

Studies On Nanocurcumin By Utilising Its Bioavailability And Bio-Distribution Against  
Nicotine Induced Toxicity At Cellular Level Under Protein Restricted Condition

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Abstract

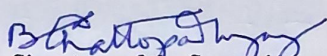
**Background:** Nicotine one of the most abundant product present in tobacco smoke, aggravates many chronic inflammatory disorder, reproductive disorder and destruction of the immune system in female under normal conditions as well as protein malnourished condition. It is known that women are more susceptible to nicotine-induced disease due to their low immunity. In protein malnourish condition the low impact factor of protein causes a depression of hepatic microsomal mixed function oxidase activities and also affects the protein synthesis, produce membrane alteration, resulting in the loss of cellular structural integrity. Curcumin have its own antioxidant properties, immunological functions that can overcome these types of problems in protein-malnourished condition. Nano curcumin, the nano particle formulation of curcumin, is a better product on account of its higher bioavailability, solubility, absorption, efficient delivery and better immunomodulation with cellular amelioration of nicotine induced problems.

**Objectives:** My thesis was designed to evaluate the ameliorative efficacies of nanocurcumin against various nicotine-induced physicochemical stresses and in female population under protein restricted condition. As well as examine the anticarcinogenic and antiproliferative properties of nanocurcumin on two different cancer cells.

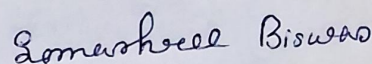
**Methodology:** Nanocurcumin was prepared by ultra-sonication and characterized by FE-SEM, UV-Visible spectrophotometer, FTIR, and XRD. Prepared nanocurcumin was used against nicotine induced female albino rat with a dose of 4 mg/kg body weight. The parameters of various groups of animals were analysed, including SGOT, SGPT, ACP, ALP, Urea, Creatinine, MDA, SOD, Catalase, GPX, GSH, IL-4, IL-6, IFN- $\gamma$ , TNF- $\alpha$ , BCL-2, BAX, Estrogen, and Progesterone. This research also included a DNA damage study and DNA content analysis. A further study was conducted to investigate the antiproliferative and anticarcinogenic properties of nanocurcumin on two different cancer cells through MTT assay, cell morphology assay, DAPI staining ROS generation and DNA laddering analysis.

**Results:** The results shows that nicotine alters the haemoglobin content, cytokine profile, apoptosis regulator protein, estrogen and progesterone hormone, DNA content and DNA damage in blood cells in protein restricted dietary condition. Nanocurcumin showed better ameliorative effects against nicotine mediated toxicities as compared with native curcumin with significantly lower doses. Nanocurcumin has the better efficiency to increase the intracellular ROS supporting apoptosis of both cervical cancer and lung cancer cells. Nanocurcumin has higher efficacy in inhibiting the proliferation of both human SiHa (cervical cancer) and A549 (lung cancer) cells in comparison to normal sized curcumin.

**Conclusion:** Nanocurcumin can act as a potential blocker of nicotine, by enhancing the efficacy of a nutritional spice (curcumin) to a clinical medicine, to protect the health of malnourished female population and shows anticarcinogenic and antiproliferative properties on two different cancer cells. Natural curcumin exhibits slow and low therapeutic activity compared to nanocurcumin. Thus, the study re-establishes the scope of nanotechnology in developing alternate nature based herbal drugs in the treatment of cancer.

  
Signature of the Supervisor with Seal

Date: 15/12/2024



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