



COMPARATIVE EFFECTIVENESS OF SALINE WATER VERSUS WARM WATER COMPRESSIONS IN REDUCING THE DEGREE OF PHLEBITIS AMONG PATIENTS WITH IV CANNULATION: A PILOT STUDY

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ABSTRACT:

The pilot study assessed the therapeutic effectiveness of warm water compresses versus normal saline. Peripheral Intravenous cannulation is an invasive procedure which predisposes the patient to an increased risk of local and systemic infection. Yet, superficial thrombophlebitis remains a common complication characterized by pain, erythema, edema, and thrombosed vein. A quasi-experimental pre-test/post-test comparative design was conducted with 20 hospitalized patients divided into a Warm Compress group ($n = 10$) and a Saline Compress group ($n = 10$). Complication severity was measured across three consecutive days (6 observation points). Split-half reliability testing confirmed high internal consistency for the rating scale ($rsb = 0.958$) (standardized). Mean severity scores declined from baseline (Day 1 PRE) to Day 3 POST in both the Warm Compress group (2.30 ± 1.80 to 0.30 ± 0.20) and the Saline Compress group (2.90 ± 2.30 to 0.70). Results stated that Both interventions demonstrated statistically significant reductions in phlebitis scores ($p < 0.001$). However, warm normal saline compression yielded a faster resolution of phlebitis by post-test evaluation at 72 hours compared to plain warm water compression ($t = 4.65$, $p < 0.001$).

Keywords: Intravenous Cannulation, Phlebitis, Warm Saline Compression, Warm Water Compression.

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INTRODUCTION

Peripheral Intravenous (I.V.) cannulation is an invasive procedure which predisposes the patient to an increased risk of local and systemic infection from micro-organisms introduced either at the time of insertion or when in situ. A common problem encountered during IV therapy is the phlebitis, i.e. the inflammation of the venous wall near the point of entry of the cannula into the veins. It is often due to patient movement and disruption of vein at the site of insertion of the cannula. This may also occur due to the use of inappropriate size of catheter for vein, prolonged use of IV catheter and use of same IV line for IV therapy for a long time. The occurrence and severity of phlebitis can be influenced by several factors such as size of catheter, its insertion, frequency of medication administration. So, early identification and proper management of phlebitis are very essential.

LITERATURE REVIEW

Peripheral intravenous catheterization is one of the most frequently performed invasive procedures in hospitalized patients and is an essential component of intravenous therapy.

Lavery and Smith (2007) discussed the risks associated with peripheral vascular access devices and emphasized the importance of prevention and appropriate risk management. The authors highlighted that peripheral venous cannulation, although a common nursing intervention, carries inherent risks for patients. Their review focused on appropriate insertion practices, identification of short- and long-term complications, regular assessment of the vascular access device, and the competence of healthcare professionals. The authors also emphasized that nurses should continuously evaluate whether the catheter is still clinically required and should remove it when it is no longer necessary. These recommendations underline the importance of continuous assessment rather than considering catheter insertion as a procedure that ends once the device has been placed.

The *Lippincott NursingCenter* (2015) review of complications associated with peripheral intravenous therapy further emphasizes the need for nurses to recognize complications at an early stage and implement appropriate preventive measures. Complications associated with peripheral intravenous therapy can affect the effectiveness of treatment and may cause additional discomfort or harm to patients. From a nursing perspective, careful observation of the insertion site, assessment of catheter function, appropriate maintenance, and prompt intervention when abnormalities are identified are essential components of peripheral intravenous catheter care. This literature supports the need for systematic monitoring of patients receiving peripheral intravenous therapy.

Marsh et al. (2015) conducted a Cochrane systematic review examining the effectiveness of different dressings and securement devices used to prevent complications associated with peripheral venous catheters. The review included six randomized controlled trials involving 1,539 participants. The studies compared transparent dressings, gauze, bordered transparent dressings, securement devices, tape, and sticking plaster. The findings suggested that transparent dressings may reduce accidental catheter dislodgement compared with gauze; however, the evidence was considered very low quality. The effects of different dressings on complications such as phlebitis and infiltration were unclear. Overall, the authors concluded that there was insufficient evidence to establish that one particular dressing or securement device was superior to another. They recommended further high-quality randomized controlled trials to establish the most effective methods of securing peripheral venous catheters.

Ray-Barruel et al. developed the I-DECIDED tool to provide a structured approach to peripheral intravenous catheter assessment and clinical decision-making. The tool incorporates systematic assessment of the patient's peripheral intravenous catheter, including the need for the device, its function, the insertion site, complications, dressing and securement, patient education, documentation, and the decision regarding continued use or removal. In the subsequent clinimetric evaluation, the tool demonstrated strong content validity among vascular access experts and clinicians, as well as high inter-rater reliability. The overall inter-rater agreement was 87.13%, and assessment using the tool took approximately two minutes. These findings indicate that a structured assessment tool can provide a feasible and reliable approach to improving peripheral intravenous catheter assessment in clinical practice.



Lavery and Smith (2007) emphasized risk prevention and ongoing evaluation, while Marsh et al. (2015) demonstrated that evidence concerning the superiority of particular securement methods remains limited. The work of Ray-Barruel et al. further contributes to this area by providing a structured decision-making approach for systematic catheter assessment.

METHODS:

A pilot comparative interventional trial was conducted with quasi-experimental design, comparative pre-test/post-test two-group design in inpatient medical and surgical wards of Maatri Medicity and Orthocare Hospital in Una Himachal Pradesh. A total of 20 adult patients exhibiting clinical signs of Grade 1, Grade 2 & Grade 3 infusion phlebitis on the Visual Infusion Phlebitis (VIP) Scale were enrolled via purposive sampling and randomly allocated into two equal groups: Group A (Experimental Group, n = 10): Received warm normal saline (0.9% NaCl) compressions. Group B (Control Group, n = 10): Received warm distilled water compressions. Inclusion Criteria: Adult patients aged 18 years above with peripheral IV cannulation showing VIP, Grade 1 (slight pain and redness at IV site) or Grade 2 (pain, erythema, swelling) or Grade 3 (pain along path, erythema, induration). • Exclusion Criteria: Patients with vesicant drug extravasation, severe peripheral vascular disease, cellulitis, burn injuries at the site, or active systemic bacteremia. Interventions: For both groups, the affected peripheral catheter was promptly removed in accordance with standard nursing safety guidelines. Interventions were initiated immediately thereafter: Group A: Sterile multi-layered gauze soaked in warm 0.9% Normal Saline maintained at 40°C–42°C applied directly over the phlebotic area for 15 minutes, three times daily (TID) for 72 hours. Group B: Sterile gauze soaked in boiled, cooled warm distilled water maintained at 40°C–42°C applied identically for 15 minutes, TID for 72 hours.

RESULTS

It concluded that Both Warm Compresses and Normal Saline Compresses demonstrated significant therapeutic efficacy in reducing infusion-induced phlebitis grades over a 3-day intervention period. However, Warm Saline Compress therapy achieved a faster, better symptom resolution, yielding lower mean severity scores across all daily evaluations and a comparatively higher rate of complete recovery by Day 3. Both groups demonstrated immediate post-application relief. The mean phlebitis score dropped by 0.50 points in the normal saline compress group (2.30 to 1.80) and by 0.60 points in the warm water compress group (2.90 to 2.30). By the conclusion of Day 3, 80% (8 out of 10) of patients in the warm Saline compress group achieved complete resolution (score = 0), compared to 60% (6 out of 10) in the warm water compress group.

Table 1: Daily Mean Phlebitis Severity Scores across Intervention Groups (N = 20)

Intervention Group (N=10)	Day 1 Pre Test (Mean)	Day 1 Post Test (Mean)	Day 2 Pre Test (Mean)	Day 2 Post Test (Mean)	Day 3 Pre Test (Mean)	Day 3 Post Test (Mean)	Overall Reduction
Saline Compress Group	2.30	1.80	1.30	0.70	0.30	0.20	-91.3%
Warm Compress Group	2.90	2.30	2.10	1.10	0.70	0.70	-75.9%

Table 2: Baseline Demographic Profile of Study Participants

Parameter	Saline Warm Compress (N=10)	Warm Water Compress (N=10)	Total (N=20)
Mean Age (Years ± SD)	40.5 ± 23.4	43.6 ± 18.7	42.05 ± 20.7
Age Range	18-81 years	18-81 years	18-81 years



CONCLUSIONS & RECOMMENDATIONS

Warm compress application demonstrates superior overall clinical efficacy compared to normal saline compress in accelerating the healing of infusion-induced phlebitis. It significantly shortens the duration of vascular inflammation, leads to lower severity scores across all observation intervals, and achieves a 91.3% total reduction in severity index compared to 75.9% in the saline group. Therefore, warm compress therapy is strongly recommended as the preferred first-line non-pharmacological nursing intervention for localized peripheral intravenous phlebitis

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