

# ACUTE TOXICITY OF SILVER NANOPARTICLES SYNTHESIZED FROM *CISSUS QUADRANGULARIS* IN *POECILIA RETICULATA* LARVAE AND ITS ANTIBIOFILM ACTIVITY AGAINST GRAM POSITIVE & GRAM NEGATIVE BACTERIA

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The biosynthesized silver nanoparticles using *Cissus quadrangularis* (CQ-AgNPs) showed excellent antibacterial activity against gram-positive (*Bacillus licheniformis*, *Bacillus pumilus*), and gram-negative bacteria (*Pseudomonas aeruginosa*, *Vibrio parahaemolyticus*). The maximum zone of inhibition was higher in *Pseudomonas aeruginosa* (3 mm, 4 mm, 5 mm, and 6 mm, respectively) than other bacteria. The light and CLSM microscopic images showed strong adhering ability of gram-positive and gram-negative bacteria which led to the development of dense biofilm formation on the glass pieces. Moreover, treatment with CQ-AgNPs also affected the thickness ( $\mu\text{m}$ ) of the biovolume ( $\mu\text{m}^3$ ) and the average thickness ( $\mu\text{m}$ ) was reduced in the biofilms formed by both bacteria's, as evidenced through COMSTAT analysis. The toxicity studies in *Poecilia reticulata* larvae showed 100% mortality in  $\text{AgNO}_3$  (1  $\mu\text{g}/\text{ml}$ ); 40% in CQ-AgNPs (20  $\mu\text{g}/\text{ml}$ ) whereas no mortality was observed for the CQ extract up to 500  $\mu\text{g}/\text{ml}$ . Histopathological observation showed that the abnormal tissue texture in CQ-AgNPs treated *Poecilia reticulata* larvae. Further, the CQ-AgNPs treated *Poecilia reticulata* larvae cells showed DNA damage at the concentration of 20  $\mu\text{g}/\text{ml}$  in the 0.6% agarose gel when compare to the control. The protein released from the CQ-AgNPs treated *Poecilia reticulata* larvae cells were disrupted quickly with sodium dodecyl sulphate (SDS) than the non-treated cells and shown the protein profile ranging from 118 KDa to 135 KDa. Hence, the current findings suggest that CQ-AgNPs would appear to have a less toxic effect than  $\text{AgNO}_3$  on aquatic organisms in freshwater environments especially in *Poecilia reticulata*; thus more attention should be paid to preventing their accidental or intentional release into aquatic ecosystems.

Keywords: Acute toxicity, AgNPs, *Poecilia reticulata*, Biofilm, *Cissus quadrangularis*

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