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Original Article

Effect of Different Salt Concentrations on Mineral Content of the Fish *(Hydrocynus Spp.)*

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ABSTRACT

This piece of work was directed towards the study to compare the effect of the different salt concentrations on the mineral content in both fresh fish and fassiekh (salted fish). It was observed that, the minerals contents of the fresh fish (Potassium, Sodium, Iodine, Phosphorous, Chlorine, Zink, Copper and Iron) were significantly different in different salt concentration while Calcium and Magnesium concentration were not significant.
Keywords: Mineral content, Hydrocynus sp., Fassiekh, Salt

INTRODUCTION

Fish and fishery products contain most of the 90 naturally occurring element the greater proportion of their body consist of carbon, hydrogen, nitrogen, oxygen, and sulfur in addition to six elements, i.e. Calcium, magnesium, phosphorus, sodium, potassium and chlorine [1]. Fourteen trace elements are now considered essential for human and animal life Most of these elements are detected in fish and shellfish which inevitably supply essential macro and trace elements to the human diet [1].

Fish meat is regarded as valuable source of calcium and phosphorus in particular but also of iron, copper and selenium. And salt water fish had high content of iodine. Murray et al. [2] reported some minerals constituents of fish muscle in mg /100g as sodium 30-134 potassium 19-50 calcium 19-88 magnesium 54-452 and phosphorus 68-550 in aquaculture fish. The content of minerals is considered to reflect the composition of the corresponding component in the fish feed [3].

The concentration of minerals in fish and fishery products is influenced by a number of factors such as seasonal and biological differences species, size, age, sex and sexual maturity [4]. Van Veen [5] stated that fish sauces contain sufficient calcium salts to be rather important source of mineral if eaten regulary and in sufficient quantities. The main functions of essential minerals include skeletal structure, maintenance of colloidal system and regulation of acid–base equilibrium. Minerals also constitute important components of hormones, enzymes and enzyme activators [6].

Calcium has important physiological and biochemical roles in humans. Besides its vital role in bone structure, dietary calcium plays an integral role in the maintenance of normal blood pressure, and adequate calcium intake may help reduce this risk of high blood pressure [7].

Copper is required for iron utilization, and as a cofactor for enzymes involved in glucose metabolism and the synthesis of hemoglobin, connective tissue and phospholipids. Numerous studies have focused on copper metabolism in fish and on toxic effects related to heavy metal pollution in the aquatic environment [8]. Global population increase and industrial development have led to an increase in the contamination of the marine environment by metals over the last three decades [9]. The main objective of this study to determine the mineral content of Hydrocynus spp fish treated with different salt concentration.

MATERIALS AND METHODS

The elements zinc, magnesium, copper, and iron were determined by (perkin Elmer A (Analyst 700) Atomic Absorption Spectrophotometer following the method described by the manufacture, the elements

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(calcium, sodium, and potassium were determined by the flame photometer (CORNING-400) Spectrophotometer. While Phosphorus, iodine and Chlorine were determined using spectrophotometer (UNICAM-8625-UV/VIS-sepctrophometer). Data of mineral content of studied fish were analyzed by one – way ANOVA procedures and SPSS version 14.

RESULTS

The results of this study shed light on fish mineral content (Hydrocynus spp.) salting, in view of its high preference when prepared as fermented product. The studied fish product parameters analyzed, investigated to determine mineral content and recorded in Table 1.

The result of investigation on (Hydrocynus spp.) meat indicated that the mineral content resulting from salting with different level of salt concentration on studied fish significant difference (p> 0.01) in all parameters except in Calcium and Magnesium.

Table 1. Mineral content of studied fish (Hydrocynus spp.)

Parameters \ Salt (%)	0	15	20	25	Significance
Calcium	340.5 ±0.70	340.5 ±0.70	338.5±0.70	338.5±0.70	NS
Potassium	412.5±3.53^{a}	408 ±000^{a}	407.5±0.70^{a}	400.5±0.70^{b}	**
Sodium	123 ±2.82^{c}	520 ±1.41^{b}	524 ±2.12^{ab}	528 ±0.70^{a}	**
Iodine	33.5 ±2.12^{c}	38.05 ±0.90^{bc}	42 ±2.82 ^{ab}	47 ±1.41^{a}	**
Phosphorus	68.0 ±2.12^{c}	69.3 ±0.49^{b}	70.4 ±0.70^{b}	72.4 ±0.63^{a}	**
Chlorine	138.0 ±1.41^{d}	837.5 ±23.33^{c}	936.5±6.36^{b}	999.5±2.12^{a}	**
Zinc	20.05±0.95^{b}	19.7 ±0.29^{b}	20.9±00^{a}	21.04 ±1.0^{a}	**
Copper	29.9±0.21^{a}	28.3 ±0.49^{b}	28.4±0.42^{b}	27.9 ±000^{b}	**
Iron	49.4±0.63^{a}	47.4 ±0.56^{b}	45.8±0.42^{c}	44.5±0.49^{c}	**
Magnesium	76.4±0.56	76.3 ±0.42	75.7±0.42	75.1±0.14	NS

$^{a, b, c, d}$ means within the same row followed by the different superscript are significantly different (P<0.01). **: significant at (P<0.01); NS: not significant

DISCUSSION

Table1 shows the mineral content of fresh and fassiekh (15% 20%and 25%) mg \100 gm expressed on wet matter basis: The Calcium content of fresh fish and salted fish (15%, 20%, and 25%) under investigation was 340.5 and 340.5, 338, and 338mg/100g respectively. This result is in the normal range that reported by Martı´nez-Valverde et al. [10] who found that the calcium content about 351mg/100g in flesh and bone in blue whittling (Micromessistius poutassou).Salting and fermentation treatment not affected the calcium content. The sodium content of fresh fish and salted fish (15%, 20%, and 25%) under investigation was 123 and 520, 524, and 528mg/100g respectively. This result is in the normal range that reported by Glucas et al. [11] who found that the sodium content is in the range of 120-400 mg/100g. And agree with the same person in the effect of salting in sodium content. Salting treatment increased significantly (P< 0.01) the sodium content due to added sodium chloride in processing to obtain the product.

The potassium content of fresh fish and salted fish (15%, 20%, and 25%) under investigation were 412.5 and 408, 407.5, 400.5 mg/100g respectively. This result is in the normal rang that reported by Martı´nez-Valverde et al. [10] who found the potassium content in flesh and bone of hake (Merluccius merluccius) about 470mg/100g. Salting and fermentation were decreased the potassium level significantly at (P<0.01). And this result agree with [1] who reported that, washing of fish reduce the potassium content.

The iodine content of fresh fish and salted fish (15%, 20%, and 25%) under investigation were 33.5 and 38, 42 and 47mg/100g respectively. This result is lower than the range that reported by Glucas et al. [11] who found that the iodine content is in range (0-2.73) mg/100gm. Salting and fermentation increased the iodine value significantly at (P< 0.01) may be due to the adding of salt that may include this mineral.

The phosphorus content of fresh fish and salted fish (15%, 20%, 25%) under investigation were 68 and 69.3, 70.4, and, 72.4 mg/100g respectively. This result is lower than that reported by Martı´nez-Valverde et al. [10] who found the phosphorus content in flesh and bone of hake (Merluccius merluccius) about 731mg/100g. Salting and fermentation treatments increased significantly (P< 0.01) the phosphorus content in the product. This finding Agree with Ruiter [1] who reported that, the salt use in surimi production increase phosphorus content of the fish.

The Chlorine content of fresh fish and salted fish (15%, 20% and 25%) under investigation were 138 and 837, 936, 999.5 mg/100g respectively. Salting and fermentation treatment increased significantly at (P<0.01) the Chlorine content in the product that may be result from adding sodium chloride.

The zinc content of fresh fish and salted fish (15%, 20%, and 25%) under investigation were 20.05 and 19.7, 20.9, 21.4mg/100g respectively. the result is higher than that reported by Mormede et al. [12] who reported that the zinc concentrations of fish muscle from 2.62 to 5.53 mg/kg for fish from the North East Atlantic. Salting and fermentation treatments as increased significantly (P< 0.01) the zinc content in the product.

The copper content of fresh fish and salted fish (15%, 20%, and 25%) under investigation were 29.9 and 28.3, 28.4, and 27.9 mg/100g respectively. This result is higher than that reported by [12] who founds that the copper concentrations of fish muscle between 0.10 and 0.83 mg/kg for fish from the North East Atlantic. Salting and fermentation treatments were affected copper value and decreased significantly at (P< 0.01).

The iron content of fresh fish and salted fish (15%, 20%, and 25%) under investigation were 49.4and 47.4, 45.8, 44.5 mg/100g respectively. This result is higher than [13] who found that the iron content between 7.16–16.5 mg kg for muscles and 48.1–384 mg kg-1 for livers of fish from Tuzla Lagoon, Mediterranean sea region. Salting and fermentation treatments decrease significantly at (P< 0.01) the iron content in the product.

The magnesium content of fresh fish and salted fish (15%, 20%, and 25%) under investigation were 76.4 and 76.3, 75.7, 75.1 mg/100g respectively. This result is in the normal range that reported by Martı´nez-Valverde et al. [14] who determined the Magnesium value of (hake) fish as 385 mg/kg. Salting and fermentation treatments were not affected magnesium value significantly at (P< 0.01).

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