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Detection and Quantification of Histamine in Canned Fish and Fish Products Purchased from Market

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Abstract

Histamine is a biogenic amine responsible for regulatory and inflammatory functions in the human body. However, histamine can cause histamine fish poisoning within histamine intolerant individuals. Due to its heat stability, histamine can survive during thermal processing, posing a potential risk in canned products. In the Sri Lankan market, various canned fish and fish products, both locally manufactured and imported, are available for consumers. Due to their lower cost and extended shelf-life, they are more frequently consumed than fresh fish. This study aimed to detect and quantify histamine levels in various canned fish and fish products in the Sri Lankan market. A total of 9 canned fish products (in brine, rapeseed oil, and sunflower oil) and 6 fish products (including tuna spread with mayonnaise and fish sauce) were analysed for histamine content. The samples included both imported and locally manufactured products within the same shelf-life. Histamine quantification was done using the HPLC-DAD system following 85% phosphate buffer solution and 15% acetonitrile with a C18 column. The correlation coefficient (R^2) was 0.9938 for the histamine calibration curve. For sample preparation, 5 g of paste was taken from the collected samples, while 1 mL was taken from the fish sauce samples. Methanol was used for histamine extraction from the prepared samples. Triplicates were done for histamine extraction from each sample. Results showed that histamine was detected in tuna chunks in sunflower oil (14.34±2.68 mg/kg). Histamine was detected in tuna spread with mayonnaise (309.76±1.05 mg/kg) at high concentrations exceeding the FDA maximum histamine concentration of 200 mg/kg for fish products. Histamine was not detected in fish sauce and canned fish products in brine and rapeseed oil. Histamine may be present in those products, below the detection limit of 0.5 mg/kg. Canned fish products contained a safe level of histamine (<100 mg/kg). This study highlights that even in canned fish products and fish products, whether they are produced according to good manufacturing practices, even histamine can be present in those products. The water activity and composition of mayonnaise, which includes ingredients such as eggs and oil, can serve as a growth medium for histamine producing bacteria. This may explain the detection of high histamine concentrations in tuna spread containing mayonnaise. However, consumption of large quantities of these products might pose health risks for histamine intolerant individuals with allergic reactions.

Keywords: *Canned fish, Fish products, Histamine, HPLC-DAD system, Sri Lanka*