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Effectiveness of glycerine magnesium sulphate versus topical heparin application in patients with peripheral intravenous cannula induced phlebitis

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Cover Page Footnote

The researcher acknowledges cooperation and the contribution of the authority of the institution and the participants of the study.

Original Article

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Abstract

Introduction: Peripheral intravenous cannula induced phlebitis is a common and significant problem in clinical practice. **Objectives** To compare the effectiveness of glycerine magnesium sulphate and topical heparin application and to find the association between the pre-test Visual Infusion Phlebitis (VIP) scores and selected demographic variables. **Method**: Quasi experimental with two group pre-test post-test design was used. This study was conducted in Bishop Benziger Hospital, Kerala for one month. Using purposive sampling technique 60 patients were selected and assigned randomly into glycerine magnesium sulphate group and heparin group. In glycerine magnesium sulphate group, glycerine magnesium sulphate paste and in heparin group topical heparin was applied over the site of phlebitis every eighth hourly for five days. VIP score was used to assess the pre-test and post-test score of both groups. **Results:** The findings revealed that both groups had a significant difference between the pre-test and post-test VIP score on the first, third and fifth day (p=.001). The study shows that there was a significant difference between the median post test score of glycerine magnesium sulphate group and heparin group on the third day (p= .0366) and fifth day (p value = .001). The study also shows that there was no significant association between pre-test VIP score and demographic variables. **Conclusion**: The study concluded that glycerine magnesium sulphate was more effective than topical heparin application in reducing the severity in patients with peripheral intravenous cannula induced phlebitis.

Keywords: Glycerine Magnesium Sulphate; Topical Heparin; Peripheral Intravenous CannulaInduced Phlebitis.

Introduction

Peripheral intravenous cannulation is a procedure in which the patient's skin is punctured with a needle to allow insertion of a temporary plastic tube into a vein. To receive the therapeutic intravenous medications, approximately 60% of hospital inpatients annually undergo peripheral intravenous cannulation (Morris & Heong, 2008). Complications such as phlebitis, thrombosis, extravasations and infiltration are the local complications associated with the insertion of the venous access device (Saini et al., 2011). Clinical signs of phlebitis are localised redness, heat and swelling, which extends further along the length of the vein, eventually leading to induration and a palpable venous cord. (McCallum & Higgins, 2012). Symptoms develop over hours to days and may resolve within a few days or weeks.

Sometimes phlebitis can be dangerous because blood clots (thrombophlebitis) can occur and may result in emboli. Several studies show that 20–80% of patients receiving peripheral intravenous therapy requires removal of the cannula because of phlebitis and inserts a new cannula at a different site or treatment with some topical agents (Singh et al., 2008).

Glycerine magnesium sulphate and topical heparin application are two commonly practising nurse led interventions for the treatment of peripheral intravenous

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cannula induced phlebitis. Through the clinical practice of the researcher, it was found that both glycerine magnesium sulphate and topical heparin were effective in symptomatic relief of phlebitis. However, it was not proven that which method is most effective in reducing the signs and symptoms of peripheral intravenous cannula induced phlebitis. Hence this study aimed to compare the effectiveness of glycerine magnesium sulphate and topical heparin in patients with peripheral intravenous cannula induced phlebitis.

Objectives

The objectives of the study were toassess the effectiveness of glycerine magnesium sulphate application in patients with peripheral intravenous cannula induced phlebitis, to assess the effectiveness of topical heparin application in patients with peripheral intravenous cannula induced phlebitis and to compare the effectiveness of glycerine magnesium sulphate and topical heparin application on peripheral intravenous cannula induced phlebitis.

Materials and methods

The study was conducted using quasi-experimental two group pre-test post-test design among patients who developed phlebitis as a result of the peripheral intravenous cannula during hospitalization. This study was conducted in the medical and surgical wards of Bishop Benziger Hospital, Kerala. The sample size was 30 in each group. Purposive sampling technique was used to select the samples. Patients with peripheral intravenous cannula induced phlebitis whose VIP score ranges from 3 to 5 on the day of cannula removal and who belonged to age group 21-70 years were included in the study. Patients who were critically ill, receiving chemotherapeutic agents, with poor skin condition, peripheral vascular diseases were excluded from the study.

The instruments used for data collection were demographic proforma, which included age, gender, marital status, education and clinical data which consisted of catheter site and catheter size. The age was categorized from: 21-70 years, their gender if whether male or female, marital status if single or married, and educational qualification was noted if they completed/ were in primary school, high school, degree, postgraduate and clinical data that includes catheter site whether hand, forearm, or dorsum of the hand was noted along with catheter size namely if it was 20G, 22G or 24G.

VIP score: It is a standardized tool used to assess the severity of patients with phlebitis before and after the intervention. The grading of phlebitis was done according to the stages and clinical features of phlebitis. Grading was done bedside, and the clinical assessment score ranged from zero to five. The stages of phlebitis are as follows

Score Stages of phlebitis

0 No signs of phlebitis
1 Possible first sign of phlebitis
2 Early stage of phlebitis
3 Medium stage of phlebitis
4 Advanced stage of phlebitis
5 Advanced stage of thrombophlebitis

The inter-rater reliability of the VIP score was checked by using Kappa's Co-relation Coefficient, and the reliability score of the scale given by the authors was 0.85. The reliability coefficient was 0.81. Thus, the scale was found to be reliable.

The data collection for the main study was done after obtaining permission from institutional ethical committee clearance of Bishop Benziger Hospital, Kerala. The investigator introduced herself to the patients, and the purpose of the study was explained to them. The patients who met the inclusion criteria were selected, and informed consent was obtained. By means of block randomization patients were randomly assigned to glycerine magnesium sulphate and heparin group.

On the day of cannula removal, the phlebitis was assessed using the VIP score (pretest). In glycerine magnesium sulphate group after the initial assessment a dressing with glycerine magnesium sulphate paste soaked on a sterile gauze pad was applied over the site of phlebitis every eight hours for five days whereas in the heparin group after the pre-test, a thin film of thrombophob gel was applied over the site of phlebitis every eight hours for five days. Post test was conducted on the third and fifth day after the intervention. Sample characteristics were analysed by using frequencies and percentage. The significant difference between the pre test and post test scores of glycerine magnesium

sulphate and heparin group was calculated using Wilcoxon's signed Rank test. The significant difference between the glycerine magnesium sulphate and heparin group was calculated using the Mann-Whitney U test.

Results

The result showed that among 60 patients, 28.3 % were in the age group of 61-70 years. Most (58 %) of the patients with phlebitis were female, and the majority (70 %) were married. Regarding educational status, about 33.3 percent of the patients had higher secondary education and graduate level of education. In the case of intravenous cannulation site, most of the patients (43.4 percent) had canula in the dorsum of the hand. Moreover, in relation to catheter size, 51.8 percent had 22G catheter. It was observed that among 60 patients under study, about 68.3 percent of the patients had medium stage of phlebitis, 21.7 percent had advanced stage of phlebitis, and 10 percent had advanced stage of thrombophlebitis.

The data regarding the frequency and percentage of glycerine magnesium sulphate group showed that majority of the patients (76.6 %) had VIP Score of 4 in pre-test, more than half of subjects (63.3%) had VIP Score of 2 on third day, and 60 percent had VIP Score of 1 on the fifth day. In heparin group 60 percent of patients had VIP Score of 4 in pre test, 50 percent of patients had a score of 3 on third day, and 53.3 percent of patients had a score of 2 on the fifth day.

In order to determine the significant difference between the pre-test and post-test VIP Score in glycerine magnesium sulphate and heparin group, Wilcoxon's sign rank test was used.

Table 1

Comparison of Median and Z value of Visual Infusion Phlebitis Score on the first, third and fifth day in Glycerine Magnesium Sulphate group

N=30

Day	Median	Z value	p value
Comparison between First day Third day	4 2	4.932	.001
Comparison between Third day Fifth day	2 1	4.903	.001
Comparison between First day Fifth day	4 1	4.916	.001

The data in table 1 show the median pre-test score of the first day is 4, median post test score of the third day is 2 and median post test score of the fifth day is 1.When the data was analysed the median post test score of the fifth day was less than the median post test score of the third day and median pre-test score of the first day. The comparison of median VIP score on the first, third and fifth day was found to be (p=0.001) significant. Hence glycerine magnesium sulphate was found to be effective in reducing the severity of intravenous cannula induced phlebitis.

Table 2

Comparison of Median and Z value of Visual Infusion Phlebitis Score on first, third and fifth day in Heparin group

N=30

Day	Median	Z value	p value
Comparison between First day Third day	4 3	4.963	.001
Comparison between Third day Fifth day	3 2	4.889	.001
Comparison between First day Fifth day	4 2	4.916	.001

The data in table 2 show the median pre-test score of the first day is 4, median post test score of the third day is 3, and median post test score of the fifth day is 2. When the data was analysed, the median post test score of fifth day was less than the median post test score of the third day and median pre-test score of the first day. The comparison of median Visual Infusion Phlebitis score on first, third and fifth day was found to be (p=.001) significant. Hence topical heparin was found to be effective in reducing the severity of intravenous cannula induced phlebitis.

Table 3

Comparison of post-test VIP score of Glycerine Magnesium Sulphate group and Heparin group on third day

N=60

Group	Mean	Median	SD	U value	p value
Glycerine magnesium sulphate	2.37	2	0.49	308	.037
Heparin	2.77	3	0.61		

The data in table 3 show that the median post test score of glycerine magnesium sulphate group is 2, which is less than the median post test score of heparin group (3) on the third day. The p value is .037. Hence glycerine magnesium sulphate application was found to be more effective than topical heparin application in reducing the severity of intravenous cannula induced phlebitis.

The data regarding post-test VIP Scores of glycerine magnesium sulphate and heparin group were analysed in terms of Mann Whitney U test.

Table 4
Comparison of post-test VIP score of Glycerine Magnesium Sulphate and Heparin group on the fifth day

N=60

Group	Mean	Median	SD	U value	p value
Glycerine magnesium sulphate	0.80	1	0.61	156	.001
Heparin	1.63	2	0.64		

The data in table 4, show that the median post test score of glycerine magnesium sulphate group is 1 which is less than the median post test score of heparin group (2) on the fifth day. The p value is 0.001. Hence glycerine magnesium sulphate application was found to be more effective than topical heparin application in reducing the severity of intravenous cannula induced phlebitis.

The association of pre-test VIP Scores and demographic variables such as age in years, education, catheter site and catheter size were computed using Kruskal-Wallis Test. The chi square value 4.168 for age (p=.384>.05); for education 2.497 (p=.476>.05); 0.871 for catheter site (p=.647>.05); and for catheter size 2.077(p=.354>.05). Mann Whitney U test was used to find the association of pre-test Visual Infusion Phlebitis Scores with gender (p=.288 > .05) and marital status (p=.522>.05). Hence there was no significant association between age, gender, marital status, education, catheter site and catheter size.

Discussion

This study was conducted to assess the effectiveness of glycerine magnesium sulphate over topical heparin application on phlebitis in patients with peripheral intravenous cannula. In order to achieve the objectives of the study, quasi experimental two group pre-test post-test design with evaluative approach was adopted. The findings of the present study support the findings of a study conducted to compare the effect of hypertonic saline compress and glycerine magnesium sulphate application in the management of superficial thrombophlebitis. The experimental group received hypertonic saline compress and glycerine magnesium sulphate application and control group received routine care (thrombophob application). The findings of the study revealed that there is no significant difference (p<.05) in the change in phlebitis score between patients received hypertonic saline compress and control group at 24, 48 and 72 hours. Hypertonic saline compress and routine therapy (thrombophob application) are equally effective in the alleviation of symptoms of superficial thrombophlebitis. There is a significant difference (p=.008) in the change in phlebitis score between patients who received glycerine magnesium sulphate application and control group, but there is no significant difference in change in phlebitis score between patients who received hypertonic saline compress and control group at 24, 48 and 72 hours. This study also concluded that glycerine magnesium sulphate application is more effective in the alleviation of symptoms of superficial thrombophlebitis compared to hypertonic saline compress and routine therapy (thrombophob application).

Conclusion

The present study aimed to find the effectiveness of glycerine magnesium sulphate over topical heparin on phlebitis in patients with peripheral intravenous cannula. The study results show that there was a significant reduction in the severity of phlebitis after the glycerine magnesium sulphate and topical heparin application. It also shows that there was a significant difference between the post-test Visual Infusion Phlebitis score of glycerine magnesium sulphate and heparin group on the third and fifth day of the intervention. The study concluded that glycerine magnesium sulphate was found to be more effective in reducing the severity of intravenous cannula induced phlebitis.

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