

Effects of Food Additives and Preservatives on Processed Food

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Abstract - Foods are substances or mixture of substances both solid and/or liquid, which are intended for human consumption or ingestion for their nutritional pleasurable benefits. Food additives are organic substances that are intentionally added to food in small quantities during production and processing to improve or maintain the quality of the processed foods. Food preservatives is a class of food additives that help to prevent food spoilage by preventing the growth of microorganism. The effectiveness of preserve foods were tested with two parameters such as pH value, moisture content at the interval of 0 days, 5 days, 15 days, 25 days. Two types of methods are used to preserve i.e. traditional and modern method. Under the traditional method I use salting and sun drying method and under the modern method, Ultrasonication and microwave method are used. In ultrasonication method, Nano particle such as Titanium dioxide is used as a preservative. Result of processed foods on physico-chemicals showed that pH was reduced on 25th days and moisture content was reduced on 25th days. With the ever growing world population and the need to store and transport the food from one place to another where it is needed food preservation becomes necessary in order to increase its shelf life and maintain & improve the quality of processed foods. The most common food additives and preservatives used are sodium benzoate, sodium chloride, titanium dioxide. The aim of this review is to summarize current information about food additives and its effects and increase the shelf life of processed foods.

Keywords: Food, Additives and Preservatives, Sodium Benzoate, Sodium chloride, Titanium dioxide.

I. INTRODUCTION

Food is any substance or material eaten or drunk to provide nutritional support for the body. It usually consists of plant or animal origin, which contains essential nutrients, such as carbohydrates, fats, proteins, vitamins, or minerals, and is ingested and assimilated by an organism to produce energy, stimulate growth and maintain life (Francis F.J., 2000).

A. Food Additives

Food additives are organic substances that are intentionally added to food in small quantities during production and processing to improve the organoleptic quality of the food (Winter, 1994). The help to increase the shelf life of the food by maintaining product consistency, wholesomeness and freshness. Food additive can be used directly or indirectly. Direct additives are those intentionally added to foods for a specific purpose while indirect additives are those to

which the food is exposed during processing, packaging, or storing (Boca Raton and Smoley, 1993).

B. Classification of food additives

Food additives can be divided into several groups, although there is some overlap between them.

C. Antioxidants

An anti-oxidant is a substance added to fats and fat-containing substances to retard oxidation or prevent rancidity (development of off flavor) and thereby prolong their wholesomeness, palatability, and sometimes, keeping time. Some anti-oxidant used in foods are Butylated Hydroxyanisole (BHA) and Butylated Hydroxytoluene (BHT), vitamin C, Vitamin E.

D. Antifoaming Agents

Antifoaming agent reduces or prevents foaming in foods (Adulmumeen *et.al.*, 2012).

E. Emulsifiers

Emulsifiers allow water and oil to remain mixed together in emulsion, as in mayonnaise, ice cream, and homogenized milk.

F. Flavor enhancers

Most common food enhancer is MSG (Mono Sodium Glutamate). They may be extracted from natural sources (through distillation, solvent extraction) or created artificially.

G. Food coloring

Coloring is added to make food look more attractive and appealing.

H. Stabilizers

Stabilizers, thickeners and gelling agents, like agar or pectin give foods a firmer texture.

I. Preservatives

A preservative is defined as any substance which is capable of inhibiting, retarding, or arresting the growth of

microorganism, of any deterioration of food due to microorganisms. Food preservatives and their functions:

1. To improve or maintain nutritional value of food.
2. To enhance quality and to reduce wastage.
3. To enhance consumer acceptability and keeping quality to make the food more readily available.
4. Preservatives are additives that inhibit the growth of bacteria, yeast, and molds in foods.

J. Additives are used in foods for five main reasons

1. *To maintain product consistency:* Emulsifiers give products a consistent texture and prevent them from separating. Stabilizers and thickeners give smooth uniform texture. Anticaking agents help substances such as salt to flow freely.
2. *To improve or maintain nutritional value:* Vitamins and minerals are added to many common foods such as milk, flour, cereal and margarine to make up for those likely to be lacking in a person's diet or lost in processing.
3. *To maintain palatability and Enrichment:* Preservatives retard product spoilage caused by mold, air, bacteria, fungi or yeast. Antioxidants are preservatives that prevent fats and oils in baked goods and other foods from becoming rancid or developing an off flavour. They also prevent cut fresh fruits such as apples from turning brown when exposed to air.
4. *To provide leavening or control acidity/alkalinity:* Leavening agents that release acids when heated can react with baking soda to help cakes, biscuits and other baked goods to rise during baking. Other additives help to modify the acidity and alkalinity of foods for proper flavour, taste and colour.
5. *To enhance flavour or impact desired colour:* Many spices, natural and synthetic flavours enhances the taste of foods. Colours, for instance help to enhance the appearance of certain foods to meet consumer expectations.

K. Preservation of food

Preservation of food is the processed of treating and handling food to stop or greatly slow down spoilage (loss of quality, edibility or nutritive value) caused or accelerated by microorganisms .Preservation usually involved preventing the growth of band other microorganism, as bacteria, fungi, and other microorganisms ,as well as retarding the oxidation of fats which cause rancidity(Jean P.B.,1994).

1. Classification of food preservation

Preservation is implemented in two modes, chemical and physical. In chemical preservation chemical compounds are added to the product. In physical preservation processes refrigeration or dry are done. Preservatives food additives reduce the risk of food borne infections, decrease microbial

spoilage, and preserve fresh attribute and nutritional quality. They are classified in to class I and class II preservatives.

Class I preservatives are Common salt, Sugar, Dextrose, Glucose, Spices vinegar or acetic acid, Honey, Edible vegetable oils.

Class II preservatives are Benzoic acid, Sodium benzoate, Nitrites.

1. *Sodium benzoate:* sodium benzoate is a substance which has chemical formula $\text{NaC}_7\text{H}_5\text{O}_2$.it is widely used food preservative .sodium benzoate is produced by the neutralization of benzoic acid. It can be produced by reacting sodium hydroxide with benzoic acid. Sodium benzoate is allowed to be used at up to 0.1 %. It is mostly used in acidic food. It is also used as preservative in medicines and cosmetics.
2. *Titanium dioxide:* titanium dioxide is nano particle also called ultrafine titanium dioxide are the particle of (TiO_2) with diameter less than 100nm.It is the fine, white, crystalline, odorless, low- solubility powder which was considered to exhibit relatively low toxicity. It is used for preserve food and increase the shelf life of processed foods and it is widely used in paints, printing ink, rubber, paper, cosmetics, sunscreens etc.
3. *Sodium Chloride:* sodium chloride (NaCl) or table salt is a most common food preservative because it is non-toxic, inexpensive . Salt is effective as a preservative because it reduces the water activity of the food so the growth of microorganism is reduced and shelf life of food are increase.

Salt has the following characteristics:

1. It produces an osmotic effect
2. It limits oxygen solubility
3. It changes pH
4. Sodium and chloride ions are toxic
5. Salt contributes to loss of magnesium ions

L. Effect of Additives and Preservatives

The effects of food additive may be immediate or may be harmful in long time if one has constant exposure or accumulations. Immediate effects may include headaches, change in energy level, and alterations in mental concentration, behaviour, or immune response (Pandey, and Upadhyay, 2012). Food additives are cause harmful effect if they are use beyond the prescript level. Many foods available in the market contain different types of preservatives. These chemical are rise to certain types of health problems. Food additives are consistency improve or maintain the high quality of foods. Some of the additive are extracted from natural sources such as corn, beet and soybean while some are the artificial, manmade additives. Many people are allergic to certain food additives or color. When someone has a reaction after eating certain foods, such an allergy is suspected. Unfortunately, some people do not have a reaction until a day or two later, so it is difficult

to know what is causing problem. Long –term effects may increase risk of cancer, cardiovascular disease and other degenerative conditions. Some modern synthetic preservatives have become controversial because they have been shown to cause respiratory or other health problem.

II. METHODOLOGY AND DISCUSSION

A. Processing and Packaging of Vegetables by Traditional and Modern Method

1. Material used in processing of Mackerel:

Fresh vegetables of good variety such as cauliflower, carrot, potato, colocassia, lemon, salt, sodium benzoate, sodium chloride, titanium dioxide, water etc.

2. Processing of Vegetables

For preserving the vegetables ,cauliflower (1kg), carrot (1kg) were selected from market, washed and peeled ,and blanched with salt and sodium benzoate at 72° c for 2-3 minutes and dried in dehydrator at temperature 30°c and potato (1kg) ,colocassia (1kg) were selected from market , washed and peeled and blanched with titanium dioxide (Nano particle) at 70°c for 2-3 minutes and dried in the sun drying .

3. Materials Used in Packaging of Vegetables

Polythene, Glass jar, Aluminium foil.

B. Shelf life of vegetables by different methods

Select fresh vegetables such as Cauliflower , Carrot, Potato, colocassia ,Lemon and remove the peel from vegetables and then Wash , Cut into the slices .Blanch at 70 °c for 2-3 minutes with different preservative and additives such as Sodium benzoate, sodium chloride titanium dioxide (Nano particle) by traditional and modern method and dried in order to reduce the moisture ,soften the tissue in microwave, dehydrator, Ultrasonication etc. pack the processed foods in polythene and jar .store the packed foods at a room temperature. Observe the shelf life at time by using different parameter.

III. CONCLUSION

This study was show that the various effects of food additives and preservatives on processed food .food additives have been used for many years to preserve, flavor, blend, thicken and color food and have a essential role in reducing serious nutritional deficiencies. Synthetic food

additives react with the cellular component of the body leading to the various food effects .if we must use food additives, because of their advantages, they should be natural one which have minimal effects and those that are generally recognized as safe (GRAS)and in the case of those not generally recognized as safe (Non GRAS) , the acceptable daily intakes (ADIs) should not be exceeded .To minimize the risk of developing health problems due to food additives and preservatives, and should avoid the foods containing these additives and preservatives . Before purchasing the preserve foods, its ingredients should be checked. Purchase only organic food, those which are free from artificial additives and preservatives.

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