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A Novel Dressing for Wound Care Based on Konjac Glucomannan

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ABSTRACT

Wound management has become a crucial component of healthcare systems since wound healing continues to be a problem for the nursing sciences. One area that could provide novel methods for regenerative complementary nursing is konjac glucomannan. It is necessary to emphasize the significance when konjac glucomannan is incorporated into biomaterials, it may induce particular qualities that make the biomaterials more effective. They are appealing as wound dressing materials. In this review, we will talk about the first line of bioactive konjac glucomannan-based dressings that are often used in nursing practice. These include semi-permeable films, hydrogel dressings, hydrocolloid dressings, alginate dressings, non-adherent contact layer dressings, and multilayer dressings. This review will also point out that there isn't enough high-quality evidence and that more advanced trials need to be done because most current wound healing treatments don't work well, either structurally or functionally. Konjac glucomannan is a unique tool that can be used to help heal wounds. They can be made to closely resemble the natural processes that lead to tissue repair.

Keywords: Wound Dressings; Konjac Glucomannan; Complementary Nursing; Hydrogel Dressings; Hydrocolloid Dressings; Tissue Repair; Nursing Sciences

Introduction

In order for a wound to heal, it goes through four stages: hemostasis, inflammation, proliferation, and remodelling (Stoica, et al. [1]). Healing a wound is a very complicated process that takes a long time to finish The remodelling phase, which creates (Castaño, et al. [2]) the right environment for healing, can last from 21 days to a year (Tamahka, et al. [3]). Care for patients with wounds requires a wide variety of clinical measurements, procedures, and treatments that make up the whole spectrum of wound management. Managing wounds properly is a major clinical difficulty, and there is a growing need in this area of medicine. Researchers are focusing on improving chronic wound care by creating novel and effective wound dressing materials. In terms of how physicians decide which dressing product to use, it's crucial that they first examine the patient's pain and the wound's underlying cause. Wound treatment techniques that take use of dressing characteristics to promote healthy innate responses should be adopted wherever possible. It is essential that the wound's depth, nature, and exudates all be taken into account while selecting a dressing. If a wound dressing can't keep the area, it's covering wet, it won't be able to do its job properly and healing won't be able to proceed. The dressing should also allow for adequate gas permeability (İnal, et al. [4]) absorb excess exudate from the wound surface and keep the wound moist. Another crucial feature is its antibacterial medium, which acts as a physical barrier to microorganisms (Tao, et al. [5]). The dressing must be biocompatible, inexpensive, and simple to apply without needing regular renewal (Bechstein, et al, [6]).

This study discusses the physical and biological features, forms, benefits, drawbacks, and indications and contraindications of the first-line bioactive dressing class based on konjac glucomannan used in nursing practice. Konjac glucomannan are used in hydrogels and hydrocolloids wound dressings. This study also highlights the absence of high-quality data and the need for future improved designed studies since present wound healing treatments seldom provide good structural or functional results. Hydrocolloids, hydrogels, fiber mats, and others have been made from natural and manmade materials. Konjac glucomannan-based therapies may transport several nursing care to the target location and target the intricacy of the natural wound-healing process, opening up new possibilities in wound care.

Hydrogel Dressings

Wound healing is a complicated, dynamic process that creates a distinct wound microenvironment. To improve healing efficiency, multifunctional skin replacements should be developed (Qu, et al. [7]). Softness and water retention are advantages of hydrogels (Mir, et al. [8]). Hydrogels minimize tissue dehydration, making them suitable for treating acute/chronic wounds, burns, and diabetic foot ulcers. Hydrogels are insoluble, swellable polymers with a high water content that produce amorphous gels or elastic solid sheets or films. Rehydrating necrosis and slough with these dressings helps autolytic debridement. Hydrogels are semitransparent and semipermeable [63]. Hydrogels, non-adherent dressings, accelerate wound healing and reduce discomfort by up to 5 °C. Hydrogel dressings enhance wound re-epithelialization without residues. Hydrogel requires a secondary dressing, yet it still provides water to the wound bed. The flexible hydrogel sheets might be trimmed to suit the wound. Hydrogel dressings are best for dry, little exuding wounds due to their high water content (70–90%). Fluid buildup may cause skin maceration and bacterial growth. It stinks and infects wounds. Hydrogels are also fragile. Hydrogels should be replaced 1–3 days depending on wound hydration to avoid skin maceration, dressings must be changed often (Li, et al. [9]).

Konjac glucomannan were added to hydrogel dressings to promote healing and antibacterial activity. Developed biocompatible chitosan and poly (vinyl alcohol) hydrogels with embedded silver nanoparticles as an effective antibacterial agent to create wound dressing materials with improved characteristics. Hydrogel dressings were non-cytotoxic and effective against S. aureus and E. coli. Because the basic therapy for chronic wounds is to avoid infection while the wound heals, pressure ulcers are particularly difficult (Nunes, et al. [10]). The silver nanoparticles based PVP/alginate/chitosan hydrogel in the ratio 10:1.2:1.8 has antibacterial capabilities, minimal cytotoxicity, decreased cost (compared to commercial ones like Algivon®, ACTICOATTM, and Suprasorb® A + Ag), and maximal swelling (Figure 1).

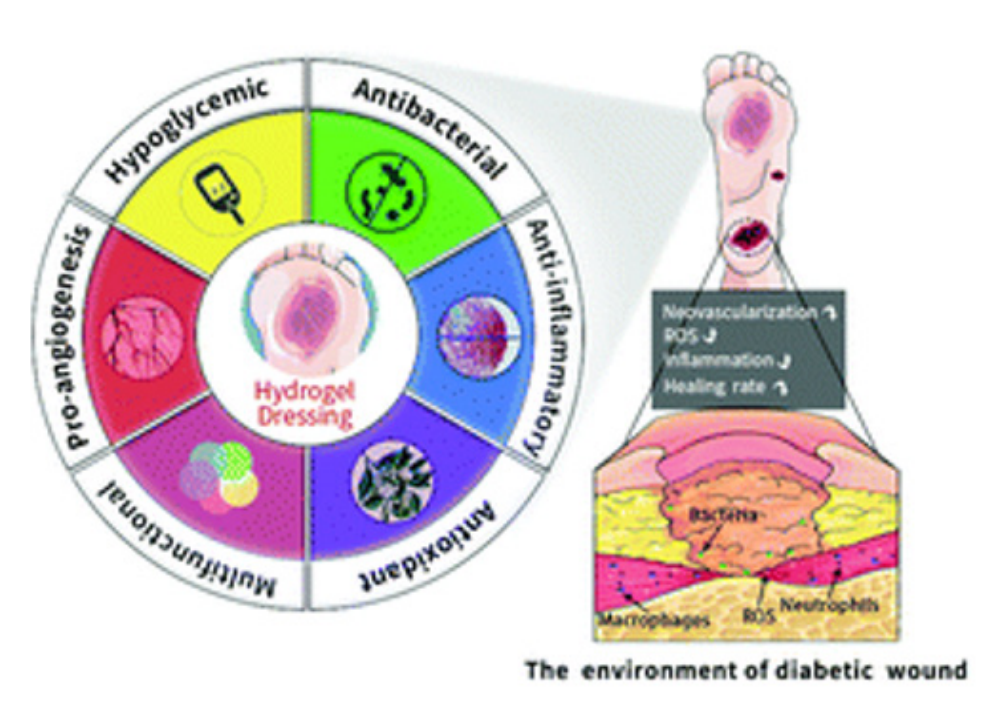

Figure 1: Potency of herbal medicine hydrogel dressing based on konjac glucomannan.

Liposomal hydrogel wound dressing reduces bacterial contamination and infection spread. Nunes et al. showed that collagen-based films with liposome-loaded usnic acid improve burn healing. Created and tested a mupirocin liposomal hydrogel for diabetic wounds (Tsioli, et al. [11]). They showed that this dressing combines prolonged medication release to prevent infection and moist wound dressing with efficient fluid absorption. Created a chitosan gel formulation with liposomes carrying epidermal growth factor to test its effects on rat second-degree burn wound healing. Cell proliferation and epithelisation increased histochemically. Monjac glucomann has various benefits, in addition to lowering cholesterol levels (Sugeng Mashudi, et al. [12]), it can also be used in wound care. Hydrogels provide a moist, cold environment for wound healing, promote high water vapor permeability, and prevent microorganisms from entering the wound.

Hydrocolloid Dressing

Colloidal, gel-forming materials, elastomers, and adhesives make hydrocolloid dressings (Kong, et al. [13]). Hydrocolloid sheets have two layers. The inner layer is a self-adhesive hydrophilic polymer matrix containing scattered gelatin, pectin, and other compounds (Enescu, et al. [14]). The outer polyurethane layer shields the wound from pathogens, foreign debris, and shear stresses. CMC, gelatin, and pectin are hydrocolloid dressings. Thin films, sheets, or composite dressings are used for mild to moderately leaking wounds (Aruan, et al. [15]). Powders and pastes include hydrocolloid dressings (Matsuzaki, et al. [16]). Gel formation alters physical state after exudate absorption. The painless dressing removal and ability to treat acute and chronic wounds in children are the most essential features (Derwin R, et al. [17]). That may be why hydrocolloid dressings are the most popular (Wang, et al. [18]). Hydrocolloid wound dressings, made from a hydrophobic pressure sensitive adhesive (continuous phase) and hydrophilic filler (dispersed phase), heal wounds quicker with less discomfort (Boyko, et al. [19]). Patients may do daily activities without wound harm (Moore, et al. [20]).

Hydrocolloid dressings are semi-permeable to water and gas vapors but not fluids or microorganisms. Infected wounds require oxygen to heal, but these coverings usually prevent water vapor exchange. Hydrocolloids are waterproof and cushioning, making them useful (Janowska, et al. [21]). Hydrocolloid dressings should be replaced daily until drainage appears underneath them, then every three days to once a week (Chamorro, et al. [22]). Pressure ulcer therapy often uses hydrocolloids (Halim, et al. [23]). Hydrocolloid dressings outperform gauze dressings due to the frequency of healed wounds and reduced pressure ulcer dimensions (Ma, et al. [24]). In 2018, (Chou, et al. [25]) found that chitosan derivative film is comparable to hydrocolloid dressing for superficial and abrasion wounds. Hydrocolloid dressing was tested for neurosurgical wounds according to current wound healing (Clark [26]). Clinical wound infection, healing, and cost-effectiveness assessments showed outstanding wound healing and aesthetic benefits. (Cuschieri L, et al. [27]) (Figure 2). Hydrocolloid dressings based on Nanotechnology might support all wound healing stages in the future. owing to a paucity of publications.

Figure 2: Potency of herbal medicine hydrogel dressing based on konjac glucomannan.

Conclusions

Wound treatment is crucial and growing globally. Evidence-based Nursing wound care requires knowledge of wound dressing products and clinical competence in dressing selection. Differentiating wound-healing from conventional materials treatment may help treat chronic and ischemic ulcers by herbal materials. Preclinical research is necessary, specifically from konjac glucomannan for diabetes foot ulcer. Research is required. to find novel konjac glucomannan material that accelerate chronic wound healing healing. New biocompatible konjac glucomannan that can controlling all wound healing stages, including antimicrobial, self-healing, good mechanical characteristics and wound dressing adherence to increase performance. This study may lead to clinical applications.

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Conflicts of Interest

The authors declare no conflict of interest.

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