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EFFECT OF DIFFERENT SALT CONCENTRATIONS ON CHEMICAL COMPOSITION OF THE FISH *hydrocynus spp.*

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ABSTRACT: *This piece of work was directed towards the study of the proximate chemical composition to compare the effect of the different salt concentrations on the nutritive value of fish. In both fresh fish and fassiek (salted fish). Proximate analysis targeted the determination of moisture%, protein%, ash%, fat and pH. Contents were determined by wet samples. The proximate composition of the fresh samples was 70.9%, 24.2%, 3.8%, 1.2% and 7.05 for moisture, protein, fat, ash and pH respectively. The proximate composition of fassiekh (moisture, protein, fat, ash and pH) for 15% salt was 60.3%, 21.7%, 3.4%, 10.5% and 6.6 respectively. And for 20% salt was 56.7%, 19.2%, 3.2%, 12.9% and 6.0 respectively. And for 25% salt was 52.2%, 17.6%, 1.9%, 14.1%, and 5.8 respectively. As for the proximate composition of fassiekh it is clearly observed that all the studied parameters are significantly different in fresh treated samples. Variations appeared to be due to the interaction of the salting treatment.*

ORIGINAL ARTICLE

Key words: *Proximate, Hydrocynus spp., Chemical composition, Salt*

INTRODUCTION

Fish and fishery products are highly nutritious, in addition to the high percentages of animal protein, they provide several other nutrients such as vitamins A and B especially in the liver, and E and K vitamins, and they are good sources of some minerals like calcium, phosphorus and iron (Lunven, 1982). The global contribution of fish as a source of protein is high, ranging from 10% to 15% of the human food basket across the world (Wilson, *et al,* 2007). Despite the fact that the nutritional value of fish is well known, it nevertheless plays only a limited role in the diet of many countries. Therefore, it seems appropriate to find new processing methods for this compared valuable raw material so as to increase consumer interest. Compared to mammalian meat, fish meat has more water and less connective tissue, which contains very little elastin (Kolakowska, 2001). In the Sudan fish is considered a major source of protein and energy for many communities, especially among the Nilotic tribes of south and some of the Nubian ethnic groups of the far North (Jackson, 1923).

In the Sudan, nearly 70% of the total fish landings are consumed fresh, the rest is cured either by salting, fermentation or sun drying very little of the local fish supply is smoked, except in the southern Sudan where smoked and very dry fermented fish products are very popular among the local community (FAO, 1992).

Salting is a traditional method of processing fish in many countries of the world. Its often used in combination with drying and smoking salting the fish removes water and lowers the water activity (water available for the support of microbial growth which causes the spoilage) if fish is placed in a solution of salt (brine) stronger than that in the tissues, water will pass from the tissues in to the brine until the strength of the two solution is equal. This phenomenon is known as osmosis. As water passes in to the brine salt will pass in to the tissues. Concentration of (6-10%) salt in the tissues will prevent the action of most spoilage bacteria (Clucas and ward 1996). The objective of this research work was to study the effect of fermentation and salting on chemical composition of *alkass* fish.

MATERIALS AND METHODS

Materials

Fresh Hydrocynus spp. were collected from EL Mawrada fish market. A total of18 kg each fish have about 150-200g were preserved in iced container and transferred to the fisheries laboratory in Sudan university Department of fisheries and wildlife science for *Hydrocynus spp).*

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Preparing and Processing

Random samples were chosen to do the chemical analysis of fresh fish. Preparing fassiekh takes place as follows: first fresh fishes were individually gutted and washed by tap water and placed on a plastic dishes to dry and then weighted on sensitive balance (FEJ-2000B). The addition of salt is made relevant to weight of the fish, fish were divided in to three groups each of 6 kg, Then subjected to different salt concentrations (15%, 20%, and 25%). Each fish was salted separately, with coarsely ground salt, applied all over the body especially on the gill area and the cavity of the gutted specimens. Then the fish were stacked in layers separated by layers of salt on plastic container and covered with a heavy cover. Random sample were taken on the 10th day for the chemical analysis for each group.

Methods

Proximate composition analysis: Proximate composition analysis was determined using the method AOAC, 1984. The moisture content of fresh and salted fish was determined by drying the meat in at oven 105c until a constant weight was obtained, crude protein content was calculated by converting the nitrogen content determined by Kjeldahl's method (6.25 _ N) Fat was determined using the Soxhlet system Ash content was determined by dry ashing in afurnace oven at 525 _C for 24 h.

pH Measurement: The PH was determined with a glass electrode of a newly calibrated Digital PH meter (JENWAY-3015ph meter) at room temperature. One gram of fresh and salted fish were blended with 10 ml distilled water, and stirred well with a magnetic stirrer, then centrifuged well, and supernatant was taken for measurement

Statistical analysis

Statistical analysis was performed with the SPSS software. by analysis of variance. Significance was established at $P<0.01$

RESULTS

This study was carried out to evaluate the effect of different salt concentration level (15%, 20%, and 25%) on the nutritive value of hydrocynus spp. (moisture, protein, fat, ash and the ph.). The result obtained was presented in Table 1.

Table 1 - The effect of salt concentration on the proximate composition of *hydrocynus spp.*

Parameters / Salt (%)	Moisture (%)	Protein (%)	Fat (%)	Ash (%)	PH
0	70.9 ±1.2^{a}	24.2 ±0.21^{a}	3.8 ±0.95^{a}	1.2 ±0.95^{a}	7.05± 0.95^{a}
15	60.3 ±0.77^{b}	21.7±0.49^{b}	3.4 ±0.35^{ab}	10.5 ±0.70^{b}	6.6 ±0.21^{b}
20	56.7 ±1.9^{c}	19.2 ±0.56^{c}	3.2 ±0.28^{b}	12.9 ±0.28^{c}	6.0 ±0.95^{c}
25	52.2±0.19^{d}	17.6 ±0.35^{d}	1.9 ±1.0^{c}	14.1 ±0.14^{d}	5.8 ±0.95^{c}
Significance	**	**	**	**	**

** = P<0.01

DISCUSSION

Proximate composition

The chemical composition of fish is an important aspect in fish processing as influences both the keeping quality and the technological characteristics of the fish. It is directly related to the moisture, protein, fat and ash contents of the muscle (Huss, 1988). These parameters were taken in consideration during the comparative study of nutritive value of fresh and salted fish products beside mineral contents. The data presented in Table 1 shows the proximate composition of raw fish and *Fassiekh*.

Moisture content

It's generally understood that microorganisms need water in an available form to grow in food products. The control of moisture content in foods is one of the oldest exploited preservation strategies. Food microbiologists generally describe the water requirements of microorganisms in terms of the water activity (aw) of the food or environment. Water activity is defined as the ratio of water vapor pressure of the food substrate to the vapor pressure of pure water at the same temperature (Jay, 2000).

The moisture content of raw fish in fresh basis was 70.9%, while *fassiekh* with different concentrations of salt (15%, 20%, and 25%) was 60.3%, 56.7%, 52.2% respectively. The fresh fish moisture content was agree with Remijo (1992) who found that the moisture content of fresh *Labeo spp.* fish was (70.4-71.2%), and lower than the result reported by Mohamed (2008)who found that the moisture content of fresh *hydrocynus spp* was (72.9- 74.4) and agree with Ahmed (2006) who found that the moisture content of fresh fassiekh fish species is (81.9-72.9).

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Salting treatment decreased significantly at (P<0.05)the moisture content of fish due to adding coarse salt Which results to be drawn out of the fish tissues causing slight dehydration (Clucas and Ward, 1996).

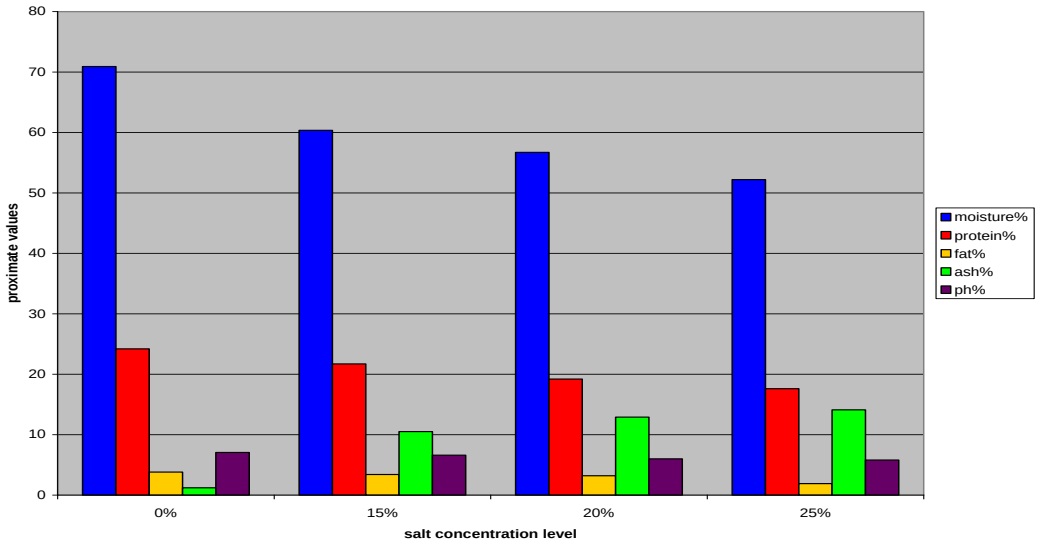

Figure 1 - The effect of different salt concentration on proximate Composition of *Hydrocynus spp.*

Protein content

With regard to the data shown in Table1 the protein content was 24.2 % in fresh fish, while in fassiekh salted with different percentages (15%, 20%, and 25%) was 21.7%, 19.2%, 17.6% respectively. This agrees with the findings of Clucas and Ward, 1996), who reported that flesh from healthy fish contained (15-24%) protein. This result agree with Ahmed (2006) who found that protein content of fresh and salted fish is as flows (20.5-18.9%) and (19.57-16.54%). And the result is not agree with Mohamed (2008) who found that adding of salt is result in increased the protein content of the fish .The decrease of protein level was found to be significantly, proportional to the salting treatment, (P<0.05), as this is due to the protein being dissolved in the brine, (Clucas and Ward, 1996).

Fat content

As illustrated in Table 1 it is clear that fat content of fresh fish was 3.8% while in salted fish (15%, 20%, 25%) was 3.4%, 3.2%, and 1.9%, respectively, the result of fat content in fresh fish is lower than the result reported by Mohamed (2008) who found that the fresh *hydrocynus spp* has 4.9% fat level. and lower than the result range (6.68%) which was given by Omer (1984) for dry *hydrocynus spp*. Also the result is higher than that presented by Ahmed (2006) who found that the fat content was (1.4-2.2%) and (1.62-0.88%) for fresh and salted fish respectively. There was significant difference in fat contents among different salt concentration level and the fresh fish, this variation might be due to loss of fat with excluded fluids with osmotic effect.

Ash content

The ash of fresh fish was (1.2%) and salted fish (15%, 20%, and 25%) under investigation was (10.5%, 12.9%, and 14.1%) respectively. The ash content of fresh and salted fish is on the normal range that recorded by Ahmed (2006) who reported that the ash contents was (1.1%-1.7%) on fresh fish and (10.21%-13.86%) on *fassiekh* using *Hydrocynus spp*. Also there was significant difference at (P<0.05) in ash content among different salt concentration level.

pH

The highest pH was found for fresh fish is (7.05), while fassiekh (15%, 20%, 25%) had the lowers pH value is (6.6, 6.0, and 5.8) respectively .This result is higher than that reported by (Riebroy, et *al* 2008), who found that the pH in Thai-fermented fish mince for fresh fish is (6.3), while fermented is (4.6). Jessen (1995) reported that LAB (*Lactobacillus or Pediococcus*) and *Micrococcaceae (Staphylococusi or Micrococcus)* are usually used for sausage fermentation. Inoculation with *lactobacilli* resulted in a rapid pH decrease. This result is in the normal ranges reported by Ahmed (2006), Agab and Shafie (1989), Eltom (1989).

CONCLUSIONS

We conclude from this study that: Due to the use of salt, the growth of pathogenic microorganisms was controlled. Adding of salt result in lowering the protein in the products. Thus the best salt percentage is considered to be 15% (by weight).

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Recommendations

More researches are needed in the field of the Sudanese fish preservation so as to overcome the problem of post–harvest losses, and to maximize the utilization of our rich fisheries resources. Future detailed studies concerning the improvement of the storage condition of the preserved fishery products are needed so as to increase the shelf life of the products. The serious need for scientific standards and specifications concerning fresh fish nutritive value and suitability of different preservation methods to different fish species according to their meat chemical composition, and the determination of the maximum storage time of the product to secure nutritional benefits and prevent food related problems.

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