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Article

Efficacy of Super Oxidized Solution Versus Povidone Iodine in the Management of Diabetic Foot Ulcers

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ABSTRACT

Background: Diabetic foot ulcers (DFUs) are a major complication of diabetes mellitus, frequently leading to infection, prolonged hospitalization, and amputation. Despite widespread use, conventional antiseptics like povidone iodine may impede healing due to cytotoxicity. Super oxidized solution has emerged as a promising alternative with strong antimicrobial activity and tissue compatibility, yet comparative clinical data remain limited. **Objective**: To compare the efficacy of super oxidized solution versus povidone iodine in the management of diabetic foot ulcers, focusing on wound healing rate, time to complete healing, and infection control. **Methods**: This randomized controlled trial included 110 patients with diabetic foot ulcers (Wagner Grade I–III) treated at the Department of General Surgery, Qazi Hussain Ahmad Medical Complex, Nowshera. Patients were randomly assigned to receive either super oxidized solution or povidone iodine dressings alongside standard diabetic foot care. The primary outcome was wound healing rate; secondary outcomes included healing duration and infection control. Weekly assessments were conducted over 4–6 weeks. Ethical approval was obtained from the institutional review board, and informed consent was secured in accordance with the Declaration of Helsinki. Data were analyzed using SPSS version 25, with $p < 0.05$ considered statistically significant. **Results**: Patients treated with super oxidized solution exhibited significantly higher wound healing rates (85.5% vs. 38.2%), shorter mean healing time (3.71 ± 0.76 vs. 5.20 ± 0.87 weeks), and improved infection resolution (83.6% vs. 41.8%) compared to povidone iodine ($p < 0.001$ for all outcomes), demonstrating both statistical and clinical significance. **Conclusion**: Super oxidized solution is significantly more effective than povidone iodine in managing diabetic foot ulcers, offering superior healing rates, faster recovery, and better infection control. Its integration into wound care protocols may reduce complications and enhance patient outcomes in diabetic populations.

Keywords: Diabetic Foot Ulcer, Super Oxidized Solution, Povidone Iodine, Wound Healing, Infection Control, Randomized Controlled Trial, Antiseptic Therapy

INTRODUCTION

Diabetic foot ulcers (DFUs) represent one of the most common and devastating complications associated with diabetes mellitus, accounting for significant morbidity, prolonged hospitalizations, and lower limb amputations globally (1). It is estimated that up to one-quarter of diabetic individuals will develop a foot ulcer during their lifetime, with recurrent ulcers and infections compounding the burden on healthcare systems and affecting patient quality of life (2). The multifactorial etiology of DFUs—including peripheral neuropathy, ischemia, and susceptibility to infection—results in delayed wound healing and progression to severe outcomes, including limb loss (3). Infected wounds and non-healing ulcers are particularly concerning, as they constitute the leading cause of non-traumatic amputations in diabetic patients, who face up to a 40-fold increased risk compared to non-diabetics (4). Hence, timely and effective wound management is critical not only to preserve limb function but also to reduce the overall disease burden.

Traditional wound care regimens often involve debridement, offloading, glycemic control, and topical antiseptics. Among

these, Povidone Iodine has been widely used due to its broad-spectrum antimicrobial activity and cost-effectiveness (5). However, evidence suggests that Povidone Iodine may impede the healing process by exerting cytotoxic effects on regenerating tissues, such as fibroblasts and keratinocytes, thus slowing epithelialization and granulation tissue formation (6). This drawback has prompted the exploration of alternative topical agents that are both antimicrobial and tissue-friendly. Super Oxidized Solution (SOS), a newer agent, has emerged as a promising candidate in wound care. It offers potent bactericidal properties through reactive oxygen species (ROS) generation while maintaining compatibility with viable tissue cells, fostering a moist healing environment, promoting autolytic debridement, and facilitating granulation (7).

Despite growing interest in SOS, comparative data against established agents such as Povidone Iodine remain limited, especially in randomized controlled settings focused on diabetic foot ulcers. Several smaller studies have suggested that SOS may outperform conventional antiseptics in promoting faster wound closure and reducing microbial load (11, 12). However, many of these investigations have lacked the rigor of randomization, employed small sample sizes, or failed to report clinically significant outcomes such as complete healing time or infection control metrics. Moreover, there is a paucity of region-specific studies that account for local wound care practices, patient compliance, and variations in microbial resistance profiles. This gap in the literature underscores the need for well-structured, statistically powered clinical trials that directly evaluate SOS against Povidone Iodine in a diabetic cohort.

In response to this need, the present randomized controlled study was designed to compare the efficacy of Super Oxidized Solution versus Povidone Iodine in the management of diabetic foot ulcers, with a primary focus on wound healing rate. Secondary outcomes included the time required for complete healing and the effectiveness of infection control. By addressing a critical clinical question with methodological rigor and incorporating real-world clinical practices, this study aims to contribute robust evidence toward optimizing DFU management. The central hypothesis guiding this research is that Super Oxidized Solution leads to superior healing outcomes compared to Povidone Iodine in patients with diabetic foot ulcers.

MATERIALS AND METHODS

Diabetic foot ulcers (DFUs) represent one of the most common and devastating complications associated with diabetes mellitus, accounting for significant morbidity, prolonged hospitalizations, and lower limb amputations globally (1). It is estimated that up to one-quarter of diabetic individuals will develop a foot ulcer during their lifetime, with recurrent ulcers and infections compounding the burden on healthcare systems and affecting patient quality of life (2). The multifactorial etiology of DFUs—including peripheral neuropathy, ischemia, and susceptibility to infection—results in delayed wound healing and progression to severe outcomes, including limb loss (3). Infected wounds and non-healing ulcers are particularly concerning, as they constitute the leading cause of non-traumatic amputations in diabetic patients, who face up to a 40-fold increased risk compared to non-diabetics (4). Hence, timely and effective wound management is critical not only to preserve limb function but also to reduce the overall disease burden.

Traditional wound care regimens often involve debridement, offloading, glycemic control, and topical antiseptics. Among these, Povidone Iodine has been widely used due to its broad-spectrum antimicrobial activity and cost-effectiveness (5). However, evidence suggests that Povidone Iodine may impede the healing process by exerting cytotoxic effects on regenerating tissues, such as fibroblasts and keratinocytes, thus slowing epithelialization and granulation tissue formation (6). This drawback has prompted the exploration of alternative topical agents that are both antimicrobial and tissue-friendly. Super Oxidized Solution (SOS), a newer agent, has emerged as a promising candidate in wound care. It offers potent bactericidal properties through reactive oxygen species (ROS) generation while maintaining compatibility with viable tissue cells, fostering a moist healing environment, promoting autolytic debridement, and facilitating granulation (7).

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RESULTS

A total of 110 patients with diabetic foot ulcers were enrolled and randomized equally into two groups: Group A (super oxidized solution) and Group B (povidone iodine), each comprising 55 patients. The mean age of the participants was 53.78 ± 12.41 years, with the majority falling within the 50–60-year age range. Gender distribution revealed a predominance of male patients across both groups (70.0% overall), consistent with previously observed demographic trends in diabetic foot pathology.

Age and gender were distributed comparably between the groups. In Group A, the majority of patients (41.8%) were aged 50–60 years, followed by 20.0% above 60 years. Group B showed a similar trend, with 45.5% aged 50–60 years and 21.8% above 60 years. Gender analysis revealed a higher proportion of male patients in both groups, with 63.6% in Group A and 76.4% in Group B. While there was a slight variation in gender ratios, no significant baseline demographic imbalance was observed.

Table 1. Descriptive Statistics of All Enrolled Patients (n = 110)

Variable	Mean ± SD / n (%)
Age (years)	53.78 ± 12.41
Age Group	
18–30 years	2 (1.8%)
31–40 years	18 (16.4%)
41–50 years	19 (17.3%)
50–60 years	48 (43.6%)
>60 years	23 (20.9%)
Gender	
Male	77 (70.0%)
Female	33 (30.0%)

Table 2. Comparison of Age and Gender Distribution Between Groups A and B (n = 110)

Characteristic	Group A (n = 55)	Group B (n = 55)
Age Group		
18–30 years	1 (1.8%)	1 (1.8%)
31–40 years	10 (18.2%)	8 (14.5%)
41–50 years	10 (18.2%)	9 (16.4%)
50–60 years	23 (41.8%)	25 (45.5%)
>60 years	11 (20.0%)	12 (21.8%)
Gender		
Male	35 (63.6%)	42 (76.4%)
Female	20 (36.4%)	13 (23.6%)

The primary outcome—rate of wound healing—was achieved in 85.5% of patients in Group A compared to 38.2% in Group B, a statistically significant difference ($p < 0.001$). This substantial disparity indicates a marked clinical advantage of super oxidized solution over povidone iodine in promoting wound closure.

Time to complete healing was significantly shorter in Group A (3.709 ± 0.761 weeks) versus Group B (5.200 ± 0.869 weeks), with $p < 0.001$. The between-group mean difference of approximately 1.5 weeks suggests a clinically meaningful acceleration in healing time attributable to super oxidized solution treatment.

Infection control was also superior in Group A, with 83.6% achieving resolution compared to only 41.8% in Group B ($p < 0.001$). The relative risk reduction in persistent infection underscores the antimicrobial efficacy of super oxidized solution.

Table 3. Comparison of Clinical Outcomes Between Groups A and B (n = 110)

Outcome	Group A (n = 55)	Group B (n = 55)	p-value
Wound Healing Achieved	47 (85.5%)	21 (38.2%)	< 0.001
Wound Healing Not Achieved	8 (14.5%)	34 (61.8%)	
Time to Complete Healing (weeks)	3.709 ± 0.761	5.200 ± 0.869	< 0.001
Infection Controlled	46 (83.6%)	23 (41.8%)	< 0.001
Infection Not Controlled	9 (16.4%)	32 (58.2%)	

The p-values across all primary and secondary outcomes were well below the conventional threshold of 0.05, indicating strong statistical significance. The large absolute differences in healing rates and infection resolution between the two groups also suggest high clinical significance. Though effect sizes were not explicitly calculated, the magnitude of difference (e.g., >40% improvement in healing rate) implies a likely large effect size (Cohen's $h > 0.8$). This strengthens the validity of the observed benefits of super oxidized solution.

No missing data or dropouts were reported, and randomization appears to have effectively balanced baseline characteristics. Post hoc analyses were not necessary due to the robust and consistent direction of treatment effects across outcomes.

These findings collectively support the conclusion that super oxidized solution significantly outperforms povidone iodine in promoting faster and more effective healing of diabetic foot ulcers, with substantial clinical implications for improved patient outcomes and reduced risk of complications.

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DISCUSSION

The management of diabetic foot ulcers (DFUs) remains a major clinical challenge due to the complex interplay of neuropathy, ischemia, and infection, which compromise wound healing and increase the risk of amputation. In this randomized controlled trial, the application of super oxidized solution demonstrated significantly better outcomes in terms of wound healing rate, time to complete healing, and infection control compared to povidone iodine. These findings align with emerging literature that highlights the clinical advantages of super oxidized solution as a wound care agent with both potent antimicrobial properties and excellent biocompatibility (6). The observed healing rate of 85.5% in the super oxidized solution group markedly exceeds the 38.2% seen with povidone iodine, reinforcing its efficacy and therapeutic potential in chronic diabetic wounds.

Previous investigations have consistently reported the cytotoxic limitations of traditional antiseptics like povidone iodine, which, while effective against a broad range of pathogens, may hinder wound repair by impairing fibroblast proliferation and epithelial regeneration (5, 14). This mechanistic drawback is substantiated by our study's results, where prolonged healing time and poorer infection control were evident in the povidone iodine group. In contrast, super oxidized solution exerts its antimicrobial effect through reactive oxygen species (ROS), disrupting microbial biofilms while preserving viable tissue, thereby creating an optimal wound environment for granulation and re-epithelialization (7). These tissue-preserving properties likely contributed to the shorter mean healing time (3.71 weeks vs. 5.20 weeks) and superior infection control (83.6% vs. 41.8%) observed in our cohort.

Comparative studies support these conclusions. Lokesh et al. reported enhanced healing and cost-effectiveness with super oxidized solution, emphasizing its moistening properties and minimal cytotoxicity (11). Similarly, Prabhakar et al. demonstrated accelerated ulcer size reduction and infection resolution in patients treated with super oxidized solution dressings compared to those using povidone iodine (12). Paparao and Reddy also noted superior clinical responses in lower limb diabetic ulcers treated with super oxidized solution, reinforcing our findings and further establishing the growing body of evidence in favor of this agent (13). The consistency of these findings across various clinical settings underlines the generalizability of super oxidized solution's benefits and its promising role in wound management protocols.

From a mechanistic standpoint, super oxidized solution appears to promote wound healing by enhancing cellular oxygenation, supporting angiogenesis, and maintaining a low microbial burden without interfering with cellular integrity. These effects not only accelerate healing but also reduce the risk of infection-related complications such as sepsis or amputation. Clinically, this translates to shorter hospital stays, reduced need for systemic antibiotics, and improved patient outcomes, particularly in resource-limited settings where diabetic foot ulcers impose a heavy financial and social burden.

Despite the strengths of this study—including randomized allocation, clear inclusion criteria, and standardized treatment protocols—certain limitations must be acknowledged. The single-center design may limit the external validity of the findings, and although the sample size was adequate for statistical power, larger multicenter studies are warranted to confirm these results across diverse populations and healthcare environments. Additionally, the study focused on short-term outcomes; long-term follow-up to assess recurrence, sustained healing, and quality of life would provide valuable insights. Cost-effectiveness analysis, patient-reported outcomes, and microbial resistance profiling were beyond the scope of this study but represent important areas for future research.

In summary, this study demonstrates that super oxidized solution is significantly more effective than povidone iodine in promoting wound healing and controlling infection in patients with diabetic foot ulcers. By offering a tissue-compatible, antimicrobial dressing alternative, super oxidized solution addresses key limitations of traditional antiseptics and presents a clinically relevant advancement in the management of diabetic wounds. Future studies should explore its long-term efficacy, economic impact, and integration into standardized DFU care algorithms to further optimize patient care and reduce diabetes-related morbidity.

CONCLUSION

This randomized controlled trial concluded that super oxidized solution is significantly more effective than povidone iodine in the management of diabetic foot ulcers, demonstrating superior outcomes in terms of wound healing rate, faster time to complete healing, and better infection control. These findings have important implications for clinical practice, suggesting that super oxidized solution offers a safer and more efficacious alternative for enhancing wound repair and preventing complications in diabetic patients. Its biocompatibility and antimicrobial efficacy support its integration into standard wound care protocols, particularly in high-risk populations. Future research should focus on long-term outcomes, cost-effectiveness, and broader implementation across diverse clinical settings to validate its role as a first-line intervention in diabetic foot ulcer management.

REFERENCES

1. Armstrong DG, Tan TW, Boulton AJ, Bus SA. Diabetic Foot Ulcers: A Review. JAMA. 2023;330(1):62–75.
2. Boulton AJ, Vileikyte L, Ragnarson-Tennvall G, Apelqvist J. The Global Burden of Diabetic Foot Disease. Lancet. 2005;366(9498):1719–24.
3. Lavanya VA, Devi AR, Kumar KS, Latha GS, Surekha A, Vijayalakshmi J, et al. Bacterial Flora in Diabetic Ulcer. J Evol Med Dent Sci. 2015;4(31):5355–63.
4. Frykberg RG, Attinger C, Smeets L, Koller A, Bal A, Kavarthapu V. Surgical Strategies for Prevention of Amputation of the Diabetic Foot. J Clin Orthop Trauma. 2021;17:99–105.
5. Babalska ZL, Korbecka-Paczkowska M, Karpinski TM. Wound Antiseptics and European Guidelines for Antiseptic Application in Wound Treatment. Pharmaceuticals. 2021;14(12):1253.

6. Alfei S, Schito GC, Schito AM, Zuccari G. Reactive Oxygen Species (ROS)-Mediated Antibacterial Oxidative Therapies: Available Methods to Generate ROS and a Novel Option Proposal. Int J Mol Sci. 2024;25(13):7182.

7. Zahedi AA, Kasediya YK, Kumar R, Singh A. A Prospective Study for Evaluation of Management of Chronic Non-Healing, Non-Diabetic Leg Ulcers. Eur J Cardiovasc Med. 2023;13(4).

8. Rodrigues BT, Vangaveti VN, Urkude R, Biros E, Malabu UH. Prevalence and Risk Factors of Lower Limb Amputations in Patients With Diabetic Foot Ulcers: A Systematic Review and Meta-Analysis. Diabetes Metab Syndr. 2022;16(2):102397.

9. Pastar I, Balukoff NC, Sawaya AP, Vecin NM, Tomic-Canic M. Physiology and Pathophysiology of Wound Healing in Diabetes. In: The Diabetic Foot: Medical and Surgical Management. Springer; 2024. p. 109–34.

10. Wang X, Yuan CX, Xu B, Yu Z. Diabetic Foot Ulcers: Classification, Risk Factors and Management. World J Diabetes. 2022;13(12):1049.

11. Akula NS, Krishna N, Sathu S. A Comparative Study of Efficacy of Povidone Iodine Versus Superoxidized Solution in Lower Limb Ulcers. J Evol Med Dent Sci. 2021;10(37):3220–4.

12. Prabhakar K, Purushotham G, Uma K. Comparison of Super-Oxidized Solution Versus Povidone Iodine in Management of Infected Diabetic Ulcers: Our Experience. Int Arch Integr Med. 2016;3:151–8.

13. Paparao S, Redd KH. A Study of Efficacy of Topical Super Oxidized Solution in Comparison With Povidone Iodine for the Management of Lower Limb Diabetic Ulcers. Res J Pharm. 2025;19:7–11.

14. Bigliardi PL, Alsagoff SAL, El-Kafrawi HY, Pyon JK, Wa CTC, Villa MA. Povidone Iodine in Wound Healing: A Review of Current Concepts and Practices. Int J Surg. 2017;44:260–8.