

Evaluation of histamine profile in *Thunnus thynnus* processed seafoods

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Keywords Histamine · Processed seafoods · *Thunnus thynnus*

Abbreviations

HIS histamine
MAO monoamine oxidase
PCA perchloric acid

Introduction

Prepared and processed tuna seafoods are gaining increasing interest from consumer and producers. As far as Scombridae are concerned one of the main safety problems is related to the possible presence of histamine, a biologically active amine produced from free histidine by decarboxylating histidine bacteria (Emborg and Dalgaard 2006). The aim of this study was to evaluate the histamine profile in innovative *Thunnus thynnus* raw and cooked processed seafoods.

Materials and methods

This study was carried out on processed seafoods obtained from *Thunnus thynnus* dorsal and ventral muscles. Three types of smoked products were prepared: two kinds of seasoned raw seafoods (salted meats and sausages), both traditionally smoked with wood, and one kind of cooked product, smoked with smoke flavouring (EF, Europrodotti S.p.A). The raw seasoned pieces of meat and the sausages were obtained from refrigerated fish and analyzed

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on days 11–18–25–32–39–46–67–81–95–109–123–137–151 from production. Two batches of cooked seafoods were obtained from frozen fish and analyzed on days 13–20–27–35–42–50–55–63–70–77–98 (1st batch) and days 14–41–28–35–42–50–57–86 (2nd batch) from production, respectively. The salted meats were divided into three groups according to their diameter: large (~9.5 cm), medium (~6.5 cm) and small (~4.5 cm). For the first group, muscles were cut into cubic pieces (size ~3 cm), salted with 20% NaCl brine mixed with 0.1% of smoke flavouring and cooked at 71°C. The muscles of the second group were cut into smaller pieces (size <3 cm), salted with 25% NaCl brine, smoked with 0.1% smoke flavouring and cooked at 69°C. An additional 1.5% of polyphosphates was added. The finished products were vacuum packed (HAFLIGER film type 145) and stored at + 3°C.

Histamine was extracted from fish muscle with 0.1 mol PCA, reacted with dansyl chloride and separated in a HPLC/FL system.

Results

Higher concentrations of histamine were found in the seasoned raw meat products of large (5.24 mg/kg) and medium (8.53 mg/kg) diameter. In products of small diameter a reduction of the initial level was observed. A gradual reduction of the histamine levels was also demonstrated in the raw sausages, which showed a concentration of 3.42 mg/kg at the final analysis.

The amine profile of the cooked products amine profiles showed differences between the two batches. In samples from first batch the histamine levels gradually decreased from the initial level of 50 mg/kg to the final value of 12.89 mg/kg.

In samples from second batch initial histamine levels of the cooked products from level of 14.03 mg/kg diminished to the final values of 11.04 mg/kg.

Discussion

Biogenic amine HIS is mainly produced by the enzymatic activity of decarboxylase positive bacteria, belonging to the endogenous and exogenous flora of fish products (Ben-Gigirey et al. 2000). Biological histamine activity is due to its vase-active property (Kerr et al. 2002). Tuna consumption can cause a histaminergic crisis in consumers showing a low detoxification threshold (allergic people) or in those with disorders of the intestinal enzyme system (MAO) involving detoxification, for different reasons such as cardiovascular and respiratory diseases, Crohn's disease or use of MAO inhibitor drugs (Auerswald et al. 2006).

Regulation CE/2073/05 established following acceptable histamine levels: 100–200 mg/kg in fresh Scombridae fish and 200–400 mg/kg in processed fish products, obtained from species with a high histidine content which had undergone an enzyme maturation treatment in brine. Evaluation of the histamine profile of raw and cooked processed seafoods demonstrated that the use of raw material of excellent quality, the implementation of good manufacturing practice and the monitoring of pH and NaCl and O₂ concentrations assured histamine levels always lower than the established ones. In particular, for raw seafoods, it is important to process the raw material rapidly to avoid conditions favorable for microbiological decarboxylase activity. In the cooked seafoods of the second batch the use of polyphosphates, the higher brine content and the cutting of tuna muscles into smaller pieces allowed rapid salt penetration and caused a reduction of the a_w and bacterial growth, thus producing lower histamine levels.

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