

ADJUNCT AND IMPROVER USED IN FOOD PROCESSING AND PRESERVATION

BY

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ABSTRACT

The extensive use of processed food products from the nineteenth century has been characterized by the increasing utilization of food additives and preservatives with differing levels of safety. The above trend has seen the introduction of laws in many countries regulating the use of additives and preservatives in food processing and preservation. During the process of carrying out the research, the researcher came up with objectives which were concerned with identifying the additives and preservatives in food processing, their preserving capabilities and the implications on human health. Food preservation involves different practices such as curing which use ingredients like salt, sugar, spices, vinegar and sodium nitrite/nitrate in food processing of certain types of animal foods. Additives and improving agents are utilized in food for various reasons making more research necessary. According to the study objectives and recommendations, the researcher concluded that food processing and preserving technologies can be used to maintain the quality, acceptability and nutrition in food. The process of preservation will help in maintaining the principal macronutrients which include carbohydrates, fats and protein.

Keywords: Food Additives, Food Preservatives, Food Processing, Food Preservation, Food Safety, Improving Agents, Food Quality, Nutritional Value, Human Health, Preservation Techniques.

Introduction

Adjuncts and Improvers have been used for centuries in foods. In cases where meats are preserved using smoking processes, chemicals like butyl gallate and butylated hydroxyl anisole (BHA) are created, which serve to inhibit bacterial growth while at the same time providing an antioxidant effect. The use of salt in preservation of foodstuffs has been known for many centuries. Salt preserves food through reducing the water activity of the foodstuff. This reduces the growth of bacteria. Presence of excess moisture in foods increases chances of growth of microorganisms such as fungi and bacteria. Addition of acids like vinegar during pickling makes foods less friendly to bacterial growth due to low pH values. Cinnamon, chilies and curry have some bactericidal properties.

Food adjunct are substances which are added to food to preserve its flavor or enhance its appearance, taste, or other qualities. Some food adjunct have been under use for centuries, e.g., preserving foods by pickling with vinegar, brining or salting, as with bacon, preserving sweet or using sulfur dioxide as in wines.

With the advent of many processed foods in second half of twentieth century, several more adjunct were introduced; both natural and artificial (or synthetic) origins. Also, food adjunct include the substances that may be indirectly introduced to foods (known as indirect adjunct) during the manufacturing process, by packaging, or during transport or storage (FDA, 2017; FDA, 2018). The US Food and Drug Administration (FDA) describes food adjunct as any substance, intended use of which results or might reasonably be

expected to result, indirectly or directly, in it becoming a constituent or otherwise affecting characteristics of any food. The WHO stated that substances which are added to foods to improve or maintain the taste, texture, appearance, safety, or freshness of foods are known as food adjunct (WHO, 2018). Some food adjunct have been used for centuries for food preservation, such as salt in meats like bacon or dried fish, sulfur dioxide in wine, or sugar in marmalade. Food adjunct may also be used to confer a specific functional property in foods (Chinaza, 2019b; Chinaza

et al., 2019a). Over time, many food adjunct have been developed to meet the requirements of food production and food industries, as producing foods on large scale is quite different from making on a small scale at home or for household. adjunct are required to ensure the processed foods remain safe, in good condition, and fresh throughout its journey from the factories or industries, during the course of transportation to shops and warehouses, and finally to the consumers, who often look out for fresh, safe, nutritious, and wholesome foods.

The use of adjunct in foods is only justified when their use does not mislead consumers, has technological need, and serves well-defined technological function, such as to enhance the stability of the food or preserve the nutritional quality of the food. Food adjunct can be derived from animals, plants, or minerals, or can be synthetic. They are added to food intentionally to perform some technological purposes which the consumers often take for granted (WHO, 2018), or unintentionally added through food-package interactions or from other sources such as pesticides used in growing crops, mycotoxins such as aflatoxin, patulin (Chinaza et al., 2019b) found in grains and other foods; also, some components such as methanol and ethyl carbamate (Igwe et al., 2018a; Igwe et al., 2018b) may be formed in some traditional beverages and become part of the foods. There are several thousand food adjunct in use, which are all designed to do specific job in making foods more appealing, safer, or nutritious. Bisphenols, perfluoroalkyl chemicals (PFCs), and phthalates are indirect adjunct used in packaging or manufacturing. In July 2018 the American Academy of Pediatrics (AAP) called for more study of Bisphenols, perfluoroalkyl chemicals (PFCs), and phthalates, along with food coloring and nitrates, as they might harm the children during development (American Academy of Pediatrics, 2018).

The safety assessments completed by the Joint Expert Committee on Food adjunct (JECFA) are used by the Codex Alimentarius Commission, a joint intergovernmental body of the FAO and WHO that sets food standard, to establish the levels for maximum use of improver and adjunct in food and drinks (WHO, 2018). Codex standards serve as reference for national standards for the consumer protection, and for international trade in foods, so that consumers everywhere will be confident that the foods they

consume meet the agreed standards for quality and safety, no matter where they were produced (WHO, 2018). Once a food additive is found safe for use by the JECFA and the maximum use levels established in Codex General Standard for Food adjunct, the national food regulations require to be implemented permitting actual use of food additive. The use of food adjunct in the US is closely regulated by the governmental agencies responsible for health, agriculture, and consumer safety. This is also the case in other developed nations in Europe, Canada, etc. (Encyclopedia, 2020). Chemicals cannot be used as food adjunct in those countries except regulators are convinced, they have been shown to be toxicologically safe, with wide margin of security. Additionally, chemicals added to commercially made foods must be listed on packaging so that the consumers will know what is present in the foods they choose to eat (Brannen, 2002; Encyclopedia, 2020; Clydesdale, 1997; Potter and Hotchkiss, 1995). As a result of the intrinsic nature of low-level, toxicological risk, especially those associated with the diseases that may take long time to develop, researchers and scientists are never able to show that trace exposures to any chemical or additive are absolutely safe—there is often a level of risk, no matter how small.

Safety Evaluation of Food adjunct

Under Food adjunct Amendment two groups of ingredients are exempted from regulation.

Group I

Prior sanctioned substances that FDA or USDA has determined safe for use in food prior to 1958 amendment. E.g., Sodium nitrate and Potassium nitrate

Group II

It includes GRAS, all the substances approved by experts as safe based on their extensive history of use in food before 1958 or based on published scientific evidence. Eg: Salt, sugar, MSG.

In 1969, President Nixon directed the FDA to update safety aspects of all GRAS substances on the basis of current scientific investigations. In 1972 a committee from Federation of American

societies for experimental biology reviewed the safety of all GRAS substances on the basis of published and other available information. The committee placed all reviewed substances in five categories.

Category I

Includes all those adjunct whose GRAS status was reaffirmed. This means that the available information presented no evidence of toxic hazards of the substance in question. These substances are generally used according to GMP

Category II

It includes those substances whose GRAS status was reaffirmed at current level of use. This means that the available information presented no evidence of toxic hazard at the level of current use and practice.

Category III

Substances whose safety is reaffirmed at the level of current use and practice. However certain uncertainties exist so that additional studies are required.

Category IV

Include those substances for which information is incomplete to “reaffirm safety”. This means evidence of toxicity has been reported, however the level and manner of current use the information is insufficient to determine the effect on public health

Category V

Those substances for which no biological studies are available to judge their safety.

Regulations of Food and improver

There are several regulating agencies that determine what must be added to food and food supplements and the quantities that they must be added so they will not have deleterious effects on the consumers. These substances are termed as generally recognized as safe (GRAS). Each country of the world has its own regulations though there might be similarities among them. In Nigeria, for instance, before anything can be added to food, it must be approved by the National Agency for Food and Drug Administration and Control (NAFDAC) in conjunction with the Standard Organization on Nigeria (SON). In Nigeria, the drug and related products (registration, etc.) act 1996 (as amended) and food adjunct regulation of 2005 of the NAFDAC gave several regulations that every food and drugs companies must adhere to or face penalty or sanctions. These regulations are; Label declaration for substances used as food adjunct, Labeling of synthetic colour and mixture of colours in food, Food adjunct

not to be described falsely, Food adjunct to bear certain information, Processing aids and carry-over of food adjunct, Prohibition against sale of food containing non-permitted food additive, Conditions for a request to add to or change food additive, Restriction on sale, of baby foods containing food additive, Conditions for allowing more than one preservative, Ionizing radiation. Some of the penalties.

In the U.S., food ingredients may either be FDA-approved food adjunct or generally recognized as safe (GRAS). Food packaging manufacturers must prove to the U.S. Food and Drug Administration (FDA, 1993) that all materials coming in contact with food are safe, before they are permitted for use in such a manner. Food adjunct were first subjected to regulation in the United States under the Food and Drug Act of 1906 (Haley, and Lyn, 2010). The act states that a food shall be deemed adulterated: “If it bears or contains any poisonous or deleterious substance, which may render it injurious to health; but in case the substance is not an added substance, such food shall not be considered adulterated under this clause if the quantity of such substance in such food does not ordinarily render it injurious to health” (Food and Drug Act, 1906). Congress passed the Food adjunct Amendment, Section 409 of the Food, Drug, and Cosmetic Act, in 1958, as well. This amendment exempts two important groups of substances from the food additive definition. Those are:

- a) Substances generally recognized as safe (GRAS) among experts qualified by scientific training and experience to evaluate safety.
- b) Substances that either FDA or the U.S. Department of Agriculture (USDA) had sanctioned for use in food prior to 1958 (so-called “prior sanction” substances). The amendment does not pertain to pesticides in or on raw agricultural commodities.

According to current U.S Federal law and regulations, any substance that is Generally Recognized As Safe (GRAS) for a particular use may be used in food for that purpose without pre-market approval from FDA. General recognition of safety (i.e., a GRAS determination) must reflect the views of experts qualified by scientific training and experience to evaluate the safety of substances directly or indirectly added to food. Those expert views must be based on “scientific procedures,” supplemented in the case of

substances used in food prior to 1958 by experience based on common use in food. According to the Code of Federal Regulations, the term “safe” means that there is reasonable certainty in the minds of competent scientists that a substance is not harmful under intended conditions of use (CFR, 2007). The 1958 Food adjunct Amendment forbids the use of any food additive not approved by FDA, and the agency may only approve adjunct shown to be “safe.” The act outlines the requirements for requesting approval for a food additive (i.e., “Petition to establish safety”) and details the action to be taken by FDA in dealing with such a petition. According to Coppens et al., (2006), food supplements were nationally regulated in the EU until 2002, when the Food Supplements Directive 2002/46/EC came into effect. This directive provides a list of the vitamins and minerals that can be used in the manufacture of food supplements.

Conclusion

This review paper has highlighted the different effects of food adjunct and improver on man. The adjunct have been used for many years now to preserve, flavour, blend, thicken and colour foods and have played an important and essential role in minimizing the serious nutritional deficiencies (Nutrition Supplement adjunct). adjunct are very useful as they ensure the availability of wholesome, palatable and economical foods that meet the consumers’ demands all through the year while at the same time preserving foods from getting spoiled by the action of microorganism. Food adjunct have an important role in the food industries but the different adverse effects associated with them is an issue that should be combated by us. Synthetic food adjunct have interactions with the cellular components of the body causing different food disturbances (effects). If we are to use the food adjunct, due to their advantages, we should use the natural ones with the least effect and that are generally recognized as safe (GRAS) and in the case of non-GRAS the acceptable daily intakes (ADIs) should not be exceeded. In order to reduce the risk of having any health problems as a result of food adjunct and improver, we should avoid the foods with these adjunct and improver. Before buying any canned foods, we should first look into its ingredients. Buy only organic foods that do not contain any artificial adjunct. Though it might be difficult to change our habits and substitute for our favourite foods, remember

that we shall be including other wholesome foods in our diets which we are going to enjoy even more. Try to find foods that are unprocessed and unpackaged and enjoy the natural products of nature such as fresh fruits, vegetables, grains, beans, nuts and seeds.

Recommendation

In order to improve the present situation, the following recommendations are therefore suggested;

1. All non-essential food adjunct should be banned, particularly all cosmetic agents such as food colourants.
2. The various regulating agencies should ensure that it is only those food adjunct which are generally recognized as safe (GRAS) that is added to foods.
3. All foods which include adjunct with carcinogenic, mutagenic and teratogenic properties should be clearly labeled with the appropriate warning.
4. All food adjunct should be banned from foods which may be consumed by infants and young children.
5. All food adjunct that are not generally recognized as safe (Non-GRAS) must not exceed the acceptable Daily Intakes (ADIs)
6. The amount of TV advertising which encourages children to buy and eat unhealthy junk food should be vigorously cut down by various regulating agencies as children are presently surrounded by images promoting extremely unhealthy eating habits.
7. All foods that have little or no nutritional value should be discouraged from all promotions.
8. Regulating agencies should ensure that Good Manufacturing Practices (GMP) are adhere to by various food producing and processing industries
9. Government should re-introduce free nutritious school meals, preferably using organic foods, which will be available to all school-children to discourage them from patronizing these colourant food adjunct.

10. Local Education Authorities should include in their health education curricula specific lectures stressing the prime importance of good nutrition in both physical and mental health of children.
11. All foods, drinks or medications currently exempt from declaring adjunct must in future be required to do so. This is particularly important and timely in connection with medicines, as presently there is no legal requirement by current labeling regulations to oblige the drug manufacturers to disclose the presence of any of their pharmacological adjuvants. Adverse reactions to drugs themselves have been recognized, but the ever-expanding range of synthetic excipients currently in use can no longer be considered either inert or non-toxic. In fact it has been already suggested that adverse reactions to undisclosed excipients should be always suspected whenever patients present with recurrent, unexplained symptoms, particularly allergies (Smith, 1991).
12. Finally, all young children diagnosed as hyperactive, including children currently seen by psychiatric services, should always be screened first for evidence of a possible food/chemical intolerance as even the simplest dietary changes i.e. by avoiding foods containing food adjunct such as coloured sweets, fizzy and sugary drinks etc., can bring about a remarkable improvement in their health and behavior (Bunday and Colquhoun, 1990). It would be appropriate to suggest that we must now finally insist that the Government pass a law refusing permission for the food industries to add continuously into our everyday foods and beverages demonstrably toxic agents for cosmetic purposes only. If not for any other reason, at least in order to protect the health of our significant population of young children, youths, adolescents and adults, as well as the health of our future generation because a healthy nation is a wealthy nation.

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