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Original Research Article

A study to assess the effect of hot fomentation on thrombophlebitis among patients undergoing intravenous therapy admitted in the selected hospitals of Guwahati, Assam

Julismita Deka[1],*, Anurupa Dutta[1]

[1] *Dept. of Nursing, Army Institute of Nursing, Guwahati, Assam, India*

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ABSTRACT

Introduction: Thrombophlebitis is contemplated as an adverse event resulting from iv therapy. Thrombophlebitis can occur due to mechanical, chemical and infective causes which lead to pain, inflammation, infiltration, injuring a nerve as well as extravasation, ecchymosis, hematoma, thrombosis and embolism are also common.

Objective: To assess the effect of hot fomentation on thrombophlebitis among patients undergoing intravenous therapy.

Materials and Methods: For this study quantitative research approach was adapted and using true experimental pre-test - post-test control group design the study was conducted. Total sample 60 (30 for experimental and 30 samples for control group) were selected by simple random sampling technique was used and among patients with thrombophlebitis getting IV therapy in Medical Ward at GMCH, Assam. Modified visual infusion phlebitis scale was used to assess pre-test level of thrombophlebitis and post-test level of thrombophlebitis. Intervention was given over the site of thrombophlebitis and evaluated on the 4^{th} day.

Result: Findings showed that in experimental group mean pre-test thrombophlebitis score was 11.07±3.062 and in post-test mean thrombophlebitis score was 6.47±1.871 with mean difference was 4.60. In control group mean post-test thrombophlebitis score was 10.70±2.693 and in experimental group mean post-test thrombophlebitis score was 6.47±1.871 with mean difference was 4.23. The comparison was tested using unpaired t test with obtained (t=7.072) was statistically significant at p<0.05 level. Result revealed that hot fomentation was effective on level of thrombophlebitis among patients received intravenous therapy in experimental group as compared to control group.

Conclusion: Hot fomentation is effective to reduce thrombophlebitis caused due to intravenous therapy.

1. Introduction

The very first requirement in a hospital is that it should do the sick no harm. Florence Nightingale.

Infusion therapy is used in all health care setting across the spectrum of care to all age groups and patient population. Infusion therapy is the administration of medications or fluids intravenously, is delivered in all health care areas. [1]

Thrombophlebitis is the presence of a clot and inflammation in the vein due to an assault to the veins. Treatments are discontinuing the IV infusion; applying a cold compress first, to decrease the flow of blood and increase platelet aggregation, followed by a warm compress; elevating the extremity; and restarting the line in the opposite extremity. [2]

* *Corresponding author*.
E-mail address: julismita257@gmail.com (J. Deka).

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2. Background of The Study

According to Australian Journal of Advanced Nursing (2015), incidence of thrombophlebitis was 41.09% globally. Thrombophlebitis is an adverse event resulting because of iv therapy. Thrombophlebitis can be due to mechanical, chemical and infective causes which lead to pain, inflammation, infiltration, injuring a nerve as well as extravasation, ecchymosis, hematoma, thrombosis and embolism are also common.[3]

Mandal A, Raghu K conducted a study in West Bengal, India in 2019, the incidence was found to be 31.4%. The increased incidence rate of phlebitis was seen in the female gender, age less than 60 years, insertion in the lower limb, larger catheter size, catheter inserted in emergency situations, and IV drugs administration. At Rewa (M.P), India also they conducted one clinical study in surgical ward of S.S. Medical College and associated S.G.M. hospital where as a result they found the incidence of thrombophlebitis is highest (100%) in saphenous vein, minimum (17%) in Basilic vein (upper limb).[4]

Sterile wet hot compress improves circulation in open wounds, helps to solve the edema, provides drainage and prevents the spread of infections. The temperature of the water in the hot compress applications varies according to the purpose, and it is sufficient to be 40.5 - 43 °C (105-110^{o} F). During the applications heat disperses quickly. Compresses should be changed frequently for the purpose of keeping the temperature at the same level.[5–7]

Many studies show that interventions for thrombophlebitis like ice pack application, comparison of hot and cold compress, glycerin magnesium gel application etc. can be applied to reduce the symptoms of thrombophlebitis. As many hospitalized patients are experiencing thrombophlebitis due to various treatment by intravenous therapy therefore the investigator is interest to apply hot fomentation as a measure to see its effect on thrombophlebitis at Guwahati Medical College and Hospital Assam.

2.1. Problem statement of the study

A study to assess the effect of hot fomentation on thrombophlebitis among patients undergoing intravenous therapy admitted in the selected hospitals of Guwahati, Assam.

2.2. Objectives of the study

1. To evaluate the effectiveness of hot fomentation on level of thrombophlebitis among patients of experimental group received intravenous therapy.
2. To compare post-test level of thrombophlebitis among patients of control group and experimental group received intravenous therapy.

3. Review of Literature

In the present study the review literature has been presented related to

1. Studies related to infusion thrombophlebitis.
2. Studies related to uses of visual infusion phlebitis scale to determine the level of thrombophlebitis.
3. Studies related to assessment of the effectiveness of hot application.

3.1. Studies related to thrombophlebitis

Devadas V, Rahaman H. (2018) conducted a study on prevention of superficial thrombophlebitis in patients coming for surgery; comparison of topical quick penetrating solution (QPS) of heparin versus heparin gel. The patients were divided into two groups using closed envelope method. Group H1 included 70 patients who receives topical heparin as QPS solution and group H2 included 70 patients who receives topical heparin gel. The patients were studied for the result on the basis of phlebitis scale at the intervals of 0 hours, 12 hours, 24 hours, 48 hours, 72 hours. As a result, they found the mean age was calculated as 33.94. there was significantly lesser score in group H1(receiving QPS topical heparin) in all time periods with p value of <0.001 and concluded that prophylaxis with topical QPS heparin is more effective than thrombophobe gel in preventing thrombophlebitis.[8]

Dwivedi R, Singh A K, Ghaharwar A. P. S. (2018) conducted a clinical study on thrombophlebitis at infusion sites in surgical ward. This prospective observational study was conducted on 300 patients admitted in surgical ward of S.S Medical College and associated S.G.M. hospital, Rewa (M.P.). Randomly patients were selected and visited daily for any sign and symptoms at infusion site. The incidence of thrombophlebitis according to common infusion sites, in relations to type of fluid and drugs used and in relation to diseased condition and type of surgical patients were recorded. Sociodemographic Performa and observational check list were used. In total 300 patients the incidence of thrombophlebitis is highest (100%) in Saphenous vein (Lower Limb) minimum (17%) in Basilic vein (Upper Limb). Incidence of thrombophlebitis is higher in earlier days (within 2 days) of infusion with Dextrose containing fluid (D5%+ D10%) and higher in critically ill and emergency operated patients. According to the researcher thrombophlebitis is still an important ongoing problem among admitted patients in surgical ward. Incidence is highest in saphenous vein, with dextrose containing fluid and in critically ill & emergency operated patients. It has definite relationship with site of infusion site, type of fluid, illness of patients and nature of operation.[9]

3.2. Studies related to uses of visual infusion phlebitis scale

Soloman V, Rajappa T, Malviya S D. (2015) Comparision of heparinoid and Ichthammol glycerine application on patients with thrombophlebitis. The study was conducted in Christian Medical College and Hospital, Ludhiana, Punjab and the adapted non-experimental comparative research design. Sample size was 60 (30 with Heparinoid and 30 for Ichthammol Glycerine application) and data was collected by using modified visual infusion phlebitis scale and numerical pain intensity assessment scale. In this study the researchers found that Heparinoid group mean phlebitis score before application was 10.14 and after 48 hours it decreased to 2.37 but on the other hand in Ichthammol glycerine application group mean phlebitis score was 10.51 which decreased to 1.50 after 48 hours of application. Before application, after 24 hours and after 48 hours of application "t" value between Heparinoid and Ichthammol application group was 0.71, 0.63 and 1.68 respectively, which were not significant at $p<0.05$ level of significance. Conclusion of the study was both the application were effective in reducing IV induced phlebitis.[10]

Tzolos E, Salawu A. (2014) conducted a study improving the frequency of visual infusion phlebitis (VIP) scoring on an oncology ward. Three plan-do-study-act cycles were carried out during which two major interventions were introduced. The first cycle introduced junior doctors' awareness of VIP scoring using presentations in introduction meetings and posters. The second cycle ensured that ready access to the VIP tool was provided in the form of bedside intentional rounding charts. Proportions of intravenous cannula with proper documentation and VIP assessment were measured before intervention and at nine subsequent bi-weekly time points. Pre-intervention, under 30% of cannulas were properly documented and assessed. This proportion rose to around 80% by the end of the second PDSA cycle and achieved 100% by the end of the third cycle.[11]

3.3. Related to effectiveness of warm application

Jasvir Kaur, Poonam Sheoran, Simarjeet Kaur and Jyoti Sarin (2020) conducted a study on effectiveness of warm compression on lumbo-sacral region in terms of labour pain intensity and labour outcomes among nulliparous. An experimental study was conducted on nulliparous mothers. Warm compression had given to nulliparous mothers of the experimental group with hydrocollator pack at 70^{o} C for 20 minutes for three times with one hour interval on lumbosacral region starting from 4 to 5 cm of cervical dilatation and labour pain, fatal heart rate, frequency and duration of uterine contractions were assessed before and immediately of warm compression and again after 30 minutes only labour pain was assessed. the results they found was that immediately after the warm compress labour pain intensity score in experimental group was lower than the control group respectively ($t= 3.20$; $P< 0.001$; $t= 4.45$; $P< 0.001$; $t= 6.18$; $P<0.001$). The study concluded that warm compress was useful method to decrease the labour pain among nulliparous mothers.[12]

Korkut S, Karadag S, Dogan Z. (2020) conducted a study on effectiveness of local hot and cold applications on peripheral intravenous catheterization with randomized controlled design where 90 patients were being taken as samples and all the data were collected using a patient information form, the numeric rating scale, and vein assessment scale for the assessment of pain and anxiety and they applied the hot and cold compress in the intervention group for 1 minute before PVC insertion. The results were found to be as pain level got significantly lower in the hot and cold application groups than the control group. no difference was determined between the hot and cold application groups, the anxiety levels of the patients were significantly lower in the hot application group than the cold application groups. and the study concluded as applying hot and cold compression therapy both reduce the pain and anxiety of the patients.[13]

Annisa F, Nurhaeni N, wanda D. (2017) conducted a study on warm water compress as an alternative for decreasing the degree of phlebitis and quasi experimental pretest posttest design was used with a non-equivalent control group. The total sample size was 32 patients with degrees of phlebitis ranging from 1 to 4. The total sample was divided into 2 interventional groups: those patients that were given 0.9% NaCl compresses and those given warm water compresses. The results showed that both compresses were effective in reducing the degree of phlebitis with similar p values ($p =.000$).[14]

Bansal P, Babu JM, Khan F, Hussain M. (2016) conducted a quasi-experimental study to assess the effectiveness of hot fomentation versus cold compress in reducing infiltration among patients undergoing IV infusion in Delhi, the conceptual model of the study was based on P.I.C.O. model. A clinical observation sheet: record analysis and a recording sheet were prepared and a quantitative research approach was used. The result they found was that the patients getting cold compress or hot compress experienced early reduction. Both the interventions were equally effective and no significant difference between the hot fomentation and cold compress application in reducing the pain.[15]

3.4. Research methodology

Quantitative research approach was adapted in this study by the researcher to see the effectiveness of the hot fomentation on thrombophlebitis in the presence of randomization, control over variables and manipulation. The researcher adapted true experimental pre-test post-test control group

design. This study was carried out in the Medicine Ward of Guwahati Medical College and Hospital, Assam. In this study population is the patients admitted in the medicine ward of Guwahati Medical College and Hospital, Assam. Samples were patients admitted in the medical ward with IV therapy having infusion site thrombophlebitis or sign and symptoms of thrombophlebitis in the upper extremities. In this study sample size is 60 (30 for experimental group and 30 for control group). The sample size was determined after extensive literature review. In this study the samples are getting selected by simple random sampling technique. The visual infusion phlebitis scale was established by Andrew Jackson in 1998. Modified Visual Infusion Phlebitis scale is the modified version of this original scale by Andrew Jackson who was an infusion nurse and in this study it is adapted after extensive review literature. The present study consists of independent variable is hot fomentation dependent variable thrombophlebitis. demographic variables and clinical variables age, gender, ambulation, habit, iv cannulation site, iv cannula size, type of drug administered, type of iv fluid administration, frequency of iv medication, history of chronic disease.

3.5. *Statistical analysis and interpretation*

3.5.1. *Section I*

Frequency and percentage distribution of pre-test and post-test level of thrombophlebitis among patients received intravenous therapy in experimental and control group. (N=60)

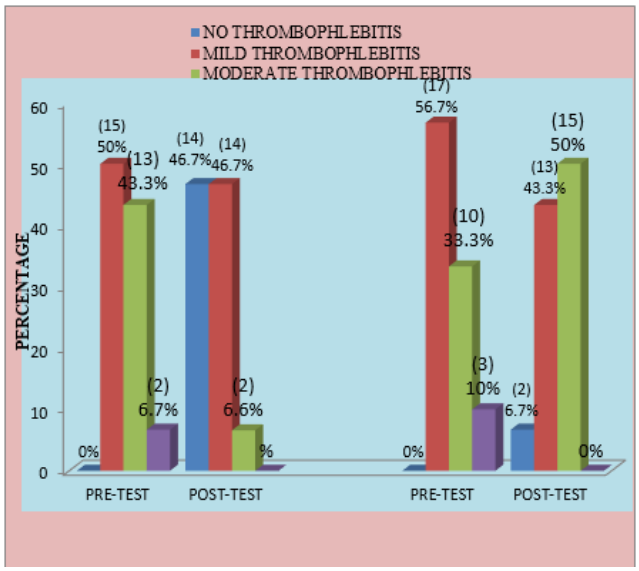

Fig. 1: Frequency and percentage distribution of pre-test and post-test level of thrombophlebitis among patients received intravenous therapy in experimental and control group.

nd Fig 1 depicts the frequency and percentage distribution of pre-test and post-test level of level of thrombophlebitis among patients received intravenous therapy in experimental and control group. Results revealed that in experimental group during pre-test majority 15(50%) of participants had mild thrombophlebitis, 13(43.3%) had moderate thrombophlebitis and 2(6.7%) had severe thrombophlebitis where as in post-test majority 14(46.7%) had no thrombophlebitis, 14(46.7%) had mild thrombophlebitis and only 2(6.6%) had moderate thrombophlebitis.

In control group during pre-test majority 17(56.7%) of participants had mild thrombophlebitis, 10(33.3%) had moderate thrombophlebitis and 3(10%) had severe thrombophlebitis where as in post-test majority 15(50%) had moderate thrombophlebitis, 13(43.3%) had mild thrombophlebitis and only 2(6.7%) had no thrombophlebitis.

3.5.2. *Section II*

Distribution of mean score and SD of pre-test and post-test level of thrombophlebitis among patients of experimental group received intravenous therapy.

**p<0.01 level of significance

epicts the effectiveness of hot fomentation on level of thrombophlebitis among patients of experimental group received intravenous therapy. Findings showed that in experimental group mean pre-test thrombophlebitis score was 11.07±3.062 and in post-test mean thrombophlebitis score was 6.47±1.871 with mean difference was 4.60. The effectiveness was tested using paired t test with obtained t value is 13.35 was statistically significant at p<0.05 level. Result revealed that hot fomentation was effective on level of thrombophlebitis among patients received intravenous therapy in experimental group.

Findings concluded that there was significant difference between pre-test and post test score of thrombophlebitis in experimental group. Hence the hypothesis H1 is accepted.

3.6. *Section III:*

Distribution of mean score and SD of post-test level of thrombophlebitis among patients of control group and experimental group received intravenous therapy.

Table 3 and Figure 2 depicts the comparison of post-test level of thrombophlebitis among patients of control group and experimental group received intravenous therapy. Findings showed that in control group mean post-test thrombophlebitis score was 10.70±2.693 and in experimental group mean post-test thrombophlebitis score was 6.47±1.871 with mean difference was 4.23. The comparison was tested using unpaired t test with obtained (t=7.072) was statistically significant at p<0.05 level. Result revealed that hot fomentation was effective on level of thrombophlebitis among patients received intravenous therapy in experimental group as compared to control group

Table 1: Frequency and percentage distribution of pre-test and post-test level of thrombophlebitis among patients received intravenous therapy in experimental and control group. N=60 (30+30)

Level of Thrombophlebitis	Experimental group				Control group			
	Pre-test		Post-test		Pre-test		Post-test	
	f	%	F	%	f	%	f	%
No Thrombophlebitis	0	0	14	46.7	0	0	2	6.7
Mild Thrombophlebitis	15	50	14	46.7	17	56.7	13	43.3
Moderate Thrombophlebitis	13	43.3	2	6.6	10	33.3	15	50
Severe Thrombophlebitis	2	6.7	0	0	3	10	0	0

Table 2: Distribution of mean score and SD of pre-test and post-test level of thrombophlebitis among patients of experimental group received intravenous therapy. N=30

Experimental Group	Mean	SD	Mean Difference	t test value	Df	p value
Pre-Test	11.07	3.062	4.60	13.35	29	0.001**
Post-test	6.47	1.871				

Table 3: Distribution of mean score and SD of post-test level ofthrombophlebitis among patients of control group and experimental group received intravenous therapy. N=60

Comparison Post-test	Mean	SD	Mean Difference	t test value	df	p value
Control Group	10.70	2.693	4.23	7.072	58	0.001**
Experimental Group	6.47	1.871				

**p<0.01 level of significance N=60 (30+30)

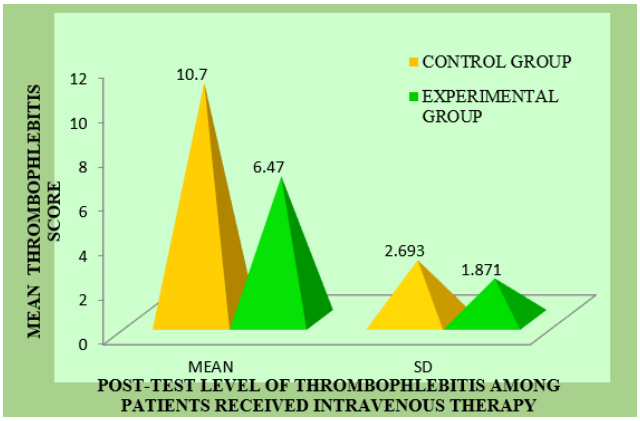

Fig. 2: Distribution of mean score and SD of post-test level of thrombophlebitis among patients of control group and experimental group received intravenous therapy.

Findings concluded that there was significant difference between the mean of effect of post-test for control group and experimental group. Hence the hypothesis H2 is accepted.

4. Discussion

4.1. Major findings of the study

1. Results revealed that in experimental group during pre-test majority 15(50%) of participants had mild thrombophlebitis, where as in post-test majority 14(46.7%) had no thrombophlebitis.
2. In control group during pre-test majority 17(56.7%) of participants had mild thrombophlebitis, post-test majority 15(50%) had moderate thrombophlebitis.
3. Result revealed that hot fomentation was effective on level of thrombophlebitis among patients received intravenous therapy in experimental group.

Findings showed that in control group mean post-test thrombophlebitis score was 10.70±2.693 and in experimental group mean post-test thrombophlebitis score was 6.47±1.871 with mean difference was 4.23. The comparison was tested using unpaired t test with obtained (t=7.072) was statistically significant at p<0.05 level. Result revealed that hot fomentation was effective on level of thrombophlebitis among patients received intravenous therapy in experimental group as compared to control group.

4.2. Objective 1.

To evaluate the effectiveness of hot fomentation on level of thrombophlebitis among patients of experimental group received intravenous therapy.

This study findings showed that in experimental group mean pre-test thrombophlebitis score was 11.07±3.062 and in post-test mean thrombophlebitis score was 6.47±1.871 with mean difference was 4.60. The effectiveness was tested using paired t test with obtained t value is 13.35 was statistically significant at p<0.05 level. Result

revealed that hot fomentation was effective on level of thrombophlebitis among patients received intravenous therapy in experimental group.

A similar study was conducted by Annisa et al. (2017) on warm compress as an alternative for decreasing the degree of phlebitis. There were two interventional group where one group has been given warm water compress and another group were given 0.9% NaCl compress. The results showed that both compresses were effective in reducing the degree of phlebitis, with similar p values (p = .000). There was no difference in average reduction score between the two groups (p = .18). Therefore, a warm water compress is valuable in treatment of phlebitis and could decrease the degree of phlebitis.

4.3. Objective 2.

To compare post-test level of thrombophlebitis among patients of control group and experimental group received intravenous therapy.

Present study findings showed that in control group mean post-test thrombophlebitis score was 10.70±2.693 and in experimental group mean post-test thrombophlebitis score was 6.47±1.871 with mean difference was 4.23. The comparison was tested using unpaired t test with obtained (t=7.072) was statistically significant at p<0.05 level. Result revealed that hot fomentation was effective on level of thrombophlebitis among patients received intravenous therapy in experimental group as compared to control group.

Similar study conducted by Sivakami, S (2015) on effectiveness of hot fomentation on reduction of sign and symptoms of thrombophlebitis showed that the post Statistical findings revealed that the post test mean score of thrombophlebitis in experimental group was 5.80 with S.D 0.85 whereas in the control group was 9.37 with S.D 1.52. The mean difference was 3.57 and the calculated unpaired 't' value of t = 11.229 was found statistically significant at p<0.001 level. This use of hot fomentation is effective in reduction of thrombophlebitis among patient received intravenous therapy.

5. Conclusion

The purpose of the study was to assess the effect of hot fomentation on thrombophlebitis among patients undergoing intravenous therapy admitted in the medical and surgical units of Guwahati Medical College and Hospital, Assam.

The level of thrombophlebitis before hot fomentation both in the control group and in experimental group. Then after hot fomentation the mean score and standard deviation was calculated and with the help of paired T-test the results showed that the hot fomentation has reduced the level of thrombophlebitis in the experimental group after hot fomentation. After post test in experimental group level of thrombophlebitis was reduced in comparison with control group level of thrombophlebitis after post test.

Findings concluded that the hot fomentation application on thrombophlebitis due to intravenous therapy is effective and can be implemented as non-pharmacological treatment.

6. Source of Funding

None.

7. Conflict of Interest

None.

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Author biography

Julismita Deka, Nursing Faculty

Anurupa Dutta, Assistant Professor

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