

Hazardous Effects of Food Additives

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ABSTRACT

Nowadays, consuming packed foods has become a trend around the world affecting all age groups. Food preservation is an ancient technique, where people would store food with natural additives, however, with advanced technology and changing environment conditions people shifted towards artificial methods. In India, Food Safety and Standard Authority lays down science-based standards for processed and packaged food, it also regulates their manufacture, storage, distribution, sale and import to ensure the availability of safe and wholesome food for human consumption. Packaged food refers to any dietary product kept inside a box, bag or container. These processed foods have a longer life because of addition of food preservatives. In addition to this, flavor enhancers contribute towards the satisfying taste of these products. To exemplify, chips, soft drinks, biscuits, jams and noodles are being used in our day-to-day lives. Concern regarding food additives has increased in past few decades. The long-term use of such food articles can deteriorate the mental and physical health of the individual. They also make us more vulnerable to non-communicable disease.

Key Words *Food Additive, Preservative, Packaged Food, Fssai*

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INTRODUCTION

Food categories like instant noodles/ jams, biscuits, soft drinks, and chips contain food additives. 53.8% of food products contain at least one food additives and 11.3% at least five¹. The most frequently used food additives are citric acid under the tag E330, Sodium bicarbonate as 500(ii), Monosodium glutamate as 635, Potassium sorbate as E202, Azorubine as E122, Sodium nitrite, Sulfite ammonia caramel, Sodium alginate and potassium metabisulphite.

A food additive is defined as any substance not normally consumed as food by itself or used as a

typical ingredient of the food, whether or not it has nutritive value².

Classification of food additives on the basis of functional use³

1. Acidity regulators
2. Antioxidants
3. Anticaking agents
4. Antifoaming agents
5. Enzymes
6. Emulsifiers
7. Flavors
8. Flavor enhancers
9. Modified starches

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10. Phosphates
11. Stabilizers
12. Thickening and jelling agents
13. Colors
14. Preservatives

A. **Color additives:** A color additive, as defined by regulation, is any dye, pigment, or other substance that can impart color to a food, drug, or cosmetic or to the human body⁴. Color additives make food more attractive, appealing and appetizing.

B. **Flavoring agents/enhancers:** It enhance the food's existing flavors. They may be extracted from natural sources or created artificially. Food safety and standard act of India has defined the flavors in three types as⁵:

- Natural flavor and natural flavoring substances
 - Natural identical flavoring substances
 - Artificial flavoring substances
1. diacetyl sodium-sulfosuccinate: used in processed foods.
 2. disodium guanylate: used in meat-based foods.
 3. monosodium glutamate: used in Chinese food, dry mixes, frozen meats.

C. **Preservatives:** A food additive which prolongs the shelf life of a food by protecting against deterioration caused by microorganisms is known as preservative. It inhibits microbes from multiplying and spoiling the food.

TYPES OF PRESERVATIVES:

1. Antimicrobial preservatives
2. Antimicrobial synergists
3. Antimycotic agents
4. Bacteriophage control agent

5. Fungistatic agents⁶

Example: a. Benzoic acid and benzoates are found in soft drinks and acidic foods.

b. Nitrites and nitrates

D. **Emulsifiers:** Emulsifier, in foods, encourages the suspension of one liquid in another, as in the mixture of oil and water in shortening, margarine, salad dressing, and ice cream, among others⁷. Emulsifiers are added to bread, sauces and puddings to make it smoother and more resistant to melting.

E. **Acidity regulators:** Any food additive, which controls acidity or alkalinity of food is known as acidity regulators⁸. Citric acid, baking soda, calcium acetate, fumaric acid, acetic acid, and malic acid are few representatives of the group.

EFFECTS ON HUMAN HEALTH:

Signs and symptoms of chronic use of food colors and flavor enhancers

a. Various studies have confirmed that the synthetic food colors are major source of food toxicity and lead to severe health problems such as low concentration, allergic reactions, mutations, cancers, irritability, restlessness, sleeping disturbances, effect on liver, kidney and intestine, hyperactive effects on children, ear infections asthma and eczema⁹.

b. Excess use of some of colors may cause diarrhea, cholesterol imbalance and growth retardation.

c. A higher concentration of amaranth has been reported to be carcinogenic, reduces

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fertility, induces abortion and fetal deformities¹⁰. The ill effect of most of the color is because they cannot decompose during digestion.

d. Yellow-color which is tartrazine (used in soft drinks, energy drinks, soups) has been linked to asthma, allergy and behavioral changes¹¹.

e. Azorubine is not allowed in USA, it is recognized as thyroid carcinogen¹².

f. Sunset yellow causes adrenal tumor in animals and hypersensitive reactions and it is still used in processed foods¹³.

g. Food coloring may result in lapses of concentration in children.

h. Study of mice using Monosodium glutamate found that large amounts caused harmful neurological effects and impaired growth and development¹⁴.

i. Some people do have a sensitivity to MSG and may experience symptoms like headache, sweating and numbness after eating a huge amount.

Signs and symptoms of overuse of preservatives

a. The U.S. environmental protection agency notes that consumption of nitrates may be linked to an increased risk of cancers, such as leukemia, brain tumors, and nasopharyngeal tumors¹⁵. Nitrates and nitrites may also increase the risk for diabetes, diarrhea, and respiratory tract infections in children.

b. Ingesting a large amount of these preservatives at one time may cause you to experience abdominal pain, muscle weakness, bloody stools and fainting according to EPA¹⁶.

c. The Center for Science in the Public Interest that people who are sensitive to sodium benzoate may experience hives, asthma or allergic reactions after consuming it¹⁷. When combined with vitamin C, sodium benzoate may pose a small risk of leukemia.

d. The Scientific Committee for Food of the EU (Directive 2008/7/CE,20008), in 22 September 1995 reported that nitrates turn into nitrites by heating. Nitrites, in turn, react with acids (the existing hydrochloric acid in the stomach) and lead to the formation of HNO₃, which in turn can react with certain amines (obtained by hydrolysis of proteins) and form nitrosamines. Moreover, nitrosamines are genotoxic carcinogens and there is no threshold below which the formation of cancerous cells and tumors can be excluded (Official journal of the European Union, 1999¹⁸).

e. Potentially sodium benzoate can cause an agent which might be responsible for creating a carcinogenic benzoic ring that may turn into cancer cells¹⁹.

f. E215 and E219 also seem to include side effects such, as allergic reactions (paresthesia oral level) and, in animal experiments, numbing effects, vasodilation, cramps and eventually teratogenicity²⁰.

g. Furthermore, E211 seems to aggravate asthma and is suspected to be neurotoxin, fetal abnormalities and hyperactivity.

Signs and symptoms of overuse of acidity

a. Inadequate acid- base balance control can result in the growth of harmful bacteria in food
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products. Such food products can be dangerous for the health of an individual.

b. There have been reports of intolerance and allergic reactions²¹.

c. When taken in large amounts, this acidity regulator can even result in tooth erosion.

d. Eczema and stomach ailments might be common in people who are allergic to this acid.

Study of emulsifier on mice

a. The authors of the recent Nature article added two common emulsifiers, food additive carboxymethylcellulose and polysorbate to the drinking water and food of lab mice. The mucus layer that usually shields intestinal cells from invading pathogens had become colonized with mucus-eating bacteria in the emulsifier-fed mice, resulting in a thinner mucus barrier²².

b. To demonstrate that the altered gut microbiota is responsible for the inflammatory disorders seen in the emulsifier-fed mice, the researchers transferred gut bacteria from the emulsifier-fed mice into germ-free mice. The germ-free mice subsequently developed mild inflammation and symptoms of the metabolic syndrome²³.

DISCUSSION

Nowadays, consumption of processed food has increased rapidly due to less availability of time, busy schedules and sedentary lifestyle. Chronic use of processed food containing food additives is causing detrimental effects on physical and mental health of the population. It requires an

immense amount of research in the field of acute and chronic use of food additive and dosage in which they can be consumed safely. Additionally, to reduce the chances of adulteration government should have a regular check over food manufacturers. The flavors may be added to food as per the good manufacturing practices (GMP). There are enough evidence suggesting health hazards caused by these food additives, specially, negative manifestations. This could be easily rectified by reducing the wide use of various non-essential food additives. Food additives which have been found to be both mutagenic and carcinogenic, neither the human nor animal body is able to detoxify. Therefore, every minute dose of these additives, when consumed continuously, will eventually result in an irreversible toxic burden²⁴.

CONCLUSION

Additives have been used for many years for different purposes like to preserve, flavor and color foods. Food additives play a vital role in the food industries, but the various adverse effects associated with them remain a problem that need to be fought by us. To minimize the risk of developing health problems due to food additives and preservatives, one should avoid such processed foods. before purchasing the canned food, its ingredients should be checked. Purchase only organic foods which are free from artificial additives. Although it, seem difficult to change habits and find substitute for foods that one loves, remind yourself that you will be adding to your
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diet new wholesome foods that you will come to enjoy even more. Look for foods that are not packaged and processed and enjoy nature's own bounty of fresh fruits, vegetables, grains, beans, nuts, and seeds. Find foods that resemble what they looked like when they were originally grown.

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