

Study on Level of Histamine in Yellowfin Tuna (*Thunnus Albacares*) in Relation to Body Size, Seasonal Variations and Spatial Variations

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Introduction

Sri Lanka has a 1500 km costal line and 23000 km² exclusive economic zones and the country has been engaged in fishery activity for a long time. Tuna is one of most imported fishery product in Sri Lanka and the annual production is around 80,000 metric tons (Fisheries year book, 2008). The European Union is the highest importer of tuna from Sri Lanka followed by Japan and United Kingdom of America respectively. Yellow fin tuna (*Thunnus albacares*) is the species mainly exported as fresh fish products from Sri Lanka. Private sector plays a dominant role in the processing, marketing and distribution of fish for local consumption and exports.

Histamine is a naturally occurring substance in mammalian physiology and when it is released in large amounts causes allergic and other reactions (Cavanah and Casale, 1993). Histamine exerts its effects by binding to receptors on cellular membranes in the respiratory, cardiovascular, gastrointestinal and haematological/ immunological systems and the skin. Hence, the tuna with higher histamine levels are rejected in the export market.

When consider landing sites, good hygienic practices on board fishing vessels, especially during landing and processing, is important to minimize contamination with non-indigenous histamine producing bacterial species. Good hygiene at processing and preparation stages further along the supply chain is also important for the histamine development. So far, research has not been conducted in Sri Lanka regarding this issue and the present study aims to identify the factors inducing elevation of histamine levels in Tuna fish and improving the conditions to reduce histamine levels in Tuna.

Methodology

Research was conducted at the Ceylon Fresh Seafood (Pvt) Ltd fish quality checking laboratory. Negombo, Dondra, Tangalle and Trincomalee were selected as four landing sites as they contribute to high yields of tuna in Sri Lanka. 1200 samples were taken from yellowfin tuna fish at the receiving point after measuring weight and standard length. Core texture sampling was used to take a sample of 15 g from just below the pectoral fin and from the tail part. Samples were collected in to polythene bags and stored in ice. Collected samples were sent to the lab inside a cooler container and the histamine level of the samples was checked. Samples collected from four landing sites also represented two seasons. May to September is major tuna season in eastern costal area and November to April is the major tuna fish season in western costal area.

Results and Discussion

The results revealed that the histamine levels in tuna caught from four sites are significant ($P < 0.05$). Further analysis showed that histamine levels in tuna from Trincomalee and Tangalle are not significantly different ($P > 0.05$). The same results were obtained for Dondra and Negombo. Mean histamine level of the Trincomalee and Tangalle were 7.327 and 7.797 respectively while the mean histamine level of Negombo and Dondra were 1.293 and 1.620 respectively.

Histamine affect because of time/temperature combination. When fish are caught, their temperature belongs to the water temperature at that time in the sea. In tropics the temperatures are greater than 18 °C while tuna in temperate countries are found in waters as cold as 10 °C (Brill, 1994). The fish caught from waters with high temperature has higher histamine levels.

On- board practices and sea food processing practices also affects histamine levels. Delay in refrigeration of fish also can elevate the histamine levels of tuna.

According to the results no significant correlation observed either between weight and histamine level of the fish or standard length and histamine level ($p > 0.05$). The level of histamine correlated significantly with the season ($P < 0.05$). The histamine level in May to September season (7.762) was higher than that of November to April season (1.852).

Around Sri Lanka, the ocean current is driven from the Bay of Bengal to the Arabian Sea during the North – East monsoon and from the Arabian Sea to the Bay of Bengal during the South – West monsoon. During the North – East monsoon, the East Indian Coastal Current (EICC) travels down the East coast impelled by the monsoon winds and fed by the rivers along the West coast. During the South – West monsoon, The West Indian Coastal Current (WICC) travels down the West Coast (Anonymous, 2004). Northern part fishermen normally prefer May to September season and western part of fishermen prefer November to April fishing season. The warmth of the currents during these periods may cause elevation or reduction of the histamine levels in tuna.

Conclusion

It can be concluded that the histamine levels of yellow fin tuna has a significant relationship with spatial variation and fishing season. However, there is no significant effect of size on the histamine level of the fish.

Reference

- Anonymous 2004. National Report of Sri Lanka. Formulation of a Trans Boundary Diagnostic Analysis and Strategic Action Plan for the Bay of Bengal Large Marine Ecosystem Program. Sri Lanka.
- Brill, R. 1994. A review of temperature and oxygen tolerance studies of tunas pertinent to fisheries oceanography movement's models and stock assessment. 3: 204 – 216.
- Cavanah, D.K., Casale, T.B. 1993. Histamine In: The Mast cell in health and disease, Marcel Dekker Publisher, New York.
- Sri Lanka Fisheries Year Book. 2008. National Resource research and development Agency, Sri Lanka.