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# fish technology

# newsletter

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## Histamine in Fish and Fish Products

Histamine is a biogenic toxin produced in the fish muscle during bacterial spoilage. Spoiled fishes usually contain 10 to 15 mg histamine per 100g. But in advance stages of spoilage, the histamine content is found in excess of 100 mg/ 100g, while the permitted level of histamine content is only 20mg/100g of fish muscle. Very high levels as much as 4000 mg histamine/ 100g has been reported in advanced stages of spoilage. Fishes belonging to the scombroid group were frequently encountered in the earlier outbreaks of histamine poisoning and for this reason it is known as scombroid fish poisoning. The scombroid fishes possess relatively large amounts of free histidine in their muscle tissue which is converted into histamine during bacterial spoilage.

### Symptoms of histamine poisoning

The symptoms of histamine poisoning occur when the ingested food contains more than 60 mg of histamine/100 gm fish. Histamine poisoning is characterised by allergic type diseases such as stomach pain, burning and itching of tongue, throat and lips, nausea, odema, urticaria, hypotension, diarrhoea etc. The onset of symptoms usually occurs within a few minutes to 5 hours following ingestion of the toxic foods. The symptoms of histamine poisoning from fish and fish products are characteristic and vary little from outbreak to outbreak. In mild cases of short duration, the common symptoms are dizziness, fainting, severe irritation of the body, burning sensation in the throat and mouth, rapid and weak pulse, in-

ability to swallow etc. Most of the victims develop rashes on the body accompanied by severe irritation.

Secondary symptoms are developed when the ingested toxin is very high. Such symptoms are gastro-intestinal in nature and include severe stomach pain, abdominal cramps, nausea without vomiting, diarrhoea etc. In severe cases, shock, bronchospasm, suffocation and severe respiratory distress may occur.

### Fishes involved

The fishes usually associated with histamine poisoning are those belonging to the scombroid group including different species of tuna, seer fish and mackerel. The non-scombroid fishes implicated in histamine poisoning are the pelagic shoaling fishes such

as sardine, anchovy, pilchard, marlin, jack mackerel, mahi-mahi etc. Shrimps are also known to contribute to histamine poisoning.

### Formation of histamine in fishes

Studies show that formation of histamine depends on the free histidine content in the fish muscle and the histidine decarboxylase activity of the bacterial enzymes. During bacterial spoilage, bacteria possessing histidine, decarboxylates the histidine and converts it into histamine. Histamine production being an enzymatic reaction, the specificity of enzyme reactions such as optimum temperature, optimum enzyme concentration, optimum pH etc. are the major operational parameters.

Studies indicate that temperatures in the range of 20 to 37°C are highly favourable for histamine production. Acidic pH ranging from 2.5 to 6.5 favours the histidine decarboxylase activity. Among the different types of or-

ganism capable of decarboxylation of histidine, *proteus morgani* and *enterobacter acrogenes* produce significant amounts of histamine.

### Preventive measures

Fresh fish do not contain any histamine. Very little histamine is produced at temperatures of 0°C and below. But tropical ambient temperatures i.e. temperatures between 25 and 37° C, are conducive to the growth and multiplication of bacteria capable of producing relatively large amounts of histamine.

Frozen storage, refrigerated sea water, chilled sea water systems etc. provide equally good means for ensuring low temperature. Good hygienic practice for keeping the bacterial flora within the safe limits of quality standards is another means for preventing histamine production. Since time and temperature are the two important factors responsible for fish spoilage, any delay in preprocessing stage will lead

to accumulation of histamine due to bacterial multiplication. Hence, handling and preservation of the fish should be done without any delay.

Presence of histamine in significant amounts in canned fish has resulted in large scale rejection by the importing countries. Histamine can be formed in canned meat during various stages of canning operations such as preparation of raw material, trimming operations of the cooked meat and during sterilisation process upto a temperature of 55°C (considered optimal for certain bacteria to produce histamine). Presence of histamine in canned fish suggests that the raw material for canning should be absolutely fresh and delay in any stage of processing is to be avoided in order to produce histamine free canned fish.

- P.K. Vijayan