

# Efficacy of Topical Sucralfate and Conventional Dressing in the Treatment of Diabetic Ulcer

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## Abstract

**Background:** Diabetic ulcers are one of the most serious and debilitating consequences of diabetes mellitus. They are difficult to cure, and they frequently result in limb amputation. Sucralfate and platelet-rich plasma used topically to chronic ulcers, particularly diabetic ulcers, have the potential to improve healing outcomes.

**Aim:** The goal of this study is to see how effective sucralfate and platelet-rich plasma therapy are at improving diabetic ulcer wound healing.

**Materials and Methods:** The current investigation enlisted the participation of 100 diabetic ulcer patients. The initial wound area was reported following sharp debridement after a thorough clinical evaluation and appropriate studies.

**Results:** In our study, it was observed that participants receiving sucralfate dressing had a better area of reduction of 43.78% as compared to the control group receiving only conventional dressing (normal saline dressing) in whom the mean area of reduction was 28.72% ( $P < 0.0001$ ).

**Conclusion:** Sucralfate dressing is an efficient modality for facilitating wound area reduction in diabetic foot ulcer patients, and it can be used as an adjuvant to traditional treatment (conventional dressings and debridement) for faster and better diabetic ulcer healing.

**Key words:** Blood sugar level, Diabetic ulcer, Sucralfate dressing, Topical application, Wound healing

## INTRODUCTION

Diabetic ulcers are one of the most dangerous consequences of diabetes mellitus. Not only can these ulcers take a long time to heal, but they can also cause disability and even limb loss. A diabetic ulcer is a long-term wound that develops on the diabetes patient's feet's soles. Diabetic ulcers are most commonly connected with neuropathy and vasculopathy in the form of peripheral arterial disease, which affects the diabetic patient's lower limb. Diabetic ulcers affect around 2–5% of the world's population.<sup>[1]</sup> Diabetics' hyperglycemic state produces molecular and physiological changes that make diabetic ulcers more difficult to heal, increasing the risk of secondary infection and, if not treated effectively,

limb amputation. Diabetic ulcers are responsible for over 90% of all lower limb amputations, with a 5.5% annual mortality rate attributable to diabetic ulcers.<sup>[2]</sup>

A vast number of novel dressings have been introduced throughout the previous 212 decades. People have used *Aloe vera*, benzoyl peroxide, collagen, gentian violet, impregnated gauze, topical phenytoin, mercurochrome, oxygen treatment, sugar, and vinegar as non-conventional topical wound healing methods. Topical sucralfate has also been shown to enhance healing of decubitus ulcers, venous stasis ulcers, traumatic wounds, burns, and trophic ulcers, and to be superior therapy of diabetic ulcers in studies.<sup>[3]</sup> The major goal of diabetic ulcer management is to prevent diabetic ulcers from becoming infected and causing more damage, potentially leading to limb amputation. Wound debridement, wound dressing, revascularization treatments, infection management, and ulcer off-loading are all part of a comprehensive diabetic ulcer treatment plan. One of the most difficult aspects of diabetic ulcer wound healing is starting the wound repair regeneration process, even when

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the ulcers have been properly treated.<sup>[4]</sup> Even when patients are treated with gold-standard therapy, diabetic ulcers take an average of 6 months to heal, with a 30% recovery rate. Even with gold-standard therapy, 14% of patients will have their limbs amputated, and 12.8% of patients will die. As a result, we can infer that the treatment for diabetic ulcers took a long time, was ineffective, and was not cost-effective.

Sucralfate is a cytoprotective medication used to treat ulcers in the gastrointestinal tract, such as gastric ulcers, duodenal ulcers, and gastritis. Sucralfate can also be used topically in open wounds, according to newer studies, and has shown to be effective in the treatment of persistent ulcers.<sup>[1]</sup> Sucralfate's capacity to prevent and mend wounds is linked to its ability to maintain blood vessel integrity. Vasculopathy is one of the key pathological processes in diabetes mellitus, as we all know. As a result, sucralfate aids in the maintenance of normal blood flow, increasing the bioavailability of wound healing growth factors.<sup>[5]</sup> Sucralfate dressing, mupirocin dressing, hemocoagulase dressing, oxum solution, and other topical treatments have been explored for decades. Treating an ulcer with a moist wound healing treatment speeds up the process of reepithelialization.<sup>[1]</sup> The efficacy of sucralfate versus conventional dressing in the healing of diabetic ulcers is compared in this study.

## MATERIALS AND METHODS

This prospective study was carried out at Hospital's Department of Surgery in Government Medical College Hospital, Ramanathapuram. Patients with long-standing diabetic ulcers (>2 weeks) were recruited, with 50 patients randomly assigned to the study group and 50 patients to the control group.

### Inclusion Criteria

Patients aged 12–75, with diabetic ulcers that has been presented for more than 2 weeks and a diameter of 15–15 cm, and who have agreed to receive topical sucralfate therapy.

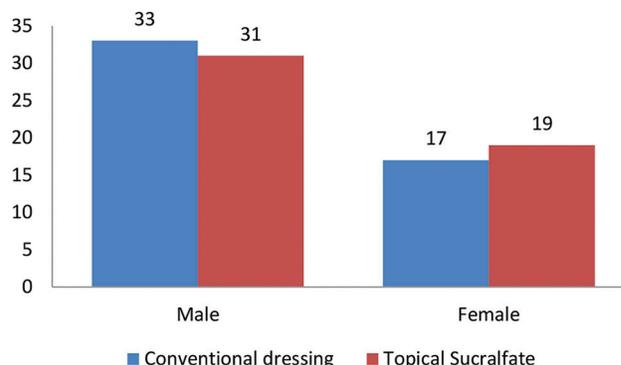
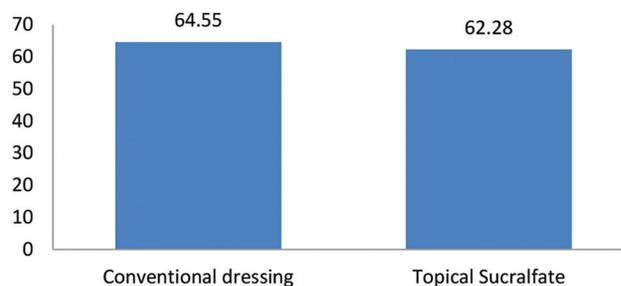
### Exclusion Criteria

Immunocompromised patients, concomitant septicemia and osteomyelitis, skin cancers, diabetic ketoacidosis, exposed bones, tendons, and charcot joint of the 100 patients, 50 were treated with regular saline dressings while the other 50 were treated with sucralfate dressings. Both groups used off-loading of pressure from the affected area and did not use antibiotics. The ulcers were photographed before and after the dressings, as well as the ulcers' culture and sensitivity before and after the dressings. The initial wound area was measured following sharp debridement by measuring length × width (ulcer should be 15 cm × 15 cm) after a thorough clinical evaluation and related tests. Both groups were given dressings once a day.

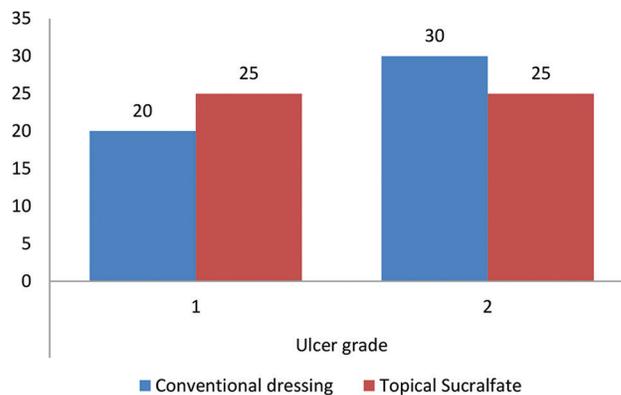
In both groups, patients were monitored on a daily basis for 3 weeks. Planimetry was used to measure the area of the target ulcer using a clear graph sheet as the outcome.

## RESULTS

The average age of the trial participants was 64.55 years in the conventional dressing group and 62.28 years in the topical sucralfate therapy group.

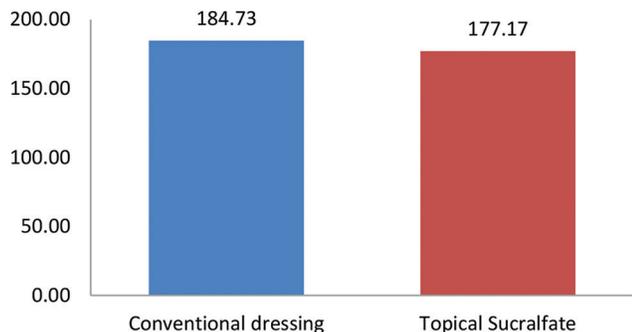


Incidences of diabetic ulcers were more in males (64%) as compared to females (36%). Among the group receiving conventional treatment, 33% were male and 17% were female. In topical sucralfate therapy group, 19% were female and 31% were male.

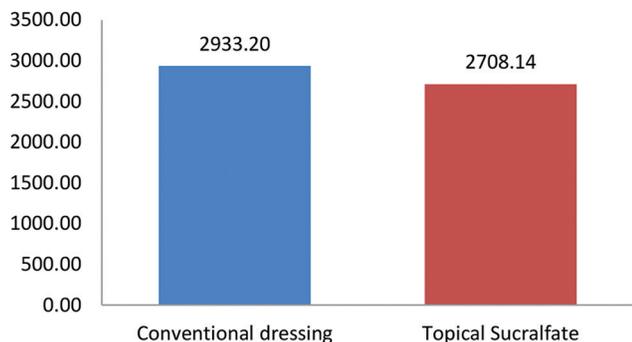


Grade 1 ulcer was observed in a lower rate of incidence (45%) compared to grade 2 (55%). The topical sucralfate

therapy group comprised of 25% of patients in grades 1 and 2, while 20 and 30% of patients were found to be in grades 1 and 2 in the group that received conventional dressing.



The random blood sugar (RBS) levels were higher in the group that received conventional dressing (184.73 mg/dl) while a comparatively lower RBS level was observed in the other group (177.17 mg/dl).



Surface area before (in mm<sup>2</sup>) The surface area of ulcer in the group that was categorised to receive conventional dressing was 2933.2 mm<sup>2</sup> and that in the other group was 270.14 mm<sup>2</sup>.

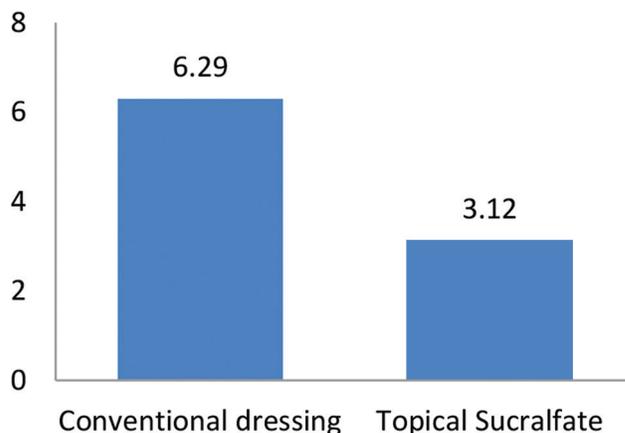
Group	Mean	Std. Deviation	P-value
% of Reduction in surface area			
Conventional dressing	28.72	9.22	<0.0001
Topical Sucralfate	43.78	7.56	

There was a reportedly larger reduction in surface area of ulcer (43.78) in the group that received topical sucralfate therapy group compared to a 28.72% reduction observed in conventional dressing therapy group.

Duration of healing in weeks. The group that received conventional dressing reported a healing time of 6.29 weeks and that of topical sucralfate therapy group was 3.12 weeks.

## DISCUSSION

Diabetic ulcers are one of the most common surgical complications. Various treatments for treating these ulcers



have been used in the past. The idea that ulcers should be kept dry is rapidly fading. A wide range of novel dressings have been created over the last quarter-century. Sucralfate therapy is found to be the most effective at speeding up the healing of diabetic ulcers. Sucralfate has been demonstrated in preclinical studies to promote the granulation tissue formation and thus promoting cutaneous ulcer healing.<sup>[6]</sup> In light of previous research on the efficiency of sucralfate in diabetic ulcers, we conducted this study to see if sucralfate administered topically to diabetic ulcers effectively reduces wound size when compared to a standard saline dressing (conventional treatment).

The mean age group of patients with diabetic ulcer was found to be 64.55 and 62.28 in groups that received conventional treatment as well as that received topical sucralfate therapy respectively. A similarly reported mean age group was 56 and 58 years in conventional dressing group and sucralfate group respectively.<sup>[7]</sup> A predominance of ulcer incidence in males was also reported by Nagalakshmi *et al.*<sup>[11]</sup> and Preethi *et al.*<sup>[7]</sup> similar to our study results. The Pressure Ulcer Scale for was used to assess the severity of ulcer that indicated 55% of patients in grade 2 that was comparatively higher than those in grade 1 (45%). Pourandish *et al.*,<sup>[8]</sup> who published a comparative examination of pressure ulcer healing with topical daily application of sucralfate and silver sulfadiazine, employed the Pressure Ulcer Scale for Healing instrument to evaluate the ulcer healing process.

Foot ulcers (sores) can develop in diabetics for a variety of causes. Nerve injury and restricted blood supply to the feet and legs are examples. High blood glucose levels may impair the capacity of foot ulcers to heal; hence, strict blood glucose control may be advantageous.<sup>[9]</sup> As a result, the RBS of the patients was determined. RBS level of over 177.17 mg/dl was observed in patients. In a previous study conducted by Shabhay *et al.*,<sup>[10]</sup> it was reported that High blood glucose levels and anaemia

seem to be also important risk factors for patients of diabetic foot ulcer patients undergoing major limb amputation.

The group that got topical sucralfate medication apparently had a greater reduction in ulcer surface area (43.78). Nagalakshmi *et al.*<sup>[1]</sup> earlier found a similar reduction in surface area in diabetic foot ulcer patients treated with Sucralfate. It has the ability to aid in the healing of skin lesions. Sucralfate causes dermal fibroblasts and keratinocytes to proliferate. It also boosts interleukin-1-stimulated interleukin-6 release from fibroblasts and increases prostaglandin E2 synthesis in basal keratinocytes. Sucralfate increased the thickness of granulation tissue when applied daily to full-thickness wounds. It also hastens the epithelialization of second-degree burns.

A number of studies have found that applying sucralfate to a wound improves the healing process.<sup>[11]</sup> Sucralfate has been shown in preclinical experiments to enhance the production of granulation tissue, which aids in the healing of cutaneous ulcers as evidenced by the results of this study reporting healing in 3.12 weeks by sucralfate. In a prior study, individuals who received Sucralfate dressing had a better area of reduction of 40.87% than those who received only conventional dressing (normal saline dressing), with a mean area of reduction of 15.62%. Sucralfate improves wound healing in diabetic ulcers, according to these findings, which are statistically significant. In addition, the sucralfate group took 2.68 weeks to heal the ulcers completely, compared to 5.36 weeks in the control group.<sup>[3]</sup>

Every surgeon wishes for an optimal dressing, one that improves chronic ulcer healing without causing complications. A successful wound dressing should keep the wound moist and avoid any negative side effects such as infection, maceration, or allergies.

## CONCLUSION

The wounds in the sucralfate dressing group contracted more than the wounds in the control group, indicating that sucralfate dressing is an effective modality for facilitating wound area reduction in diabetic foot ulcer patients and can be used as an adjunct to conventional treatment (conventional dressings and debridement) for faster and better healing of diabetic ulcers.

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