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Protective effect of biofabricated Prosopis cineraria silver nanoparticles against renal carcinoma via knock down oxidative stress and inflammation by regulating NF-κB pathway

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Objectives: Renal cell carcinoma is considered as the most frequent and lethal cancer of urinary system. Since *Prosopis cineraria* (PC) leaves are rich in polyphenolic compounds and their silver nanohybrids potentially inhibit the human breast cancer cells (MCF-7). Considering the previous facts the current study was designed to bio-fabricate, characterize and to evaluate the protective efficacy of PC extract mediated silver nanoparticles (AgPCNPs) against renal carcinoma in Wistar rats.

Methods: AgPCNPs were synthesized by using co-precipitation method and characterized by various techniques. Renal cancer in animals was initiated by injecting N-nitrosodiethylamine (DEN, 200 mg/kg, i.p.) for single time and further promoted by using ferric nitrilotriacetate (FeNTA, 9 mg Fe/kg, i.p.) treatment twice weekly till next 16 consecutive weeks. Simultaneously, for 16 weeks animals were administered with AgPCNPs at two dose levels (10 and 20 mg/kg p.o.). To assess the underlying molecular mechanism concerned with the anticarcinogenic activity of AgPCNPs, its effect on tumour marker enzymes (G_6PD), serum marker enzymes (Creatinine and BUN) and enzymatic antioxidant levels (SOD, CAT and GPx) along with proinflammatory cytokines and mediators (IL-6, IL-1b, TNF-α, and NF-κB) was observed. Histological analysis was also performed with renal tissue.

Results: Different characterization techniques confirmed the formation of spherical crystalline nanoparticles with size range of 50-80 nm showed UV-Visible absorbance peak at 420 nm. DEN-FeNTA enhanced the serum toxicity marker, tumour marker enzyme as well proinflammatory mediators and cytokines whereas it reduced the antioxidant enzyme activity. AgPCNPs pretreated rats significantly restored ($p<0.05$) DEN-FeNTA induced damaging effects in a dose dependant manner as compared to DEN-FeNTP alone group. Histological characterization also supported the protective effect of AgPCNPs by potentially recovering the renal cellular structure in DEN-FeNTA induced cancer rats.

Conclusions: AgPCNPs possess strong efficacy to prevent DEN-FeNTA induced renal cancer in rodents through regulation of oxidative stress and inflammation via NF-κB pathway.