Studies the ameliorative effect of nano - curcumin against nicotine induced complications of female rats under normal protein dietary condition

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Abstract

Background: Nicotine toxicity is one of the greatest human health challenges throughout the World. Several pathological changes like colorectal cancer, breast cancer, and cardiovascular diseases have been well documented due to nicotine toxicity. It showed various toxic effects through bio-chemical changes, immunological disorders, respiratory problems, cellular changes and genetic disorders. Curcumin showed promising effects against nicotine induced toxicity. But the major drawback of curcumin is its poor bioavailability due low absorption, faster rate of metabolism, molecular instability, and speedy elimination. Use of nanoparticles of different drugs showed better effects than their native forms due to better drug loading rate, higher biocompatibility, and targeted delivery.

Objectives: My thesis work was designed to evaluate the ameliorative effect of nanocurcumin against nicotine induced toxicity in female rats.

Methodology: Nanoparticles of curcumin was prepared by ultra-sonication and charecterised by FE-SEM, UV-Visible spectrophotometer, FTIR and XRD. Prepared nanocurcumin was used against nicotine induced female albino rats with a dose of 4mg/kg body weight. Various bio-chemical, immunological, molecular, and histo-pathological parameters were analysed like SGOT, SGPT, ACP, ALP, Urea, creatinine, MDA, SOD, Catalase, GPX, GSH, IL-4, IL-6, IFN-γ, TNF-α, BCL-2, BAX, estrogen, progesterone. The DNA content and DNA damage were also measured.

Results: Physico-chemical analysis of nanocurcumin showed exactly identical characteristics to that of curcumin. Different set of animal experiments confirmed its ameliorative effects against nicotine toxicity at biochemical, cellular and molecular levels. Nanocurcumin showed better ameliorative effects against nicotine mediated toxicities as compared with native curcumin with significantly lower dosages. Adverse histo-pathological changes at cellular level in vital organs like liver and kidney due to nicotine toxicity were prevented by nanocurcumin more effectively than curcumin. Dry lab molecular docking studies showed its high affinity to haemoglobin, DNA, various types of proteins.

Conclusion: Better protective efficacy of nanocurcumin than native curcumin might be due to its increased effective surface area, water solubility, high rate of intestinal absorption, cellular distribution and long half life. Similar studies with large number of animals as well as in different cell lines are highly suggested for strengthening the present findings. Human trial with nanocurcumin against nicotine toxicity among smokers may be undertaken following proper guidelines and permission of Drug controlling authority of India and approval of any registered Human Ethics committee.

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