

INCIDENCE OF BIOGENIC AMINES IN FOODS IMPLICATIONS FOR THE GAMBIA

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ABSTRACT

Amines are found in food. Biogenic amines are a class of amines, which result from decarboxylation. They are food quality indicators. Health-wise biogenic amines play positive roles and have adverse effects as well; they are a public health concern. Certain conditions make it possible for them to be produced. These could be controlled for a better and improved food quality. [*African Journal of Chemical Education—AJCE 7(1), January 2017*]

This feature article deals with a class of derivatives of ammonia called biogenic amines (Bas). These are found in food. A process known as amino acid decarboxylation is responsible for the synthesis of amines in foods. Decarboxylation has to do with the removal of the carboxylic acid group (-COOH) on the amino acid by enzymic reactions. Enzymes that take part in such reactions are known as decarboxylase enzymes. Amines, which are formed by this process, are known as biogenic amines, BAs.

BAs are toxic substances. They are responsible for many diseases in man and animals which are associated with the ingestion of food; food from plant and animal sources. The action of microbes on food during aging and storage results in the formation of biogenic amines. Some BAs which result from this process are: histamine, putrescine, cadaverine, tyramine, tryptamine, β -phenylethylamine, spermine and spermidine. Whenever they are produced, it is always as a mixture. There is a specificity to the production of these BAs: histamine is produced from histidine; cadaverine from lysine; putrescine from three amino acids: glutamine, arginine and agmatine. Depending on the food, some BAs occur in more quantity than others. Certain foods are known to contain more of some biogenic amines than others. Examples of foods which contain BAs include, fish, fish products, meat products, eggs, cheeses, fermented vegetables, soybean products, beers and wines. Conditions that lead to the production of the BAs: free amino acids, (proteinaceous foods), presence of micro-organisms that can decarboxylate amino acids. Mishandling of food, (during storage and processing) also leads to the production of BAs. Any food which ferments would produce BAs in the process of fermentation. Ironically, yoghurt is a fermented food, and it contains no biogenic amines. Conditions that favour the decarboxylation of amino acids must favor the production of the enzymes necessary for the reaction that would produce the BAs. However, it is possible to find high levels of histamine, a biogenic amine, in

foods before they begin to appear spoiled. So, the fact that food looks good does not mean that it is. According to a study carried out by Shalaby, even high temperature treatment, (heating) does not significantly reduce the amount of BAs found in foods that have been subjected to deliberate or accidental bacterial contamination. In other words, if food is bad, heating it does not make it edible [1, 2, 3].

BAs are also responsible for the typical and characteristic taste of mature foods. The taste of food becoming stale is due to BAs. BAs are responsible for food poisoning. The amount of BAs present in foods, fruits and vegetables provides an index for measuring food quality [3].

In the tropics fish are caught in temperatures more than 200C. These conditions make it easy for bacteria containing decarboxylase enzymes to act on fish if not refrigerated immediately. At temperatures between 00C and 50C bacterial growth ceases, however, enzymic activity continues to produce more BAs. In The Gambia, fish is widely consumed. At the sea side, one finds many fishermen displaying fish at temperatures over 200C; average temperatures range from 290C to 330C. Fish not sold is stored away in ice. When resold later, the quantity of BAs would have increased since enzymic activity would still have been continuing. In the market, women openly display chicken parts for sale at temperatures over 200C; usually under sunny conditions. This is noteworthy since no-one seems to do anything about this. Heating may not reduce the level of the BAs in these foods.

Importers play a major role in the wholesale and retail trade of poultry meat products. They usually operate cold chain facilities and market their products to retailers in cartons and to household consumers either in cartons, or whole chicken or in portions. Imported whole chicken or portions are sold by retail shops, supermarkets and street vendors. An important effect of the importation of poultry products has been an increase in health risks and incidents of food

poisoning, the Department of Livestock Services has documented instances wherein imported poultry products have been examined and found to grow fungi.

Consumption of food containing BAs leads to food poisoning, food borne disease, scombroid poisoning and tyramine toxicity, (results from cheese). Even poultry and farm animals can be poisoned from eating food containing BAs. This was according to a research carried out by C.A. den Brinker et al in 2003 [4]. In The Gambia what kinds of food do livestock farmers feed their animals? There is need for the appropriate professionals to look into these matters.

Certain conditions limit the production of BAs in foods. These include; pH, salt concentration and temperature. These could be exploited as a way of ensuring better storage conditions. Could fishmongers be made aware of the effect of BAs on what they sell? Tanji in The Gambia is a fishing village. Many men (men and women) in Tanji use generous amounts of salt when preserving fish; usually smoked fish.

Symptoms resulting from the consumption of large amounts of BAs in foods are: headache, nausea, hypo – or hypertension, cardiac palpitation and in severe cases, intracerebral haemorrhage and death [5, 6]. What percentage of reported illnesses in hospitals are due to the accumulation of BAs resulting from food consumption? If the population is educated on the effect of BAs, then may be the government would spend less on health care.

On the other hand, some BAs, are not that toxic; they play vital roles in the body. They are involved in growth of cells, tissues and organs. Their role in this respect is as cofactors in several biochemical reactions associated with cellular activities and proliferation. Other important roles include regulation of body temperature, stomach volume, stomach pH and brain activity. BAs are considered as very important food micro-components during periods of intensive tissue growth; infant gut maturation [1, 3]. In order for this biological function to be performed, the BAs must be

present in little quantity. Their use in this respect is strongly influenced by certain physiological conditions. A complication of this is that the presence of certain BAs in little quantity leads to the production of other BAs in large quantities. Further to this, the body also produces its own BAs. Different parts of the body contain different amounts of BAs. The amount produced depends on body metabolism.

Different researchers have analysed the amount of BAs present in certain foods in different countries. This is an area that could be looked into in The Gambia, especially with regard to the local foods and beverages. Perhaps better conditions of handling and processing could be discovered. There should be a ban on the open display of food in market places. This could lead to a better quality of food being consumed. Further to this, how much BAs are present in foods, which are imported into The Gambia? Are their levels safe for consumption?

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