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by Krisna Murti

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Literature Review

The Potential of Shell Extract as a Hemostasis and Wound Healing Agent: A Literature Review

Potensi Ekstrak Cangkang sebagai Agen Hemostasis dan Penyembuhan Luka: Sebuah Tinjauan Pustaka

Putri Erlyn[1,2], Irfannuddin Irfannuddin[2,3], Krisna Murti[4], Aldes Lesbani[5]
[1]Department of Pharmacology Faculty of Medicine Universitas Muhammadiyah Palembang
[2]Doctoral Program in Biomedical Science Faculty of Medicine Universitas Sriwijaya Palembang
[3]Department of Physiology Faculty of Medicine Universitas Sriwijaya Palembang
[3]Department of Anatomical Pathology Faculty of Medicine Universitas Sriwijaya Palembang
[5]Research Center of Inorganic Materials and Complexes Faculty of Mathematics and Natural Sciences Universitas Sriwijaya Palembang

ABSTRACT

Hemostasis is an emergency medical treatment to reduce pain and patient mortality, therefore research is being developed to find effective hemostasis. The utilization of natural materials for hemostasis and wound healing is rapidly expanding, including chitosan found in shell extracts. Chitosan is obtained from chitin found in the soft shells of marine animals such as squid, shrimp, and crabs, or from hard shells such as clams, crabs, and lobsters. Chitosan offers advantages such as good biodegradability, biocompatibility, and non-toxicity, and has been widely used in biomedical, chemical, food, and cosmetic industries. This literature review aims to investigate the potential of shell extracts, particularly the characteristics of chitosan, in wound healing across hemostasis, inflammation, proliferation, and remodeling stages. The study results indicate that extracts from shells containing chitosan exhibit varying characteristics in terms of molecular weight and degree of deacetylation. Chitosan with higher molecular weight and degree of deacetylation tends to yield better outcomes in hemostasis and wound healing. The material is effective in reducing antithrombin, enhancing blood clotting processes, and aiding clot formation. Increased molecular weight contributes to stimulating various cytokines, such as TNF-α, TGF-ß1, and FGF2, which play a key role in the wound healing process. Additionally, higher degree of deacetylation chitosan is effective in stimulating fibroblast proliferation. Chitosan also influences VEGF inducing angiogenesis and enhancing neovascularization in bone healing. Chitosan from shell extracts with certain molecular weight characteristics and degree of deacetylation has the potential to be the material of choice for accelerating hemostasis and wound healing.

Keywords: *Shell extract, chitosan, hemostasis, wound healing*

ABSTRAK

Hemostasis adalah perawatan medis darurat untuk mengurangi rasa sakit dan kematian pasien, maka penelitian dikembangkan untuk menemukan hemostasis yang efektif. Pemanfaatan bahan-bahan alam untuk hemostatik dan penyembuhan luka semakin berkembang pesat, salah satunya kitosan yang terkandung dalam ekstrak cangkang. Kitosan diperoleh dari kitin yang terdapat pada cangkang lunak hewan laut seperti cumi-cumi, udang, dan kepiting, atau dari cangkang keras seperti kerang, kepiting, dan lobster. Kitosan memiliki kelebihan yaitu biodegradabilitas yang baik, biokompatibilitas, dan non-toksisitas, dan telah banyak digunakan dalam bidang biomedis, industri kimia, industri makanan dan kosmetik. Tinjauan literatur ini bertujuan untuk menyelidiki potensi ekstrak cangkang, khususnya karakteristik kitosan terhadap penyembuhan luka di tahap hemostasis, inflamasi, proliferasi dan remodeling. Hasil studi ini menunjukkan bahwa ekstrak dari cangkang yang mengandung kitosan menunjukkan karakteristik yang bervariasi dalam hal berat molekul dan derajat deasetilasi. Kitosan dengan berat molekul dan derajat deasetilasi yang lebih tinggi cenderung menunjukkan hasil yang lebih baik dalam hemostasis dan penyembuhan luka. Bahan tersebut efektif dalam mengurangi antitrombin, meningkatkan proses pembekuan darah, dan membantu pembentukan bekuan. Peningkatan berat molekul berkontribusi pada stimulasi berbagai sitokin, seperti TNF-α, TGF-ß1, dan FGF2, yang memainkan peran kunci dalam proses penyembuhan luka. Selain itu, kitosan dengan derajat deasetilasi yang lebih tinggi, efektif dalam merangsang proliferasi fibroblas. Kitosan juga mempengaruhi VEGF dalam menginduksi angiogenesis dan meningkatkan neovaskularisasi dalam penyembuhan tulang. Kitosan dari ekstrak cangkang dengan karakteristik berat molekul dan derajat deasetilasi tertentu berpotensi menjadi bahan pilihan untuk mempercepat hemostasis dan penyembuhan luka.

Kata Kunci: Ekstrak cangkang, kitosan, hemostasis, penyembuhan luka

Correspondence: Irfannuddin. Department of Physiology, Faculty of Medicine, Universitas Sriwijaya, Doctoral Program in Biomedical Science, Faculty of Medicine, Universitas Sriwijaya, Jl. Dr. Mohd. Ali Komp. RSMH, Palembang 30126, South Sumatera, Indonesia Tel. +6281367673749 Email: irfan.md@unsri.ac.id

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