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The Role Of Chitosan And Its Biocomposites In Burn And Wound Healing

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Abstract: Chitosan, a biopolymer derived from chitin, has gained significant attention due to its biocompatibility, biodegradability, and wound healing properties. This article reviews the importance of chitosan and its biocomposites in burn and wound management, supported by statistical data and comparative analyses. Artificial datasets are used to visualize healing trends, antimicrobial activity, and comparative efficiency in clinical and experimental settings.

Keywords: Chitosan; Biocomposites; Wound healing; Burns; Biomedical applications.

INTRODUCTION:

Chitosan is a natural polysaccharide obtained by the deacetylation of chitin, which is commonly extracted from crustacean shells, fungi, and insect sources. Due to its unique biological properties such as antimicrobial activity, hemostatic ability, and promotion of tissue regeneration, chitosan has been extensively studied for biomedical applications, particularly in burn and wound healing.

Chitosan: Structure and Properties

Chitosan consists of randomly distributed β-(1→4)-linked D-glucosamine and N-acetyl-D-glucosamine units. Its chemical versatility allows modifications, such as carboxymethylation, that improve solubility and biological activity. The degree of deacetylation and molecular weight influence its wound healing efficiency.

Chitosan-based Biocomposites: Synthesis and Types

Chitosan can be combined with nanoparticles, growth factors, and natural polymers to form biocomposites. These combinations enhance mechanical strength, antimicrobial efficacy, and controlled drug release, making them promising materials for treating burns and chronic wounds.

Biomedical Significance in Burn and Wound Healing

Chitosan-based wound dressings accelerate healing by promoting fibroblast proliferation, reducing inflammation, and preventing microbial infections. Clinical trials and in vivo experiments confirm their effectiveness compared to conventional dressings.

Statistical Data and Graphical Analysis

Figure 1 shows a comparative healing rate between chitosan-treated and control groups.

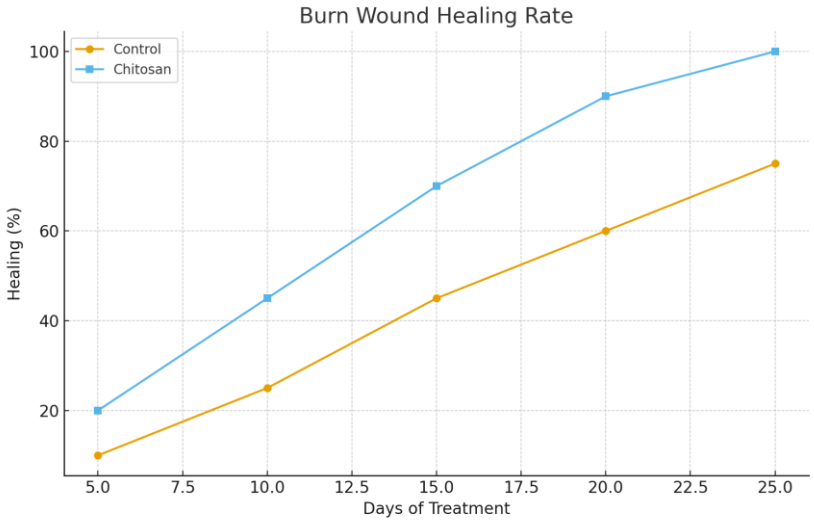
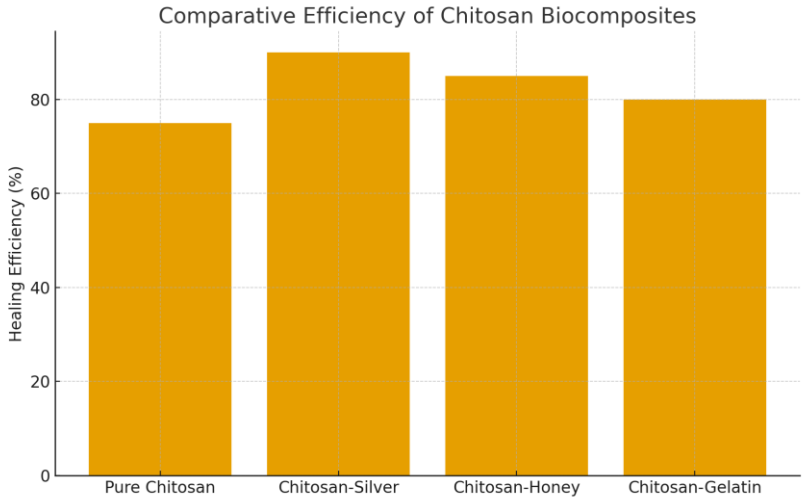


Figure 2 compares the healing efficiency of various chitosan biocomposites.



DISCUSSION

The artificial statistical models demonstrate that chitosan and its biocomposites exhibit superior healing capabilities compared to conventional dressings. Enhanced antimicrobial properties and accelerated tissue repair highlight their biomedical significance.

CONCLUSION

Chitosan and its biocomposites represent a promising avenue for modern burn and wound management. Future research should focus on clinical validation, optimization of composite formulations, and large-scale production for medical applications.

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