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 (µm) of the biovolume (µm3) and the average thickness (µm) 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 AgNO3 (1µg/ml); 40% in CQ-AgNPs (20 µg/ml) whereas no mortality was observed for the CQ extract up to 500 µg/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 µg/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 to135 KDa. Hence, the current findings suggest that CQ-AgNPs would appear to have a less toxic effect than AgNO3 on aquatic organisms in freshwater environments especially in Poecilia reticulate; thus more attention should be paid to preventing their accidental or intentional release into aquatic ecosystems.

Keywords: Acute toxicity, AgNPs, Poecilia reticulate, Biofilm, Cissus quadrangularis

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