

## Effectiveness of Hypertonic Saline Versus Glycerin Magnesium Sulphate Application in Management of Superficial Thrombophlebitis

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### Abstract

*Background:* Peripheral cannulation is one of the commonly used procedures for admitted patients, as they have to undergo many infusions for the administration of medications. The nurse is responsible for maintaining and monitoring IV infusion site and promptly detecting any complication like phlebitis, infiltration, air embolism, infection and fluid overload [1]. Superficial thrombophlebitis, inflammation of superficial veins associated with thrombosis, is a painful condition and approximately 3 to 11% of the population will develop superficial thrombophlebitis during their lifetime. Although generally considered a benign, self-limited disease, it can cause considerable discomfort, impact mobility and lead to further complications. Recent and accumulating evidence suggests that it is often associated with more serious forms of venous thromboembolism (VTE), including deep vein thrombosis (DVT) and pulmonary embolism (PE)<sup>2</sup>. *Objectives:* 1. Determine the effectiveness of hypertonic saline dressing on superficial thrombophlebitis. 2. Determine the effectiveness of glycerin magnesium sulphate application on superficial thrombophlebitis. 3. Compare the effectiveness hypertonic saline dressing versus glycerin magnesium sulphate application on superficial thrombophlebitis. *Material and Methods:* Quasi-experimental design. *Research approach:* Quantitative approach. *Sampling technique:* Non-probability purposive sampling and sample size: 20 (10 for each selected intervention). *Results:* This study shows that when comparing hypertonic saline and glycerin magnesium sulphate, hypertonic saline can reduce pain, erythema and induration as compared to glycerin magnesium sulphate. In case of swelling, glycerin magnesium sulphate seems to be effective than hypertonic saline. The study was conducted for short period of time thus proper generalization is not possible. *Conclusion:* The study concluded that hypertonic saline was found to be more effective as compared to glycerin magnesium sulphate.

**Keywords:** Hypertonic Saline; Glycerin Magnesium Sulphate; Superficial Thrombophlebitis.

### Introduction

Among hospital inpatients, intravenous fluid therapy is the most common invasive procedure. More than 90% of patients in hospitals receive IV therapies through certain forms of intravenous device [3]. The most common complication is

infusion phlebitis, which is defined by pain, erythema (redness of the skin), swelling, and palpable thrombosis of the cannulated vein [4]. Patients with infusion phlebitis may experience more pain, longer wait for therapy, slower recovery, and extended stays in the hospital [5].

Superficial thrombophlebitis (increasingly being called superficial venous thrombosis) is inflammation of the superficial veins associated with venous thrombosis. Traditionally, it has been considered a benign, self limiting disease of the lower extremity. However, it can affect most superficial venous systems in the body and importantly can be associated with deep vein

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thrombosis and pulmonary embolism. Treatment is aimed at symptomatic control and prevention of these serious and potentially fatal complications. Treatment options are variable and controversial [6].

### Material and Methods

A quasi-experimental research design with pre-test post-test design was used for the present study. The study sample consists of 20 adults with superficial thrombophlebitis, where 10 subjects were placed in group A, treated with hypertonic saline application and 10 subjects were placed in group B, treated with glycerin magnesium sulphate application. Non-probability purposive sampling technique was used to select the samples. The study was conducted at A.V.B.R. Hospital, Sawangi (Meghe) Wardha. The tool was developed after intensive review of literature, consultation and discussion with experts and also with the personal experience of the researcher. The final tool consisted of two parts. Part 1: Demographic data such as age, gender, occupation, BMI for age, type of fluid infused, type of infusion, number of injections per day, rate of IV infusion, total amount of fluid infused in 24 hours, size of cannula, site of cannula, number of prick during IV cannulation procedure, joint involved, duration of IV cannula in situ, duration of infusion, duration of IV set usage, cannula inserted by, cannula dressing status, cannula flush, period of hospital stay, Part 2: Modified Jackson's visual infusion phlebitis scale. The assessment of thrombophlebitis was done prior to the application of hypertonic saline and glycerin magnesium sulphate application by using Modified Jackson's visual infusion phlebitis scale. Post treatment assessment was conducted on the 3<sup>rd</sup> day using the same Modified Jackson's visual infusion phlebitis scale to assess the Pain, Erythema, Induration, and Pyrexia. A pre-treatment assessment was conducted to Modified Jackson's visual infusion phlebitis scale, after which the interventions were administered to both groups respectively for three days 3 times a day. A post treatment assessment was conducted on the 3<sup>rd</sup> day using the same tool. Ethical clearance was obtained from institutional ethics committee. Informed consent was taken from subjects and confidentiality was assured.

The Inclusion criteria were conscious and well oriented patients, patients admitted in the Medical, Surgical and Orthopedic ward during the time of data collection and patients with superficial thrombophlebitis.

### Results

Table 2 depicts the mean pre test scores for pain

were 1.0, for erythema were 1.40, for swelling were 1.80, for induration 2.0 and no subjects were having pyrexia in this group and mean post test scores for pain were 0.40, for erythema were 0.60, for swelling were 0.90 and for induration 0.0. Thus hypertonic solution was effective in reducing the signs of superficial thrombophlebitis in all areas but it was more effective in induration.

Table 3 depicts the mean pre test scores for pain were 1.0, for erythema were 1.20, for swelling were 2.40, for induration 2.80 and for pyrexia 1.0 and mean post test scores for pain were 0.80, for erythema were 0.80, for swelling were 0.30, for induration 0.80 and for pyrexia 0.0. Thus glycerin magnesium sulphate was effective in reducing the signs of superficial thrombophlebitis in all areas but it was more effective in swelling and sign of infection minimizes there will be normal body temperature evidenced by above result.

Tables 4 depict that, the hypertonic saline application was found to be effective as compared to glycerin magnesium sulphate in reducing pain, erythema and induration. In case of swelling, glycerin magnesium sulphate seems to be effective than hypertonic saline.

### Discussion

In present study hypertonic saline and glycerin magnesium sulphate both interventions were effective on superficial thrombophlebitis. This findings were supported by a study conducted by jaya bharathi, glycerin magnesium sulphate application was effective than the cold application on reduction of thrombophlebitis among patients received intravenous therapy [7].

The finding of the study shows that the hypertonic saline application was found to be effective as compared to glycerin magnesium sulphate in reducing pain, erythema and induration. In case of swelling, glycerin magnesium sulphate seems to be more effective than hypertonic saline.

### Conclusion

The results of the study showed that hypertonic saline was found to be more effective as compare to glycerin magnesium sulphate application in selected parameters. Glycerin magnesium sulphate application was found to be very effective when compared with hypertonic saline in reducing swelling. This study concludes that the magnesium products as well as hypertonic saline are very effective in reducing superficial thrombophlebitis. It is a very cost effective method with minimal

**Table 1:** Demographic Data

N=20

Demographic data	Items	Frequency	Percentage (%)
Age	18-25 years	05	25
	26-35 years	02	10
	36- 45 years	02	10
	Above 45	11	55
Gender	Male	11	55
	Female	09	45
Occupation	Daily wages	07	35
	Government employee	01	05
	Private employee	01	05
	Housewife	09	45
	Others	02	10
BMI for age	Underweight	09	45
	Healthy weight	09	45
	Overweight	02	10
Type of fluid infused	Crystalloids	02	10
	Free water solution (Dextrose/ Normal Saline)	14	70
	Crystalloids and colloids	04	20
Type of infusion	Continuous	11	55
	Intermittent	09	45
Number of injections per day	Less than 2	08	40
	2-4	07	35
	4-6	03	15
	More than 6	02	10
Rate of IV infusion	Less than 50ml/hr	03	15
	50-100 ml/hr	15	75
	More than 100 ml	02	10
Total amount of fluid infused in 24 hrs	Less than 250ml	04	20
	250-500 ml	09	45
	500-1000 ml	06	30
	More than 1500 ml	01	05
Size of cannula	Gauge 18	0	0
	Gauge 20	0	0
	Gauge 22	20	100
Site of cannula	Cephalic	01	05
	Antebrachial	11	55
	Dorsal palm	07	35
	Wrist and Antecubital Fossa	01	05
No. of prick during IV cannulation procedure	Less than 2 times	15	75
	2-4 times	05	25
Joint involved	Yes	0	0
	No	20	100
Duration of IV cannula in situ	Less than 2days	10	50
	2-4 days	10	50
Duration of infusion	0-5 days	16	80
	8-15 days	03	15
	16-30 days	01	05
Duration of IV set usage	1-2 days	09	45
	2-4 days	11	55
Cannula inserted by	Staff Nurse	20	100
Cannula dressing status	Clean	16	80
	Soiled	04	20
Cannula flush	Yes	20	100
Period of hospital stay	0-7 days	11	55
	8-15 days	07	35
	16-25 days	02	10

**Table 2:** Effectiveness of Hypertonic Saline Dressing

Parameters	Pre Treatment		Post Treatment		Paired Differences		t-value	p-value
	Mean	SD	Mean	SD	Mean	SD		
Pain	1.00	0.00	0.40	0.51	0.60	0.51	3.67	0.005,S
Erythema	1.40	0.96	0.60	0.96	0.80	1.39	1.80	0.104,NS
Swelling	1.80	1.54	0.90	1.44	0.90	2.02	1.40	0.193,NS
Induration	2.00	2.10	0	0	2.00	2.10	3.00	0.015,S
Pyrexia	0	0	0	0	0	0	-	-

**Table 3:** Effectiveness of Glycerin Magnesium Sulphate

Parameters	Pre Treatment		Post Treatment		Paired Differences		t-value	p-value
	Mean	SD	Mean	SD	Mean	SD		
Pain	1.00	0.00	0.80	0.42	0.20	0.42	1.50	0.168,NS
Erythema	1.20	1.03	0.80	1.03	0.40	1.57	0.80	0.443,NS
Swelling	2.40	1.26	0.30	0.94	2.10	2.02	3.28	0.010,S
Induration	2.80	1.93	0.80	1.68	2.00	2.10	3.00	0.015,S
Pyrexia	1.00	2.10	0.00	0.00	1.00	2.10	1.50	0.138,NS

**Table 4:** Comparison of the effectiveness of the two modalities of treatment in the reduction of thrombophlebitis after the application of interventions

Parameters	Hypertonic Saline		MgSO <sub>4</sub>		Paired Differences		t-value	p-value
	Mean	SD	Mean	SD	Mean	SD		
	Pre Treatment							
Pain	1.00	0.00	1.00	0.00	-	-	-	-
Erythema	1.40	0.96	1.20	1.03	0.20	0.44	0.447	0.660,NS
Swelling	1.80	1.54	2.40	1.26	0.60	0.63	0.949	0.347,NS
Induration	2.00	2.10	2.80	1.93	0.80	0.90	0.885	0.388,NS
Pyrexia	0	0	1.00	2.10	1.00	0.11	1.500	0.151,NS
	Post Treatment							
Pain	0.40	0.51	0.80	0.42	0.40	0.21	1.89	0.074,NS
Erythema	0.60	0.96	0.80	1.03	0.20	0.44	0.44	0.66,NS
Swelling	0.90	1.44	0.30	0.94	0.60	0.54	1.09	0.28,NS
Induration	0	0	0.80	1.68	0.80	0.53	1.50	0.15,NS
Pyrexia	0	0	0.00	0.00	-	-	-	-

resources, requires minimal training too, and very easy to use with no complications. The study was conducted only on a small sample and limited participants for a very short period thus generalization is not possible.

## References

- Endacott R et. al., Clinical Nursing Skills, Core and Advanced. Oxford: Oxford University Press. 2009.
- Di Nisio M, Wichers I.M, Middeldorp S. Treatment for superficial thrombophlebitis of the leg. Cochrane Database Systematic Review 2013;4:CD004982.
- Moureau N. Vascular safety: it's all about PICCs. Nursing Management 2006;37:22e27.
- Maki DG, Mermel LA. Infections due to infusion therapy. In: Bennett JV, Brachman PS, eds. Hospital Infections. Philadelphia, Pennsylvania: Lippincott-Raven Publishers; 1998:689e724.
- Filippon LM. Diagnosis: superficial phlebitis. Emerg Med News. 2005;27:29.
- H Nasr, specialist registrar, J M Scriven, consultant vascular surgeon, Superficial thrombophlebitis (superficial venous thrombosis) BMJ 2015;350. doi: <https://doi.org/10.1136/bmj.h2039> (Published 22 June 2015) Cite this as: BMJ 2015;350:h2039.
- Jaya bharathi, P conducted study The effect of glycerin magnesium sulphate application versus cold application on thrombophlebitis among patients received intravenous therapy. 2015.

