SUGAR FOR WOUND TREATMENT

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Please find following a summary of a literature search and relevant results. All articles can be provided in full - email library@monashhealth.org for a list of the articles you require.

QUESTION

What evidence is available for using sugar to treat wounds?

SEARCH LIMITS

English-language.

SEARCH METHODOLOGY

A systematic search was conducted for literature. The results were screened by two librarians using Covidence. See the Appendix for the PRISMA chart, search terms, and Medline search strategy.

DATABASES SEARCHED

- Medline – index of peer reviewed articles across health sciences and medicine.
- Embase – index of biomed and pharmacological peer reviewed journal articles.
- Emcare – index of nursing, allied health, critical-care medicine and more.
- Cochrane Library – collection of databases containing high-quality independent evidence.

PEER-REVIEWED LITERATURE - IN REVERSE CHRONOLOGICAL ORDER

Articles are grouped by theme:

- Surgical Wounds
- Diabetic Wounds
- 2-Deoxy-D-Ribose
- Sugar and Povidone-Iodine
- Pain and Odour
- Additional Articles

Each article summary contains excerpts from the abstract and an online link.

SURGICAL WOUNDS

Naselli, A., et al. (2017). **Granulated sugar for adjuvant treatment of surgical wound infection due to multi-drug-resistant pathogens in a child with sarcoma: a case report and literature review.** *Le infezioni in medicina*, *25*(4), 358–361. Click for full-text.

Sugar instillation in the extended spectrum beta-lactamase (ESBL)-producing Enterobacter cloacae positive wound, in addition to systemic treatment with meropenem and levofloxacin, allowed culture negativization in six days and complete wound healing in 30 days. These results make the

use of sugar an attractive option for wounds which are difficult to treat, even in an immunocompromised child.

Cavazana, W. C., et al. (2009). **Sugar (sucrose) and fatty acid compounds with triglycerides on the treatment of wounds: experimental study in rats**. *Anais brasileiros de dermatologia*, *84*(3), 229–236. Click for full-text.

The sugar group promoted effective cellular inflammatory response modulation. There were no differences between all the treated groups regarding types I and III collagen at the end of this study.

Beadling L. (1997). **A bag full of sugar. Surgeons find that ordinary table sugar is a sweet adjunct to conventional treatment of deep wound healing.** *Today's surgical nurse*, *19*(3), 28–30. Request full-text.

Table sugar used as an adjunct to antibiotics may be effective in treating deep wound infections. Filling infected wounds with sugar has been practiced for centuries in some countries.

Rahal, F., et al. (1984). **Sugar in the treatment of infected surgical wounds.** *International surgery*, *69*(4), 308. Request full-text.

Forty-two patients with infected wounds were treated with common sugar. In all cases, the infections cleared within five to 30 days.

DIABETIC WOUNDS

Escárcega-Galaz, A. A., et al. (2018). **Chitosan treatment for skin ulcers associated with diabetes.** *Saudi journal of biological sciences*, *25*(1), 130–135. Click for full-text.

At the end of the treatment (topical chitosan) period, the infections were cured. All patients experienced a significant improvement in the initial injury and developed granulation tissue and a healthy skin cover.

Murandu, M., et al. (2011). **Use of granulated sugar therapy in the management of sloughy or necrotic wounds: a pilot study.** *Journal of wound care*, *20*(5). Request full-text.

Preliminary data suggest that sugar is an effective wound cleansing and is safe to use in patients with insulin-dependent diabetes. In vitro studies demonstrate that sugar inhibits bacterial growth.

2-DEOXY-D-RIBOSE

Dikici S. (2021). **A "sweet" way to increase the metabolic activity and migratory response of cells associated with wound healing: deoxy-sugar incorporated polymer fibres as a bioactive wound patch.** *Turkish journal of biology*, *46*(1), 41–56. Click for full-text.

2dDR is a potential pro-angiogenic agent that has a positive impact not only on endothelial cells but also fibroblasts, which take a key role in wound healing. It could easily be introduced into polymeric scaffolds to be released quickly to enhance the metabolic activity and the migratory response of cells that are associated with angiogenesis and wound healing.

Andleeb, A., et al. (2020). **Developing affordable and accessible pro-angiogenic wound dressings; incorporation of 2 deoxy D-ribose (2dDR) into cotton fibres and wax-coated cotton fibres**. *Journal of tissue engineering and regenerative medicine*, *14*(7), 973–988. Click for full-text.

This study offers a simple approach to developing affordable wound dressings as both have the potential to be evaluated as pro-active dressings to stimulate wound healing in wounds where management of exudate or prevention of adherence to the wounds are clinical requirements.

Azam, M., et al. (2019). **Addition of 2-deoxy-d-ribose to clinically used alginate dressings stimulates angiogenesis and accelerates wound healing in diabetic rats.** *Journal of biomaterials applications*, *34*(4), 463–475. Request full-text.

Results suggest that the controlled use of 2-deoxy-d-ribose could be a novel and cost-effective therapy for the management of impaired wound healing in diabetic patients.

SUGAR AND POVIDONE-IODINE

Di Stadio, A., et al. (2019). **The use of povidone-iodine and sugar solution in surgical wound dehiscence in the head and neck following radio-chemotherapy**. *International wound journal*, *16*(4), 909–915. Click for full-text.

The combination of povidone-iodine and sugar had a higher success rate compared with traditional topical treatment in the treatment of wound defect closure in oncological patients who underwent radio-chemotherapy.

Shi, C. M., et al. (2007). **Mixture of sugar and povidone-iodine stimulates healing of MRSA-infected skin ulcers on db/db mice.** *Archives of dermatological research*, *299*(9), 449–456. Click for full-text.

A 70% sugar and 3% PI paste was applied to the closed wounds for 8 days. Application of the intervention significantly accelerated reepithelialization ($P < 0.01$) and decreased colony-forming units ($P < 0.05$) of the ulcers in the MRSA-infected wounds, compared to the non-treated group.

Nakao, H., et al. (2006). **Mixture of sugar and povidone--iodine stimulates wound healing by activating keratinocytes and fibroblast functions.** *Archives of dermatological research*, *298*(4), 175–182. Click for full-text.

The mixture of 70% sugar and 3% PI paste, is likely to act on wounds not only as an antibiotic agent, but also as a modulator for keratinocytes and fibroblasts.

Knutson, R. A., et al. (1981). **Use of sugar and povidone-iodine to enhance wound healing: five year's experience.** *Southern medical journal*, *74*(11), 1329–1335. Click for full-text.

Over a 56-month period (January 1976 to August 1980), we treated 605 patients for wounds, burns, and ulcers with granulated sugar and povidone-iodine. Rapid healing ensued, due to a reduction in bacterial contamination, rapid debridement of eschar, probable nourishment of surface cells, filling of defects with granulation tissue, and covering of granulation tissue with

epithelium. The requirements for skin grafting and antibiotics were greatly reduced, as were hospital costs for wound, burn, and ulcer care.

PAIN & ODOUR

Chiwenga, S., et al. (2009). **Audit of the use of sugar dressings for the control of wound odour at Lilongwe Central Hospital, Malawi.** *Tropical doctor*, *39*(1), 20–22. Click for full-text.

This very cheap treatment produced reproducible benefits as part of an appropriate protocol for use in developing world hospitals with limited resources and nursing care.

Mphande, A. N., et al. (2007). **Effects of honey and sugar dressings on wound healing.** *Journal of wound care*, *16*(7), 317–319. Request full-text.

Honey appears to be more effective than sugar in reducing bacterial contamination and promoting wound healing, and slightly less painful than sugar during dressing changes and motion.

ADDITIONAL ARTICLES

Li, J., et al. (2019). **O-Mannosylation Affords a Glycopeptide Hydrogel with Inherent Antibacterial Activities against E. coli via Multivalent Interactions between Lectins and Supramolecular Assemblies.** *Macromolecular bioscience*, *19*(9), e1900124. Request full-text.

Through a specific mannose-lectin interaction, a biocompatible hydrogel with inherent antibacterial activity against E. coli is achieved without the need to resort to antibiotic or antimicrobial agent treatment, highlighting the potential role of sugar-coated nanomaterials in wound healing and control of bacterial pathogenesis.

Méndez, M. B., et al. (2012). **Sugar inhibits the production of the toxins that trigger clostridial gas gangrene.** *Microbial pathogenesis*, *52*(1), 85–91. Request full-text.

Sugars (sucrose, glucose) inhibited the production of the main protein toxins, PLC (alpha-toxin) and PFO (theta-toxin), responsible for the onset and progression of gas gangrene.

Plichta, J. K., et al. (2012). **Sugar-coating wound repair: a review of FGF-10 and dermatan sulfate in wound healing and their potential application in burn wounds.** *Journal of burn care & research*, *33*(3), 299–310. Click for full-text.

Dermatan sulfate (DS) is the most abundant glycosaminoglycan in human wound fluid and has been postulated to be directly involved in the healing process. Recently, the combination of FGF-10 and DS demonstrated the potential to accelerate wound healing via increased keratinocyte proliferation and migration. this novel therapeutic combination could be used in conjunction with some of the current therapies, but it would have the unique ability to initiate wound healing by stimulating keratinocyte epithelialization.

De Feo, M., et al. (2000). **Treatment of recurrent postoperative mediastinitis with granulated sugar.** *The Journal of cardiovascular surgery*, *41*(5), 715–719. Click for full-text.

Sugar treatment is a reasonable and effective option in patients with mediastinitis refractory to closed irrigation treatment. It may be used either as primary treatment or as a bridge to pectoralis muscle flaps.

Topham J. (2002). **Why do some cavity wounds treated with honey or sugar paste heal without scarring?** *Journal of wound care*, *11*(2), 53–55. Click for full-text.

As well as having antimicrobial properties, honey and sugar paste are associated with scarless healing in some cavity wounds.

Chirife, J., et al. (1983). **In vitro study of bacterial growth inhibition in concentrated sugar solutions: microbiological basis for the use of sugar in treating infected wounds.** *Antimicrobial agents and chemotherapy*, *23*(5), 766–773. Click for full-text.

An important function of sugar in the treatment of infected wounds is to create an environment of low water activity (aw), which inhibits or stresses bacterial growth.

APPENDIX

PRISMA CHART