

A Comparative Study of Magnesium Sulphate and Glycerin Dressing Versus Glycerin Dressing Alone for Cellulitis in Diabetics

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Abstract

Background: Acute bacterial non-necrotizing cellulitis, or erysipelas, is an acute infection of the dermis and subcutaneous tissue, characterized by erythema, swelling, warmth and pain. Cellulitis has an incidence of 16.4 to 24.6 per 1000 persons-years [1]. Cellulitis is an acute, painful and potentially serious infection associated with significant morbidity and healthcare costs [2]. In the present study, cellulitis denotes acute, nonsuppurative, superficial skin infection of presumed bacterial origin. Prompt diagnosis and treatment leads to faster recovery and reduces the risk of serious complications and long-term health problems. Supportive nursing measures can ease symptoms and provide comfort during the acute phase. Cellulitis is a widely prevalent condition, especially in a country like India, with the highest population of diabetics. Cellulitis most typically occurs in the leg, and less often in the upper extremity, in the face, or other parts of the body. Around 50% of people who develop cellulitis suffer from longstanding oedema following the infection. Thus reducing oedema is important, as it improves venous return, maintains skin health and reduces the risk of recurrent infection [3]. **Objectives:** The purpose of this study is to study, establish and compare two treatment modalities namely, Magnesium Sulphate & Glycerin paste dressing versus plain Glycerin dressing for cellulitis in diabetic patients. **Methods:** The present prospective study was done in the Department of General Surgery,

Basaveshwar Teaching and General Hospital, attached to Mahadevappa Rampure Medical College, Kalaburagi, Karnataka. A total of 60 diabetic patients with cellulitis of limbs were divided into 2 groups (Group A- MgSO₄+ Glycerin paste dressing, Group B - Plain Glycerin dressing) and were subjected to the above mentioned treatment modalities respectively and followed up, to assess the outcome with respect to improvement in oedema, erythema and pain associated with cellulitis. **Results:** The average (Mean) number of days required for erythema to resolve in Group A patients - 5.33±1.32 days, while for patients in Group B it was - 19.5±4.12 days, which is statistically significant (p<0.0001). These findings suggest towards anti-inflammatory action/property of MgSO₄+ Glycerin paste dressing. The average(Mean) number of days required for oedema to resolve among Group A patients was - 12.56±2.55 days, while among Group B patients it was - 38.56±9.67 days, which was statistically significant (p<0.0001). These findings re-establish the hygroscopic nature of MgSO₄+ Glycerin paste and hence its role in resolving oedema from cellulitis areas. There is very limited evidence showing action of MgSO₄ in relieving pain associated with wounds. In our study we found that, the mean duration required for total relief from pain among cellulitis patients, treated with MgSO₄+ Glycerin paste dressing was 3.9±1.06 days, as against 15.06±3.15 days needed for patients in plain Glycerin dressing group(p<0.0001). This suggests that MgSO₄+ Glycerin paste indeed helps in alleviating pain as against plain Glycerin dressing, in cellulitis. The overall beneficiary effects of MgSO₄+ Glycerin paste can be emphasized clearly by comparing the average length of hospital stay for patients- which was 13.76±2.84 days for Group A versus 41.03±10.96 days for Group B. **Interpretation & Conclusion:** Based on the findings of this study, it can be concluded that MgSO₄+ Glycerin paste dressing is better than plain Glycerin dressing, for reducing oedema in patients with cellulitis. In this study the

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overall length of hospital stay (LOS) was significantly less for patients treated with MgSO₄+ Glycerin paste dressing. The findings of this study are also suggestive of the possible anti-inflammatory action of MgSO₄+ Glycerin paste dressing, as evidenced by lesser duration required for resolution of erythema and pain among cellulitis patients treated with this modality.

Keywords: Cellulitis; Diabetes Mellitus; Magnesium Sulphate and Glycerin paste; Oedema; Erythema.

Background

Acute bacterial non-necrotizing cellulitis, or erysipelas (most probably from Greek “erythros”, red, and “pella”, skin), is a skin infection affecting the dermis and subcutaneous tissue [4]. Until the recent decades, the most typical location of erysipelas was the face. At present, erysipelas is most commonly located in the leg [5]. There is some confusion in the terminology concerning cellulitis and erysipelas. In the present study, cellulitis is defined as acute bacterial non-necrotizing cellulitis, which corresponds to erysipelas (in Finnish study). Thus, suppurative conditions are excluded, as well as necrotizing infections. For practical reasons, the term “cellulitis” is used in the text to denote acute non-necrotizing cellulitis, which is the subject of the present study.

Cellulitis is not uncommon. Incidence is estimated to be 200/100 000 persons/year [6]. The incidence of cellulitis has likely been quite stable throughout the 20th century, but case fatality rate has declined close to zero after the introduction of penicillin. The exact pathogenetic mechanisms behind the clinical manifestations of cellulitis are unknown. Although bacterial etiology is not always possible to ascertain, BHS and especially group A BHS (GAS) is considered the main pathogen. The role of Staphylococcus aureus as a causative agent in diffuse non-suppurative cellulitis is controversial [4,7]. A typical clinical picture of cellulitis is an acute onset of erythematous skin lesion, with more or less distinct borders, accompanied with, often high, fever. Treatment of cellulitis consists of administration of antibiotics and supportive measures. Skin breaks, chronic oedema and obesity have most consistently been found associated with acute and recurrent cellulitis [8,9,10].

The number of adults who are vulnerable to developing cellulitis is growing in line with the population ageing and rising levels of obesity and diabetics [11]. Cellulitis damages the lymphatic system and increases the risk of oedema and lymph edemas. Around 50% of people who develop

cellulitis suffer from longstanding oedema following the infection. Thus reducing oedema is important, as it improves venous return, maintains skin health and reduces the risk of recurrent infection [12].

Supportive measures can ease symptoms and provide comfort during the acute phase. From this understanding, arises the need to study and compare measures to reduce oedema. Cellulitis is a widely prevalent condition, especially in a country like India, with the highest population of diabetics! The mainstay of treatment of cellulitis in the recent past has been antibiotic therapy and plain compression dressing. Hence the purpose of this study is to compare two treatment modalities namely- Magnesium Sulphate+Glycerin paste versus plain Glycerin dressing and identify the better option for treating patients suffering from cellulitis in our setup.

Aims & Objectives

- 1) To study and establish the role of Magnesium Sulphate with Glycerin dressing in cases of cellulitis in Diabetics.
- 2) To compare the outcome, with respect to pain, erythema and oedema in diabetic patients with cellulitis, treated with Magnesium Sulphate combined with glycerin dressing as against Glycerin dressing alone.

Materials and Methods

The present study was a prospective study and was carried out at Department of General Surgery, Basaveshwar Teaching and General Hospital attached to Mahadevappa Rampure Medical College, Kalaburagi, Karnataka, from January 2017 to June 2018.

Source of Data: Diabetic patients diagnosed with cellulitis of limbs.

Sample size: A total of 60 patients were divided into two groups of 30 each.

Sampling Procedure: The sample size of 60 patients (diabetic) diagnosed with cellulitis were studied. MgSO₄ + Glycerin paste dressing was used for Group A - 30 patients, while plain Glycerin dressing was used for Group B - 30 patients.

Selection criteria

A. Inclusion

- Diabetic patients clinically diagnosed with

cellulitis of limb.

- Patients aged >18 years.

B. Exclusion

- Patients with known allergies to MgSO₄ and Glycerin.
- Non-diabetic patients with cellulitis.
- Patients with co-existing necrotizing fasciitis, folliculitis, septic bursitis, septic arthritis, carbuncles and furuncles.

Method of collection of data

The selected patients were interviewed and their demographic data and clinical history was recorded. Further the patients were subjected to physical examination and relevant investigations and the assigned treatment modality. The findings were recorded and tabulated in a predesigned proforma.

Procedure

Diabetic patients diagnosed with cellulitis were subjected to the treatment modality assigned to their respective group and were followed up until discharge from the hospital. They were observed and studied with respect to the improvement in limb oedema, resolution of erythema and complete relief from pain. The findings thus recorded, were tabulated and studied to reach to a conclusion.

Outcome

- The length of stay (LOS) of the patients in each group was recorded and compared.

- A pain scale ranging from 0-10, with 0 being no pain and 10 being severe pain, was used to record the pain in the affected limb and followed up until discharge.
- A clinical tool (subjective) was devised and used to follow up the patients with respect to resolution of oedema and erythema and the data was recorded.

Results

A total of 60 patients were divided into 2 groups, of 30 patients each, as follows:

- Group A - MgSO₄ + Glycerin paste dressing.
- Group B - Plain Glycerin dressing.

The data obtained was tabulated and analyzed. The final results and observations were tabulated as below.

In the present study, most number of patients in Group A were in the age group of 41-60 years (11 patients, 36.66%) and equally in the range of 61-80 years (11 patients, 36.66%). The same findings were noted for Group B too. i.e. 11 patients (36.66%) each in the age group of 41-60 years and 61-80 years. The mean age of patients in Group A was: 56.56 years, whereas it was 54.90 years in Group B. (Table 1).

In the present study of 60 patients, most were males - 46 (76.66%) while the rest were females-14 (23.34%). In the study Group A comprised of 23 (76.66%) males and 7 (23.34%) females. Group B also had 23 (76.66%) males and 7 (23.34%) females (Table 2).

In the present study, the minimum LOS for a

Table 1: Age Distribution

	Age Range (in years)				Total	Standard Deviation (SD)
	21-40	41-60	61-80	>80		
Group A	6 (20%)	11 (36.66%)	11 (36.66%)	2 (6.66%)	30 (100%)	16.72
Group B	8 (26.66%)	11 (36.66%)	11 (36.66%)	0 (0%)	30 (100%)	16.94
Total	14 (23.33%)	22 (36.66%)	22 (36.66%)	2 (3.33%)	60 (100%)	

p value = 0.50

Table 2: Sex Distribution

	Male	Female	Total
Group A	23 (76.66%)	7 (23.34%)	30 (100%)
Group B	23 (76.66%)	7 (23.34%)	30 (100%)
Total	46 (76.66%)	14 (23.34%)	60 (100%)

patient in Group A was 9 days while it was 25 days for a patient in Group B. The maximum LOS for a patient in Group A was 18 days, while it was 66 days for a patient in Group B. The average (Mean) LOS in Group A was 13.76 days. The average (Mean) LOS in Group B was 41.03 days (Table 3).

In the present study, the minimum number of days required for erythema to resolve completely, for a patient in Group A was 3 days, while it was 13 days for a patient in Group B. The maximum number of days required for erythema to resolve for a patient in Group A was 8 days, while it was 28 days for a patient in Group B. The average (Mean) number of days required for erythema to resolve in Group A patients - 5.33 days. The average (Mean) number of days required for erythema to resolve in Group B patients - 19.5 days (Table 4).

In the present study, the minimum number of days required for oedema to resolve completely among Group A patients was 9 days, while it was

24 days in Group B patients. The maximum number of days required for oedema to resolve completely among Group A patients was 18 days, while it was 60 days in Group B patients. The average (Mean) number of days required for oedema to resolve among Group A patients - 12.56 days. The average (Mean) number of days required for oedema to resolve among Group B patients - 38.56 days (Table 5).

In the present study, the minimum number of days required for complete pain relief among Group A patients was 2 days, while it was 10 days among Group B patients. The maximum number of Days required for complete pain relief was 6 days among group A patients, while it was 22 days among Group B patients. The average (Mean) number of days required for pain to resolve among Group A patients - 3.9 days. The average (Mean) number of days required for pain to resolve among Group B patients - 15.06 days (Table 6).

Table 3: Length of Stay (LOS)

	Minimum LOS	Maximum LOS	Average Length of hospital stay (LOS) in days (Mean)	Standard Deviation (SD)
Group A	9	18	13.76	2.84
Group B	25	66	41.03	10.96

p value = <0.0001

Table 4: Days Required for Erythema to Resolve

	Minimum days required	Maximum days required	Average no. of days required (Mean)	Standard Deviation (SD)
Group A	3	8	5.33	1.32
Group B	13	28	19.5	4.12

p value = <0.0001

Table 5: Days Required for Oedema to Resolve

	Minimum days required	Maximum days required	Average number of days required (Mean)	Standard Deviation (SD)
Group A	9	18	12.56	2.55
Group B	24	60	38.56	9.67

p value = <0.0001

Table 6: Days Required for Pain to Resolve

	Minimum days required	Maximum days required	Average number of days required (Mean)	Standard Deviation (SD)
Group A	2	6	3.9	1.06
Group B	10	22	15.06	3.15

p value = <0.0001

Discussion

Cellulitis is an inflammatory condition of the skin and subcutaneous tissue, characterized by erythema, swelling, warmth and pain. Cellulitis has an incidence of 16.4 to 24.6 per 1000 persons-years [1]. Cellulitis is an acute, painful and potentially serious infection associated with significant morbidity and healthcare costs [2]. Prompt diagnosis and treatment leads to faster recovery and reduces the risk of serious complications and long-term health problems. Supportive nursing measures can ease symptoms and provide comfort during the acute phase.

The number of adults who are vulnerable to developing cellulitis is growing in line with the population ageing and rising levels of obesity and diabetics [11]. Cellulitis damages the lymphatic system and increases the risk of oedema and lymph edemas. Around 50% of people who develop cellulitis suffer from longstanding oedema following the infection. Thus reducing oedema is important, as it improves venous return, maintains skin health and reduces the risk of recurrent infection [3].

The mainstay of treatment of cellulitis in the recent past has been antibiotic therapy and plain compression dressing. Hence the purpose of this study was to compare the efficacy of two dressing modalities, i.e. MgSO₄ + Glycerin paste versus plain Glycerin and identify the better option for treating patients suffering from cellulitis in our setup.

This prospective study was carried out in Basaveshwar Teaching and General Hospital attached to Dept. of General Surgery, Mahadevappa Rampure Medical College, Kalaburagi, Karnataka. Based on the average hospital data, 60 diabetic patients diagnosed with cellulitis of limb/limbs were included in the study. MgSO₄+Glycerin paste dressing was used for 30 patients (Group A), while plain Glycerin dressing was used for another 30 patients (Group B).

In the present study, most number of patients in Group A were in the age group of 41-60 years (11 patients, 36.66%) and equally in the range of 61-80 years (11 patients, 36.66%). The same findings were noted for Group B too. i.e. 11 patients (36.66%) each in the age group of 41-60 years and 61-80 years. The mean age of patients in Group A was: 56.56±16.72 years, whereas it was 54.90±16.94 years in Group B. However the difference observed in age distribution and the mean age was statistically not significant (p>0.050).

Magnesium Sulphate or Epsom salt, contains Magnesium, has a hygroscopic action, which helps

to alleviate the pain and inflammation of injuries such as sprains and strains. The Southwest Council of Naturopathic Medicine and Health Sciences recommend using Epsom salt compresses to take away the pain and swelling of insect bites and stings. In a study done by Biswas D, in Kolkata, 2005, it was said that glycerin with Magnesium Sulphate was being used effectively in the treatment of swelling in phlebitis [13]. The treatment with Glycerin + Magnesium Sulphate emulsion also takes less time as compared to that taken by 50% Magnesium Sulphate solution [14].

Glycerin + Magnesium Sulphate paste application was found to be very effective when compared with Magnesium Sulphate fomentation in reducing swelling and duration, in patients with oedema due to phlebitis [15]. External application of magnesium sulphate is usually adopted to reduce local inflammation and swelling in clinical practice. Once the magnesium sulphate is mixed with glycerin, the glycerin can effectively prevent its evaporation and extend its duration of action [16].

In the present study, the minimum number of days required for erythema to resolve completely, for a patient in Group A was 3 days, while it was 13 days for a patient in Group B. The maximum number of days required for erythema to resolve for a patient in Group A was 8 days, while it was 28 days for a patient in Group B. The average (Mean) number of days required for erythema to resolve in Group A patients - 5.33±1.32 days, while for patients in Group B it was - 19.5±4.12 days, which is statistically significant (p<0.0001). These findings suggest towards anti-inflammatory action/property of MgSO₄+ Glycerin paste dressing.

In the present study, the minimum number of days required for oedema to resolve completely among Group A patients was 9 days, while it was 24 days in Group B patients. The maximum number of days required for oedema to resolve completely among Group A patients was 18 days, while it was 60 days in Group B patients. The average (Mean) number of days required for oedema to resolve among Group A patients was - 12.56±2.55 days, while among Group B patients it was - 38.56±9.67 days, which was statistically significant (p<0.0001). These findings re-establish the hygroscopic nature of MgSO₄+ Glycerin paste and hence its role in resolving oedema from cellulitis areas.

There is very limited evidence showing action of MgSO₄ in relieving pain associated with wounds. In our study we found that, the mean duration required for total relief from pain among cellulitis patients, treated with MgSO₄+Glycerin paste dressing was

3.9±1.06 days, as against 15.06±3.15 days needed for patients in plain Glycerin dressing group ($p < 0.0001$). This suggests that MgSO₄+ Glycerin paste indeed helps in alleviating pain as against plain Glycerin dressing, in cellulitis.

The overall beneficiary effects of MgSO₄+ Glycerin paste can be emphasized clearly by comparing the average length of hospital stay for patients- which was 13.76±2.84 days for Group A versus 41.03±10.96 days for Group B.

Conclusion

1. Based on the findings of this study, it can be concluded that MgSO₄+ Glycerin paste dressing is better than plain Glycerin dressing, for reducing oedema in patients with cellulitis, by virtue of its hygroscopic action.
2. In this study the overall length of hospital stay (LOS) was significantly less for patients treated with MgSO₄+ Glycerin paste dressing.
3. The findings of this study are also suggestive of the possible anti-inflammatory action of MgSO₄+ Glycerin paste dressing, as evidenced by lesser duration required for resolution of erythema and pain among cellulitis patients treated with this modality.

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