

Combined super-oxidized therapy: an effective treatment for chronic wounds



Author:
Harikrishna KR Nair

Managing chronic wounds is always a challenge in current healthcare, this study aims to assess the efficacy of combined super-oxidized therapy in treating chronic wounds. Ten patients were enrolled, and treatment efficacy was assessed by changes in wound size, pain score via Visual Analogue Scale and exudate level for period of 1 month. Statistical analysis was done using Wilcoxon Signed Ranks Test and paired T-Test. Patient satisfaction with treatment outcome was collected too. Overall there was significant reduction in wound size, pain and exudate level with good patient satisfaction on treatment outcome. No adverse events were reported.

Chronic wounds impose a significant burden on the patients, their relatives, and healthcare systems around the globe. A chronic wound is defined as one that has failed to proceed through an orderly and timely reparative process to produce anatomic and functional integrity within 3 months or that has proceeded through the repair process without establishing a sustained and anatomic and functional result (Werdin et al, 2009; Jäbrink et al, 2017). Based on data from Wound Healing Society, around 15% of older adults in the US suffer from chronic wounds, predominantly diabetic foot ulcers, venous ulcers and pressure sores. Every year 2 to 3 million more Americans are diagnosed with various types of chronic wounds (Cheng et al, 2011). In China, the incidence of chronic ulcers in hospitalized patients ranged from 1.5% to 20.3%. In another study, among 580 wounds in 489 patients, 63% were ulcers on the lower extremities (Fu, 2005). In Malaysia, a study showed that among patients assessed for diabetic foot complications, leg amputation, vascular surgery, and active ulcer/gangrene were present in 3.8%, 2%, and 1.5% respectively (Mafauzy et al, 2011).

Chronic wounds might take few years to heal, and some could remain unhealed for decades. During this period, patients may experience severe pain, significant physical as well as emotional distress, challenge on mobility and social isolation (Walshe, 1995). Besides that, chronic wounds not only can cause severe physical and emotional trauma to the patients themselves but also to their families (Augustin and Maier, 2003). Rising cost on wound care management is also an alarming global issue, in USA alone, estimated cost of US\$20 billion per

year has to be spent which involves 5.7 million people, about 2% of population (Frykberg et al, 2015). Another report from UK stated that the expenditure for management of chronic wounds is about 3% of total healthcare expenditure in developed countries (Posnett et al, 2008). A more recent study from Wales using data from NHS showed that chronic wounds have a prevalence of 6% and management of the wounds accounts for 5.5% of NHS expenditure (Phillips CJ et al, 2015). Chronic non-healing wounds would thereby impose an immense financial burden to the society, not only through an economic burden on the health care system but also through a reduction in productivity (Augustin M et al, 2014).

The combined super-oxidized therapy used in this study comprised of super-oxidized solution and super-oxidized hydrogel which are based on patented Microcyn technology produced by Sonoma Pharmaceuticals, Petaluma, CA, USA (Formerly Oculus Innovative Sciences), containing highly stable small molecule oxychlorine compounds including hypochlorous acid. The super-oxidized solution and super-oxidized hydrogel are non-cytotoxic and non-irritating advanced wound care products which have broad-spectrum antimicrobial and anti-inflammatory properties, as well as able to improve wound bed vascularity and promote granulation tissue formation (Landa Solis et al, 2005; Sasai-Takedatsu et al, 1997; Dumville et al 2013). These properties promote wound healing and help to reduce wound odour significantly (Microcyn® Technology, 2017). A combination of these super-oxidized wound care products can enhance chronic wound healing, which is often associated with higher bacteria diversity

Harikrishna KR Nair is
Head and Consultant of
Wound Care Unit, Department
of Internal Medicine, Kuala
Lumpur Hospital, Malaysia

and antimicrobial-resistant strains than acute wounds (Wong et al, 2015). Super-oxidized therapy has been used mainly in diabetic foot infection. In a study, super-oxidized solution was proven to have greater improvement compared with povidone-iodine as an antiseptic in infected diabetic foot (Paola et al, 2006). The efficacy of super-oxidized therapy was also compared to saline on one hundred patients with diabetic foot ulcers, where super-oxidized solution group had shorter hospital stay compared to saline-treated group and an improvement of grading of diabetic foot ulcer (Hadi et al, 2007). In a study conducted on 1249 venous ulcers, improved periwound tissue oxygen concentration as well as healing time using super-oxidized therapy was observed (Bongiovanni, 2014). In another study done on venous leg ulcers, super oxidized solution improved healing and reduced lesion in size by over 60% (Selkon et al, 2006).

The purpose of this study is to find out that combined super-oxidized therapy can be a cost-effective treatment for chronic wounds.

Methodology

This case series involved ten patients with 6 diabetic foot ulcer cases, 3 venous ulcer cases, and 1 lower extremity ulcer case at Wound Care Unit, Hospital Kuala Lumpur for a period of 1 month. Patients who came to the unit during weekdays, from 8 am until 12.30 pm and fulfilled the inclusion criteria were included in the study.

Inclusion criteria:

- Diabetic foot ulcer, venous ulcer, and other lower extremity chronic wounds
- Wound surface area of at least 0.5 cm² and maximum of 25 cm² (by flexible plastic measuring tape)
- Additional wounds may be present but not within 3 cm of the study wound
- Compliance with two visits per week
- Use studied super-oxidized wound care products during dressing at a local clinic.

Exclusion criteria:

- Patient with wound greater than 25 cm²
- Patient with a known history of poor compliance with medical treatments
- Patients who were participating in another clinical study
- Patients who were receiving radiation therapy or chemotherapy
- Patient who refused to give informed consent.

Patients who agreed to participate in this study

would receive recommended dressing steps for combined super-oxidized therapy, which consisted of super-oxidized solution (marketed as Dermacyn wound care solution) and super-oxidized hydrogel (marketed as Dermacyn wound care hydrogel (produced by Sonoma Pharmaceuticals). Initially, gauze soaked with super-oxidized solution was applied to the wound for 10 to 15 minutes for the purpose of eliminating microbes and spores, as well as for autolytic debridement to soften slough. This was then followed by irrigation and cleaning of the wound before a thin layer of super-oxidized hydrogel was applied to the wound, then appropriate dressing was used.

Primary objectives of this combined super-oxidized therapy:

- Wound area reduction (measured by wound measurement ruler)
- Wound-related pain reduction (by VAS scores)
- Exudate level reduction.

Secondary objective of this combined super-oxidized therapy:

- Good patient satisfaction score on treatment outcome (options of Satisfied, Dissatisfied or neither satisfied nor dissatisfied).

Statistical analysis:

Primary objectives were analysed using SPSS version 20 using Wilcoxon Signed Ranks Test (wound area reduction and exudate level reduction) and paired T-Test (pain reduction).

Results

There were 13 wounds being studied among the 10 patients. All of the studied wounds had significant wound area reduction ($p < 0.001$) [Figure 1]. Besides that, all the 10 patients had significant pain reduction ($p < 0.001$) [Figure 2] and exudate level reduction ($p < 0.001$) [Figure 3]. Regarding on patient's satisfaction on treatment outcome, 9 out of 10 patients were satisfied with the treatment outcome, only 1 patient was neither satisfied nor dissatisfied with the treatment outcome. There were no adverse events reported.

Discussion and conclusion

Combined super-oxidized therapy on chronic wound management was proven to be an effective as shown in this study, with significant wound area reduction, pain reduction, and exudate level reduction among the 10 patients with 13 wounds. Patients are generally satisfied with the treatment outcome. Therefore, it can be

Posnett J, Franks PJ (2008) The burden of chronic wounds in the UK. *Nurs Times* 104(3): 44–5

Sasai-Takedatsu M, Kojima T, Yamamoto A et al (1997) Reduction of *Staphylococcus aureus* in atopic skin lesions with acid electrolytic water - a new therapeutic strategy for atopic dermatitis. *Allergy* 52: 1012–6

Selkon J, Cherry G, Wilson J, Hughes M (2006) Evaluation of hypochlorous acid washes in the treatment of chronic venous leg ulcers. *J Wound Care* 15(1): 33

Walshe C (2005) Living with a venous leg ulcer: a descriptive study of patients' experiences. *J Adv Nurs* 22(6): 1092–100

Werdin F, Tennenhaus M, Schaller HE, Rennekampff HO (2009) Evidence-based management strategies for treatment of chronic wounds. *Eplasty* 9:e19

Wong S, Manikam R, Muniandy S (2005) Prevalence and antibiotic susceptibility of bacteria from acute and chronic wounds in Malaysian subjects. *J Infect Dev Ctries* 9(09): 936–44

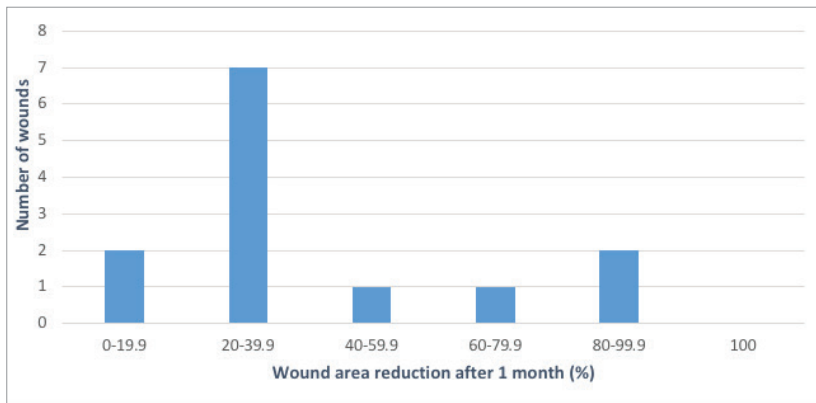


Figure 1. Effect of combined super-oxidized therapy on wound area reduction

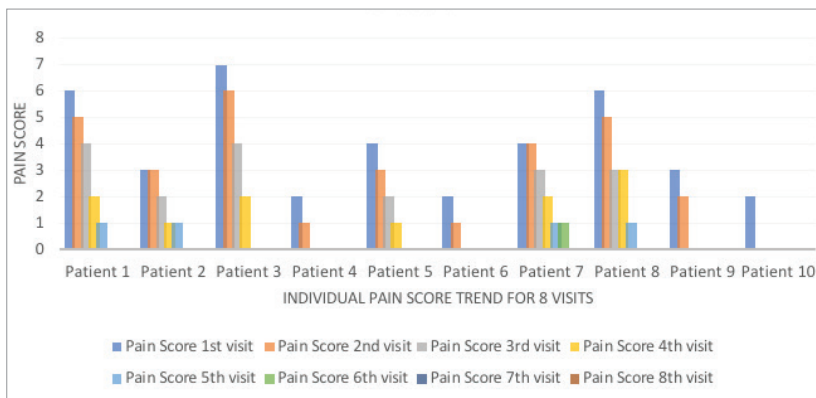


Figure 2. Effect of combined super-oxidized therapy on pain reduction

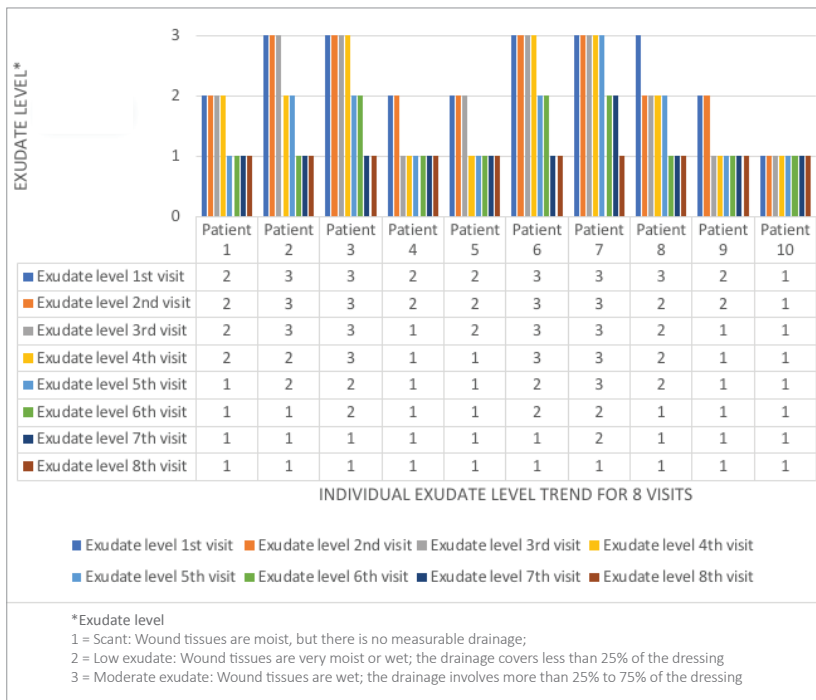


Figure 3. Effect of combined super-oxidized therapy on exudate level reduction

postulated that combined super-oxidized therapy using patented Microcyn technology with broad-spectrum antimicrobial and anti-inflammatory properties, as well as ability to improve wound bed vascularity and promote granulation tissue formation, can enhance wound healing (Goretti et al, 2007). Dermacyn wound care solution and Dermacyn wound care hydrogel were used in this study. This combined super-oxidized therapy can be used as a cost-effective treatment for the management of chronic wounds. **WAS**

References

Augustin M, Brocatti LK, Rustenbach SJ et al (2014) Cost-of-illness of leg ulcers in the community. *Int Wound J* 11(3):283-92

Augustin M, Maier K (2003) Psychosomatic aspects of chronic wounds. *Dermatol Psychosom* 4: 5-13

Bongiovanni CM (2014) Effects of hypochlorous acid solutions on venous leg ulcers (VLU): experience with 1249 VLUs in 897 patients. *J Am Coll Clin Wound Spec* 6(3): 32-7

Cheng CF, Sahu D, Tsen F et al (2011) A fragment of secreted Hsp90a carries properties that enable it to accelerate effectively both acute and diabetic wound healing in mice. *The Journal of Clinical Investigation* 121(11): 4348-61

Dumville JC, O'Meara S, Deshpande S, Speak K (2013) Hydrogel dressings for healing diabetic foot ulcers. *Cochrane Database Syst Rev* (9): CD009101

Frykberg RG, Banks J (2015) Challenges in the treatment of chronic wounds. *Adv Wound Care (New Rochelle)* 4(9): 560-82

Fu X (2005) Skin ulcers in lower extremities: the epidemiology and management in China. *Int J Low Extrem Wounds* 4(1): 4-6

Goretti C, Mazzurco S, Nobili LA et al (2007) Clinical Outcomes of Wide Postsurgical Lesions in the Infected Diabetic Foot Managed With 2 Different Local Treatment Regimes Compared Using a Quasi-Experimental Study Design: A Preliminary Communication. *Int J Low Extrem Wounds* 6(1): 22-7

Hadi SF, Khaliq T, Bilal N et al (2007) Treating infected diabetic wounds with superoxidized water as anti-septic agent: a preliminary experience. *J Coll Physicians Surg Pak* 17(12): 740-3

Järbrink K, Ni G, Sönnergren H, Schmidtchen A, Pang C et al (2017) The humanistic and economic burden of chronic wounds: a protocol for a systematic review. *Syst Rev* 6(1): 15

Landa Solis C, Gonzalez Espinosa D, Guzman Soriano B et al (2005) MicrocynTM: a novel super-oxidized water with neutral pH and disinfectant activity. *J Hosp Infect* 61(4): 291-99

Mafauzy M, Hussein Z, Chan SP (2011) The status of diabetes control in Malaysia: results of DiabCare 2008. *The Medical Journal of Malaysia* 66 (3): 175-81

Sonoma Pharmaceuticals (2017) *Microcyn® Technology*. Available at: <http://www.sonomapharma.com/microcyn-technology/> (accessed 4.06.2018)

Paola LD, Brocco E, Senesi A et al (2006) Super-oxidized solution (SOS) therapy for infected diabetic foot ulcers. *Wounds* 18(9): 262-70

Phillips CJ, Humphreys I, Fletcher J (2015) Estimating the costs associated with the management of patients with chronic wounds using linked routine data. *Int Wound J* 13(6):1193-7