

Abstract

Hepatocellular Carcinoma is the most common and highly aggressive form of liver cancer, with high incidence and mortality rate. The conventional therapeutic approaches used in cancer treatment are linked with severe side effects, chemoresistance, and high treatment cost. Medicinal plants like *Allium sativum* (Garlic) have anti-cancer properties which are important for cancer treatment due to their active biochemical components (such as organosulfur compounds, alliin, allicin, diallyl disulfide, diallyl sulfide, allyl mercaptan, and S-allyl cysteine). Particularly, *A. sativum* conjugated silver nanoparticles have been shown to have effective cytotoxic activity against hepatocellular carcinoma (HCC) cells. Current study was designed to evaluate the anticancer potential of *A. sativum* conjugated silver nanoparticles against hepatocellular carcinoma in mice. Male albino mice were divided into 11 groups (n=5 in each group). Diethylnitrosamine (DEN) carcinogen was used to induce HCC. The treatment groups G1, G2A, G2B, G2C, G2D, G3, G4, G5, G6, G7, and G8 were treated with Saline, DEN, Cisplatin (T), *A. sativum* extract (T), *A. sativum* AgNPs (T), Cisplatin, *A. sativum* extract, *A. sativum* AgNPs, DEN+ Cisplatin, DEN+ *A. sativum* extract, DEN+ *A. sativum* AgNPs, respectively. The biochemical tests like ALT, AST, AFP, LDH, GGT, MDA, GSH, CAT, bilirubin, and liver histology were determined to analyze HCC status in mice. Results showed that the level of biomarkers AFP, AST, ALP, LDH, GGT, MDA were significantly decreased in all treatment groups as compared to the HCC induced group, but higher significant results shown by ASNPs (T) (150mg/kg) as followed; AFP (57.8 ± 1.5 ng/mL), AST (299.2 ± 8.0 U/L), ALT (142.8 ± 3.9 U/L), ALP (239.6 ± 4.1 U/L), LDH (546.8 ± 6.9 U/L), GGT (35.2 ± 1.1 U/L), MDA (6.7 ± 0.2 mmol/l), and bilirubin (6.6 ± 0.2 mg/dl). The level of antioxidant enzyme CAT and GSH significantly reduce to its normal in all treatment groups but highest reduction was shown by ASNPs (T) as followed; CAT (159.0 ± 3.2 mmol/l) and GSH (3.9 ± 0.1 μ mol/l). The histopathological study of liver tissues showed destruction in the DEN treated group, that were restored in all treatment groups after given treatment to them. The effective and encouraged results was showed in ASNPs (T) group. It can be concluded that, *A. sativum* (due to the present of bioactive components *Department of Zoology, GCU Lahore* i.e. allicin, S-allyl cysteine, diallyl disulfide) conjugated AgNPs could be used against cancer by improving their liver histology and enhancing antioxidant defense systems.