TOXICITY ASSESSMENT OF CARMINE AND ITS INTERACTION WITH CALF THYMUS DNA

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Carmine (CRM) is a colouring agent, extensively used in a variety of foods and beverages with several non-food items like cosmetics and pharmaceuticals. The cytotoxicity and genotoxicity of xenobiotics such as CRM is expected to be modulated through cellular distribution of the ligand bound DNA. Therefore, a battery of *in vitro* toxicity assessment and chemical interaction studies of CRM with calf thymus DNA (ctDNA) have been conducted using various bioassay systems. Multiple biophysical techniques were employed to ascertain its toxicity and nature of binding. Hemolysis assay clearly revealed the cytotoxic potential of CRM while *Allium cepa* and seed germination tests for phytotoxicity of CRM were also positive. Genotoxic potential of CRM was confirmed by plasmid nicking assay which further gave a clue that it can induce DNA damage. UV-visible absorption and fluorescence spectra suggested the formation of a complex between CRM and ctDNA. Competitive displacement studies using acridine orange (AO) dye suggested that intercalative mode of binding is dominant in case of CRM-ctDNA interaction. On the other hand remarkable 43.4% displacement of Hoechst (groove binding dye) as compared to AO (100%) suggests the probable disruption of groove which might be possible due to the large size of CRM. Intercalatory mode of CRM binding was further confirmed by significant increase in double helix melting temperature of ctDNA and changes in circular dichroism spectra of ctDNA. Our study suggests that CRM has significant cytotoxic, phytotoxic and genotoxic potential though additional studies will be needed to get a better insight.