



## Effect of food additives and preservatives on human health

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### Abstract

Food additives are compounds of natural or synthetic origin that are added to foods to perform a specific technological or sensory function, such as to prevent food from spoiling or being spoiled by bacteria, to add colour or restore colour, or to give meals flavour. These additives typically offer some sort of advantage to the person making, processing, or eating the food. As an illustration, acids that are added to food to prevent rotting may also reduce the growth of germs that might lead to foodborne sickness. Other chemicals are added indirectly through contact with packaging materials, such as the preservatives BHA and BHT on the inside of breakfast cereal packets, while some additives are directly added to food and ingredients. Oxalic acid, sodium benzoate, sodium nitrates, sodium citrate, and benzoic acids, in addition to sodium thiosulfates, are a few food additives that are consumed on a massive basis. However, these all-important preservatives serve multiple functions in both liquid and solid packaged food types and are also to blame for adversely affecting people's health. This article discusses certain food additives that are used often in India, their significance, and any negative consequences on human health.

**Keywords:** health, colours, flavours, preservatives, emulsifier, nutrition & food

### Introduction

Food additives are described as substances that are employed by adding them to food or using other means to produce food, process food, or preserve food (Branen and Haggerty, 2002) [2]. Depending on how they are used in food, food additives are categorised into a wide range of functional classes, including sweeteners, colourants, preservatives, antioxidants, carriers, acids, acidity regulators, anticaking agents, antifoaming agents, bulking agents, emulsifiers, emulsifying salts, firming agents, flavour enhancers, foaming agents, gelling agents, glazing agents, humectants, modified starches, packaging. One class of additives that are frequently added to goods like margarine, soft drinks, and confectionary products are colouring agents. In a similar vein, flavour enhancers like hydrolyzed vegetable protein are frequently discovered in sweets. Emulsifiers, such lecithin and mono- or diglycerides, are used in breads, dessert mixes, and chocolates to help particles of one ingredient spread into particles of another component within the same product. Similar to this, stabilisers like pectin and gelatine help to create a smooth texture and are commonly used in the making of sauces, baked goods, and cream cheeses (Vapnek and Spreij, 2005) [13]. The Codex Alimentarius defines food additives as "any substance not normally consumed as food itself and not normally used as a typical ingredient of the food, whether or not it has nutritive value, the intentional addition of which to food for a technological purpose (including organoleptic) results, or may reasonably be expected to result, (directly or indirectly), in the manufacture, processing, preparation, packing, packaging, transport, or holding of such food." Sodium chloride, contaminants, and substances added to food to maintain or increase its nutritive qualities are not included (Codex Alimentarius; Motarjemi *et al.*, 2014; Carocho *et al.*, 2015) [8, 3]. Despite the wide variety of additives, Carocho *et al.* claimed in 2014 that the additives can be divided into four

basic groups based on their sources and methods of production: natural additives (obtained directly from animals and plants); similar to natural additives (produced synthetically to mimic natural ones); modified from natural (natural additives that are then chemically modified); and finally artificial additives (synthetic compounds). All authorised food additives have the potential to be harmful to health once they are consumed in quantities that exceed the advised daily intake. Pathological side effects of food additives include upper respiratory tract symptoms, allergic skin reactions, digestive problems, asthma, migraines, and conjunctivitis (Schoenthaler and Doraz, 1986) [11].

### Importance of Food Additives

Food additives are mostly included for food preservation, sweetness, and colouring. The additions support preserving food quality and shelf life while preventing nutritional loss brought on by enzymatic activity, changes in the chemical makeup of food, or microbiological activity. The following are some of the several roles that food additives play in food.

### To Provide Nutrition

To improve and retain the food's nutritional value. Examples include the promotion of asthma, malignancies, ulcerative colitis, ageing, kidney stones, hypertension, urinary difficulties, and other conditions by interfering with normal metabolic processes when vitamin D is supplied to the body in excess of the daily intake value or recommended daily intake (ADI) (Rajesh *et al.*, 2013) [9]. Oxidative stress, cytotoxicity, genotoxicity, and biomolecular damage were all brought on by food additives and preservatives. Sodium acetate is utilised as an acidity regulator and a food ingredient in numerous sectors. When making vinegar and cheese, sodium acetate is utilised as an emulsifier and preservative. The sodium acetate has various features that could impact how proteins operate. As a result, the sodium

ionic concentration has been used to estimate the solubility of the proteins in melon seed flour. Any food additive's use is a crucial aspect of its functionality. When food is processed with other foods like water, minerals, carbon sources, etc., its physiochemical qualities play a role in determining their nature. In today's food technology, food additives are being added to foods at an increasing rate. Rickets is the primary target of the added dietary additives for milk and other milk products. Nicin is a naturally occurring food preservative that may be found in bread and cereals and helps to lower the risk of pellagra and other diseases of the central nervous system. Numerous nutritional food preservatives have been employed in diets to improve food's nutritional value and lessen its nutritional shortage.

### To making and processing of food

To keep the desired level of food quality, additives must possess a number of crucial qualities. To improve the texture of food, many chemicals are added. To improve the flavour of items like ice cream, jam, and bread, certain additives are added.

### To retain the purity and durability of the product

Food cannot remain fresh for an extended amount of time. They begin to decompose or deteriorate. The presence and proliferation of microorganisms, as well as the oxidative activity of bacteria and yeast, are the causes of food degradation and spoilage, which are prevented by preservatives. They can prevent oxidation and other chemical changes from occurring, which keeps food safe from pathogens, or they can improve the appearance, flavour, or mouthfeel of food (Al-Shammari *et al.*, 2014). For instance, the oxidation activity of bacteria and yeast causes fruit and vegetable pieces that have been chopped and left out for a while to turn brown.

### Preservatives

Certain items' shelf lives are extended by the addition of preservatives, which also guarantee their safety during the extended duration. The most crucial benefit is that they prevent bacterial deterioration, which can result in the formation of toxins and food poisoning (Lee, 2012). In keeping food safe during the product's shelf life, which may be extended by their use, they provide a clear benefit to consumers and satisfy the needs of modern lives, including infrequent trips for bulk purchases (Branen and Haggerty, 2002; Emerton and Choi, 2008) <sup>[2]</sup>.

### Types of food preservatives

#### Natural preservatives

##### Salt

When making a pickle at home, individuals usually start by adding salt because salt has some beneficial properties that prevent the pickle from spoiling. The taste of food is improved when salt is added, and because salt absorbs water from food, there is no room for microorganisms to grow there, keeping food safe.

##### Sugar

There are numerous ways to preserve food using sugar. Many packaged foods, including jam, jelly, sweets, and squashes, include sugar. Sugar not only keeps food fresh but also improves its flavour. The presence of water in food has

been eliminated by the addition of sugars, which prevents microbial growth.

### Acid

Some foods that are sour are used to preserve food. Since citric acid has several uses in diverse cuisines and well-known beverages, it is used in the production of processed dairy products like cheese. About 50 different countries presently view it as a safe food preservative. Given that nisin has no negative effects on human health, it is increasingly employed in fermented dairy products. In many well-known foods like wine, beer, whisky, alcohol, and low-pH-producing foods like salad, nisin protects food against lactic acid bacteria that cause food to decay. Nisin has the ability to fight off a variety of Gram-positive bacteria, particularly those that release spores.

### Oil and spices

Some spices, such as mustard powder and red chilli powder, are used in food preparation and can serve as food preservatives. They stop the food from becoming bad. Food is stored for a long period by the oil, which also functions as a preservation agent.

### Chemical preservatives

#### Benzoates

Fruit juice, coffee, tea, and coffee all contain this preservative. These preservatives are prohibited in some countries because they might lead to allergic reactions, skin rashes, asthma attacks, and even brain damage. Benzoic acid is used in sauces, salad dressings, and soft drinks.

#### Potassium sorbate

Many different kinds of foods are preserved with sorbic acid. bread, cheese, salad, cakes, etc. Yeast, bacteria, and fungi can all be killed with the use of potassium sorbate. Dry fruit, dry meat, beer, curd, and cheese are also included. Although it is believed to be safe for food when these preservatives are applied, some experts have voiced worry that there may be a potential of an allergic reaction.

#### Emulsifiers and stabilizers

Emulsifiers and stabilisers are used to make it easier for components like fat and water to mix together that wouldn't ordinarily do so. Stabilizers are then used to keep the aqueous and lipid phases blended. Producing mayonnaise, chocolate, ice cream, homogenised milk products, and fat spreads without these ingredients would not be possible (WHO, 2009) <sup>[14]</sup>. The term "stabiliser" also refers to compounds that can stable, retain, or accentuate a food's natural colour as well as substances that boost a food's ability to bind, enabling the binding of food fragments into reconstituted food (Jie, 2015; Emerton and Choi, 2008) <sup>[6, 5]</sup>. These kinds of emulsifiers are employed in the food industry as flavouring oils, a clouding agent, and a crystallisation inhibitor.

### Effects of food Additives and Preservatives

- At the moment, the negative effects of food additives are a popular topic. People's reactions to the consequences depend on their age, immunological system, frequency, and other factors.
- Exposure to some chemicals, such as azo, has been linked to an increased risk of attention deficit

hyperactivity disorder or hyperactivity-related effects on children's behaviour (Sandler *et al.*, 1999; Gil, 2014).

- In addition to other items (such cosmetics and drugs), foods are a source of these poisons. If customers are exposed to food additives on a regular basis, the effects could be negative in the long run or immediate. Headaches, a shift in energy level, and changes in behaviour or the immune system may all be immediate impacts.
- The risk of cancer, cardiovascular disease, and other degenerative diseases may be raised by long-term effects (US Food and Drug Administration, 1993). Preservatives and chemicals are necessary for food storage, but they can also cause some health issues (Tuormaa, 1994).
- For certain persons who are allergic to certain chemicals, they can result in diseases including hyperactivity and attention deficit disorder. According to Gil's (2014) research, eating foods with chemicals can aggravate eczema, worsen hives, and cause rashes, vomiting, headaches, and tightness in the chest.
- Following are some of the known risks associated with food additives and preservatives: Benzoates are known to cause brain damage and are thought to cause allergies like skin rashes and asthma. Bromates deplete dietary sources of their nutrition. It may result in diarrhoea and motion sickness. High blood cholesterol levels, as well as compromised liver and renal function, are brought on by butylates. A diuretic and stimulant, caffeine is a flavouring and colouring agent. Nervousness, palpitations, and possibly heart abnormalities are possible effects. The skin, digestive system, and heart are all affected by toxic responses and allergic reactions caused by saccharin. The risk of bladder cancer and tumours is also present.
- Researchers advise avoiding meals that include food additives and preservatives to reduce the chance of acquiring health issues as a result of these ingredients. Customers should examine the ingredients of the canned food before buying it. They ought to purchase natural, additive-free organic meals.

### Conclusion

Food additives contain chemicals that also are intentionally incorporated into food throughout manufacturing or storage to fulfil a specific scientific need. Between the time food is produced and the time it is finally sold on the market, food additives keep the meal appealing and fresh. Since they were introduced into foods for technological reasons, food and colour additives are now subject to stricter regulations than ever before. Foods with improved shelf life, flavour, and texture are a part of our daily lives due to the increased reliance on packaged foods and globalisation. We have access to seasonal fruits all year long. The health of youngsters in particular has been significantly impacted by a change in lifestyle and an excessive consumption of food additives found in preserved foods. It is recommended to utilise natural food additives with little adverse effects rather than chemical food additives. Food additives make sure that food may be transported safely and with no loss of quality in an industry that is becoming more and more competitive. However, it is important to use food additives responsibly and in accordance with the law.

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