VISIBLE LIGHT DRIVEN POLYSACCHARIDE/ AGNPS BIONANOCOMPOSITE WITH ENHANCED ANTIMICROBIAL EFFICIENCY

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Abstract –

Recently, increase bacterial resistance to antimicrobial and antifungal compounds issue constitutes a real threat to human health. One of the useful materials for fighting against pathogens is silver nanoparticles (AgNPs). However, the use of AgNPs in medical fields remains somewhat limited due to their probable cytotoxic effects. To reduce the toxicity, AgNPs can be functionally modified by biocompatible polymer composition such as cellulose, chitin, agarose, starch.
The current study is aimed at preparing a smart functionalized AgNPs using biomimetic synthesis pathway and evaluation their antimicrobial potential. For this purpose, visible light sensitive polysaccharide nanocomposite template was designed. Structure of visible light mediated spherical ultra small AgNPs was characterized by Ultraviolet–Visible (UV–Vis) Spectroscopy and Transmission Electron Microscopy (TEM). Antimicrobial activity and synergistic effect of AgNPs were evaluated against following microorganism : Enterococcus faecalis 29212, Escherichia coli 25922, Pseudomonas aeruginosa 27853, Candida albicans 10231 using the agar disk diffusion method. The antimicrobial analyses show effect in a dose-dependent manner at 4 different concentration AgNPs. Patogenes treated with the initial concentration of AgNPs (2,5 mg/mL) show the biggest inhibition zone diameter and appeared antimicrobial efficiency obtained AgNPs proceeds up to 4 dilution (0.05 mg/mL). We conclude that used visible light LED approach gave us a unique opportunity to maintain the compatibility of AgNPs with biopolymer environments. Given the current findings, biofunctionalized AgNPs mediated by harmless LED approaches have positive antimicrobial and synergistic powers. Therefore, they can be considered as a promising candidate to combat the multi-drug resistance bacteria and some fungi.

Keywords - Antimicrobial AgNPs; Visible light driven; Polysaccharide nanocomposite