



Prevalence of Phlebitis and Comparison of the Effectiveness of Topical Ichthammol Glycerin and Heparinoid Application on Phlebitis among Patients on Peripheral Intravenous Therapy

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ABSTRACT

Aim: The aim of this study was to determine the prevalence of phlebitis and compare the effectiveness of topical ichthammol glycerin and heparinoid application on phlebitis among patients receiving intravenous therapy.

Background: The incidence of thrombophlebitis varies and various treatment modalities are available for treating phlebitis.

Design: Quasi experimental design.

Method: The study was conducted in the general medical, surgical and orthopaedic wards among 90 patients. Cluster randomization technique was used to allocate the wards to each interventional group. Consecutive sampling technique was used to select the subjects from each ward.

Subjects were observed for 48 hours with an interval of 12 hours. Visual infusion phlebitis scale and numeric pain intensity scale were used to collect data.

Results: The prevalence of phlebitis was 26.07% for the time period of six weeks from June 25, 2012 to August 5, 2012. Result showed that ichthammol glycerin was more effective than heparinoid application based on the observation at 12 hours and 24 hours after the introduction of the intervention ($p=.001$). Both interventions were found to be equally effective at 48 hours of the observation.

Conclusion: This study demonstrated evidence on the more effective intervention (ichthammol glycerin) for the management of phlebitis.

Trial registration: The study was registered in Clinical Trials Registry of India (CTRI/2012/05/002629).

Keywords: phlebitis, incidence, risk factors, management, ichthammol glycerin, heparinoid application.

INTRODUCTION

Peripheral intravenous catheter (PIC) is one of the most commonly used devices for the infusion of medications, fluids and blood products¹. Insertion and use of this device predisposes the patient to various local and systemic complications that can have impact on the clinical status and outcome of the patient².

Phlebitis is one of the most common complications of the PIC and is defined as inflammation of a vein related to a mechanical or chemical irritation, or both². Tagalakis and Blostein in 2002 reported an average thrombophlebitis incidence of 30% based on studies published between 1966 and 2001³.

Various treatment modalities are available for phlebitis, that include discontinuing intravenous catheter and restarting it in another site, applying a warm moist compress to the affected site², administration of analgesics and local application of heparinoid ointment. In some hospitals ichthammol glycerin and magnesium sulphate local application are also used to reduce the pain and inflammation resulting from phlebitis. Even though phlebitis occurs frequently, it is considered as a preventable complication associated with IV therapy. Early detection and appropriate interventions reduces the occurrence and severity of cannula related phlebitis⁴.

This study aims at determining the prevalence of phlebitis and comparing the effect of ichthammol glycerin and heparinoid application on phlebitis.

SIGNIFICANCE AND NEED FOR THE STUDY

The primary goal of intravenous therapy is to maintain patent intravenous access that can be used to administer the prescribed therapy reliably and safely⁵. In modern health care about half of the patients admitted in hospitals receive intravenous therapy through a peripheral venous catheter. Insertion and maintenance of peripheral intravenous catheter are the responsibilities of health care professionals⁶. The Intravenous Nurses

Society states that the accepted phlebitis rate is 5% or less in any given population⁵.

It is the nurses' responsibility to identify the contributing factors to phlebitis, assess the access site and determine the need for treatment or intervention in the event of phlebitis. Such interventions should be affordable by the clients.

Treatment of phlebitis depends upon the extent and severity of pain and inflammation. Evidence shows that topical heparin is safe and effective for the treatment of superficial phlebitis secondary to indwelling intravenous catheter⁷. Vecchio and Frisinghelli concluded that topical heparin preparations may be useful for relieving the signs and symptoms of vascular disorders while improving microcirculation⁸. Saini and Paul conducted a study in Indore to compare the effect of cold application, heparinoid application and magnesium sulphate application for superficial thrombophlebitis among patients. The result indicated that even though cold application and heparinoid ointment are effective in reducing phlebitis, magnesium sulphate is most effective in reducing superficial thrombophlebitis⁹.

Ichthammol glycerin is a cost effective intervention, commonly used in medicine as a remedy for treating some skin diseases such as acne, eczema and psoriasis. Ten percentage glycerine- ichthammol is effective in the initial treatment of severe acute otitis externa¹⁰. A study conducted by Beulah in Christian medical college Vellore, India found that both ichthammol glycerin and infra red radiation are equally effective for the treatment of thrombophlebitis¹¹.

If phlebitis is identified treatment measures include thrombophob local application, ichthammol glycerin dressing and magnesium sulphate application. Even though all these measures have been found to be effective for the treatment of phlebitis, clinical observation and prior research findings in this area is inadequate. Therefore this study was conducted to determine the prevalence of phlebitis and to identify the most effective treatment measure for the management of phlebitis.

STATEMENT OF THE PROBLEM

A study to determine the prevalence of phlebitis and compare the effectiveness of topical ichthammol glycerin and heparinoid application on phlebitis among patients receiving intravenous therapy in the selected adult wards of Christian Medical College, Vellore, India.

OBJECTIVES

1. To determine the prevalence of phlebitis
2. To compare the effectiveness of ichthammol glycerin and heparinoid application on phlebitis.

RESEARCH DESIGN

Quasi experimental design

SETTING OF THE STUDY

General medical, surgical and orthopedic wards of Christian Medical College, Vellore.

POPULATION

Adult patients admitted in general medical, surgical and orthopedic wards and developed phlebitis as the result of intravenous therapy.

SAMPLE

Ninety patients who developed phlebitis as the result of intravenous therapy during the data collection period and fulfilled the inclusion criteria. Both ichthammol glycerin group and heparinoid application group had 45 subjects each.

CRITERIA FOR SAMPLE SELECTION**Inclusion criteria**

- Patients with visual infusion phlebitis score of two or more.
- Patients with infusion related phlebitis and not received any form of intervention by the staff nurse.
- Patients who developed phlebitis only on the upper limbs.

Exclusion criteria

- Patients who were on intravenous chemotherapeutic agents during the data collection period.
- Patients with central venous catheter on the same limb.
- Patients with dermatological disorders.

- Patients who were allergic to either the topical application of ichthammol glycerin or heparinoid application.
- Patients with any bleeding disorders, injury to the same limb, pre-existing lymphatic obstruction.

SAMPLING TECHNIQUE

Cluster randomization technique

DATA COLLECTION INSTRUMENT

Questionnaire and observation were used to collect the data regarding the prevalence of phlebitis and the effective management measure for phlebitis. The tool consisted of the following items.

Part I: Demographic and clinical profile

Part II: Visual infusion phlebitis scale

Part III: Numeric pain intensity scale and the questionnaire.

DATA COLLECTION PROCEDURE

The data was collected from the selected general medical, surgical and orthopaedic wards for a time period of six weeks. Medical wards (2) surgical wards (2) and orthopaedic wards (2) were selected for the allocation of subjects to each interventional group by using cluster randomization. Out of six wards, three (medical, surgical and orthopaedic) were assigned to the ichthammol glycerin group and the remaining three wards were assigned to the heparinoid application group. Patients who develop phlebitis during study period were identified and the interventions were provided by the investigator. Subjects were observed for 48 hours with an interval of 12 hours

DATA ANALYSIS: descriptive and inferential statistics. SPSS soft ware version 17 was used.

ETHICAL CONSIDERATIONS

- Ethical clearance was obtained from Institutional Review Board (IRB) of Christian Medical College, Vellore (IRB Min.No.7749).
- The study was registered in Clinical Trials Registry – India (CTRI/2012/05/002629).

Oral and written consents were obtained from the subjects, prior to the data collection.

RESULTS

Table 1 : Distribution of subjects based on the demographic variables (N=90)

Demographic variables	Heparinoid group (n=45)		Ichthammol group (n=45)		Total (N=90)	
	n	%	n	%	N	%
Age (years)						
<30	9	20	10	22.2	19	21.1
31 – 50	19	42.2	20	44.5	39	43.3
>51	17	37.8	15	33.3	32	35.6
Gender						
Male	25	55.5	33	73.3	58	64.4
Female	20	44.5	12	26.7	32	35.6

Table 1 highlights the demographic variables of the subjects who participated in the study.

Majority of the subjects belong to the age group of 31-50 years. Most of them are males (64.4%).

Table 3 : Prevalence of phlebitis

Ward	Phlebitis rate
Medical ward	31.90%
Surgical ward	17.60%
Orthopaedic wards	28.30%

The above table indicates the prevalence of phlebitis in general medical wards (31.9%),

surgical wards (17.60%) and in orthopaedic wards (28.30%).

Table 4 : Comparison of the effectiveness of heparinoid application and ichthammol glycerin application on phlebitis

Variables	Heparinoid group		Ichthammol glycerin group		t value	p value
	Mean	SD	Mean	SD		
Based on VIP scale						
At 12 hours	1.06	0.81	1.64	0.80	-3.40	.001*
At 24 hours	1.86	0.81	2.33	0.47	-3.37	.001*
At 36 hours	2.51	0.66	2.60	0.49	-0.72	.472
At 48 hours	2.51	0.66	2.60	0.49	-0.72	.472
Based on numeric pain intensity scale						
At 12 hours	2.84	1.90	4.11	2.04	-3.03	.003*
At 24 hours	4.55	1.81	5.62	1.23	-3.26	.002*
At 36 hours	5.42	1.43	6.06	1.01	-2.46	.016**
At 48 hours	6.04	1.24	6.15	0.95	-0.47	.635

*p<.01, **p<.05

Table 4 demonstrates that there is a statistically significant difference in phlebitis score among the subjects in heparinoid group and ichthammol glycerine group after 12 hrs and 24 hrs of administration of the intervention (p=.001). Numerical pain intensity score also shows a statistical significant difference among the subjects in both the groups after 12 hrs (p=.003), 24 hrs (p=.002) and 36 hrs of administration

(p=.016).The mean VIP score and mean pain rating score is more in ichthammol glycerin group as compared with that of heparinoid group. It shows that there is more reduction of VIP score and pain intensity score in ichthammol glycerin group.

DISCUSSION

The first objective of the study was to determine the prevalence of phlebitis in the general medical surgical and orthopaedic wards

Prevalence of phlebitis identified in the general medical, surgical and orthopaedics wards was 26.07%. This result is consistent with that of the study conducted in 15 wards in four hospitals in Germany. They identified that the phlebitis rate was 27 per 100 patients¹². Rego Furtado in 2011 reported a high incidence of phlebitis (61.5%) in general surgical department¹³. However the current study finding is contradicting with the finding from the study done by White. Three hundred and five intravenous catheters were observed from the time of admission of the patient till the time of discharge. The phlebitis rate identified was 3.8%⁵.

Although most of the studies report similar findings which are a higher prevalence, the current study in our set up emphasizes the need for bringing down the prevalence from 26.07% to 5% which is the standard

Second objective of the study was to compare the effectiveness of ichthammol glycerin and heparinoid application on phlebitis.

Table 4 shows the findings regarding the comparison of the effectiveness of the ichthammol glycerin and heparinoid application on phlebitis. The findings indicate that there was a statistically significant difference in VIP score at 12 hours and 24 hours ($p < .01$). Numeric pain intensity score at 12 hours, 24 hours ($p = < .01$) and 36 hours ($p < .05$) also show that there was a statistically significant difference in the pain intensity among subjects of both groups. The mean score of ichthammol glycerin group was high as compared with that of heparinoid group which indicates that ichthammol glycerin was effective than heparinoid application in the reduction of visual infusion phlebitis score and numeric pain intensity score based on the observation at 12 hours and 24 hours. At 48 hours

of observation both the interventions were found to be equally effective.

The statistical difference between both the interventions may be due to the differences in the properties of components and mechanism of action. Ichthammol glycerin has both anti-inflammatory and analgesic properties. Studies have shown that ichthammol glycerin has anti-bacterial properties also¹⁴. Thrombophob is a commonly used form of heparin for the treatment of phlebitis. Heparin inhibits thrombin formation, promotes fibrinolysis and helps absorption of the more superficial microthrombi. Benzyl nicotinate, by vasodilation, enhances local heparin absorption. The process of healing is substantially promoted thereby pain is rapidly alleviated. Heparin also possesses anti-inflammatory effect due to the blockade of P-selectin and L-selectin which are responsible for the initial event in cellular infiltration¹⁵. While both the interventions possess anti-inflammatory and analgesic effect, ichthammol glycerin has the added advantage of antibacterial action.

Procedures for the application of both the interventions are different. Ichthammol glycerin is applied by using soaked gauze pieces covered with cotton balls and secured with bandage where as thrombophob ointment is applied in a thin layer to the skin of the affected part and the surrounding area, which is absorbed by the skin within a short period of time. Thus for the subjects who received ichthammol glycerin, the medication was in constant contact with the affected area till the next application. The above mentioned reasons could have made ichthammol glycerin as the most effective intervention for reducing phlebitis. However there is a lack of scientific evidence on the comparison of the effectiveness of ichthammol glycerin and heparinoid application on phlebitis. The findings of the study suggest that ichthammol glycerin was more effective than heparinoid application for the management of phlebitis based on the observation at 12 hours and 24 hours.

CONCLUSION

The intravascular related complications including phlebitis are increasingly prevalent amongst hospitalized patients. The health care members need to be aware about the risk factors associated with phlebitis. Preventive measures need to be followed by selecting appropriate size of the cannula, selecting the correct vein based on the patient's requirement and using strict aseptic technique during initiation and maintenance of intravenous therapy. Frequent monitoring of the IV site, early identification and appropriate intervention is essential for the prevention of the further complications associated with intravenous therapy. Nurses need to equip themselves with the adequate skill and knowledge for handling the intravenous catheter and the prevention of intravenous catheter related complications Current study findings demonstrate the evidence on the most effective intervention for the management of phlebitis.

Conflict of Interest statement: None

Funding Statement: None

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