ABSTRACT

Over the past few decades, the excessive use and high levels of occupational exposure to metal-based nanoparticles have raised significant concerns about their potential toxic effects. This scenario necessitates the employment of safer nanomaterials. We aim to introduce safer silver nanoparticles (AgNPs) by capping the same with Selenium, an essential nutrient for health, and designing silver and selenium nanohybrids (Se-Ag NHs) via chemical reduction method; the same were characterized using UV-visible spectroscopy and FTIR showing the peaks 360nm and Se-O and Ag-O stretch ranging 400-600cm-1 respectively. The subject material was tested against albino mice. Six groups of mice, each comprising 5 albino mice, one of which was a control while the others were treatments with the test material in varying concentrations. Antioxidant status was elevated by monitoring liver enzymes. It was found that NHs-treated groups showed significantly elevated ($p<0.05$) levels of SOD and CAT as compared to the AgNPs-treated group and high bilirubin (3.3) and SGOT (695) levels were recorded in AgNPs-treated group as compared to selenium nanoparticles (SeNPs) and NHs treated groups ($p<0.05$) Renal markers study reveals that Se-Ag NHs showed less blood urea (35) and serum creatinine (0.3) as compared to AgNPs ($p<0.05$). In-vitro antioxidation studies reveal that Se-Ag NHs significantly increased DPPH scavenging activity and ferric-reducing power assay ($p<0.05$). The histology of the liver, kidney, and intestine depicts mitigated damage in Se-Ag NHs as compared to AgNPs showing low stress. The current study suggests that Se-Ag NHs are safer and eco-friendly, without compromising their biomedical efficacy as compared to the AgNPs. We also recommend that the Se-Ag NHs may be employed as a preference for biomedical applications.

Keywords: Silver, Selenium, nanoparticles, nanohybrids, toxicity, antioxidant, SOD, GST, CAT, renal, and hepatic.