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Review Paper

The effect of fibrinolysin ointment in the treatment of burn scars: A narrative review article

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ABSTRACT

Burn injuries are a significant global health concern, ranking among the most common causes of trauma and leading to severe physical, functional, and psychosocial consequences. Effective burn wound management aims not only to promote healing but also to minimize scarring, infection, and long-term complications. Fibrinolysin ointment, a topical enzymatic agent containing proteolytic enzymes such as fibrinolysin, deoxyribonuclease, and trypsin, has been investigated as a treatment option for improving burn wound outcomes. This narrative review explores the potential therapeutic benefits, mechanisms of action, clinical applications, and limitations of fibrinolysin ointment in the context of burn injuries. Fibrinolysin functions primarily through enzymatic debridement, dissolving necrotic tissue, facilitating wound cleansing, reducing bacterial colonization, and stimulating tissue regeneration. Its anti-inflammatory properties also help reduce edema and local pain, creating a favorable microenvironment for re-epithelialization and collagen remodeling. Several animal studies suggest its usefulness in promoting faster healing in second- and third-degree burns. However, the results are often less favorable when compared to more aggressive enzymatic agents or natural alternatives, such as kiwi extract or honey. While fibrinolysin has shown promise in reducing healing time and indirectly improving scar quality, there is a lack of robust human clinical trials assessing its long-term effects on scar formation, particularly through the use of standardized scar assessment scales. Although generally safe with minimal side effects, fibrinolysin ointment may cause localized irritation or hypersensitivity in some patients. This review concludes that while fibrinolysin may serve as a supportive treatment in burn care, especially in superficial wounds, further clinical research is warranted to validate its efficacy, optimize its usage, and establish its role in multidisciplinary burn scar management protocols.

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1. Introduction

Burns are the fourth most common type of trauma worldwide, following road accidents, falls, and interpersonal violence [1,2]. Burns result from exposure to heat, chemicals, electricity, or radiation and are classified into different degrees based on the depth and extent of the injury [3,4]. Burns are among the most common and painful injuries that can have serious health consequences. These injuries may be caused by heat, chemicals, electric current, or harmful radiation, and depending on their severity and depth, the healing process can be lengthy and complex. One of the significant challenges in burn treatment is preventing secondary infections, accelerating tissue repair, and minimizing scarring [5-7].

Post-burn scarring is one of the most significant challenges in burn treatment. It has been shown that more than 40% of patients are dissatisfied with their burn scars [8]. Facial and hand scars, in particular, can leave patients with lifelong distress. Consequently, nearly 15% of burn patients are unable to return to work even after completing rehabilitation [9-11]. Wound debridement is the initial step in treating deep burn wounds. The long-term aesthetic outcome depends on the amount of viable tissue that can be preserved. Timely and appropriate burn treatment is essential to prevent infection, accelerate healing, and reduce scarring [12-14].

In this context, the use of topical ointments and compounds plays a crucial role in the treatment protocol. Fibrinolysin ointment, a topical preparation containing proteolytic enzymes, has been proposed as an anti-inflammatory and tissue-repairing agent [15]. Fibrinolysin ointment is one of the compounds that have recently attracted the attention of researchers and physicians. This ointment contains ingredients that may improve burn wound healing [16]. Given the importance of optimal burn treatment and reducing its complications, evaluating the effects of this ointment and its role in accelerating healing and preventing infections is of great significance. This narrative review article highlights the impact of fibrinolytic ointment in burn treatment, aiming to assess its efficacy and safety in managing burn wounds by reviewing existing scientific evidence. The findings of this study will contribute to more effective treatment strategies and improve the quality of life for burn patients.

2. Mechanism of Action of Fibrinolysin Ointment

Fibrinolysin ointment is a topical preparation commonly used to treat wounds, burns, and other skin injuries. Its mechanism of action is primarily attributed to its active ingredients, which typically include proteolytic enzymes (such as trypsin and chymotrypsin) and other soothing and reparative substances. Fibrinolysin ointment contains enzymes such as collagenase and protease, which help break down dead and damaged tissue. These enzymes facilitate wound healing by accelerating the debridement process (removal of necrotic tissue). This enzymatic debridement reduces the risk of infection, shortens the inflammatory phase, and indirectly improves scar outcomes [17]. Additionally, fibrinolysin has anti-inflammatory properties that reduce swelling and pain in the burn area. The most important mechanisms of action include:

Breakdown of necrotic tissue: Proteolytic enzymes (e.g., trypsin, chymotrypsin) degrade proteins in dead and damaged tissue, facilitating wound cleansing and accelerating the healing process.

Reduction of inflammation: Certain components of the ointment have anti-inflammatory properties, which help reduce swelling and inflammation in the affected area.

Stimulation of tissue regeneration: By cleansing the wound and reducing inflammation, fibrinolysin ointment creates favorable conditions for new cell growth and tissue repair.

Pain relief: Certain ingredients in the ointment may help alleviate pain and discomfort in the affected area.

Prevention of infection: By removing necrotic tissue, the risk of infection is reduced [18].

3. Published articles and discussions

Limited studies, primarily conducted on animal models, have shown that fibrinolysin-containing compounds are effective in treating second and third-degree burns. Below are some key findings:

In an animal study by Kooshiar et al., the fibrinolysin group took an average of 18.5 days for complete debridement of necrotic tissue, which was significantly slower than the group treated with kiwi extract (5.7 days) [19]. Schulz et al. demonstrated that while fibrinolysin alone is slower, combining enzymatic debridement with platelet-rich fibrin (PRF) reduced healing time to 9–21 days in partial-thickness burns, indirectly improving scar quality by minimizing prolonged inflammation [17]. Another animal study by Biondo-Simões showed that wound area significantly decreased in groups treated with honey, copaiba oil-resin, and fibrinolysin compared to the control group [20].

Fibrinolysin is suitable for superficial burns where enzymatic debridement is prioritized but may require adjunct therapies (e.g., PRF) for deeper wounds [17,19]. Proteolytic enzymes such as collagenase, fibrinolysin, and deoxyribonuclease are used for debriding purulent or fibrinous pressure ulcers [16]. However, no direct studies have examined fibrinolysin's effect on scar assessment scales (e.g., Vancouver Scar Scale), and its benefits are inferred from reduced healing time [17,21]. Therefore, human studies and clinical trials are needed to confirm findings from animal models. Additionally, determining optimal dosages for different types of burns requires further investigation. In summary, fibrinolysin ointment supports scar reduction by facilitating wound

cleansing and acceleration of healing. Although generally safe, it may cause local irritation, redness, or itching in some cases. Caution is advised in patients with enzyme sensitivities. Further studies are needed to evaluate its efficacy in severe burns and compare it with other treatments. Advantages include non-invasiveness, minimal side effects, and long-term usability, though complete scar resolution may require prolonged use.

4. Conclusion

Fibrinolysin ointment is recognized as an effective topical treatment for burns. Given its mechanism of action in accelerating healing and reducing burn complications, it can serve as a complementary treatment alongside other therapies. However, further extensive human studies are needed to confirm its efficacy, safety, and optimal dosage for different burn types.

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Authors' contributions

The author confirms sole responsibility for the conception of the study, the presented results, and manuscript preparation. The author has read and approved the final version of the manuscript.

Conflict of interest

No potential conflict of interest was reported by the authors.

Ethical declarations

Not applicable.

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References

[1] Greenhalgh DG. Management of Burns. N Engl J Med. 2019;380(24):2349-2359. DOI: 10.1056/NEJMra1807442 PMID: 31189038

[2] Alcalá-Cerrillo M, González-Sánchez J, González-Bernal JJ, Santamaría-Peláez M, Fernández-Solana J, Sánchez Gómez SM, et al. Retrospective Study of the Epidemiological-Clinical Characteristics of Burns Treated in a Hospital Emergency Service (2018-2022). Nurs Rep. 2024;14(3):1987-1997. DOI: 10.3390/nursrep14030148 PMID: 39189278

[3] Żwierełło W, Piorun K, Skórka-Majewicz M, Maruszewska A, Antoniewski J, Gutowska I. Burns: Classification, Pathophysiology, and Treatment: A Review. Int J Mol Sci. 2023;24(4):3749. DOI: 10.3390/ijms24043749 PMID: 36835171

[4] Yakupu A, Zhang J, Dong W, Song F, Dong J, Lu S. The epidemiological characteristic and trends of burns globally. BMC Public Health. 2022;22(1):1596. DOI: 10.1186/s12889-022-13887-2 PMID: 35996116

[5] van den Bosch AS, Verwilligen RAF, Pijpe A, Bosma E, van der Vlies CH, Lucas Y, et al. Outcomes of dermal substitutes in burns and burn scar reconstruction: A systematic review and meta-analysis. Wound Repair Regen. 2024;32(6):960-978. DOI: 10.1111/wrr.13226 PMID: 39435560

[6] Ladhani HA, Yowler CJ, Claridge JA. Burn Wound Colonization, Infection, and Sepsis. Surg Infect (Larchmt). 2021;22(1):44-48. DOI: 10.1089/sur.2020.346 PMID: 33085576

[7] D'Abbondanza JA, Shahrokhi S. Burn Infection and Burn Sepsis. Surg Infect (Larchmt). 2021;22(1):58-64. DOI: 10.1089/sur.2020.102 PMID: 32364824

[8] Finnerty CC, Jeschke MG, Branski LK, Barret JP, Dziewulski P, Herndon DN. Hypertrophic scarring: the greatest unmet challenge after burn injury. Lancet. 2016;388(10052):1427-1436. DOI: 10.1016/S0140-6736(16)31406-4 PMID: 27707499

[9] van Baar ME, Essink-Bot ML, Oen IM, Dokter J, Boxma H, van Beeck EF. Functional outcome after burns: a review. Burns. 2006;32(1):1-9. DOI: 10.1016/j.burns.2005.08.007 PMID: 16376020

[10] Ghahghai M, Ghorbani SS, Hoseininejad S, Sheikhi A, Farhadi M, Rahbar R. Factors responsible for mortality among burns patients in Islamic Republic of Iran. East Mediterr Health J. 2023;29(8):650-656. DOI: 10.26719/emhj.23.092 PMID: 37698220

[11] Bayuo J, Wong FKY, Lin R, Su JJ, Abu-Odah H. A meta-ethnography of developing and living with post-burn scars. J Nurs Scholarsh. 2023;55(1):319-328. DOI: 10.1111/jnu.12811 PMID: 36161474

[12] Hirche C, Citterio A, Hoeksema H, Koller J, Lehner M, Martinez JR, et al. Eschar removal by bromelain based enzymatic debridement (Nexobrid®) in burns: An European consensus. Burns. 2017;43(8):1640-1653. DOI: 10.1016/j.burns.2017.07.025 PMID: 29033046

[13] Schulz A, Perbix W, Shoham Y, Daali S, Charalampaki C, Fuchs PC, et al. Our initial learning curve in the enzymatic debridement of severely burned hands-Management and pit falls of initial treatments and our development of a post debridement wound treatment algorithm. Burns. 2017;43(2):326-336. DOI: 10.1016/j.burns.2016.08.009 PMID: 28341257

[14] Rosenberg L, Krieger Y, Bogdanov-Berezovski A, Silberstein E, Shoham Y, Singer AJ. A novel rapid and selective enzymatic debridement agent for burn wound management: a multi-center RCT. Burns. 2014;40(3):466-74. DOI: 10.1016/j.burns.2013.08.013 PMID: 24074719

[15] Abdul Rahim P, Rengaswamy D. Fibrinolytic Enzyme - An Overview. Curr Pharm Biotechnol. 2022;23(11):1336-1345. DOI: 10.2174/1389201023666220104143113 PMID: 34983344

[16] Püllen R, Popp R, Volkers P, Füsgen I. Prospective randomized double-blind study of the wound-debriding effects of collagenase and fibrinolysin/deoxyribonuclease in pressure ulcers. Age Ageing. 2002;31(2):126-30. DOI: 10.1093/ageing/31.2.126 PMID: 11937475

[17] Schulz A, Schiefer JL, Fuchs PC, Kanho CH, Nourah N, Heitzmann W. Does Platelet-Rich Fibrin Enhance Healing Of Burn Wounds? Our First Experiences And Main Pitfalls. Ann Burns Fire Disasters. 2021;34(1):42-52. PMID: 34054386

[18] HARDAWAY RM, BURNS JW. Mechanism of action of fibrinolysin in the prevention of irreversible hemorrhagic shock. Ann Surg. 1963;157(2):305-9. DOI: 10.1097/00000658-196302000-00020 PMID: 13952731

[19] Kooshiar H, Abbaspour H, Motamed Al Shariati SM, Rakhshandeh H, Khajavi Rad A, Esmaily H, et al. Topical effectiveness of kiwifruit versus fibrinolysin ointment on removal of necrotic tissue of full-thickness burns in male rats. Dermatol Ther. 2012;25(6):621-5. DOI: 10.1111/j.1529-8019.2012.01541.x PMID: 23210763

[20] Biondo-Simões MLP, Henning Júnior L, Boen BRO, Prado JLD, Costa LRD, Robes RR, et al. Comparative analysis of the effects of honey, copaiba oil-resin and a commercial product (fibrinolysin, deoxyribonuclease and chloramphenicol) on second intention healing, in rats. Rev Col Bras Cir. 2019;46(5):e20192245. DOI: 10.1590/0100-6991e-20192245 PMID: 31778393

[21] Kooshiar H, Abbaspour H, Motamed Al Shariati SM, Rakhshandeh H, Khajavi Rad A, Esmaily H, et al. Topical effectiveness of kiwifruit versus fibrinolysin ointment on removal of necrotic tissue of full-thickness burns in male rats. Dermatol Ther. 2012;25(6):621-5. DOI: 10.1111/j.1529-8019.2012.01541.x PMID: 23210763