Protective and genotoxic effect of food coloring.

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Abstract

Food additives adding to food and some drinking to protect taste or improve its flavor and quality, it has been used for centuries to help ease processing, packaging, and storage. Food additives are classified as colors, antimicrobial agents, anti-fungal agents, and flavor enhancers. Antimicrobial agents including salts, sorbic acid, vinegar and calcium propionate are used in the products like salad dressings, margarine, cheese and pickled foods. Antioxidant agents such as vitamin C, vitamin E, BHT and BHA are using in the foods containing high fats. Food additives are significant in drinking and food manufacturing firms.

Keywords: Genotype, Biotechnology, pharmaceuticals, Vitamin, Blood.

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Commentary

Food coloring is one of food additive agents that we used in food and some drinking. Food coloring or food dye, is any color, pigment or material that give color to food or drinks. There are many types of food coloring including liquids, powders and gels. Food dyes is used both in commercial food production and in domestic cooking. Also, Food dyes are using in non-food applications such as cosmetics, pharmaceuticals and medical devices [1,2]. The addition of any dye to foods is thought to have comprised in Egypt as early as 1500 Before Christ, when candy makers added to wine for improve the wine appearance [3].One of first food canons, formed in Germany relevance spices or dyes and required saffron counterfeiters to be burned [4].

Food coloring are natural or synthetic agents. Carotenoids (E160, E161, E164), chlorophyllin (E140, E141), anthocyanins (E163), and betanin (E162) including four basic categories of plant pigments grown to color food products [5]. Other colorants or specialized derivatives of these core groups following as: Annatto, Caramel coloring, Carmine, Elderberry juice, Lycopene, Paprika and Turmeric are natural food color that we use in our foods or drinks. There are many permitted artificial food dyes that people use on their foods. We listed some of usable colors as following as:

EU: Some artificial dyes approved for food use in the EU include: E104 (Quinoline Yellow), E122 (Carmoisine), E124 (Ponceau 4R), E131 (Patent Blue V) and E142 (Green S) [6].

U.S: Some artificial dyes approved for food use in the EU include: Brilliant Blue FCF, Indigotine, Fast Green FCF, Erythrosine, Allura Red AC, Tartrazine, Sunset Yellow FCF [2].

Two colors are allowed by the FDA for limited applications: Citrus Red 2 that allowed only to color orange peels and Orange B that allowed only for use in hot dog and sausage casings [7,8].

Some of food coloring have not tested for toxicity or other risk effects. Abe and Sasaki showed that azo dyes induced chromosomal aberrations in Chinese hamster ovary cells [9]. Patterson and Butler aimed to study of genotoxic effect of tatrazine in mammalian cells. The result of this study revealed that Tatrazine induced chromosomal aberrations in lymphocytes of Muntiacus muntjac [10]. In another study Roychoudhury and Giri investigated the effect of indigo carmin, orange G and tatrazine on human peripheral blood lymphocytes [11]. The results obtained from this study showed that high concentrations of indigo carmin, orange G and tatrazine induced chromosome breaks and micronucleus formation in blood lymphocytes (Giri et al. [11]). Ozaki et al. investigated the genotoxic effect of red 3, red 40, red 102, blue 1 and blue 2 synthetic colors on Mouse bone marrow cells [12]. The result of this study was showed that blue 2 induced chromosomal aberrations [12]. Agarwala et al. reported that safflower yellow and kokum red weakly increased chromosomal aberrations in bone marrow cells of Swiss albino male mouse Agarwala et al. [13] Same result obtained from Tazehkand, et al. the researchers studied the genotoxic effect of 4-methylimidazole on bone marrow cells of albino mice [14]. The result of this study was showed that the 4-methyl imidazole do not induce chromosome aberrations on albino mice.

Some food colors don't have genotoxic effect, for example, Brusick et al. reported that sulfite-ammonium caramel did not induce chromosomal aberrations in Chinese hamster ovary cells [15]. Santos et al. reported that *Bixa orellana* L. extract including annatto dye did not induce micronucleus [16]. The researchers showed that the annatto dye do not genotoxic effect on cells. In contrast to food dyes that have genotoxic effect on humans and mouse, there are some food colors that have protective effect against carcinogenic agents. In another study Mukherjee et al. investigated the anti genotoxic effect of beta karoten (natural dye) against cyclophosphamide in bone marrow cells of rats by micronucleus assay [17]. The result of this study revealed that beta karoten reduced the genotoxic effect of cyclophosphamide. Tazehkand, et al. investigated the

in vivo antigenotoxic effect of 4-methyl imidazole against ethyl methane sulfonate [18]. The result obtained from this study revealed that 4-methyl imidazole does not antigenotoxic and protective effects in bone marrow cells of Abino Mice [14]. Same researcher's testes the 4-methyl imidazole effect on different cell lines. The result of these studies showed that 4-MEI has cytotoxic effect on 3T3-L1 and colon cancer cell lines and induce necrosis on rat liver cells [14,18,19]. Izawa et al. [20] reported that red and yellow pigments from Monascus has inhibitory effect against the bacterial mutagenicity of heterocyclic amines [20]. Edenharder and Tang, who observed the antimutagenic effect of purpurin, alizarin and other 10 anthraquinone compounds using the Ames test [21]. Similar results were obtained by Rayes who found the Cola soft drink had toxic effect on the mice testicular cells [22-24]. According to our and other researcher's results, some of food dyes usually induce genotoxicity. Therefore, some of food coloring do not induce genotoxicity but some of them have protective effects.

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