differ in individual, and also differ in perception of pain among the individual. Nurses should be vigilant enough to treat the patient appropriately based on the signs and symptoms of complications of peripheral intravenous infusion. The entire above if the nurse is competent enough to apply evidence based practice to improve the quality of care.

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, whereas glycerin magnesium sulfate preparation were not available as ready made.

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