Effect of food colorants supplementation on reactive oxygen species, antioxidant vitamins level and DNA damage

ABSTRACT

There are various undesirable products generated from endogenous aerobic metabolism such as reactive oxygen species (ROS). Physiological and biochemical lesions are caused by ROS and which give rise to oxidative damages towards DNA, proteins and lipids which ultimately lead to cell death. This study was aimed to examine the effect of oral administration of food colorants (tartrazine and curcumin) on the oxidants and antioxidants level in blood and fecal of rats after 15, 30, and 45 days. Two doses were used based on the admissible daily intake (ADI) of 9.6 and 96 (high) mg/kg/body weight for tartrazine, 3.85 and 38.5 6 mg/kg/body weight for curcumin. The results showed that oral administration of tartrazine had significantly increased the total oxidant level, arylesterase, glutathione reductase, and MDA whereas there was significantly decreased the total antioxidants level, catalase, glutathione peroxidase in plasma and fecal after 30 and 45 days. Vitamin E and C were decreased in plasma. Fecal showed high level of vitamin A. High dose of tartrazine caused alteration in the aldehyde reactive probe (ARP) sites of DNA showing the DNA damage. After 45 day, significant increment was observed in the level of AST in low and high curcumin treated group. Whereas, elevations of arylestrase were seen in high curcumin group after 45 day. High dose of curcumin significantly ($P \leq 0.05$) decreased the concentration of vitamin C after 45 days of treatment and increased the level of vitamin E in plasma of treated groups after 30 and 45 days of treatment. The present study showed that the ADI and doses up to 10 times higher than ADI showed negative effects on antioxidant level and demonstrated the importance of using appropriate doses of food colorants such as tartrazine and curcumin in different processed food products.

Keyword: Antioxidants; Arylesterase; Food colorants; Glutathione; Lipid peroxidation; ROS