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Synthesis of biopolymer based platinum nanoparticles And 5-fluorouracil loaded Platinum nanoparticles and evaluation of their anti-tumor potential employing Potato Tumor Bioassay model


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A facile and green synthesis of platinum nanoparticles (GKPtNP) using biopolymer, Gum Kondagogu (GK) as a reducing, capping and stabilizing agent was developed. The formation and stability of GKPtNP was confirmed by UV-visible spectroscopy, SEM-EDAX, TEM, XRD, Zeta potential analysis, FTIR, ICP-MS and stability studies. The formed GKPtNP are well dispersed, homogenous and showed a characteristic absorption peak at 201 nm, with a size of $2-4 \pm 0.50$ nm and recorded negative zeta potential (-46.1 mV) indicating good stability. 5-fluorouracil (5FU), a known anticancer drug, was loaded into the synthesized GKPtNP, which leads to the development of a new combination of nanomedicine (5FU-GKPtNP). The in vitro drug release studies of 5FU-GKPtNP in pH 7.4 showed a sustained release profile over a period of 120 mins, and the hemolysis studies revealed that GKPtNP, 5FU and 5FU-GKPtNP were found

to be blood compatible. *A. tumefaciens* induced in vitro potato tumor bioassay was employed for screening the anti-tumor potentials of GKPtNP, 5FU and 5FU-GKPtNP. The experimental results suggested, a complete tumor inhibition by 5FU-GKPtNP at a lower concentration than the GKPtNP and 5FU respectively. Further, the mechanism of antitumor activity was confirmed by their interactions with DNA using gel electrophoresis and UV-spectroscopic analysis. The electrophoresis results revealed that the 5FU-GKPtNP totally diminishes DNA and the UV-spectroscopic analysis showed hyperchromic effect with red shift indicating intercalation type of binding with DNA. Over all, the present study revealed that the combined exposure of the nanoformulation (5FU-GKPtNP) resulted in the enhanced antitumor effect on *A. tumefaciens* induced potato tumor bioassay.

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