

## Effects of Gelatin on Characteristics and Dental Pathogen Inhibition by Silver Nanoparticles Synthesized from Ascorbic Acid

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**Abstract :** In this study, silver nanoparticles (AgNPs) were prepared using ascorbic acid as a reducing agent and silver nitrate as a precursor. The effects of gelatin (G) on particle characteristics and dental pathogen inhibition were investigated. The spectra of AgNPs and G-AgNPs were compared using UV-Vis and Energy-dispersive X-ray (EDX) spectroscopy. The obtained AgNPs and G-AgNPs showed the maximum absorption at 410 and 430 nm, respectively, and EDX spectra of both systems confirmed Ag element. Scanning electron microscope showed that AgNPs and G-AgNPs were spherical in shape. Particles size, size distribution, and zeta potential were determined using dynamic light scattering approach. The size of AgNPs and G-AgNPs were  $56 \pm 2.4$  and  $67 \pm 3.6$  nm, respectively with a size distribution of  $0.23 \pm 0.03$  and  $0.19 \pm 0.02$ , respectively. AgNPs and G-AgNPs exhibited negative zeta potential of  $24.1 \pm 2.7$  mV and  $32.7 \pm 1.2$  mV, respectively. Minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) of the obtained AgNPs and G-AgNPs against three strains of dental pathogenic bacteria; *Streptococcus gordonii*, *Streptococcus mutans*, and *Staphylococcus aureus* were determined using broth dilution method. AgNPs and G-AgNPs showed the strongest inhibition against *S. gordonii* with the MIC of 0.05 and 0.025 mg/mL, respectively and the MBC of 0.1 and 0.05 mg/mL, respectively. Cytotoxicity test of AgNPs and G-AgNPs on human breast cancer cells using MTT assay indicated that G-AgNPs (0.1 mg/mL) was significantly stronger toxic than AgNPs with the cell inhibition of  $91.1 \pm 5.4\%$ . G-AgNPs showed significantly less aggregation after storage at room temperature for 90 days than G-AgNPs.

**Keywords :** antipathogenic activity, ascorbic acid, cytotoxicity, stability

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