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Histamine Detection in Mackerel (*Scomberomorus* Sp.) and its Products Derivatized with 9-Flourenilmethylchloroformate

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Abstract

Histamine is commonly present in food containing proteins, like in mackerel. Consuming fish is imperative for the improvement of human muscles. Nevertheless, some studies reported ingesting fish containing histamine more than 50 $mg \cdot kg^{-1}$ can cause toxicity. This study analyzed and determined the composition of histamine in mackerel and its products commonly consumed in Malaysia, especially on the East Coast of Malaysia. These included processed mackerel such as canned products, *satay* (skewed fish) and *keropok lekor* (fish cake/ cracker). Histamine analysis was performed using High Performance Liquid Chromatography (HPLC) equipped with a fluorescence detector. A derivatizing reaction was applied to increase the sensitivity of HPLC to histamine using 9-flourenilmethylchloroformate (FMOC-Cl). The chromatographic separation was achieved in 15 min. Method validation was in accordance to Commission Decision 657/2002/CE. The linear range was at 0.16 – 5.00 $\mu g \cdot mL^{-1}$ (histamine) with the LOD at 0.10 $\mu g \cdot mL^{-1}$ and LOQ at 0.30 $\mu g \cdot mL^{-1}$. Method applicability was checked on seven real samples involving raw, cooked, and dry products, yielding acceptable recovery.

Keywords: Histamine, Mackerel, HPLC, Validation, LOD, LOQ

Introduction

An increase in the number of food types and their products are produced and distributed for human consumption. Nevertheless, several problems still exist for many years in relation to consumers' health, such as heavy metals, usage of pesticides, and traces of toxic compounds such as biogenic amines that are commonly detected in fish [1] and fish products. Biogenic amines are simple nitrogen compounds that generally can be found in food and beverages containing protein such as fish, meat, cheese, milk, and others. The main biogenic amines present in these products are putrescine, tyramine, cadaverine, and histamine [2]. They are produced by amination and/or transamination of aldehydes and ketones. They can also be formed by decarboxylation of free amino acids (Fig. 1) during the degradation process of protein-based food and beverages involving specific bacteria such as *Lactobacillus, Pediococcus,* and *Leuconostoc* species. The determination of biogenic amines in fish is of great interest simply because of their toxicity besides being used as an indicator for quality [3] or freshness or even spoilage level of fish [4].