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Chemo-preventive effects exerted by Bromelain encapsulated in poly (lactic co-glycolic acid) nanoparticles against chemically induced two-stage skin tumorigenesis model in mice

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Conventional cancer chemotherapy is associated with various side effects which limits their use. Bromelain, a proteolytic enzyme obtained from the pineapple plant, has been shown to exert anti-cancer properties which however have not been realized effectually due to requirement of high concentration of drugs at the tumor site. Hence, the concept of nano-chemoprevention has been employed which offer an effective alternative to develop more effective therapy system. Hence, bromelain loaded poly (lactic-co-glycolic acid) acid nanoparticles were formulated and characterized. The nanoparticles with the mean particle size of 130.4 ± 8.81 nm, bromelain encapsulation of $52 \pm 3.34\%$, showed intact bromelain's proteolytic activity and sustained bromelain release from NPs. Subsequently, investigation of anti-tumor efficacy of nanoparticles against developed 2-stage skin tumorigenesis model in mice revealed the enhanced ability of NPs in reducing the tumor burden, average number of papillomas (~ 2.3 folds), delay in tumorigenesis (~ 2 weeks), percent tumorigenesis (~ 4 folds) as well as reduction in average tumor volume (~ 2.5 folds) on mice as compared with free BL. The NPs were found to be superior in protecting the DNA from induced damage at 10 fold reduced doses than free bromelain. The results were also supported by histopathological evaluations. Additionally, the mechanism of proposed anti-tumor efficacy of NPs was evaluated by its ability to modulate the expression of pro-apoptotic (P53, Bax) and anti-apoptotic proteins (Bcl2) and rendering more cells to apoptosis. Therefore, formulated NPs suggested improving the efficacy of chemotherapy by exerting chemo-preventive effects against induced carcinogenesis at lower doses.

Biography

Priyanka Bhatnagar is pursuing her PhD in Bio-Organic Chemistry from CSIR-Institute of Genomics and Integrative Biology, New Delhi, India. She has completed her MSc Degree in Organic Chemistry and BSc Degree in Chemistry from University of Delhi. She is working in the area of "Design and Development of Polymeric Systems for Effective Drug Delivery". She has six papers in reputed journal.

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