Active wound dressing of electrospun lignin/cellulose acetate on cotton gauze

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Wounds that do not heal within a reasonable time frame can be considered as chronic wounds and it is estimated that 1.51 to 2.21 per 1000 people worldwide are suffering from this condition [1]. Chronic wounds can be characterized as permanently in the inflammatory stage. This stage comprises a continuing influx of neutrophils that release cytotoxic enzymes, reactive oxygen species (ROS), and inflammatory mediators [2]. The antioxidant activity of lignin, the second largest eco-friendly lignocellulosic biopolymer, may play a pivotal role in wound healing due to its mitigation of ROS present in the wound environment. Continuous ROS release leads to inflammation downregulation, promoting collagen production, thus tissue repair and regeneration. In addition, lignin possesses other remarkable properties such as: antimicrobial, thermal, and mechanical [3]. Cellulose acetate is a biocompatible and biodegradable polymer which may be promptly electrospun. The interconnected and porous network of nanofibers is beneficial for wound dressings [4]. Its nano structure prevents microorganisms infiltration [5]. Therefore, electrospun lignin mixed with cellulose acetate onto cotton gauze may display an interesting set of active properties. Cotton gauze is one of the most often used wound dressing materials and is responsible for providing additional mechanical resistance to the wound dressing. Hence the study aimed to improve the antibacterial and antioxidant properties of cotton gauze by coating it with electrospun lignin/cellulose acetate fibers. The samples were tested for antimicrobial, antioxidant, mechanical, wettability, and thermal properties. The results demonstrated the excellent antioxidant properties of the composite dressing, thus potentially being used in active wound dressing applications.

References

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