DEVELOPMENT AND VALIDATION OF A LC-MS/MS METHOD FOR THE DETERMINATION OF BIOGENIC AMINES IN TUNA FISH

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ABSTRACT

The presence of biogenic amines (BAs), which serve as indicators of both freshness and safety in fish and fishery items, is influenced by factors such as harvesting methods, handling procedures, and onboard operations. Among fish types, scombroid dark-meat fish like tuna are most commonly associated with histamine poisoning. Histamine, tyramine, putrescine, and cadaverine are the primary BAs detected in fish, formed through microbial decarboxylation of corresponding amino acids. This study presents a swift and cost-effective HILIC-MS/MS technique validated for quantifying putrescine, cadaverine, histamine, and tyramine in tuna samples. A straightforward sample preparation involving protein precipitation and analyte extraction using a solvent mixture of MeOH/H_2O 50/50, 0.1% Acetic Acid was employed prior to analysis. Accuracy ranged from 88.0% (cadaverine) to 102.7% (tyramine) intra-day and from 85.0% (cadaverine) to 99.8% (tyramine) inter-day. Precision varied from 0.4% (tyramine, putrescine) to 3.3% (histamine) intra-day and from 0.7% (tyramine) to 5.0% (cadaverine) inter-day. Limits of detection (LOD) and limits of quantification (LOQ) ranged from 0.0009 to 0.0940 mg/kg and from 0.0030 mg/kg to 0.3100 mg/kg, respectively, depending on the analyte. No concerning levels of biogenic amines were detected in the analyzed samples concerning potential toxic effects in foods. This proposed method holds promise for routine assessment of BAs in fish products.

KEYWORDS: LC-MS/MS, quality control, biogenic amines, fish products, foodborne intoxication