

Effectiveness of Guggul Application on Intravenous Infiltration

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Abstract: Guggul is a small thorny tree and an important herb in Ayurveda treatments. The purpose of this study was to assess the effectiveness of Guggul paste application on Intravenous infiltration among hospitalised patients. An experimental pre-test post-test – control group design was used. 60 patients having intravenous infiltration were randomly assigned to the experimental and control group. Guggul paste was applied on the infiltrated site and observations were carried out using the Infusion nurses' society infiltration scale at an interval of 12 hours for three days. Results indicated that both guggul application and other standard care measures like magnesium sulphate dressing, warm compress, thrombophob ointment application were effective in reducing Intravenous infiltration however guggul was slightly better ($p < 0.05$). Further investigation on a larger sample is required to generalise the findings.

Keywords: Guggul, Intravenous Infiltration, Thrombophob Ointment, Hot Fomentation.

I. INTRODUCTION

Infiltration-the inadvertent leakage of a nonvesicant solution into surrounding tissue-and extravasation-the inadvertent leakage of a vesicant solution into surrounding tissue¹-are both known risks of intravenous (IV) therapy.² While the injury is usually minor and resolves spontaneously,³ some cases result in serious complications, including full-thickness skin loss and muscle and tendon necrosis requiring reconstructive surgery or even amputation, leading to longer hospital stays, increased morbidity,³ and increased costs.^{4,5} However, management of infiltration and extravasation lacks evidence-based standardization, and many institutions do not have adequate policies and procedures in place. Barriers to optimal management include failure to identify the problem in a timely fashion; failure to disseminate or update management information; inadequate staffing; high staff turnover; lack of knowledge about effective treatments and cost.

Almost 80 – 90 percent of the patients admitted to acute care hospitals receive some form of peripheral IV therapy as a part of the treatment. The most common complications associated with peripheral intravenous infusions are infiltration and extravasation. Although eliminating the occurrence of complication is nearly impossible, the risk for infiltration and extravasation can be considerably reduced by understanding the process of occurrence, selecting the right veins and equipment therapy that has been ordered, and monitoring the site of infusion. The incidence of peripheral vein extravasation has been reported to range from 0.1% to 6.5% ⁽⁶⁾ The effect of IV infiltrations though is patient discomfort and need for re-insertion of an IV, which requires time and increases the cost of hospitalization for the patients Large infiltrations may cause serious outcomes like marked tissue damage. The extent of injury from infiltration is often related to how much of the fluid or medication has leaked into the tissues, and the time when intervention was started. Early detection of infiltrations or extravasations is therefore essential for prevention of nerve damage and/or tissue sloughing, which may require surgery. Failure to detect infiltrations early may lead the patient to permanent disfigurement and loss of function. Traditionally several methods have been used to treat infiltration and phlebitis. Guggul is a naturally occurring product available early in markets has the anti-inflammatory properties, is comparatively safe and cheap. The main purpose of the study was to compare the effectiveness of Guggul versus conventional treatment in intravenous infiltration management.

1.1 Need Of The Study

Intravenous catheterization is one of the most widespread procedures in health care environments. Close to 90% of all hospitalized patients receive intravenous catheters (IVs). A third of patients have unnecessary tubes (cannula) inserted when they are in hospital, needlessly exposing them to serious complications such as infection and blood clots.² In a study

of 168 peripheral cannulas, it was found that the incidence of infiltration and phlebitis was as high as 31.5% and 29.8%⁶ Intravenous infiltrations is the most common ill effect of IV therapy which can be easily prevented. Although it seems harmless it is quite distressing for the patient causing undue pain and discomfort. Patients' complain of pain and irritation is often neglected by the health care providers. Sometimes thrombosis occurs, the infusion drip stops, and the patient develops thrombophlebitis

Several studies have assessed the effectiveness of nursing interventions in prevention and reduction of Intravenous infiltration. In a comparative study on effectiveness of hot versus cold application it was found that there was more satisfaction in patients receiving hot fomentation than cold compress. Hot fomentation was found to be more effective than cold in reduction of infiltration⁷. A quasi-experimental study to assess the effectiveness of tanshinone, magnesium sulphate and hirudoid in the treatment of infusion phlebitis on 150 inpatients with infusion phlebitis found that the excellence rate was 64% in tanshinone group, 36% in hirudoid group and 18% in magnesium sulphate group, the differences was statically significant at level of $p=0.05$. The efficacy rate was 94% in tanshinone group, 80% in hirudoid group and 60% in magnesium sulphate group, the differences was statically significant at level of $p=0.001$.⁸

A quasi experimental study was conducted to assess the effectiveness of cold application, heparinoid application and magnesium-sulphate application on superficial thrombophlebitis among patients in selected hospitals of Indore. The finding of the study suggested that all three interventions were effective in reducing the signs and symptoms of superficial thrombophlebitis. However, the mean difference of magnesium sulphate group (18.34) was higher than the cold application (13.33) and heparinoid application (12.8) group. This study concluded that magnesium sulphate application is most effective intervention in reducing the superficial thrombophlebitis.^(9,10.)

Although the review of literature highlighted the availability of several methods which have been found to be effective in reducing Intravenous complications, there was very little evidence on the use of Guggul for Intravenous infiltration. Guggul is a dry gum resin and has potent anti-inflammatory effects. Guggul is the exudate of small, perennial shrub or trees (4 to 6 feet) of *Commiphora mukul*. The exudates are collected by making incisions in the bark of the tree. The English name of Guggul is Indian Bedellium. Guggulu isolates have been found useful in curing many diseases like rheumatism, arthritis, hyper-lipidemia, obesity, inflammation, atherosclerosis, wrinkles, and acne.¹¹ A study was conducted to compare the effect of sitz bath versus guggul dhupan on episiotomy pain in selected hospitals, Pune. Quasi experimental approach was used. The sample consisted of 60 postnatal mothers, 30 were selected for treatment with sitz bath both (group A) and 30 with guggul dhupan (Group B). Results showed that (53.3%) postnatal mothers were having severe episiotomy pain before giving sitz bath and 56.7% of postnatal mothers were having mild pain after sitz bath and the difference was statistically significant 63.3% postnatal mothers were having severe episiotomy pain before guggul dhupan and 80% of postnatal mother were having mild pain after guggul.¹² Although there is empirical proof for effective treatment for infiltration there is scanty evidence to prove that guggul is effective in reducing intravenous infiltration, as guggul has an anti-inflammatory property and has been used in arthritis, skin infections, there is a need to study the effect of guggul in reducing the inflammation caused by intravenous infiltration. Guggul is cheap, easily available and has no known side effects.

2. RESEARCH METHODOLOGY

An experimental research using a quantitative research design was conducted. The participants were divided into experimental and control groups. The study was conducted in a large 369 bedded hospital in India. Participants with intravenous infiltration admitted to the medical surgical ward of this hospital were selected. 60 subjects were selected and randomly assigned to the experimental and control group

2.1. Inclusion criteria

- 1) Adult patients with intravenous infiltration admitted to medical surgical wards
- 2) Subjects who are willing to participate in the study

2.2. Exclusion criteria

- 1) Patient with severe thrombophlebitis and peripheral catheter related infection.
- 2) Subjects who are critically ill.

2.3. Data Collection instrument

After an extensive review of literature and consultation with experts the tool was developed and consisted of three sections.

Section A- Demographic data

Section B- Checklist to assess the Clinical variables related to infiltration

Section C- Modified (INS- infiltration scale) observational tool to assess infiltration.

2. 3. Reliability & Validity

Reliability of the tool was done by using inter-rater reliability technique. The tool was considered reliable since reliability index was 0.9.

Content validity was performed by experts in the field of medicine and nursing. The Item content validity index was computed to be 0.8

2.4. Data Collection

Formal permission was obtained from the respective hospital authority. Ethical approval for gained from the hospital ethical review board as well as the institutional ethical review committee. Each randomly selected participant was individually explained the purpose of the study and a written informed consent was signed by the participant. A pre intervention observation of the infiltration site was carried out by the investigator to assess the degree of infiltration.. The Guggul paste was prepared by boiling Guggul powder in water in the proportion of 1:1.5. A sensitivity test was performed to assess if the participant is allergic to guggul. This was done by applying a thin layer of guggul paste over a small area on the forearm. If any irritation or redness was present on the area after half an hour the participant was considered to be allergic to Guggul None of the participants were found to be allergic. Every 12 hours the site was cleaned and observed and a fresh application of the paste was done. Seven participants dropped out due to discharge prior to completion of the course of interventions. The participants in the control group received conventional treatment with thrombophob ointment or hot fomentation. Observations were made for 3 days at 12 hourly intervals. Observation 1 was the baseline observation following which six observations were made at 12 hourly intervals.

3. RESULTS AND DISCUSSION

The data was analysed as per the objectives of the study. The null hypothesis was stated as follows:

“There is no difference between the effect of guggul application and conventional treatment for intravenous infiltration.”

3.1. Demographic findings

Majority of the participants (50.0%) from experimental and (43.3%) from control group were in the age group of 21-40 years with a significant number of them being males [20 (66.7%) in the control group and 21(70.0%) from experimental group]. It was also found that 10 (33.3%) in control group and 13 (43.3%) in the experimental group have completed their education up to secondary level.

3.2. Assessment of clinical variables

A majority (43.3%) from the control group had developed infiltration on second day of the intracath insertion, while (43.3%) from experimental group had developed infiltration on third day of the intracath insertion. Majority of subjects in the control group (46.7%) had intracath placed over the back of the palm while (50.0%) in the experimental group had intracath over the forearm. In control group 14 (46.7%) were having intracath of size 20 and another 14 (46.7%) had an intracath of size 22, while in experimental group, majority 16 (53.3%) had intracath of size 22.

In experimental group 16 (53.3%) had intracath inserted only for administration of medications; while in the control group 14 (46.7%) the intracath was placed for the purpose of giving infusion amounting to 1000-2000ml of fluid daily. In the control group majority 12 (40.0%) received isotonic solution while majority of participants in experimental group 18 (60%) received other solutions like metrogyl, medications in Normal Saline, antibiotics etc. None of the subjects in the study group received hypotonic solutions.

The infusions were given at a drop rate of 55-78 drops/ min in majority 14 (46.7%) of the subjects in control group while it was 31-54 drops/ min for 20 (66.7%) participants in experimental group. Only one (3.3%) participant had flow rate set ranging from 103- 126 drops/ min. This section of the analysis indicated that although majority (46.7%) patients received only 1000-2000 ml of fluids / day, at an average flow rate of 55 – 78 drops / min (46.7%) they had develop infiltration.

This signifies the severity of infiltration as a complication of IV therapy requiring safe and effective interventions to tackle it.

3.3. Effect of Guggul application on IV infiltration

A paired t test was used to assess the effectiveness of Guggul application on intravenous infiltration. T values of this comparison over days one to six were 4.4, 17.7, 13.5, 14.3 and 17 at 29 degrees of freedom. The corresponding p-values were less than 0.05 (of the order of 0.000) at 29 degrees of freedom.

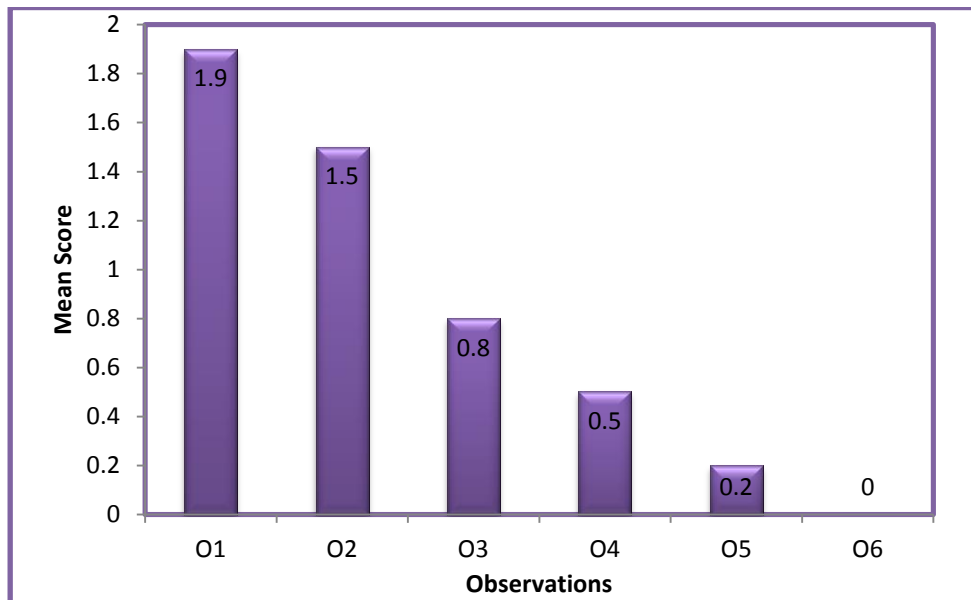


Figure 1 - Mean of infiltration observation Scores following Guggul application Scores

3.4. Effectiveness of conventional treatment on IV infiltration

Using a paired 't' test the effectiveness of conventional care on intravenous infiltration was analysed. T values of this comparison over days one to six were 2.7, 0.9, 12.13, 14.3 and 17.5 at 29 degrees of freedom. The corresponding p-values were less than 0.05 at 29 degrees of freedom. Thus it was concluded that conventional treatment was also effective on intravenous infiltration.

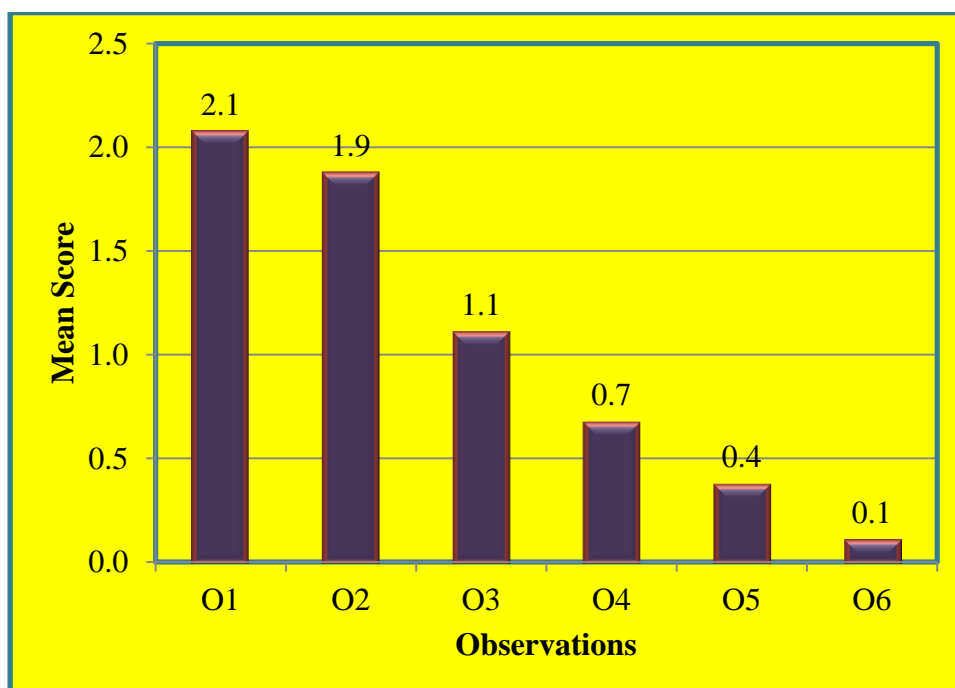


Fig 2: Mean of infiltration observation scores following conventional treatment

3.5. Comparison of conventional treatment and Guggul application

A comparison of the effectiveness of conventional treatment with Guggul application on IV infiltration revealed that Guggul was more effective on second observation indicating a quick and effective reduction in grade of infiltration. The Calculated value of t (2.449) is greater than tabulated value (2.0) at second observation. Whereas the third to sixth observations indicate that both treatments are equally effective.

3.6. Association of clinical variables with IV infiltration

Fisher's exact test was done to associate clinical variables with IV infiltration. It revealed that the p -value corresponding to volume of infusion is 0.017 which is less than p value at 0.05. There was significant association of volume of infusion and intravenous infiltration at $p < 0.05$

4. CONCLUSION

The study concluded that both Guggul and conventional treatments are equally effective in reducing IV infiltration. It is evident that IV infiltration invariably occurs in almost all the patients receiving. Singh et al (2003) have reported that Guggul has an anti-inflammatory effect in osteoarthritis patients. In the study on 30 male and female participants WOMAC total score significantly improved ($p < 0.0001$) after taking guggul supplement for one month¹³. A study to evaluate anti-inflammatory effect of Guggul on cultured human middle ear epithelial cells showed that the guggulsterone has inhibitory effect on TNF- α expression and COX-2 production and it may be mediated through its inhibition of nuclear factor- κ B activation. Findings provided an insight into the molecular mechanisms underlying the anti-inflammatory activities of guggulsterone in relationship to otitis media¹⁴. The study findings have also indicated that Guggul has definite anti-inflammatory activity which can be beneficially used in treating Intravenous thrombophlebitis and infiltration

4.1. Implications:

The study has implication in nursing practice, nursing education, administration, research and in community setting. Nurses play an important role in rendering supportive and educative care to all the patients. This study provided evidence for practicing the use of Guggul to treat all the patients with intravenous infiltration, Guggul is cost effective and easy to use and can be safely recommended for use in clinical practice. Alternative and complementary is already being included in nursing education. The use of such safe herbs in nursing care could be taught to the students. Nursing teachers can use the results of the study as an informative illustration for the students, emphasising evidence based nursing practice. This will help in inculcating values and sense of responsibility in the students to use newer and cost effective treatment for the patients according to the evidence based practice. The findings of the study can be used as a basis of in service education programs for nurses so as to make them aware about the emerging complication of thrombophlebitis.

4.2. Recommendations

The authors recommend replicating the study on a larger sample for generalization. Comparing the effect of Guggul with specific treatment methods like hot fomentation or cold therapy or thrombophlebitis is likely to give better results. An exploratory study may be conducted to assess the use of complementary medicine in treatment of complications related to intravenous therapy. The frequency of guggul application may be increased and its effect may be studied.

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