

ORIGINAL ARTICLE

Effectiveness of Magnesium Sulphate Compression on Phlebitis among Patients Receiving Intravenous Therapy in Selected Hospital, West Bengal

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ABSTRACT

Background: Near about 80% of all hospitalized patient receiving intravenous therapy for their treatment and diagnostic procedure, 20-80% of them develop phlebitis. Phlebitis is a major issue which indicate lack of quality patient care.

Objectives: To assess the effectiveness of magnesium sulphate compression on phlebitis and to find out association between level of phlebitis and sociodemographic variables among 30 hospitalized patient in medical and surgical ward of District Hospital Howrah, West Bengal.

Design and methods: A one group pre-test post-test quasi-experimental study was adopted, the study based on general System Model proposed by biologist, Lodwig Von Bertalanffy in 1986. A valid reliable structured Visual Infusion Phlebitis (VIP) Scale and semi structured interview schedule was used to collect data from respondents who were selected through non-probability purposive sampling.

Results: 40% of patients with intravenous therapy for 3-4 days in cephalic insertion (46.7%) having phlebitis among them 73.3% of patients received Isotonic solution through 20G cannula 86.7%. 63.3% of patients had 2 times attempt for insertion of cannula. Pre and Post-test Mean score level of phlebitis was 2.97 and 1.93 with mean difference of 1.04 which is statistically significant at 0.01. There were significant association between type of fluid and duration of administration and level of phlebitis at 0.05 level.

Conclusion: The study concluded that magnesium sulphate and glycerine compression is effective for reducing the level of phlebitis.

The study result has different level of implications in nursing practice, education, administration and nursing research.

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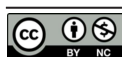
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KEYWORDS

• Effectiveness • Magnesium sulphate with glycerine • Phlebitis • Superficial thrombophlebitis • Peripheral intravenous cannula • Visual infusion phlebitis score

INTRODUCTION

Peripheral cannulation is an invasive procedure to insert a small plastic cannula into a vein to create a temporary venous access for administering fluids, medicines, blood and other substances for hospitalized patients. Very common complication of peripheral cannulation is pain, redness, swelling, warmth and irritation along with vein are sign of phlebitis. Phlebitis is an inflammation of the endothelial layer of vein. Phlebitis causes sepsis, pulmonary embolism and other serious complications that increases patient morbidity and mortality among hospitalized patients. Chronic disease, drugs and blood administration in one vein, inappropriate cannula dressing, and large cannula size and longer cannula dwelling time had high probability to develop phlebitis.² The national study of adverse events verified that if phlebitis included as an adverse health care event it ranked first followed by medication error, health care associated infection and surgical site infection.³ In Spain up to 30% of the bacteraemia associated with hospital care is related to peripheral cannulation which produce high morbidity and hospital expense.⁴ The incidence of phlebitis was estimated 31.4% in 2019 in Kalikunda, West Bengal, and another study carried out in PGIMER, Chandigarh in 2011 estimated 29.8% and further study in same setting in same year showed the rate of phlebitis was 56.5%. In 2020 a prospective observational study in Maharashtra HBT Medical College estimated 6.4% incidence of phlebitis. Various factors are associated with phlebitis like age, gender, cannulation site, size of cannula, types, duration and rate of fluids and medicine.¹

Background of the study

Common complication among hospitalized patient who received prolonged intravenous fluid, irrigative substance through vein is phlebitis, manifested by pain, redness, swelling, and warmth causing temporary or permanent damage the endothelial layer of vein. Non-invasive nursing management for phlebitis is topical compression. Magnesium sulphate acts as an anti-inflammatory, osmotic and

analgesic which effectively control swelling, decrease cytokine activity and reduce pain therefore reduce the level of phlebitis. When it is used with glycerine it acts more effectively. Glycerine has humectant effect and it's allow magnesium sulphate to penetrate through skin and maintain a soothing effects on skin. Both magnesium sulphate and glycerine compression together halt the progression of phlebitis.⁵ This compression very cost effective, easily accessible, easy to apply with minimum side effects.

The magnesium sulphate and glycerine compression shows an evidence based non-invasive nursing intervention to reduce catheter related phlebitis.

Need of the study

Magnesium sulphate may offer a non-invasive, cost-effective treatment option for caring of phlebitis, reduction of patient's discomfort and healthcare costs. Application of magnesium sulphate reduce patient's suffering and morbidity. Some studies suggested that magnesium sulphate may be effective, more research is needed to confirm its efficacy and optimal usage. Further studies can help determine how magnesium sulphate compares to existing treatments, such as cold compresses or topical creams. Research can inform the development of standardized protocols for using magnesium sulphate to treat phlebitis, ensuring consistent and effective care.

By studying the effectiveness of magnesium sulphate on phlebitis, researchers can provide valuable insights into its potential as a treatment option, ultimately improving patient outcomes.

Title

Effectiveness of Magnesium Sulphate compression on phlebitis among patients receiving intravenous therapy in selected Hospital, West Bengal.

Objective of the study

1. To assess the effectiveness of magnesium sulphate compression on phlebitis.
2. To find out association between level of phlebitis and sociodemographic variables.

Variables under the study

- **Independent variable:** Magnesium sulphate compression.
- **Dependent variable:** Effect of magnesium sulphate compression on phlebitis.
- **Demographic variables:** Age, gender, education, occupation, monthly income, residence height, weight, BMI, name of cannulated vein, size & duration of cannula, types of drugs administered, history of chronic vascular disease.

Hypothesis

H₀: There will be no significant mean difference between pretest & post-test scores after applying magnesium sulphate on phlebitis to the patients receiving intravenous therapy.

H₁: There will be significance mean difference between pretest & post-test scores after applying magnesium sulphate on phlebitis to the patients receiving intravenous therapy.

Research Design

Quasi- experimental (one group pretest post-test design) design.

Study setting

- **Pilot study** Female surgery ward, Dist. Hospital Howrah.
- **Final study** Male surgery, male medicine and female medicine ward, Dist. Hospital Howrah.

Population

- All Patients admitted in Hospital & receiving intravenous therapy.

Sample

- Patients who are receiving intravenous therapy with phlebitis in general medicine and surgery ward.

Administrative and ethical permission

Administrative and ethical permission was taken from Principal, Govt. College of Nursing, Superintendent, District Hospital Howrah, Nursing Superintendent, District Hospital Howrah.

Organization and analysis of data

Section I: Findings related to demographic characteristics of patients receiving intravenous therapy with phlebitis.

Section II: Findings related to effectiveness of magnesium sulphate compression on phlebitis.

Section III: Findings related to identify the association between selected demographic variables and level of phlebitis.

SECTION I

Table 1: Frequency & Percentage Distribution of population receiving intravenous therapy according to Age, Sex and causes of hospitalization

n=30

Selected variables	Frequency	Percentage (%)
Age		
20-40	12	40
40-60	10	33.3
>60	8	26.7
Gender		
Female	15	50
Male	15	50
Primary causes of hospitalization		
Acute illness	16	53.3
Chronic illness	6	20
Surgery	8	26.7

Data depicted in Table 1 shows that 40% patients receiving intravenous therapy having phlebitis were less than 40 years of age, 33.3% were 40 to 60 age and 26.7% were more than 60 years of age. It also depicts that 50% of the patients receiving intravenous therapy having phlebitis were female patients and 50% were male patients. It also depicts that most of the patients (53.3%) admitted due to acute illness, 26.7% admitted for elective surgery and 20% patient admitted for chronic illness.

n=30

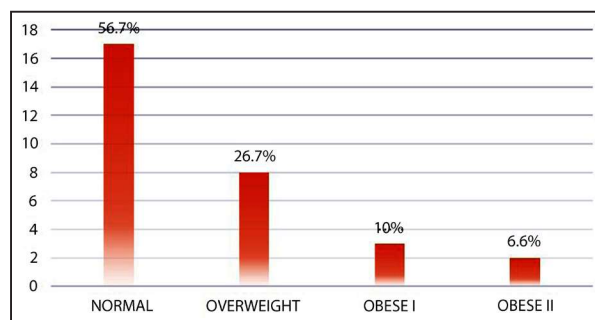


Figure 1: Bar Diagram showing Frequency and Percentage Distribution of patients receiving intravenous therapy according to BMI

The bar diagram shows that most of the patient (56.7%) with phlebitis had normal body mass

index and 26.7% were overweight, 10% were obese grade I and 6.6% were obese grade II.
n=30

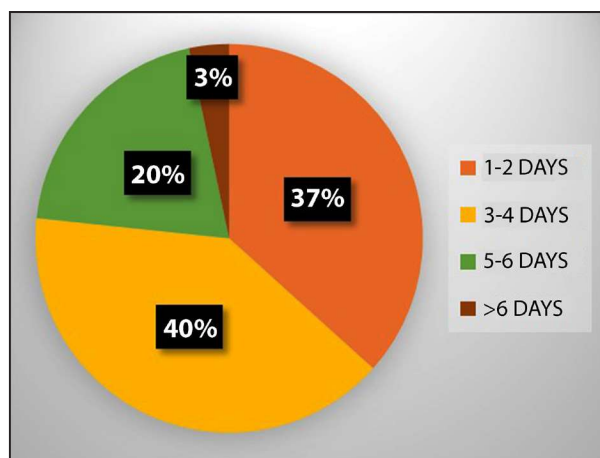


Figure 2: Pie Diagram showing Percentage Distribution of patients receiving intravenous therapy according to duration of Intravenous fluid administration

Pie diagram shows that near about 40% of patients with phlebitis were receiving intravenous therapy for 3-4 days and 37% of patients with phlebitis were receiving intravenous therapy for 1- 2 days and 20% for 5-6 days and 3% for >6 days respectively.

Table 2: Frequency and Percentage Distribution of patients receiving intravenous therapy according to Type of Fluid Administered and Vein of Insertion

n=30

Selected variables	Frequency	Percentage (%)
Type of fluid		
Isotonic	22	73.3
Hypertonic	8	26.7
Vein of insertion		
Cephalic	14	46.7
Metacarpal	10	33.3
Basilic	6	20

Data depicted in Table 2 shows that most of the patient (73.3%) with phlebitis received Isotonic fluid and 26.7% received Hypertonic fluid.

It also shows that 46.7% of patients had cephalic vein insertion, 33.3 had metacarpal vein insertion and 20 % of patients had basilic vein of insertion.

Table 3: Frequency and Percentage Distribution of population receiving intravenous therapy according to Size of Cannula, fixation of Site and number of pricking in vein.

n=30

Selected variables	Frequency	Percentage (%)
Size of IV cannula		
18 G	4	13.3
20 G	26	86.7
Fixation of IV site		
Appropriate	16	53.3
Inappropriate	14	46.7
Number of pricking done		
1	8	26.7
2	19	63.3
3	3	10

Table 3 shows that most of the patient (86.7%) with phlebitis received intravenous therapy through 20G size of cannula and rest of (13.3%) received through 18G size of cannula.

It also shows that 53.3% of patients with appropriate Fixation of cannula and 46.7% of patients with inappropriate Fixation of cannula.

It is also shows that majority of patient cannulated by 2 times of pricking attempt and 26.7 % by 1 time Pricking and 10 % by 3 times Pricking attempt for cannulation.

SECTION II

n=30

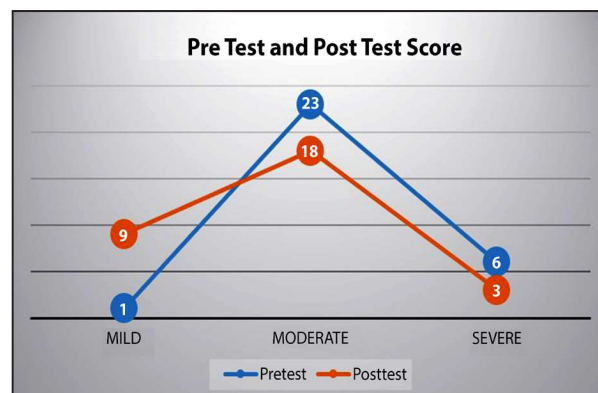


Figure 3: Line diagram shows frequency distribution of pre test and post test score level of phlebitis

Line diagram shows that frequency of pre test phlebitis score level were moderate (23),

severe (6) and mild (1) respectively whereas after application of magnesium sulphate compression the post test phlebitis score were moderate (18), mild (9) and severe (3).

Table 4: Mean, Mean difference and “t” value of pretest and posttest score level of phlebitis

n=30				
Test	Mean	Std. Deviation	Mean difference	“t” value
Pre-test	2.97	.89		
Post-test	1.93	.94	1.04	10.1785*

“t” (29) = 3.659, P < 0.01

Table 4 Shows that the Mean of pretest phlebitis score was 2.97 with 0.89 standard deviation and mean of post test phlebitis score was 1.93 with 0.94 standard deviation Mean difference was 1.04. The calculated “t” value is 10.1785 and the table value at 0.01 level of significance at df(29) is 3.659. Here the calculated value is more than Table value. Therefore mean difference is not by chance, there is significant statistical mean difference between two test. Therefore application of magnesium sulphate on phlebitis had significant effectiveness.

SECTION III

Table 5: Chi square showing association between level of phlebitis with type of fluid administered to the patients receiving intravenous therapy.

Selected variable	Level of phlebitis		Total	χ ²
Type of fluid administered	0-3	4-5		
Isotonic	23	3	26	8.726*
Hypertonic	1	3	4	
Total	24	6		

χ² (1) = 3.84 P < 0.05

Data presented in table 5 Showed that out of 26 patient who received isotonic fluid, 23 of them had phlebitis level in between 0-3, and 3 of them had phlebitis score in between 4-5. Out of patients who received hypertonic fluid, 1 of them had phlebitis level in between 0-3 and 3 of them had phlebitis score 4-5.

The chi square computed between the types of intravenous fluid and level of phlebitis score was 8.726 which is more than table value at 0.05 level of significance.

Thus it can be said that there was significant association between types of intravenous fluid administration and level of phlebitis.

The statistical test employed were frequency and percentage distribution, mean, standard deviation, paired t test and chi square test for association.

Major findings of the study

Major findings of the study summarized below:

1. Findings related to demographic variables

- Maximum participant 40% belonged to the age group of 20-40 years.
- Both male and female were 50%
- Majority 53.3% were admitted with acute illness
- Majority 56.7% with normal BMI whereas 6.6% participants belonged to Obese-II category.
- Most of the 40% participant received intravenous fluid for 3-4 days.
- Maximum 73.3% participant received isotonic solution through cephalic (46.7%) insertion with 86.7% 20G cannula.
- Majority 63.3% participants cannulated after 2 times pricking.
- Maximum 76.6% moderate level of phlebitis, 20% had severe level of phlebitis and 3.3% had mild level of phlebitis in pre-test but 60% had moderate level of phlebitis, 30% had mild level of phlebitis and 10% had severe level of phlebitis in post-test.

2. Findings related to effectiveness of magnesium sulphate compression on phlebitis.

- The application of magnesium sulphate on phlebitis had significant effectiveness (t'=10.1785) with pre-test and post-test mean score 2.97 and 1.93 with mean difference 1.04.

3. Findings related to identify the association between selected demographic variables and level of phlebitis.

- Statistically significant association was found between types of intravenous fluid and level of phlebitis (χ²=8.726, P < 0.05).

Result of the study

40% of patients with intravenous therapy for 3-4 days in cephalic insertion (46.7%) having

phlebitis among them 73.3% of patients received Isotonic solution through 20G cannula 86.7%. 63.3% of patients had 2 times attempt for insertion of cannula. The application of magnesium sulphate on phlebitis had significant effectiveness ($t'=10.1785$) with pre-test and post-test mean score 2.97 and 1.93 with mean difference 1.04. Statistically significant association was found between types of intravenous fluid and level of phlebitis ($\chi^2=8.726$, $P < 0.05$).

Therefore application of magnesium sulphate on phlebitis had significant effectiveness so, nurse can apply magnesium sulphate dressing on phlebitis in clinical practice.

DISCUSSION

The findings of the present study are consistent with several previous research works that have demonstrated the effectiveness of magnesium sulphate and glycerine application in reducing the severity of superficial thrombophlebitis among patients receiving intravenous therapy.

Beerappa Metagudda et.al (2025) conducted a randomized control trial at HSK Hospital, Bagalkot, Karnataka on 60 adult patients and found a statistically significant reduction in mean post-test thrombophlebitis scores (1.67) compared to pre-test scores (3.9) after the application of glycerine and magnesium sulphate ($p < 0.05$). This supports the observation of current study that topical application of magnesium sulphate significantly lowers phlebitis score.

Similarly Rehan Abdel Hamed, Elsiaud et.al.(2023) in Mansoura University Hospital, Egypt, compared topical glycerine with magnesium sulphate and cold application among 30 patients. Result revealed a highly significant difference in Visual Infusion Phlebitis scale (VIP) scores between both groups after intervention ($P=0.0001$), indicating that magnesium sulphate with glycerine is effective in reduction of IV catheter induced thrombophlebitis.

Nora Hasnain Ahmed et.al.(2023) also compared magnesium sulphate with glycerine and ice chips in 100 patients with peripheral intravenous cannula-induced phlebitis. Both interventions were effective but magnesium sulphate with glycerin showed slightly better

outcomes ($\chi^2=93.601$, $p < 0.001$) compared to ice chips ($\chi^2=85.350$, $p < 0.001$), aligning with the present study findings.

A comparative study, Hemlata Laila (2023) evaluated Sumag dressing versus topical glycerine dressing in 60 patients and found a significant reduction in post test phlebitis scores in the Sumag group ($p < 0.01$), highlighting that topical application are beneficial in managing thrombophlebitis.

Gaurav Patil *et al.* (2023) assessed magnesium sulphate paste application in 60 patients and observed a notable decrease in phlebitis severity over four consecutive days of treatment. The results mirror the present study, reinforcing the clinical value of magnesium sulphate based interventions in reducing IV related phlebitis.

Collectively these studies strengthen the evidence base that magnesium sulphate, especially when combined with glycerine is a safe, simple and cost effective, fruitful intervention to manage superficial thrombophlebitis, reduce discomfort of patient and prevent further complications.

Implication

- Nurse can apply magnesium sulphate dressing on phlebitis in clinical practice
- Nurse educator should give emphasis on magnesium sulphate dressing to find out the effectiveness and its side effects.
- Nurse administrator supervises and manages the nursing profession to use VIP scale and application of magnesium sulphate.
- Further research requires for find out more association between other variables and level of phlebitis.

Limitation of study

- The study was confined to a small sample size (30) and conducted in single selected hospital setting so the scope of generalization of findings were limited.

Recommendation

- Similar study can be conducted with large sample size and different hospital setting.
- Comparative study can be conducted.

CONCLUSION

The study findings revealed that there was significant mean difference between pre-test and post-test. There were significant association between types of fluid administration and level of phlebitis score. There were less association between duration of fluid administration, number of pricking for cannula with level of phlebitis.

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