

PHYSIOLOGICAL EFFECT OF FOOD ADDITIVES ON HUMAN BODY FUNCTIONS

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Abstract

Food is one of the essential elements that all living organisms need, there are a lot of nutrients such as proteins, carbohydrates, fats, vitamins, and minerals. These nutrients aliments found in food are ingested and used for energy production, stimulating growth and preservation life. Food have restricted shelf life, in order to augmentation the shelf life and preservation the quality certain preservatives are used. Food additives are material that added to diet in little amount for the purpose of improving the quality of food in terms of taste, color, flavor and duration of consumption.

Food additives include multiple types such as preservatives, antioxidants, artificial sweeteners, industrial colorings, emulsions, and others, which have been shown in many studies and studies of their harmful effect on the physiological functions of various organs of the body such as the liver, heart, brain, kidneys and other organs, Exposure the body to these food additives for long periods may lead to cancer.

Keywords: *Physiological, Food Additives, Function*

INTRODUCTION

Often times toxins are in our hands and we do not know that due to the changing lifestyles of people on these days - due to the woman going out to work and being away from home, it may last longer, depending on circumstances and the nature of its work, and because of the fast pace of life - people began to eat processed foods and preserved foods, in recent years many restaurants and food and beverage manufacturers are adding certain chemicals to food - in an intentional way with the aim of protecting it from damage, or giving it an attractive color, palatable taste (Abdul Ghani and Wahhab, 2012)

The food additives are materials that are adding to diet for betterment the flavor, color or chemical preservatives, taste, appearance or functions processing aid. Food additives as non-nutritive materials adding to diet, in little amount, for its quality as taste, odor, color and flavor (Khanum *et al.*, 2018). Because food additives have become essential in the food industry, the European Economic Community (EEC) in 1988 introduced the regulation of labeling and numbering of food additives, such as food colorings, flavors, taste enhancers and preservatives, to promote a free and fair market of safe food products within the European Community (Haen 2014).

Always food are exposed to contamination by with bacteria or fungi or other factors that lead to food spoilage, lipids become decayed, especially when exposed to Humidity, The talking about

the characteristic of foods against factors lead to corruption the food need to appending of preservatives(Khanum *et al.*,2018) preservation food for long time involve addition of chemicals, cultivation manufacture depend on many types of chemical materials, possibility caused poisoning agricultural products, many of these chemical materials will be absorbed with human and animal body and effect on both human and ecology(Sharma *et al.*,2018). Most of food additive may causes many symptoms such as general weakness, headache, and various respiratory problems. Research has also proven that these food additives have toxic effects on the nervous system. despite of humans cannot avoid these toxic substances, they can be minimized by relying on the use of natural materials that are not harmful to humans and the environment. (Nagasinduja and Shahitha,2019).

CLASSIFICATIONS OF FOOD ADDITIVES AND ITS PHYSIOLOGICAL HARMFUL EFFECTS

Food additives are classified on the basis of their functional use as:

Antioxidants is a material that append to lipids and fat-containing materials to delay oxidation and to maintain its natural qualities in a healthy way (Khanum *et al.*,2018). Anti-oxidant must be smell acceptable and not offensive or Unacceptable color, to the food and It must be used in low concentrations (Inetianbor *et al.*,2015). Antioxidants in fact eliminating the oxygen atoms as examples ascorbic acid, While other types like hydroxylbutyl, tocopherol, gallic acid esters interfere with the mechanism of the oxidation process. This materials possesses special characteristic, cause to be them more operative in many applications than in other (Bereket *et al.*,2017 ;Dalton, 2002). Mostly a integration two or more antioxidants very operative more than using each one alone because the cooperative effects (Department of human nutrition, 2010).Antioxidants did not able to come back oxidizing food, It can only perform a delay the oxidation process. The majority impressive using of antioxidants is in the lipids that used in the industrialization operation (US Food and Drug Administration, 1993).

Tran (2013) indicate that BHA and BHT have been doubt of causing health dangers like hyperactivity of children , injury to kidneys, liver and lungs. The cancer studies refers that BHA and BHT caused cancer in high dosage with a concentration more than 3000 ppm, has been renowned to causes anterior stomach epithelial cells cancer in rats, while BHT at 250 mg/kg/day elevated malignant tumor, BHA lead to cancer in rats' for stomach (Whysner *et al.*, 1994). BHA and BHT is considered a preservatives in low concentrations, While it can cause cancer in high While it can cause cancer in high doses (Branen, 1975). other researcher refers that BHA lead to anterior stomach hyperplasia and cytotoxicity (Ito *et al.*, 1986). Recently medical research propose that oxidation reactions inside of human body may be linked to occurrence of arteriosclerosis (obstruction in blood artery) causing heart heart disease (Emerton and Choi, 2008).

Preservatives

Preservatives are material which is able of suppression, delaying the evolution of microorganisms for any depravation of food, or of signing the indicator of any depravation, Preservatives are used to expand the shelf-life of food products and make sure the safety by expand period, chiefly it delay bacterial degeneration, And that will cause manufacturing the toxins and lead to food toxication (Lee, 2012). Therefore, it will gives a lot of benefits to the consumer in order to keep food safety for consumption even if the product exceeds the shelf life and that of course will lead to meeting the requirements of the rapid lifestyle and increasing the

development. (Branen and Haggerty, 2002).

TYPES OF PRESERVATIVES

Preservatives are classified to:

I. Class I: involve food preservatives that are taken from nature such as salt, sugar, vinegar, spices, honey, edible oils etc.

II. Class II: involve chemical food preservatives, that semi manufactured or manufactured in nature like nitrates and nitrites, sorbic acid and sorbates, benzoic acid, benzoates, sulphur dioxide and sulphates etc.. (Anand and Sati, 2013).

NITRATES AND NITRITES

Nitrates and nitrites were used in preserving various kinds of meats such as salted meats and cured meats, and they were also used in preserving of cheeses. Studies confirmed that nitrates and nitrites lead to a headache for the consuming person, as well as studies have proven their direct relationship with cancer, As it has been shown through research that these preservatives are mutagenic when consumed by humans or animals (Silva and Lidon,2016).The nitrate linkage with blood hemoglobin causes hemoglobin modulation and composition of the so-called (methemoglobin) that lead to pervert oxygen transferring to various body organs, Which leads to the appearance of a blue color under the skin (Knobeloch, 2000).

Incurrence the concentration of nitrates or nitrites are correlated with augmentation concurrent of cancer, and may be elevate concurrent of brain cancer, leukemia, studies conducted on children have confirmed that nitrates and nitrites have led to cancerous infections in the mouth and throat. (Rowe *et al.*,2012; Sharma,2015). The occurrence of contamination of drinking water with nitrates or nitrites led to a decrease the ability of oxygen to binding with blood (hemoglobin) and causes the disease that is called "blue baby syndrome" (oxygendeficient that resulted from decrease the of oxygen binding with blood. Exposure of new borns to high concentrations of nitrates and nitrites as a result of contamination of drinking water also leads to "blue baby syndrome" (Anand and Sati, 2013;Pogoda and Preston-Martin, 2001).

SORBIC ACID AND SORBATES

Sorbic may be taken from blackberry or may be chemically production. (Silva and Lidon,2016). The influence of sorbic acid is against a large number of microorganisms such as bacteria, fungi, and yeasts as well as the sorbic acid, sodium, potassium and calcium sorbic acid salts, Consider the amount using in food manufacture, Studies have not shown direct harmful effects of scoopic acid and sorbates, but it is possible that food additives may cause an allergic reaction that appears in the form of a rash (Abdulmumeen *et al.*, 2012). In addition, the metabolism of sorbic acid and sorbates can produce fatty acids that do not have direct harmful effects (Silva and Lidon,2016). Sorbates causes contact dermatitis(Nagasinduja and Shahitha,2019).

BENZOIC ACID, BENZOATES

Used in agricultural manufacture for food. The activity of Benzoic acid as antioxidant, it work on the cell membrane of various microorganisms through suppression citric acid cycle caused oxidative phosphorylation.

benzoic acids –sodium, potassium, calcium benzoates often utilize in various types of fruit juices and soft drinks. Benzoic acid may obtained from fruits as blue berries but produce artificially to inhibition fungi and other microorganisms. The use of benzoates are often against fungi and bacteria. It is used for treated the of dry meat surface , benzoates should not be used by asthma patients, it lead to rhinitis carcinogenic and brain injury (McCann *et al.*,2007).

The harmful effect are represented by allergic response ,injury of gastric. Also may causes acute asthma, the activity of benzoic acid as neurotoxic, probably to be carcinogen, and lead to new born unnatural and hyperactivity. Laboratory animals showed the anesthetist impact, vasodilation, spasm and embryos malformation (Dibyarajan *et al.*,2017).

SULPHUR DIOXIDE AND SULPHATE

Utilize as preservatives agents growth of various microorganisms in dried fruit, Sulphur dioxide, sodium, potassium and calcium sulphites used for to resistance various microorganisms as bacteria , fungi and yeast. With pH lass than 3 they give extreme inhibition because the activity of sulphurous acid With pH lass than 3 . However it lead to auxiliary benefit as an antioxidant (Vally and Misso, 2012).

Sulphides may present as powder, crystalline and grain, have white color, Increased use of sulphur di oxide destroy thiamine and lead to destitution in vitamin B1, lead to allergic response in patients with asthma, increase skin diseases, and lead to head pain, , dizziness, inflammatory in intestine . Sulphates are little soluble in the body , However, studies have not confirmed that it is directly related to the development of cancer (Voss, 2002; Inetianbor *et al.*, 2015). In addition to what was mentioned, these food additives are mutagenic for several types of bacteria while in humans is remain under consideration (Voss, 2002).

SWEETENERS

In order to add sweetness to food while keeping calories at low levels, non-sugar sweeteners are used, And the use of sweeteners may be due to not affecting people with diabetes mellitus and dental problems, Material that give a sweet taste for food like sugar, saccharine or another with little-calorie artificial products (Abdulmumeen *et al.*, 2012). Artificial sweeteners can be used alone, but sometimes they can be used with other types of sweeteners and in this case it is called a mixture, and at the present time the trend of food manufacturers is towards the use of mixing more than one type of sweeteners because some sweeteners give special flavors (Sardarodiyani and Hakimzadeh, 2016).

Sweeteners are divided into

Natural Sweeteners

Sweeteners that are isolated from natural materials without any chemical change on their composing (Priya, 2011) .They are imbibe, in small intestines and metabolized to adenosine triphosphates (ATP), which is consider the source of energy for the cell (Sudan *et al.*, 2016). Natural sweeteners may be used to sweeten foods, drinks and in medical treatment (Neacsu and Madar, 2014).

Artificial Sweeteners

Are used instead of sugar, they are chemical substance and can be isolated from plant or sugar materials, artificial sweeteners are not carbohydrate and have no calories, accordingly, they sweeten material without additional calories (Christina *et al.*, 2008). It differs from sugar, because they do not cause dental caries, do not raise the levels of blood sugar, (Tandel, 2011; Mattes and Popkin, 2009).

COMMON ARTIFICIAL SWEETENERS AND POTENTIAL TOXICOLOGY

Aspartame

Aspartame is formed from 2 amino acids: L-aspartic acid and L-phenylalanine, it is sweeter than sugar by 200 times, and participate in several products, when the temperature rises, aspartame breaks down into amino acid components and its sweet taste disappears (Christina, 2008; Kroger *et al.*, 2006).

Aspartame disintegrate in the body to aspartic acid, phenylalanine and methanol (George *et al.*, 2010). A number of people are suffering from disease named phenylketonuria (PKU), It causes the body's inability to break down the phenylalanine (a component of aspartame) because the body does not have an enzyme phenylalanine hydroxylase, additionally phenylalanine leads to a defect in brain functions (Christina, 2008). Soffritti *et al.* (2007) Proved that aspartame leads to increasing of brain cancer in males Rats, leading to an increased risk of lymphoma and leukemia in males and females, It may lead to mammary cancer in females.

Saccharin

Saccharin is a benzoic sulfimide, is an organic acid, insoluble in water, therefore saccharin is used in sodium salt form, Saccharine is very popular and used in a lot of products such as toothpaste and even cosmetic products. It is much more sweeter than sucrose by 300 times (Haroun and Haider, 2018). Saccharin using in high doses can lead to bladder cancer in rats, so saccharin was banded due to the adverse effects. High doses of saccharin lead to a sediment in rat micturition which hurts the bladder cells and causes cancer (Elcock and Morgan, 1993). Another studies confirm that saccharin may lead to pathogenesis of the liver damage (Negro *et al.*, 1994).

Cyclamates

Cyclamate is an organic acid (Cyclohexylsulfamic acid), sodium cyclamate is active sweetening element, it is mercantile obtainable in the sodium and calcium salts, they are odour less stiff (Leban *et al.*, 2007). Cyclamate is much more sweeter than sucrose by 30-50 times and does not break down under heating and freezing conditions (Haroun and Haider, 2018). Numerous studies have been conducted on cyclamate for the purpose of ascertaining whether it is a carcinogen or not, Numerous studies have shown a direct relationship between cyclamate and the incidence of abnormalities in the intestinal tissues and cancerous injuries in the urinary system (Derfler *et al.*, 1988).

Acesulfame-K

Acesulfame-K (potassium) was discovered by scientist Karl, The scientist noticed that there was a sweet taste of this substance on his fingers when working on it in the laboratory. It is worth noting that acesulfame-K it has a sweet taste 200 times more sweet than sugar and without

calories. Commercially, it can be known by several names such as sunett and Sweet One and it can be found in many sweets and baked goods (FDA, 2006). At high dose (60, 450, 1,100, and 2,250 mg/kg), acesulfame-K lead to blood clotting and gene toxicity. In addition interacts with DNA to produce genetic damage (Whitehouse *et al.*,2008).

Sucralose

In order to building up sucralose, a modulation of the sucrose molecule is performed, whereby three hydroxyl groups are replaced by chlorine atoms. And Sucralose is not digested inside the human body, as a result, it does not give any calories even though it is made from sucrose. Most of the Sucralose taken orally in humans and laboratory animals, and it passes through the digestive system without any change and is excreted outside the body (Roberts *et al.*, 2000). studies have not shown significant toxic effects of sucralose on humans or laboratory animals, and they were found that feeding a diet contains 5% leads to impact on the thymus gland and the occurrence of shrinkage in it (Grice & Goldsmith,2000).

Emulsifiers

Emulsifiers are used in the manufacture of fats in processed foods (Lecomte *et al.*,2015). In order to improve the texture of food and give it better qualities, food emulsifiers are used in order to prevent processed food mixtures from separating, and food emulsifiers are used in many food products such as sweets, mayonnaise, ice cream and baked goods. two common emulsifiers namely carboxy methyl cellulose (CMC) and polysorbate-80 (P80) (Chassaing *et al.*,2015).

Numerous recent researches confirmed that eating food emulsifiers led to intestinal inflammation, because emulsifiers lead to alter the composition of gut microorganisms (Viennois *et al.*,2016) Alterations in microorganisms may cause many diseases and disorders such as intestinal infections (IBD) ,which in turn has a direct relationship with rectal and colon cancer. (Arthur and Jobin, 2013) studies have confirmed that the development of colorectal cancer has a direct relationship with the feeding of emulsifiers, and increasing in intestinal infections,It also led to a change in the microorganisms present in the intestin (Viennois *et al.*,2016).

Food colouring

There are many coloring agents of food commodities represented by dyes food available in the local market includes many types, such as sunset yellow, allura red, and bright blue (Okafor *et al.*,2016).

It has been shown through many studies that there are high toxicological reactions and carcinogenicity effect caused by industrial food coloring. (Sahar and Manal ,2012) study was conducted for the purpose of demonstrating the effect of industrial food colors on blood biochemistry through a study number of blood constituent in liver and kidneys of rats,It was found that there was a significant increase in the concentration of total and triglyceride, cholesterol, as well as a significant increase in the activity of liver and heart enzymes such as ALT and AST as well as a high concentration of blood proteins. Other studies confirmed that industrial food colors led to a decrease in the concentration of high density lipoprotein (HDL) as well as a decrease in glutathione secretion (GSH), Also the artificial colors caused an increase in

low-density lipoprotein (LDL) concentration and total cholesterol, increase in lipid peroxidation, blood glucose and blood creatinine, and increased activities of alkaline phosphatase, acid phosphatase, and lactate dehydrogenase

Antibiotics

Many studies have confirmed that antibiotics can be used to preserve food, but it has been found that using these antibiotics can lead to the emergence of resistant organisms, which results in many negative effects in their use as a treatment for diseases, both nisin and pimaricin are prepared from the antibiotics that are used as a food preservative, nisin is formed from Polypeptide protein has an active role in the resistance of many gram-positive microorganisms as (lactic acid bacteria, streptococci, bacilli and clostridia anaerobic spores of other producers) (Suganthi et al., 2012).

CONCLUSIONS

In order to preserve the quality of the food and improve the flavor, food additives are used, such as taste, color, aroma, flavor, texture, etc., which gives the food a good quality and makes it more consumable. Despite the aforementioned, it has been shown that food additives have harmful effects on public health through their effect on many vital and physiological activities inside of human body, which leads to the infection of many diseases, especially cancer, The researchers confirmed that food additives significantly affected the functions of the heart, liver, brain and stomach and blood, In addition food additives lead to the formation of free radicals inside the body and generate oxidative stress, which makes the body vulnerable to types of cancers such as leukemia, brain and stomach cancer.

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