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Development, characterization, and in vitro evaluation of water soluble poloxamer/pluronic-mastic gum-gum acacia-based wound dressing

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Abstract

Bacterial infections are serious complications associated with wounds. Wounds can become chronic due to bacterial infections. In this research, lyophilized wound dressings were prepared from poloxamer, pluronic, mastic gum, and gum acacia. The wound dressings were loaded with metal-based nanoparticles and carbon-based materials. They exhibited effective antibacterial activity, water-soluble, biodegradable with the capability to absorb large amounts of wound exudates. The bandages were analyzed using Fourier transform infrared spectroscopy, scanning electron microscopy/energy-dispersive X-ray spectroscopy, thermogravimetric analysis, and transmission electron microscopy followed by porosity and water uptake. TEM confirmed the successful incorporation of the metal-based NPs and carbon-based materials into the wound dressings. The TGA confirmed that the wound dressings are thermally stable. The wound dressings were also characterized by a high uptake of water to form a gel which was soluble in water indicating their useful application for wounds with large wound exudate, sensitive and damaged skin. The unique properties of the wound dressings indicate that they are potential materials for the treatment of chronic wounds in patients with sensitive skin.