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SILVER NANOPARTICLES INCORPORATED POLYMER-BASED ELECTROSPUN SKIN SCAFFOLD FOR BURN WOUNDS

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Polymeric electrospun nanofibrous scaffolds with enhanced antimicrobial properties have become a suitable substitute for artificial scaffolds in tissue engineering applications, including skin scaffolds, in the recent past. This is because of the ability to mimic the anatomical architecture of extracellular matrices by facilitating cell growth and proliferation. Silver nanoparticles (AgNP) are known to have antibacterial activity. In this study, AgNP and Graphene oxide (GO) incorporated PolyCaproLactone/ PolyEthylene Glycol (PCL/PEG) based electrospun fibrous mesh was prepared, characterized and tested *in vitro* for use as wound dressings. Silver nanoparticles were synthesized by reducing Ag^+ using trisodium citrate and characterized using UV-Vis spectrophotometry. Different fibrous scaffolds were prepared, including PCL+PEG, PCL+AgNP, PCL+PEG+AgNP and PCL+PEG+AgNP+GO using an electrospinning apparatus. The scaffold discs were loaded with prepared AgNP solutions (0.05 M, 0.1 M, 0.2 M) for the antimicrobial assay. The morphology of fabricated scaffolds was evaluated by optical microscopic studies and by XRD studies. Finally, water absorption capacity and antibacterial assays (by disc diffusion method) were performed using Ciprofloxacin 0.50 mg /disc as the positive control. The water absorption studies showed that the scaffold could absorb water by seven folds of its initial weight. The scaffold showed promising antibacterial activity against both Gram-negative bacteria (*Escherichia coli, Pseudomonas aeruginosa*) and Gram-positive bacteria (*Bacillus cereus, Staphylococcus aureus, Staphylococcus epidermidis*), which can be predominantly seen in burn wounds. The results show that the prepared biodegradable and biocompatible electrospun fibrous scaffold may be useful as an effective tissue-engineered artificial extracellular matrix for burn wounds since it can absorb high amounts of exudate with an antimicrobial action against the above-mentioned bacteria.

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Keywords: Burn wounds, Electro spinning, Polymers, Silver nanoparticles, Skin scaffold