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HETEROCYCLIC AROMATIC AMINES FORMATION IN BARBECUED SARDINES (*SARDINA PILCHARDUS*) AND ATLANTIC SALMON (*SALMO SALAR*)

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The consumption of fish provides utilization of proteins of high biological value, certain minerals, and vitamins. Additionally, fish and fish oil are rich sources of omega-3 fatty acids. Sardines (*Sardina pilchardus*) and salmon (*Salmo salar*) are fish species rich in omega-3 PU-FAs. On the other hand, fish cooking can lead to undesirable modifications, such as the loss of nutritional value and formation of undesirable mutagenic and carcinogenic compounds such as heterocyclic aromatic amines (HAAs).

To date, about 20 carcinogenic/mutagenic HAAs have been isolated and identified in cooked foods. Grilling and barbecue are the most common methods for preparation of fatty fishes, and usually, requires high temperatures of cooking and HAAs are sometimes formed. Several studies show that charcoal-cooked meat presents higher amounts of these compounds. Concerning fish samples studies are scarce but indicate similar trend.

As HAAs are candidates in the aetiology of human cancer, the search for ways to minimise their intake by limiting their occurrence in cooked foods is very important. In the present study, we focused on conditions favouring the formation of HAAs during barbecue of sardines (*Sardina pilchardus*) and Atlantic salmon (*Salmo salar*) to varying degrees of doneness and grilling conditions was evaluated by HPLC-DAD/FLD. Additionally, the influence of charcoal and electric heat source on formation of HAAs in grilled salmon was compared.

Only polar HAAs have been determined in most food surveys, because apolar HAAs have been formed thought, exclusively, under extreme cooking conditions. PhIP is the most ubiquitous and abundant mutagenic HAA, and with MeIQx and DiMeIQx, they are the most predominant HAAs.

The presence of AαC, an apolar amine, in fish dishes prepared in a way that reflects normal household cooking, may be use as a marker of high temperatures in extreme conditions.

Despite present a relatively low mutagenic potential, the apolar amines, wich include AαC, revealed a moderate to high level of carcinogenic potential and is responsible for training a large number of aducts in the DNA of liver cells of rats. These amines can not therefore be considered of minor importance, for thermal amines, regarding the risk they pose to human health: They are, therefore, required further studies related to bioactivation, metabolism and the intake of HAAs, namely, resorting to the development of human biomarkers for these amines.

KEYWORDS: heterocyclic aromatic amines, sardines, salmon, barbecued, grilled.

COMBINED EFFECTS OF CHEMICAL DIP AND/OR EDIBLE COATING AND/OR CONTROLLED ATMOSPHERE ON QUALITY OF FRESH-CUT BANANA

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The combined effect of chemical dip and/or edible coating and/ or controlled atmosphere on quality of fresh-cut banana slices was investigated. Three different solution formulations were tested for the chemical dip: combinations of 1% or 2% (w/v) calcium chloride with 0.5% or 0.75% (w/v) ascorbic acid and combined with 0.75% (w/v) cysteine; and five different coatings were used based on: alginate, carrageenan, pectin, carboxymethyl cellulose, or chitosan. The controlled atmosphere composition was 3% O₂ + 10% CO₂. Physico-chemical and microbiological qualities were evaluated during five days of storage at 5°C. Dip with 1% (w/v) calcium chloride, 0.75% (w/v) ascorbic acid and 0.75% (w/v) cysteine combined with CA treatment contributed better to maintain colour, firmness, pH, TA and TSS values and total phenolic content, and to prevent from weight loss and from increase of polyphenol oxidase activity of fresh-cut banana during five days of storage. Microbial analysis showed that minimally processed bananas were within the acceptable limits during five days of storage at 5°C.

KEYWORDS: fresh-cut banana, chemical dip, edible coating, controlled atmosphere.