ABSTRACT

The main aim of the present study is to synthesize and characterize metallic nanoparticles and synthesised nanoparticles of *T.pallida* loaded liposomes and to evaluate its antioxidant and anticancer potential. The drug release profile of the silver nanoparticles loaded liposomes were also analysed and the results are validated using various mathematical models. In phase I, the AgNPs are synthesized by sunlight mediated green synthesis and the AgNPs loaded are prepared by a conventional thin film hydration method. The synthesized silver nanoparticles and silver nanoparticles loaded liposomes were characterized using various spectral techniques. The UV visible spectrum peak at 450 nm indicates the formation of AgNPs. EDAX spectrum indicates the presence of 65.94% of silver and the XRD pattern reveals that the synthesized silver nanoparticles are Face Centered Cubic crystalline in nature. High encapsulation of silver nanoparticles into the liposomes was observed and the high encapsulation effficiency indicates the strong interaction exist between the silver nanoparticles and the lipids. FTIR spectrum reveals the various functional groups that are involved in the synthesis of AgNPs and formation of Liposomes. The average size of the nanoparticles and AgNp loaded liposomes was 55.4 nm and 172.1 nm with a dispersity index of the synthesized polymer 0.33 and 0.381as identified by DLS analysis. The Zeta potential of AgNPs and AgNPs loaded Liposomes were found to be -15.6 mV and -21.5 mV respectively. *In vitro* Drug Release Profile of AgNPs Loaded Liposomes were carried out using 3 different pH:pH 5.5 (Mature Endosomes of cancer cells), pH 6.8 (Cancer Cells) and pH 7.4 (Blood). A high AgNP release was found at a pH of 5.5 (mature endosomes of cancer cells) when compared to the others clearly indicate the targeted delivery of the AgNps. This drug release profile was validated using various mathematical models including, “Zero Order Model, First order model, Higuchi model, Korsmeyer and peppas model and Hixson crowel model”. Among the models analysed Higuchi model was the best fitted model for the release of AgNPs from liposomes as the correlation coefficient is higher which indicates that the drug release occurred through diffusion. From the Korsmeyar peppas model, it could be concluded that the drug release follows Non-Fickian Diffusion and also time dependent. The Hydro Ethanolic extract, AgNPs and AgNP loaded Liposomes were evaluated for their Antioxidant potential using, DPPH, ABTS, Hydroxyl radical, Reducing Power assay, Hydrogen peroxide and Nitric oxide radical scavenging assays compared with the standard antioxidant Quercetin. The Hydro Ethanolic extract, AgNPs, AgNP loaded Liposomes and standard quercetin exhibited a dose dependent scavenging potential. In cell

viability assays it was found that the Liposomes are very effective against Molt-3 cells and doesn't affect the normal PBL cells much. Annexin V/FITC staining revealed that the cells are in both early and late apoptotic phase in case of Molt-3 cell line and more cells are in live phase in PBL. JC 1 staining revealed that after treating Molt-3 cells with various treatment groups there was a loss of mitochondrial membrane potential to a great extent but in the case of normal peripheral blood lymphocytes, minimal loss of mitochondrial membrane potential was observed proving the non toxic property of the *T. pallida* loaded nanoliposomes. From Cell cycle analysis it was found that the cells were arrested in G0-G1 phase in Molt-3 cells and in the treated PBL cells the cells were disbursed in all the phases of cell cycle indicating the antiproliferative effect only in the leukemic cells. To conclude, the Green Synthesized *Tabebuia pallida* Silver Nanoparticles Loaded Liposomes were found to possess both Antioxidant and Anticancer efficacy through targeted delivery while sparing the normal peripheral Blood Lymphocytes.