



RESEARCH ARTICLE

FOOD ADDITIVES AND THEIR EFFECTS: A MINI REVIEW

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ABSTRACT

Preservatives, additives are generally used to help stop, edible products from being spoiled and giving desired taste, color, texture and. Like sodium thiosulfates, oxalic acid, sodium benzoate, sodium nitrates, sodium citrate and benzoic acids are a few food additives which find consumption on very large scale. But these all major preservatives have multipurpose use in all forms of liquid and solid packaged food and are also responsible for creating negative health issues. This review deals with the few food preservatives very commonly used in Indian sub-continent and their side effects.

Key words:

Food additives, Antioxidant, Food modifiers, Food additives, Nutrition.

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INTRODUCTION

Packaged food industries are multibillion dollar industry, spreading all over the world. Ready to eat and packaged edibles and food are now an integral part of present society and for its daily need. Our daily life finds complete dependence on food additives treated edible food items (Mamur *et al.*, 2012). The main purpose of using food additives is to enhance shelf life, prevent food from getting degraded, giving them desired taste, color, and texture. To meet the demand of the rising population, chemical based preservatives and additives are added to the edible items (Yetuk *et al.*, 2014). Food modifiers, additives and preservatives like (SN, E251) sodium thiosulfates; (OA) oxalic acid; (SB, E 211) sodium benzoate; (ST, E 539) sodium nitrate; (SC, E 331) sodium citrate and (BA, E 210) benzoic acids, are consumed in food product associated industries for the packaged food. By the study conducted by Yetuk and coworkers in 2014, It was observed that food preservatives have been doing more damage to human health system than any good (Yetuk *et al.*, 2014). All these food additives generate free radicals or ROS which induces genotoxic, cytotoxic and mutagenic effects (Rajesh *et al.*, 2013). SB which is a common ingredient of beverage like sodas and fruit juice products, produces carcinogen on reaction to vitamin C, (Saad *et al.*, 2005; Clauson *et al.*, 2008).

Chemical additives like sodium nitrites and nitrates are commonly used in meats products like ham and bacon, and hot dogsto make them look red color. And as per the study of The American Cancer Society one must avoid consumption of these chemically treated meat food items as they increase the chances of headaches, cancer, vomiting, asthma, nausea (Kilfoy *et al.*, 2011). While benzoic acid damages the CNS (central nervous system), make the consumer suffer from hypertension, asthma and increased hyper activity in the children (Clauson *et al.*, 2008). Benzoic acid is a common ingredient of processed food. Food items like sauces, margarine, cheeses, fruit juices, carbonated soft drinks. Sodium thiosulfate and sulphites are added to the food to prevent the growth of fungal strains and prevent food spoilage and their browning which is very common in fruits and vegetables. Sodium thiosulfate and sulphites are responsible for causing allergic reactions (Vally *et al.*, 2009). Patient of kidney diseases, high blood pressure, heart problems, urinary problems etc. should avoid consuming food added with sodium citrate, because it can increase the intensity and severity of the disease. Additives like oxalic acid when consumed in high dosage act like poison and forms kidney stones by combining with the calcium present in the body. It increases the chances of dystrophic calcification. Daily intake of food treated with food additives, increase their concentration in the body beyond

the daily intake value or acceptable daily intake (ADI) there for promote asthma, cancers, ulcerative colitis, aging, kidney stones, hypertension, urinary problems and others, by disturbing normal metabolic reactions (Rajesh *et al.*, 2013). Then metabolic reactions generate reactive oxygen species and reactive nitrogen species, and free radical species like hydroxyl, peroxy nitrite, superoxide, nitric monoxide, singlet oxygen, hydrogen peroxide and are generally neutralised by body's efficient self-defense mechanism as the part of homeostasis (Halliwell and Gutteridge, 2007). But presence of ROS, in excess leads to oxidative damage to the cellular components especially the bio-molecules like DNA, proteins and poly unsaturated fatty acids (PUFA) of membrane (Droge, 2002). Cell membrane plays very important role in cell signaling, cell adhesions, cell potential and ion conductivity. Any damage to cell membrane can cause cell death (Pagan *et al.*, 2000). DNA stores the information which governs all the functions of somatic and germ cells. There is always a danger that damage to biomolecules like DNA can change the pattern of normal reaction and fundamental activities of the both germ cells and somatic (Han *et al.*, 1995). Similarly, free radicals also affect the proteins and disturb the regular functioning and reactions of the cells and ultimately the body (Wolff *et al.*, 1986). Food additives and preservatives induced oxidative stress, cytotoxicity, genotoxicity and bio-molecular damage. In many industries sodium acetate used as a food additive and as an acidity regulator. sodium acetate used as a preservative in the production of vinegar and cheese as an emulsifier. The sodium acetate has some ability which may affect the functional properties of proteins. Therefore, the melon seed flour protein solubility has been determined by ionic concentration of sodium acetate. A functional property of any food additives its utilization. It involves the physio chemical properties of food that help to determine their nature during food processing with some different food like as water, minerals, carbon source etc. Adding of food additives become increase day by day in modern food technology. The main aim to added food additives for coloring, and for sweetening. The preservatives prevent the loss of nutrition due to microbiological, or the changes in their enzymatic and chemical properties. They maintain the shelf life or quality of food. The preservative work as an anti-microbiological in food such as energy drink jams, cold drink, vine etc. The adding of food additives has seen a rise. Hence the result determined that the 75% of western diet has been made up different types of processed food. Every person in world consumed 8 to 101bs of food preservative per year. Various adverse effect of food additives has been estimated by the consumption of preservatives such as dermatitis, nausea, vomiting, eczema, brain disorder. In research report has been found that the food additives which are anti-microbiological agents were also found to cause genotoxicity.

Importance of food additives: Food additives become important for modern day technology. The main purpose of adding food additives for preservation, sweetening and coloring of food. The additives help to stop nutritional loss due to the enzymatic activity, changing in chemical composition of food or microbiological activity and to maintain the shelf life of foods as well as quality of foods. Food additives has some various role in food that are as follows.

To provide nutrition: To enhance and to maintain the nutritional quality of food. for example, the added of vitamin D in milk and other milk product has work same towards the

rickets. Nicin is a biological food preservative which has found in bread, cereals that help to reduce the risk of pellagra and other central nervous related disease. There are many nutritional food preservatives has been used in diet that increased the nutritional property in food and reduced the nutritional deficiency of food.

To maintain the quality of product and freshness of product: The freshness of food cannot maintain for a long period. They start undergoing decomposition or spoilage. Preservative stop the deterioration of food and prevent from spoilage due to presence and growth of microorganisms and the oxidation activity of bacteria and yeast. For example, if we cut a pieces of apple and banana and leave for a few period of time they turn in brown color due to oxidation activity of bacteria and yeast.

To making and processing of food: Additives has some important characteristics to maintain the desirable quality of food. Many additives are added in food to increase the texture of food. Certain additives are added in ice cream, jam, biscuit making bread to enhance the taste of these things.

History of food preservatives: The using of food additives is not a new it has been used from many centuries. It was used in ancient period of time where people understand the making of food from fire. Later people understand the food can be prevented by adding of salt in food without cooking the food. In ancient times people doing many things to preserve the food. They used cloves in food to stop the growth of bacteria. In ancient time people used additives for natural coloring, flavoring and taste modulation. In ancient time the olive oil, bread, wine is most important food and their food processing are complicated. The Egyptian uses of food additives for flavoring and make them for appealing. The bread making process has been first improved by Egyptians by adding some yeast and improves its quality. In old days the herbs and spices has been used as food additives as flavoring agent. Many herbs and spices has some quality which work against various types of microorganisms. Egyptians uses coriander oil and castor oil in many applications like medicinal, beauty and in preservatives.

Types of food preservatives

Natural preservatives

Salt: When people make a pickle at home they first put salt in pickle because salt has some important property which protect the pickle from getting spoil. Adding of salt in food the taste of food is increased and the presence of salt in food the all water from food has been decreased hence the microorganism cannot grow in food and the food remain safe. Salt are widely used in making chutney, pickle, salad, sauce and canned food. Salt are also used in preserving the fish by rubbing the salt on fish.

Sugar: Sugar are used as a food preservative in many ways. Sugar are added in various packaged food like jam, jelly, murabbas, sweet and squashes. Sugar not only preserved the food but also enhance the taste of food. By adding of sugars in food the presence of water in food has been removed due to this the growth of microorganism are inhibit.

Acid: Some sour food used as a food preservative. Citric acid, lemon juice and vinegar are added in food which prevent the

food from spoilage. The onions and tomato sauce are preserved by adding vinegar in it. The presence of acid in food the microbial activity cannot takes place in food.

Oil and spices: some spices are used in making food it also works as a food preservative for food like mustard powder, red chilies powder are some of them. They prevent the food from spoiling. The oil also works as a preservation agent and makes food preserved for long time.

Chemical preservatives

Benzoates: This preservative is found in teas, coffees, and fruit juice. These preservatives are banned in some country because it causes skin rashes, asthma and allergies and sometimes brain damages. benzoic acid are used in dressing salad, sauce and found in soft drink.

Potassium sorbate: Sorbic acid is used for preserving many types of foods Cakes, bread, cheese, salad etc. Potassium sorbate helps to killing microbes yeast, bacteria, and fungus. It is also added in dry fruit, drymeat, beer, curd and cheese. When these preservatives are added in food it considered as it is safe for food but some experts expressed their concern that there is a chances of allergic side effect.

Caramel: Caramel is most widely used additives for a coloring of foods from many decades. It involves in many foods like drink, candy, wine, pizza, other beverages.

Biological preservative

Nisin: In UK the nisin is commercially available as a food preservative approximately 30 years ago. Nisin was first involved in making of processed food dairy product cheese and since there are various application involved in many foods and identified beverages. It is currently considered as a safe food preservative approximately 50 countries. The nisin in used in many fermented dairy products the use of nisin increase now a days because it has no side effect on human health. Nisin prevent food from spoilage lactic acid bacteria in many known food wine, beer, visky, alcohol and low ph production food like salad. Nisin has the ability of anti microbial activity against wide range of Gram-positive bacteria especially in those that produces spores. Nisin inhibit many strain of bacteria that are found in food such as *clostridium botulinum*, *staphylococuss aureus*, *Bcilusss stearothermophiilus*, *Bacilus subtilis* and some other. Nisin application not only involved in food industry but also involved in various application like in medicine nisin is very promising in medical field. Respiratory tract infection is treat by nisin.

Chitosan: Chitosan is a linear polysaccharide which is second most abundant polysaccharides in nature. Chitosan has many desirable properties therefore it is used in food industries Chitosan is a nontoxic, biodegradable, biocompatible molecule. Chitosan has a very important properties of antimicrobial, antifungal activities that can help to prevent fruit and vegetables. Chitosan now widely used in many post-harvest foods like grapes. berry etc. Chitosan considered in many foods because it inhibits the growth of microbes that decay the food. In market the demand of fresh fruit has been increase day by day as the demand of consumer the chitosan coating fruit and vegetables come in market which not looks fresh but also prevent fruit from decay.

Chitosan mainly obtained by chitin. Chitosan also found in some fungi, insect and crustaceous shells. Coating of chitosan in food or vegetables control the gas atmosphere of food and vegetables reduces the rates of respiration and transpiration during retarding and ripening process. The mode of action of chitosan against the microorganisms involves the interaction among positively charged molecules to negatively charged.

Conclusion

With the increase dependence on packaged food and globalization, food with enhanced shelf life, taste and texture are part of our daily life. Seasonal fruits are available to us in all seasons. Changing life style and over consumption of food additives present in preserved food has negatively affected the health of children especially. Instead of chemical food additives it is advisable to used natural food additives with minimal side effects.

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