Abstract

In the present research work both green and chemical synthesis of silver nanoparticles (AgNPs) was done. Green synthesis was done from *Halymenia porphyraeformis*. Nanoparticles were characterized with Uv-Visible. The maximum peak was obtained at 420 nm for both green and chemically synthesized nanoparticles. SEM analysis indicated that green AgNPs were cubic and cylindrical in shape and chemically synthesized AgNPs were cubic and spherical in shape. By XRD results the size of the AgNPs was calculated by using scherrer's equation. The size of the green AgNPs was calculated as 17.23nm and size of the chemically synthesized AgNPs were 17.32nm. The FTIR analysis indicated that C=C bending, S-H groups and aromatic functional groups were attached with the green synthesized AgNPs. The FTIR analysis of the chemically synthesized AgNPs revealed that methyl, carboxyl, Si-OR, CO^{-}, N-H groups were attached with AgNPs. The comparative toxicological effects of chemically synthesized AgNPs, green AgNPs and Ag-salt on *Cyprinus carpio* were studied. For this purpose, LC_{50} was calculated in seven days experiment and then, 14 days of acute toxicity assay was done. After 14 days the fish was dissected and its vital organs were preserved by dry freezing for further testing. Different chemicals tests were performed for the estimation of oxidative stress caused by chemical and green AgNPs, and Ag-salt. Maximum lipid peroxidation (LPO) was observed in the gills of fish treated with chemically synthesized AgNPs and minimum LPO was estimated in the brain of the fish treated with green AgNPs. The maximum amount of catalase was found in gills of fish exposed with Ag-salt and minimum was in chemically synthesized AgNPs. Maximum GSH was found in the liver exposed to green AgNPs and minimum was found in chemically exposed gills. Maximum GST was present in green AgNPs exposed gills and minimum was in brain of chemical AgNPs exposed. The hisopathological analysis of gills and liver were also done. It was noted that there were maximum destruction found in the gills and liver of the fish treated with chemical AgNPs that was followed by the green AgNPs and Ag-salt as compared to control. So it is concluded that green AgNPs have aromatic groups attached with them which make them less toxic. So the green synthesis is cost effective as well as less toxic.