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SHORT COMMUNICATION

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Colorants in the Food Industry: Are they Really Necessary?

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Desserts, candies, ice cream, yogurts, cookies, fillings or creams, sausages: the industry extensively uses in food a variety of vibrant coloring substances. But, are these really necessary?

Colorants used in food aim to intensify or stabilize the color of food products and this implies visual and taste stimulation which promote marketing, purchase, and quality due to the maintenance of final product standardization. However, the consumption of these substances, especially of synthetic origin, is implicated in several toxic effects on human health, and even more in children, who are one of the most stimulated by the diversity of vibrant colors in industrialized foods.

Therefore, some alternatives can be explored and applied in the industry to minimize the use or replace the colorants with other substances that have minimal or no harmful effects. These alternatives can satisfy both the interests of the food industry and current health promotion strategies that focus on the nutritional quality of foods and reduction toxicological impacts on the population.

Colorants are substances of chemical, synthetic, or natural origin, also known as dyes, and are classified as a type of additive added to food, beverages, and even pharmaceuticals, in order to improve technological characteristics, without improving the nutritional value, but to intensify the color, making them more attractive and shinier to consumers. Those of synthetic and chemical origins are the ones that are the easiest to incorporate into food due to their characteristics of physicochemical stability during processing and storage, in addition to their low production cost.

Synthetic colorants are chemically classified by azo, xanthan, chinilin, triphenylmethane, and indigoid dyes groups. Examples of colorants from these groups most used in the food industry are ponceau red, burgundy (Bordeaux), erythrosine, bright blue, tartrazine yellow, twilight yellow, IV caramel, among others. These have advantages over natural colorants because they do not impact the food's flavor, as well as generally having permanent color, as foods are complex compounds and can present changes in pH acidity that result in changes in color tones in natural pigments. The visual stimulus that colorants play in food influences eating habits and makes them more attractive, which consequently contributes to the increase in sales and profitability of the industry. The artificially colored food industry, however, should only use colorings that are allowed and the amount within the concentration limit established as safe for certain types of food.

The authorization for the use and maximum concentration of colorants in foods is regulated by international agencies such as the Joint FAO/WHO Expert Committee on Food Additives (JECFA) and Food and Drug Administration (FDA). These agencies perform toxicological evaluation, maximum acceptable intake, and other safety-of-use criteria. However, despite compliance with the requirements for the use of artificial colors in food, the consumption of various artificially colored products, even more, those that are not of primary colors and are formulated with a mixture of colors (e.g. purple-blue and red, green-yellow and blue; and orange-yellow and red) implies a high toxicological risk assessment.

Many studies show the relationship between the ingestion of synthetic dyes with neurotoxicity, carcinogenicity, genotoxicity, intestinal problems, allergies and dermatitis, inflammation, headache, and others. There are also effects reported by the consumption of natural coloring, cochineal carmine, which is widely used in children's products because it expresses a pinkish hue, such as in yogurts and candies. Carmine, despite its natural origin, is extracted from an arthropod insect, and its constituent proteins have allergenicity, in addition to effects such as hyperactivity, and memory and learning problems in individuals from that age group. In toxicological risk assessment, they are often the most affected by harmful effects, considering that the substance is metabolized due to lower body weight (mg/Kg weight).

Light-colored industrialized products, such as white candies, are also likely to be formulated with a colorant to whiten or lighten, such as titanium dioxide, which despite being a mineral inorganic rather than synthetic, is also implicated in intestinal problems and multi-organ toxicity. Thus, the lesser the use of colorants in food and, consequently, the lower the consumption, the lower the risk the population will be exposed to its harmful effects.

There is a global trend to seek the development of healthier foods with less toxic implications. Considering the use of colorants in

food, some alternatives can be mentioned, such as the use of colored packaging and the use of natural pigments from plants, fruits, and vegetables in food formulation. The packages are already elaborated and planned as colored systems and can preserve the product's content due to its natural characteristics. As color is always associated with flavor, red-fruit flavored drinks, for example, could be filled in red glass bottles without the food necessarily having this vibrant red color. Grape-flavored yogurts can continue to be packaged in purple containers and be produced without adding colorants, thus preserving the ingredients' original color. Consumers may find it strange a paler color in foods that usually have vibrant colors, but after a while, they will be adapted to it and this will become common.

Aiming at replacing synthetic colorants with natural pigments extracted from plants, such as anthocyanins, carotenoids, and chlorophyll, as these have a wide range of color tones, and have biological properties beneficial to human health; however, they have some limitations as a shorter shelf life than synthetic dyes, stability problems in food mainly by pH and flavor changes. Nevertheless, many researches and quality control techniques can be applied to intensify the use and increase their stability in foods, for example, through nanoencapsulation or production of natural colorants by microbial engineering with better stability.

Considering the toxic effects caused by the consumption of these substances in food, the use of colorants in industrialized products is still based on the demand and choice of the population associated with the ease of incorporation with various food ingredients. Therefore, the dissemination of knowledge that colorants are harmful substances can increase consumer awareness and they will request healthier alternatives, consequently, the food industry will respond by promoting research and development of new products that can satisfy this new and trend standard.

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