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Characterization and *in vitro* evaluation of ascorbic acid nanoparticles at cellular (blood) and chromosomal level

Syeda Juveriya Fathima and Farhath Khanum
Defense Food Research Laboratory, India

Vitamin C is an essential micronutrient required in traces in order to maintain skin health, vision and development of skeleton. It acts as an antioxidant thereby reducing the risk of many chronic diseases, also improves immune function and regulates gene expression. The lack of sustainability of vitamin C is due to its susceptibility to high temperature, light and oxygen. Thereby it becomes obligatory to protect this labile ingredient while processing of food and storage. Encapsulation in the form of nanoparticles can prolong the shelf life and target delivery to the desired site; increase retention time. In the present study, chitosan has been used to prepare ascorbic acid nanoparticles by ionotropic gelation method. Ascorbic acid nanoparticles were characterized by measuring particle size, zeta potential (DLS), encapsulation efficiency (90%), thermal behavior (DSC), stability with respect to pH, temperature and time, functional group analysis (FTIR) and morphological (SEM and AFM) analysis. Disintegrating properties; *in vitro* digestion testing with respect to time at pH range of 1.2-6.8 mimicking gastrointestinal tract was investigated using AFM and HPLC. The effects of nanoparticles on RBC, WBC and platelets were assessed. Chromosomal analysis was performed on phytohemagglutinin stimulated blood lymphocyte cultures treated with the nanoparticles (68 hours). Metaphases were analyzed and karyograms were prepared using standard software. It was found that the vitamin C was successfully encapsulated (size ~100-150nm, zeta potential +50mV) and the nanoparticles formed were highly stable (upto autoclavable temperature i.e. 120oC) and allowed sustained release in small intestinal mimicked environment. No significant effect was observed on the extent of hemolysis (RBC), membrane integrity (WBC), ADP- induced platelet aggregation and chromosomes. Therefore, nanotechnology can be increasingly applied for fortification of food products with heat and time sensitive vitamins. The technique has great impact and future prospective to protect vitamins during thermal processing and storage of the formulated product and deliver the desired active components to the targeted site of the body.

Biography

Syeda Juveriya Fathima is working as a research scholar at Defence Food Research Laboratory, India. She is currently working on “Development of Vitamin B1 and Vitamin C nanoparticles and their evaluation *in vitro* and in vivo” for her Doctoral studies. She has acquired excellent skills in research methods related to biochemistry. She is considerate, sincere, kind and skilful in interpersonal skills. She has published 2 research articles in reputed journals. Recently published an article entitled "Phosphatidylcholine, an edible carrier for nanoencapsulation of unstable thiamine." in *Food Chemistry* 197 (2016): 562-570. She has written 2 book chapters for Elsevier (Nutrient Delivery).

juveriya.sjf@gmail.com

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