

Curcumin protects DNA damage in a chronically arsenic-exposed population of West Bengal

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Abstract

Groundwater arsenic contamination has been a health hazard for West Bengal, India. Oxidative stress to DNA is recognized as an underlying mechanism of arsenic carcinogenicity. A phytochemical, curcumin, from turmeric appears to be potent antioxidant and antimutagenic agent. DNA damage prevention with curcumin could be an effective strategy to combat arsenic toxicity. This field trial in Chakdah block of West Bengal evaluated the role of curcumin against the genotoxic effects of arsenic. DNA damage in human lymphocytes was assessed by comet assay and fluorescence-activated DNA unwinding assay. Curcumin was analyzed in blood by high performance liquid chromatography (HPLC). Arsenic induced oxidative stress and elucidation of the antagonistic role of curcumin was done by observation on reactive oxygen species (ROS) generation, lipid peroxidation and protein carbonyl. Antioxidant enzymes like catalase, superoxide dismutase, glutathione reductase, glutathioneS-transferase, glutathione peroxidase and non-enzymatic glutathione were also analyzed. The blood samples of the endemic regions showed severe DNA damage with increased levels of ROS and lipid peroxidation. The antioxidants were found with depleted activity. Three months curcumin intervention reduced the DNA damage, retarded ROS generation and lipid peroxidation and raised the level of antioxidant activity. Thus curcumin may have some protective role against the DNA damage caused by arsenic.