

Preparation and in vitro Bactericidal and Fungicidal Efficiency of NanoSilver/Methylcellulose Hydrogel

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Abstract : In this work we describe the preparation of NanoSilver/methylcellulose hydrogel containing silver nanoparticles (NPs) for topical bactericidal applications. Highly concentrated dispersion of silver NPs as high as of 5g/L of silver with diameter of 10nm was prepared by reduction of AgNO₃ via strong reducing agent NaBH₄. Silver NPs were stabilized by addition of sodium polyacrylate in order to prevent their aggregation at such high concentration. This way synthesized silver NPs were subsequently incorporated into methylcellulose suspension at elevated temperature resulting in formation of NanoSilver/methylcellulose hydrogel when temperature cooled down to laboratory conditions. In vitro antibacterial activity assay proved high bactericidal and fungicidal efficiency of silver NPs alone in the form of dispersion as well as in the form of hydrogel against broad spectrum of bacteria and yeasts including highly multiresistant strains such as methicillin-resistant Staphylococcus aureus. A very low concentrations of silver as low as 0.84mg/L Ag in as-prepared dispersion gave antibacterial performance. NanoSilver/methylcellulose hydrogel showed antibacterial action at the lowest used silver concentration equal to 25mg/L. Such prepared NanoSilver/methylcellulose hydrogel represent promising topical antimicrobial formulation for treatment of burns and wounds.

Keywords : antimicrobial, burn, hydrogel, silver NPs

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