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## **Original Research**

# Assessment of outcome of collagen dressing in the treatment of diabetic foot ulcers

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#### ABSTRACT:

**Background:** To assess the outcome of collagen dressing in the treatment of diabetic foot ulcers. **Materials & methods:** 40 patients with diagnosis of diabetic foot ulcer were included in the present study. Pre-treatment evaluation of the lesion was also done. Collagen dressing was done in all the patients and was changed at regular follow-up visits. Effect of collagen dressing was recorded. **Results:** Mean pre-treatment wound area was 38.35 mm<sup>2</sup> while mean post-treatment wound area was 19.11 mm<sup>2</sup>. Significant reduction in wound area post-dressing was seen in present study. **Conclusion:** In managing patients with diabetic foot ulcer, collagen dressing is effective in enhancing early wound healing.

Key words: Diabetic, foot ulcer, Collagen

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#### INTRODUCTION

Diabetic foot ulcers are common and estimated to affect 15% of all diabetic individuals during their lifetime. It is now appreciated that 15 - 20% of patients with such foot ulcers go on to need an amputation. Almost 85% of the amputations are preceded by diabetic foot ulcers. Numerous risk factors for the development of foot ulcers have been suggested, the most important being peripheral sensory neuropathy followed by peripheral vascular The proportion of disease. neuropathic, neuroischemic, and purely ischemic lesions in diabetics is 54, 34, and 10%, respectively.<sup>1-3</sup> Since the development of foot ulcers and amputations are preventable and this condition can greatly affect the quality of life of patients, prevention of this complication can relieve direct and indirect cost burdens on society.<sup>3, 4</sup>

Collagen type I (Col-I) is deem required to attract GFs towards the wound site and to initiate wound healing and tissue regeneration. However, in the DFU case, the epidermis is ulcerated, leading to the disruption of the extracellular matrix contributing to tissue integrity loss resulting in Col-I deficiency. Besides that, it hinders the normal proliferation and

migration of fibroblasts to the wound area and eventually slows down the wound healing. Scientifically, it was proven that collagen accelerates wound healing and enhances re-epithelisation.<sup>4-6</sup> Hence; we assessed the outcome of collagen dressing in the treatment of diabetic foot ulcers.

#### **MATERIALS & METHODS**

40 patients with diagnosis of diabetic foot ulcer were included in the present study. Clinical and demographic details of all the patients were included. Clinical examination was done. Exclusion criteria for the present study included:

- Patients with presence of any cancerous or precancerous condition,
- Patients with osteomyelitis

Pre-treatment evaluation of the lesion was also done. Collagen dressing was done in all the patients and was changed at regular follow-up visits. Effect of collagen dressing was recorded. All the results were recorded and analysed by SPSS software.

#### RESULTS

50.8 years was the mean age of the patients with majority of the patients being males. Mean pre-

treatment wound area was  $38.35 \text{ mm}^2$  while mean post-treatment wound area was  $19.11 \text{ mm}^2$ .

Significant reduction in wound area post-dressing was seen in present study.

Table 1: Comparison of wound area

Wound area (mm <sup>2</sup> )	Before dressing	Two weeks after dressing
Mean	38.35	19.11
SD	8.2	4.1
p- value	0.0010 (Significant)	

#### DISCUSSION

Diabetic foot ulcer and the related excess morbidity and mortality as a consequence of foot problems in people with diabetes represent a major public health challenge. The most frequent cause of hospitalization of diabetic patients is serious foot or lower extremity problems. Furthermore, 40% to 70% of all nontraumatic major (lower limb) amputations are performed on patients with diabetes. The resulting burden to society in terms of costly health care cannot be underestimated. The treatment of diabetic ulcers is complex. Even when properly managed, the wounds may not heal as well as expected; when they do heal, the closure is often temporary and difficult to maintain. Medical intervention to prevent ulcer formation and subsequent amputation is imperative to reduce health care costs and to improve the quality of life of diabetic patients. Several methods of offloading that reduce the mechanical stress on the foot have been recommended for the treatment of diabetic ulcers. These include bed rest, crutches, walking casts and splints, prefabricated walkers and splints, patellar tendon-bearing braces, foam pads, cutout sandals, and healing footwear. In granulating wounds, the topical application of wet-to-dry gauze has traditionally been used and acknowledged as a standard of care.7-10Hence; we assessed the outcome of collagen dressing in the treatment of diabetic foot ulcers.

In the present study, 50.8 years was the mean age of the patients with majority of the patients being males. Mean pre-treatment wound area was 38.35 mm<sup>2</sup> while mean post-treatment wound area was 19.11 mm<sup>2</sup>. Significant reduction in wound area postdressing was seen in present study.Park KH et al examined the effectiveness and safety of collagen dressing material in DFU treatment. Patients were treated with foam dressing alone (control group) or with a porcine type I collagen dressing material (collagen group). Complete ulcer healing rate was the primary endpoint, and healing velocity and time to 50% size reduction were secondary endpoints. Thirty patients were included (collagen group: 17, control group: 13). There were no significant differences in demographic factors or baseline DFU characteristics. Compared to the control group, the collagen group presented a higher rate of complete healing, faster healing velocity (P < .05), and shorter median time to 50% size reduction. Wound management using collagen materials in DFUs showed faster and complete healing rate.<sup>10</sup>

A study was done by Dumont and co-workers (2018), using a tridimensional collagen-based matrix, GBT013, a collagen-based dressing applied to the DFU patients proved that collagen has the ability to deteriorate MMPs and increases cell proliferation rate. It has been demonstrated to have more than 44% reduction in the ulcerated area of non-healing ulcers. A randomised and prospective study on proteasemodulated ORC dressing or collagen matrix was performed by Kloeters and co-workers for treating pressure on sore ulcers. The subjects receiving ORC or collagen matrix treatment showed a positive healing rate with a drastic reduction of plasmin level from the fifth until 28th day and elastase from the fifth day with 100% absence of intolerant towards the treatment and infection. Through this study, it has been proven that low level of plasmin activity accelerates angiogenesis by increasing the level of VEGF that plays a pivotal role in wound healing. This finding has been further supported by Tahergorabi and co-workers (2012), revealing that VEGF has a higher potential to mediate abnormal angiogenesis.11-14

Wound healing is a complex process that involves the timely expression of numerous growth factors that promote cellular migration and proliferation, production of new connective tissue matrix, and collagen deposition. In addition, diabetic foot ulcers are chronic wounds that are stuck in the inflammation phase and show a cessation of epidermal growth or migration over the wound surface. A common characteristic of all chronic wounds is the elevation of the levels of matrix metalloproteinases, which results in increased proteolytic activity and inactivation of the growth factors involved in the wound-healing process. The combined use of collagen and oxidized regenerated cellulose has been shown to specifically inhibit the action of these proteases without affecting the activity of the growth factors. Thus, theoretically, Promogran may be an advantageous alternative to the moistened gauze that is the current standard of care.<sup>13-15</sup>

#### CONCLUSION

Collagen dressing is effective in treating Diabetic foot ulcers thereby assisting in early wound healing.

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