Journal of Chemical Health Risks

www.jchr.org

JCHR (2024) 14(5), 2125-2129 | ISSN:2251-6727

A Prospective Comparative Study of 7% Topical Sucralfate Vs 1% Silver Sulfadiazine in the Management of Second-Degree Burns

Dr Aashish S Pawar[1*], Dr G Prabhu[2], Dr Senthilnathan[3], Dr K Ravichandran[4]

[1]Postgraduate, Department of General Surgery, Aarupadai Veedu Medical College, Vinayaka Mission's Research Foundation (VMRF-DU), Puducherry, India

[2]Associater Professor, Department of General Surgery, Aarupadai Veedu Medical College, Vinayaka Mission's Research Foundation (VMRF-DU), Puducherry, India

[3]Associate Professor, Department of General Surgery, Aarupadai Veedu Medical College, Vinayaka Mission's Research Foundation (VMRF-DU), Puducherry, India

[4]Professor and Head, Department of General Surgery, Aarupadai Veedu Medical College, Vinayaka Mission's Research Foundation (VMRF-DU), Puducherry, India

(Received: 11 March 2024 Revised: 16 April 2024 Accepted: 28 May 2024)

KEYWORDS

Burns, Sucralfate, Wound Healing, Silver Sulfadiazine, Infection Control

ABSTRACT:

Background: Burns are a significant source of morbidity and psychological distress, particularly in developing countries, where they tend to be more prevalent and severe. They often result in considerable economic burdens and complications such as infections, delayed healing, and scarring. Although silver sulfadiazine has been widely used as a topical treatment, emerging alternatives like topical sucralfate have shown promise in enhancing wound healing and infection control.

Objective: To compare the efficacy of 7% topical sucralfate versus 1% silver sulfadiazine in the treatment of second-degree burns, focusing on the rate of healing, reduction in wound size, infection rates, and overall cosmetic outcomes.

Methods: A prospective comparative study was conducted at AVMCH from September 2022 to July 2024. Seventy-six patients with second-degree burns were enrolled and divided into two groups through convenience sampling: one group treated with 7% topical sucralfate, and the other with 1% silver sulfadiazine. The groups were comparable in terms of age, gender, burn site, and other physical characteristics. Wound assessments, including measurements of wound size and infection rates, were carried out on days 0, 3, 7, and 21. Statistical analyses were performed using SPSS version 28, with a significance level set at $p<0.05$.

Results: The sucralfate group demonstrated a significantly greater reduction in mean wound size compared to the silver sulfadiazine group. By day 21, 86.8% of patients in the sucralfate group achieved complete healing, compared to 68.4% in the silver sulfadiazine group. Additionally, the sucralfate group showed a significantly lower rate of infection, indicating superior infection control ($p<0.05$).

Conclusion: Topical 7% sucralfate is more effective than 1% silver sulfadiazine in the management of second-degree burns, offering superior outcomes in terms of wound contraction, healing rate, and infection prevention. Sucralfate presents a promising alternative treatment for burns, potentially improving patient outcomes and reducing complications associated with burn injuries.

Journal of Chemical Health Risks

www.jchr.org

JCHR (2024) 14(5), 2125-2129 | ISSN:2251-6727

Introduction

Burns can have significant psychological effects on patients.[1] They are also associated with mortality, with lower rates in developed countries compared to developing ones.[2] The annual incidence of burns is higher in poorer countries, where both mild and severe burns are more common.[3] Burns create an economic burden on individuals, as treatment costs vary according to income, particularly affecting low-income patients. Burn wounds heal through inflammation, proliferation, and remodeling, with increased capillary permeability.[4] Dermal wounds heal by connective tissue deposition, contracture, and epithelialization, leading to scar formation.[5] In young patients, there is a clear relationship between the duration of re-epithelialization and scar formation. Partial-thickness burns that re-epithelialize within 10-14 days typically heal without scarring, while those taking longer are more likely to scar.[6] Infection is the most common complication following burns and delays granulation formation, leading to scarring and contracture. Infection is also the most common cause of mortality after burns, and many topical antibacterials slow the wound healing rate.[7]

Topical agents used in burns include silver nitrate, sulfamylon, and a combination of sulfonamide with silver sulfadiazine.[8] Silver sulfadiazine, used at 1% concentration is effective against both gram-positive and gram-negative pathogens, and has low toxicity and high sensitivity.[9] Sucralfate, a topical solution containing sucrose sulfate and aluminum hydroxide, is used at a 7% concentration to treat conditions such as radiation proctitis, stomatitis, peristomal and resistant excoriation, and stomatitis. It has also been found to improve wound healing.[10]

This study aims to compare the effects of topical sucralfate versus silver sulfadiazine in treating second-degree burns, focusing on the time taken for healing and granulation tissue formation. It also seeks to evaluate the cosmetic outcomes and complications of wound healing associated with these topical applications.

Materials and Methods

A prospective comparative study was conducted at the Department of General Surgery, Aarupadai Veedu Medical College and Hospital, Puducherry between September 2022 and July 2024, involving 76 patients with second-degree burns. The patients were allocated into two groups using convenience sampling: one group received treatment with 7% topical sucralfate, while the other was treated with 1% silver sulfadiazine. The objective of the study was to compare the effectiveness of these treatments in terms of healing rate, reduction in wound size, infection rates, and cosmetic outcomes. The study included patients aged between 18 and 65 years who had sustained scald or thermal burns covering less than 30% of their total body surface area (TBSA) and had presented within 12 hours of injury. Patients with immunocompromised conditions, severe anemia, diabetes, or burns of specific types such as electrical, chemical, or inhalational burns were excluded from the study.

The sample size was determined based on a prior study, ensuring a statistical power of 80% and a significance level of 5%. Each group comprised 38 patients. During the treatment, the wounds were initially cleaned with normal saline and then dressed in either 1% silver sulfadiazine or 7% sucralfate. On day 7, wound cultures were taken to assess infection, and wound size and healing progress were evaluated on days 0, 3, 7, and 21 using the Lund and Browder chart. Data were also gathered on demographic characteristics, wound healing patterns, and infection rates.

The primary outcome variables of the study included wound healing scores, wound size measurements, results of wound swabs, and the TBSA affected by burns. Statistical analysis was conducted using SPSS version 28, with a p-value of less than 0.05 considered statistically significant. Categorical variables were summarized as frequencies and percentages, while continuous variables were summarized as means and standard deviations. Comparisons between the two groups in terms of granulation tissue formation were made using the Chi-square test or Fisher's exact test, as appropriate.

Results

In the present study, 76 patients with second-degree burns were randomly allocated into two treatment groups: 38 patients were treated with 1% topical silver sulfadiazine, and 38 patients received 7% topical

Journal of Chemical Health Risks

www.jchr.org

JCHR (2024) 14(5), 2125-2129 | ISSN:2251-6727

sucralfate. The demographic and clinical characteristics, including mean age, gender distribution, burn site, height, weight, heart rate, and blood pressure, were comparable between the two groups, ensuring that any observed differences in outcomes were likely attributable to the treatment regimens rather than baseline variations between the participants.

The study revealed significant differences in wound healing outcomes between the two treatment groups. Patients in the sucralfate group exhibited a notably greater reduction in mean wound size over the course of the study, indicating more rapid wound contraction and healing. By day 21, 86.8% of patients in the sucralfate group had achieved complete wound healing, a significantly higher proportion than the 68.4% observed in the silver sulfadiazine group. This suggests that sucralfate may enhance the healing process more effectively than silver sulfadiazine in the treatment of second-degree burns.

In addition to superior healing outcomes, the sucralfate group also demonstrated a lower incidence of wound infection compared to the silver sulfadiazine group, with statistical analysis confirming the significance of this finding ($p<0.05$). This reduced infection rate further supports the potential of sucralfate as a more effective option for managing second-degree burns, both in promoting faster healing and in minimizing complications related to infection.

Discussion

Second-degree burns pose significant clinical management challenges due to the risks of infection, pain, and potential scarring. Topical treatments are crucial in accelerating wound healing, reducing pain, and minimizing infection risks. This study aims to compare the efficacy and safety of two widely used agents in burn care: 7% topical sucralfate and 1% silver sulfadiazine. Silver Sulfadiazine is a standard treatment known for its broad antimicrobial activity,[11,12] while Sucralfate, primarily used for peptic ulcer disease, has shown promise in enhancing epithelialization and providing pain relief through its mucosal protective properties.[13,14] By evaluating these agents in a clinical setting, this study seeks to determine which provides superior outcomes in terms of healing time and infection control for patients with second-degree burns.[15]

In this study, 76 patients were included in the study and divided into two groups based on convenience sampling, with 38 receiving 1% topical silver sulfadiazine and 38 receiving 7% topical sucralfate. The groups were comparable in terms of mean age, gender distribution, burn site, physical characteristics, and vital parameters. A significant decrease in mean wound size was observed in the sucralfate group compared to the silver group. Additionally, 86.8% of the sucralfate group achieved healing by day 21, compared to 68.4% in the silver group. The incidence of infection was lower in the sucralfate group, indicating better infection control ($p<0.05$).

Banati et al. found that the sucralfate cream group required significantly less time for epithelialization (18.8 days) compared to other topical agents (24.6 days), with a P value of less than 0.001.[16] Godhi et al. reported that sucralfate dressing not only has an antibacterial effect similar to silver sulfadiazine but also speeds up the healing of second-degree superficial burns.[10] Koshariya et al. suggested that topical sucralfate significantly decreases pain and accelerates healing without detrimental effects, highlighting its potential as a future supplementary or alternative therapy.[8]

The healing success rate was 86.8% in the sucralfate group compared to 68.4% in the silver sulfadiazine group. The lower incidence of infections in the sucralfate group underscores its enhanced infection control capabilities. These findings suggest that 7% topical sucralfate is an effective alternative to 1% silver sulfadiazine for managing second-degree burns. Sucralfate's ability to promote more rapid wound contraction, accelerate healing, and reduce infection rates presents a compelling case for its adoption in clinical practice.[17–19] This could lead to improved patient outcomes, reduced healing times, and lower risks of burn-related complications.[20] Further research and larger-scale studies could solidify sucralfate’s role in burn care, potentially redefining standard treatment protocols for second-degree burns.

Journal of Chemical Health Risks

www.jchr.org

JCHR (2024) 14(5), 2125-2129 | ISSN:2251-6727

The present study is not without limitations. It includes single-centre study design, short-term follow up, lack of blinding, and lower sample size.

Conclusion

The results indicate that 7% topical sucralfate is more effective than 1% silver sulfadiazine in reducing wound size, accelerating healing, and preventing infections in second-degree burns. Therefore, sucralfate emerges as a promising alternative for burn management, potentially leading to improved patient outcomes and a lower risk of complications.

Funding: The authors received no funding for the present study

Conflict of interest: The authors declare no conflicts of interest

Reference

1. Knol R, Kelly E, Paul E, Cleland H, Wellington-Boyd A, Lambert C, et al. The psychosocial complexities of acute burn patients in an Australian trauma hospital. Burns 2020;46(2):447–53.
2. Yen CI, Chiou MJ, Kuo CF, Liao HT. Determination of risk factors for burn mortality based on a regional population study in Taiwan. Burns 2018;44(6):1591–601.
3. Jahangir S, Rehman M, Munir MK, Rehman S, Rehman I. Identification and drug susceptibility pattern of pathogenic bacterial species among burn patients. Pak J Med Health Sci 2017;11(1):698–702.
4. Olsson M, Järbrink K, Divakar U, Bajpai R, Upton Z, Schmidtchen A, et al. The humanistic and economic burden of chronic wounds: A systematic review. Wound Repair Regen 2019;27(1):114–25.
5. Janis JE, Harrison B. Wound healing: part I. Basic science. Plast Reconstr Surg 2016;138(3S):9S-17S.
6. Jadhav K, Dhamecha D, Bhattacharya D, Patil M. Green and ecofriendly synthesis of silver nanoparticles: characterization, biocompatibility studies and gel formulation for treatment of infections in burns. J Photochem Photobiol B 2016;155:109–15.
7. Pujji OJS, Nakarmi KK, Shrestha B, Rai SM, Jeffery SLA. The bacteriological profile of burn wound infections at a tertiary burns center in Nepal. J Burn Care Res 2019;40(6):838–45.
8. Koshariya M, Shitole A, Agarwal V, Dave S. Role of topical Sucralfate in healing of burn wounds. Int Surg J 2018;5(9):2995.
9. Aziz Z, Hassan BAR. The effects of honey compared to silver sulfadiazine for the treatment of burns: A systematic review of randomized controlled trials. Burns 2017;43(1):50–7.
10. Godhi AS, Ram P, Powar R. Efficacy of topical sucralfate vERSUs silver sulfadiazine in the management of burns: A 1-year randomized controlled trial. J West Afr Coll Surg 2017;7(1):57–70.
11. Hummel RP, MacMillan BG, Altemeier WA. Topical and systemic antibacterial agents in the treatment of burns. Ann Surg 1970;172(3):370–84.
12. Williams FN, Herndon DN, Hawkins HK, Lee JO, Cox RA, Kulp GA, et al. The leading causes of death after burn injury in a single pediatric burn center. Crit Care Lond Engl 2009;13(6):R183.
13. Kochhar R, Patel F, Dhar A, Sharma SC, Ayyagari S, Aggarwal R, et al. Radiation-induced proctosigmoiditis. Prospective, randomized, double-blind controlled trial of oral sulfasalazine plus rectal steroids versus rectal sucralfate. Dig Dis Sci 1991;36(1):103–7.
14. Driks MR, Craven DE, Celli BR, Manning M, Burke RA, Garvin GM, et al. Nosocomial pneumonia in intubated patients given sucralfate as compared with antacids or histamine type 2 blockers. The role of gastric colonization. N Engl J Med 1987;317(22):1376–82.
15. Shpichka A, Butnaru D, Bezrukov EA, Sukhanov RB, Atala A, Burdukovskii V, et al. Skin tissue regeneration for burn injury. Stem Cell Res Ther 2019;10(1):94.
16. Banati A, Chowdhury SR, Mazumder S. Topical use of Sucralfate Cream in second and third degree burns. Burns 2001;27(5):465–9.
17. Beheshti A, Shafigh Y, Zangivand AA, Samiee-Rad F, Hassanzadeh G, Shafigh N. Comparison of topical sucralfate and silver sulfadiazine cream in

Journal of Chemical Health Risks

www.jchr.org

JCHR (2024) 14(5), 2125-2129 | ISSN:2251-6727

second degree burns in rats. Adv Clin Exp Med Off Organ Wroclaw Med Univ 2013;22(4):481–7.

18. Lumintang L, Adnyana MS, Riasa INP, Asmarajaya AAGN, Hamid AR, Sanjaya H. A Systematic Review: Topical Sucralfate for Burn Wound. Open Access Maced J Med Sci 2021;9(F):516–22.
19. Godhi AS, Ram P, Powar R. Efficacy of topical sucralfate vERSUs silver sulfadiazine in the management of burns: A 1-year randomized controlled trial. J West Afr Coll Surg 2017;7(1):57–70.
20. Chung JY, Herbert ME. Myth: silver sulfadiazine is the best treatment for minor burns. West J Med 2001;175(3):205–6.

Table 1: Comparison of the mean parameters between the groups

	Silver		**Sucralfate**		**p-value**
	Mean	**SD**	**Mean**	**SD**	
Age (in years)	38.5	14.1	34.5	17.4	0.51
Height (in cm)	159.0	7.1	160.7	21.4	0.62
Weight (in kgs)	66.6	8.6	67.2	19.6	0.22
Heart rate	76.1	4.5	76.6	8.5	0.51
Systolic blood pressure	130.6	7.1	126.8	11.9	0.24
Diastolic blood pressure	78.9	6.7	79.9	6.8	0.36
Wound size – Day 0	79.3	37.9	66.7	35.3	0.12
Wound size – Day 3	70.8	34.5	51.2	32.9	0.01*
Wound size – Day 7	55.4	30.1	38.0	27.4	0.01*
Wound size – Day 21	3.3	2.1	2.8	1.8	0.66

Table 2: Distribution of gender and wound features between the groups

		Silver		**Sucralfate**		**Chi-square (p-value)**
		Count	**N (%)**	**Count**	**N (%)**	
Gender	Female	19	50.0	13	34.2	0.65 (0.52)
	Male	19	50.0	25	65.8	
Day 0	Pale granulation tissue	3	7.9	7	18.4	1.84 (0.175)
	Pink granulation tissue	35	92.1	31	81.6	
Day 3	Healthy granulation tissue	38	100.0	38	100.0	-
Day 7	Healthy granulation tissue	38	100.0	38	100.0	-
Day 21	Healed	26	68.4	33	86.8	1.15 (0.05)*
	Healthy granulation tissue	3	7.9	4	10.5	
	Pale granulation tissue	9	23.7	1	2.6	
Wound swab – Day 7	E coli	6	15.7	2	5.2	1.200 (0.05)*
	Negative	27	71.1	34	89.6	
	Staph	5	13.2	2	5.2	