

Preparation of silver nanoparticles impregnated contact lenses

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Background and Aims: Contact lenses (CL), whilst being an excellent form of vision correction, are a significant risk factor for keratitis. Approximately one-third of isolated microorganisms from CL are Gram-positive cocci, meanwhile two thirds of them are Gram-negative rods. Silver nanoparticles have been used as antimicrobial agent. The aim of this study was to prepare silver impregnated contact lenses which could be applied for preventing bacterial infection in eyes.

Methods: A series of soft contact lenses using hydroxyethyl methacrylate, other monomers and different amounts of nano-sized silver powder were prepared. The lenses were soaked in sodium hypochlorite solution for nano-sized silver powder oxidation. These lenses were soaked into 1 ml of Mueller Hinton Broth (MHB) containing 10⁴ CFU/ml *Pseudomonas aeruginosa* (ATCC15442) and *Staphylococcus aureus* (ATCC6538) separately, and incubated at 37° C for 6, 24, 48 and 72 hours. Survived bacteria in each sample were counted in Mueller Hinton Agar (MHA) plates containing quenching agent by pour plate method. Silver released from the contact lenses quantified by flame atomic absorption spectrometry.

Results: The lenses which prepared with 2 mg nano silver, had a significant effect on both *S. aureus* after 24 hour and *P. aeruginosa* after 6 hour, but reduction in the number of *S. aureus* was not observed at 48 and 72 hours. Moreover, lenses which prepared with 5 and 7 mg silver nanoparticles respectively had significant effect on both types of bacteria at all times.

Conclusions: Due to its lowest silver released in medium culture and proper efficacy in reducing the number of both type of bacteria after 24 hour, the lenses with 2 mg silver nanoparticles were selected as the most effective lenses.

Keywords: Bacterial infection; Contact lens; Silver nanoparticles