1st International Electronic Conference on Biomolecules: Natural and Bio-Inspired Therapeutics for Human Diseases

Session 1: The natural and bio-inspired drug universe

Title: Propolis loaded sodium alginate/gelatin films cross-linked with Ca^{2+} for potential wound dressing and healing applications

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Abstract
Problems associated with microbial resistance to antibiotics are growing due to their overuse. In this scenario, plant extracts have been considered as potential alternatives to antibiotics, since they can inhibit the action of the most common bacteria found colonizing infected wounds. The propolis extract (PE) has been used for centuries in folk medicine due to its antimicrobial, antioxidant, and anti-inflammatory properties as well as to its ability to induce tissue regeneration. Also known as "bee glue", propolis is a complex mixture of chemical constituents (such as resin, waxes, pollen, essential oil and organic compounds) with a high polyphenol content. To improve the stability and long-term effectiveness of PE in wound healing, polymeric films composed of biodegradable and biocompatible polymers are being engineered as delivery vehicles. Here, sodium alginate/gelatin (SA/GN) films (2 wt% SA concentration, polymer ratio 70/30 v/v), containing PE, were prepared via a simple, green process of solvent casting/phase inversion technique, followed by crosslinking with calcium chloride (2 wt%) solutions. The minimum inhibitory concentration (MIC) of PE was established as 0.338 mg/mL for *Staphylococcus aureus* and 1.353 mg/mL for *Pseudomonas aeruginosa*, the most prevalent bacteria in infected wounds. The extract was incorporated at *P. aeruginosa* MIC (a value effective against both bacteria) within the polymeric films before (blended with the polymeric solution) and after (immobilization via physisorption) film production. Flexible, highly hydrated films were obtained. Successful incorporation of PE was confirmed via Fourier-transformed infrared spectroscopy (FTIR). The antibacterial activity of the films was assessed via agar diffusion (qualitative) and killing time kinetics (quantitative) examinations. Data confirmed the modified films effectiveness to fight bacteria infections caused by *S. aureus* and *P. aeruginosa* and their ability to be applied in the treatment of infected wounds.

Keywords: antibacterial activity; plant extracts; propolis; localized drug release; bactericidal effects; infection control.