



IMPACT OF FOOD ADDITIVES ON PREGNANT WOMEN AND CHILD HEALTH

Pharmacology

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ABSTRACT

Increasing scientific evidence suggests potential adverse effects on children's health from synthetic chemicals used as food additives. Food additives are the chemicals which are added to food to prevent them from spoilage, to enhance their colour and taste. People are more cautious on the taste rather than the nutritional value in them as these additives are used for centuries. Some are associated with adverse health effects, while others are safe and consumed in minimal risk. Dangerous additives and preservatives lead to health problems like Asthma, ADHD, Heart problems, Cancer, Obesity and etc. Number of studies suggests that some food additives may interfere with hormones, growth, and development. It is one of the reason where kids suffer from obesity. Children are more exposed to these kinds of dietary intakes than the adults. Women during pregnancy and breast feeding utilize several food additives which are not considered completely safe. We need to take certain measures to prevent using the harmful additives until it starts taking over our health.

KEYWORDS

Food Additives, Adverse Effects, Preservatives, Colourants And Regulators

INTRODUCTION:

Food additives have been used for centuries. The ancient Romans would use spices such as saffron to give foods a rich yellow colour. Salt and vinegar were used to preserve meats and vegetables for long voyages. Food additives need to be checked for potential harmful effects on human health before they are used. The food additives must be added in limited quantities and should be within the acceptable daily intakes (ADIs). US Food and Drug Administration (FDA) describes food additives as any substance, intended use of which results or might reasonably be expected to result directly or indirectly in becoming a constituent otherwise affecting the characteristics of food. Boric acid was widely used as food preservative from the 1870s to 1920s, but it was banned after World War I as it was toxic and was demonstrated in animal and human studies. Use of Food additives has made consumers exposed to different variety of foods and access them from anywhere in the country. Food additives can be derived from animals, plants, minerals and etc. Our ancestors used salt to preserve fish and meat, added herbs and spices to improve the flavor of the food, preserved fruit with sugar and pickled cucumbers in vinegar. Today consumers demand more flavorful, colourful and affordable. Yet they don't tend to look into the ingredients whether they are harmful to them or not. Additives perform variety of useful functions in food that consumers often take for granted. Some additives could be eliminated if we were willing to grow our own food, harvest and grind it, or even spending some more time in cooking and canning. Technology has grown and makes even food easier in cooking. As most of the consumers today, rely on technological or more convenient benefits that additives provide. Preservatives slow product spoilage caused by mold, air, bacteria, fungi or yeast. They maintain or control the food contamination that may cause food-borne illness.

Many food preparations like Pizza, Burger, ice creams, bright green yogurt and many other foods which look appealingly delicious contains food additives or chemicals that can be dangerous to children. Over these last decades, the number of chemicals added to foods and other products has skyrocketed. Children are still growing so their dose of any given chemical ends up being higher. Their bodies are still developing, so they can be more at risk of harm and they are young, so the chemicals have more time to do more damage. In the 1960s, regulators decided to make a standardised list of these additives. In Europe, these are referred to as E numbers (the E stands for Europe). E number restrictions vary between countries, depending on how the local regulatory authorities interpret the product's toxicity results.

Table: 1 List of Food Additives and the specification code

Number Range	Additive type	Examples
100-199	Food colours	131-patent Blue V 173-Aluminium

200-299	Preservatives	200-Sorbic acid 234-Nisin
300-399	Antioxidants	300-Vitamin C 315-Erythorbic acid
400-499	Thickeners, emulsifiers, stabilisers	406-Agar 460-Cellulose
500-599	Acidity regulators and anti caking agents	509- Calcium chloride
600-699	Flavour enhancers	621-MSG
700-999	Antibiotics, Sweeteners, foaming agents and gases	951-Aspartame
1000-1599	Additional chemicals	polydextrose

Nutritional supplements: Nutritional additives are used for the purpose of restoring nutrients lost or degraded during production, fortifying or enriching certain foods in order to correct dietary deficiencies, or adding nutrients to food substitutes. The fortification of foods began in 1924 when iodine was added to table salt for the prevention of goitre. Fluorine may be added to water. Vitamins are commonly added to many foods in order to enrich their nutritional value. For example, vitamins A and D are added to dairy and cereal products, several of the B vitamins are added to flour, cereals, baked goods, and pasta, and vitamin C is added to fruit beverages, cereals, dairy products, and confectioneries. Vitamins are added to fruit juices and baby foods. Other nutritional additives include the essential fatty acid linoleic acid, minerals such as calcium and iron and fiber.

Flavor enhancers: Flavor enhancers are an additive used to intensify the flavor of food. This concept of food flavor enhancer first came into Asia, where cooks added seaweed to soup stocks in order to provide richer flavor to foods. Extracts, essence and flavors employ only natural flavoring agents called pure. Those which employ synthetics are called artificial. Flavor enhancers are made up of Monosodium glutamate (the sodium salt of the amino acid L-glutamic acid). Some food flavorings rely on just one major component, but most are a mixture of many different aroma chemicals. The main motto of the food enhancers is to make flavorless poor quality foods look good and taste nicer. It is the colorless, odorless powder which is easily available and less cost so that chefs, food manufacturers and cooks replace this with real ingredients. Flavour enhancers in infant foods have been banned in countries like New Zealand, Australia and America as it causes severe damage to the brain and nervous system. And when we talk about MSGs and other flavor enhancers they are highly addictive. After eating these taste buds will crave more and more due to its flavor. So this leads to obesity. MSG is injected into these poor animals simply to make them obese for research purposes. There are numerous number of side effects consuming these would lead to migraine, asthma,

fatigue, depression, insomnia, shakes, brain fog and much more.

Table 2. Artificial flavoring agents and their flavors

Chemical	Flavor
Ethyl decadienoate	Pear
Methyl anthranilate	Grape
Methyl salicylate	Wintergreen
Cinnamaldehyde	Cinnamon
Ethyl propionate	Fruity
Isoamyl acetate	Banana
Ethylvanillin	Vanilla
Diacyetyl, acetylpropionyl, acetoin	Buttery
Allyl hexanoate	Pineapple
Ethyl maltol	Sugar, Cotton candy
Limonene	Orange
Benzaldehyde	Bitter almond, cherry

Emulsifiers: Food emulsifiers prevent food from separating and gives some texture to the food. They are used to aid in the processing of foods and also to help maintain quality and freshness. They're commonly found in ice creams. Emulsifiers may cause inflammation in gut and increased levels of bad bacteria and also leading to cancer. These are made from plants, animals and synthetic sources commonly which are added to processed foods. There are two types of emulsifiers; one is droplets of oils dispersed in water and other is the droplets of water dispersed in oil. Low-fat spreads, ice cream, margarine, salad dressings and many other creamy sauces are kept in stable emulsions with the addition of emulsifiers. These additives also are widely used in other foods such as peanut butter and chocolate. Emulsifiers enhance the structure of baked goods by increasing whip-ability of batters, conditioning of dough and helping foods like pasta be more resistant to overcooking. Commonly used emulsifiers in food production include mustard, soy and egg lecithin, mono- and diglycerides, polysorbates, carrageenan and etc.

Food Colours: The rainbow of colours of foods we see around contain food coloring, or color additive. It is a dye, pigment or substance that imparts color when it is added to food or drink. They come in many forms consisting of liquids, powders, gels, and pastes. Food coloring is used both in commercial food production and in domestic cooking. There are two types of food colors, certified colors and colors exempt from certification. The certified colors are synthetic compounds. They are usually more effective than natural compounds and they do not introduce off-flavors to the foods. Colors derived from natural sources are exempt from certification. These compounds are more expensive than synthetic compounds. Yet, the colors exempt certification may give off-flavors to the foods.

Table: 3. List of Colors and Acid regulators used in Food manufacturing

Food Colours	Acid Regulators
Curcumin, Capsorubin,	Sodium lactate,
Ammonia caramel,	Potassium lactate,
Sulphite ammonia caramel,	Calcium lactate, Citric acid,
Plain caramel, Betanin,	Sodium citrates,
Riboflavin, Paprika extract,	Potassium citrates,
Riboflavin5'phosphate,	Calcium citrates,
Tartrazine, Carotenes,	Tartaric acid (L(+)),
Quinoline yellow, Capsanthin,	Sodium tartrates,
Sunset Yellow FCF,	Potassium tartrates,
Orange Yellow S, Norbixin,	Sodium potassium tartrate
Cochineal, Caustic sulphite caramel,	Phosphoric acid,
Carminic acid, Brown HT,	Potassium phosphates
Carmines, Indigotine, Lycopene,	Potassium phosphates,
Azorubine, Indigo Carmine,	Calcium phosphates,
Carmoisine, Brilliant Blue FCF,	Magnesium phosphates,
Amaranth, Chlorophylls	Sodium malates,
Ponceau 4R, Brilliant Black BN,	Potassium malate,
Cochineal Red A, Black PN,	Calcium malates,
Erythrosine, Brown FK,	Metatartaric acid,
Allura Red AC, Annatto, Bixin,	Calcium tartrate, Adipic acid,
Patent Blue V, Green S, Vegetable carbon,	Sodium adipate,
Beta-apo-8'-carotenal (C30),	Potassium adipate,

Ethyl ester of beta-apo-8'Carotenoic acid(C30),	Succinic acid,
Lutein, Canthaxanthin, Beetroot Red,	Triammonium citrate,
Anthocyanins, Lithlubine BK	Calcium disodium EDTA.

Acid Regulators: Acidity regulators, or pH control agents, are food additives used to change or maintain pH (acidity or basicity). They can be organic or mineral acids, bases, neutralizing agents or buffering agents. Typical agents include the following acids and their sodium salts: sorbic acid, acetic acid, benzoic acid, and propionic acid. Acidity regulators are indicated by their E number, such as E260 (acetic acid), or simply listed as "food acid". Acidity regulators differ from acidulants, which are often acidic but are added to confer sour flavors. They are not intended to stabilize the food, although that can be a collateral benefit. Acidity regulators such as citric acid, tartaric acid, and phosphoric acid are numbered together with antioxidants in the E numbering system. This approach is very logical as certain acidity regulators, such as citric acid, exhibit antioxidant properties. In fact, citric acid has imparted favorable effects on food, functioning as an acidity regulator and antioxidant simultaneously. What's more, food acidity regulators have shown advantageous combined effects with other food additives on food. Antibrowning effect of citric acid together with ascorbic acid and nitrogen on banana smoothies is an example. The list of acidity regulators commonly used in food manufacturing is stated in the table 2.

Antioxidants:Antioxidants play a pivotal role in the food industry, combating oxidative stress on oxygen sensitive species. The antioxidants used in the food industry are either hydrophilic, lipophilic, or amphiphilic, protecting various types of ingredients. Certain antioxidants functions also as acid regulators. Examples include ascorbic acid and citric acid. Acidity regulators are also an essential group of food additives as lowering the pH of the food usually assists to retard microbial attack. Although antioxidants are deemed to confer numerous health benefits to the humans, synthetic antioxidants such as butylated hydroxyanisole (BHA) and butylated hydroxytoluene (BHT) have shown negative health effects. On the contrary, some reports have shown chemoprevention properties of those synthetic carcinogenic antioxidants. Again, the issue of toxicity is dealt with by adhering strictly into the ADI published by the governing bodies worldwide including the US FDA. List of antioxidants: Ascorbic acid, Sodium ascorbate, Calcium ascorbate, Fatty acid esters of ascorbic acid, Tocopherols, Alpha-tocopherol, Gamma-tocopherol, Delta tocopherol, Propyl gallate, Octyl gallate, Dodecyl gallate, Erythorbic acid, Sodium erythorbate, Tertiarybutyl hydroquinone (TBHQ), Butylated hydroxyanisole (BHA), Butylated hydroxytoluene (BHT), Extracts of rosemary, 4-Hexylresorcinol.

Preservatives: The term "preservatives" refers to the functional name for a wide variety of compounds that help slow or prevent bacterial growth in a wide range of products, including foods, medicines, and personal care products. These compounds can be natural or synthetic. Preservatives play important roles in many products people use every day – for example, by helping prevent the growth of harmful microorganisms and protect products from spoilage or contamination. Food preservatives are classified into two main groups: antioxidants and antimicrobials. Antioxidants are compounds that delay or prevent the deterioration of foods by oxidative mechanisms. Antimicrobial agents inhibit the growth of spoilage and pathogenic microorganisms in food. As expected, encapsulated natural food preservatives including thyme essential oil and curcumin have shown favorable properties such as sustained release and enhanced antioxidant and antimicrobial properties. In addition to natural products, fermented milk products have shown promise as food preservatives. The reasons for utilizing natural products and nonsynthetic products as food preservatives include imparting health benefits to the consumers and gaining "clean label" advantage. Some food preservatives used in food manufacturing are listed below: Sorbic acid, Potassium sorbate, Calcium sorbate, Benzoic acid, Sodium benzoate, Potassium benzoate, Calcium benzoate, Ethyl p-hydroxybenzoate, Sodium ethyl p-hydroxybenzoate, Sodium methyl p-hydroxybenzoate, Sulfur dioxide, Sodium sulphite, Sodium hydrogen sulphite, Sodium metabisulphite, Potassium metabisulphite, Calcium sulphite, Calcium hydrogen sulphite, Potassium hydrogen sulphite, Biphenyl; diphenyl, Nisin, Natamycin, Hexamethylene tetramine, Dimethyl dicarbonate, Potassium nitrite, Sodium nitrite, Sodium nitrate, Potassium nitrate, Propionic acid, Sodium propionate, Calcium propionate, Potassium

propionate, Boric acid, Sodium tetraborate; borax.

Adverse effects in pregnancy:

Food additives utilisation by women during pregnancy and breastfeeding has not to be considered completely safe; actually, current evidence suggests that these substances induce alterations of the differentiation of several cell-types, resulting in development of disease during the adult age. During pregnancy, for instance, E100 color additive is suspected to be embryotoxic, amaranth causes a reduced olfactory orientation in F1 generation mice and beta-cyclodextrin produces transient neonatal growth retardation in rodents. The food additive methylmercury is excreted in human milk and causes neurotoxicity in breastfed babies. Steroids pass in human milk, too: they can inhibit lactation and cause newborn breast hypertrophy. High maternal intake of nitrite-cured meats has also been linked to an increased risk of childhood brain tumors in the offspring, especially tumors of the astroglia. Regulations to avoid these early exposures may contribute to an important improvement of health conditions of humankind.

Adverse effects in children:

Synthetic artificial food colors (AFCs) are added to foods and beverages for aesthetic reasons, and the resulting brightly colored products are appealing to young children in particular. In some cases, AFCs serve as substitutes for nutritious ingredients, such as in fruit juice drinks that contain little or no actual fruit. Some study found that tartrazine led to an allergic reaction in about a quarter of people with allergies. A more recent review found that avoiding tartrazine can help control asthma. It has been suggested tartrazine might contribute to hyperactivity, but only in those children who are sensitive to it. More synthetic colors and preservatives cross blood brain barrier. There is also some evidence to suggest that certain children with ADHD may be genetically sensitive to food colours. Consuming excessive food colours may therefore make their symptoms worse. The American Medical Association emphasized that infants are particularly vulnerable to methemoglobinemia from nitrates and nitrites because of the chemical composition of their gastric tracts and also highlighted the risk of gastrointestinal or neural cancer from the ingestion of nitrates and nitrites, which may react with secondary amines or amides to form carcinogenic N-nitroso compounds (NOCs) in the body.

DISCUSSION AND CONCLUSION:

Food additives have become an indispensable part of the food industry today. Millions of people suffer from hunger as a result of lack of enough food and thus advantages of using food additives in food processing are plentiful. Food preservatives along with other additives are under strict control by numerous governing bodies. Most artificial food additives impart negative health effects at high and chronic uses. Natural additives are an appealing alternative to artificial or synthetic food additives, especially with respect to health effects. In recent years, there has been increasing use of alternative sources of artificial food additives. Elimination of artificial food additives like colors and preservatives from the diet may provide benefits to children with attention deficit hyperactivity disorder and teratogenicity.

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