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Effect of Salting and Frozen Storage on Nutrient Composition of Smoke Dried Synodontis Membrancea

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Abstract: *The proximate composition of samples of smoke dried Synodontis membranacea subjected to different preservative methods of salting and frozen. Frozen involves leaving the samples in a functional deep freezer which was supplied at -4^{0}C constant electricity for seven days, while salting involved the immersions of the samples in saturated salt solution for 24 hours. The protein and fat contents for frozen samples were lowered, as thus10.04±0.13 and 20.14±0.08 respectively, compared with those obtained for salted samples (12.41±0.08 and15.46±0.12).But the frozen samples had the higher moisture content of 59.21±0.13. Highly significant difference (P<0.001) existed among the different preservative method in terms of proximate composition.*

Keywords: *Proximate composition; preservative; Synodontis membranacea.*

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I. Introduction

Fish constitutes a very important component of diet for many people and often provides the much needed nutrient not provided in cereal-based diet. According to FAO (2000) and Gandotra et al (2012), fish provides 20% of animal protein intake to about 2.6 billion people globally and at least 50% of animal protein intake for over 40 million in Asia and Africa. Fish demand is increasing as a result of the increasing world population, higher living standards, and health benefits of consuming fish and the good overall image of fish among consumers (Cahu et al., 2004). Fish and fish products are highly nutritious with protein content of 15 to 20% and are particularly efficient in supplementing the cereal and tuber diets widely consumed in Africa (Fagbenro et al., 2005). Olumu (1995) and Ojutiku (2009) also highlighted that fish is rich in protein (amino acids) composition very well suited for human dietary requirements comparing favorably to eggs, milk and meat in the nutritional value of its protein. In addition, fish contain absorbable dietary minerals (Bruhiyan et al., 1993). The constitute about 60% of the total protein intake in adult especially in rural areas (Adeleye, 1993). In Nigeria, fish is eaten cooked, and preserved or processed (smoked) form a much-cherished delicacy that cuts across socio-economic, age, religious and educational barriers (Adebayo-Tayo, et al.,2008), it is also a rich source of protein commonly consumed due to the higher cost of meat and other sources of animal protein (Omolara and Omotayo, 2009). Locally, fish spoilage has been known to be influenced to a large extent by high ambient temperature, considerable distances from landing site as well as poor and inadequate infrastructure for post-harvest, harvest processing and landing. Smoking, salting and freezing are among the commonest methods used for fish preservation in Nigeria. However, fish is highly perishable because it provides favourable medium for growth of micro-organism after death (Aliya et al 2012, Ojutiku et al 2009, Oparaku and Mgbenka 2013). It has become increasingly important that fish once caught is fully and efficiently utilized to avoid deterioration. An estimate of 40% post-harvest losses of total fish landings have been reported in Nigeria (Akande, 1996). Thus, preserving food and other perishable products like fish and meat generally involves process that impedes growth of micro-organisms either by addition of growth inhibiting ingredients or adjusting storage conditions by freezing or drying (Okonta and Ekelemu, 2005, Igbodaro and Abolaga, 2010). To prolong the shelf life of fish, it is preserved by many processes including sun-drying, salting, freezing and smoking among others. Dried fish is a major component of harvested fish raised in many countries including Nigeria. About 23-30% of the world fish caught is consumed in the dried, salted, smoked form or combination of these processes (Aliya et al 2012). Some of these processes, though important for preservation have various effects on the physical and nutritional quality of fish because it has been observed that different processing and drying methods have different effects on the nutritional composition of fish (Oparaku and Egbenka 2012). However, the acceptability of smoked fish depends on the types of wood used. According to Okolor et al (2007), hardwood is preferred because it has higher hemi-cellulose content compared to soft word.Synodontismembranacea is an important good taste apart

from Clarias spp. The study is aimed at examining the effect of salting and frozen on nutrient composition of smoke dried Synodontismembranacea.

II. Material and Methods

Samples of Synodontismembranacea were purchased from Fakun Fishing Village area of Niger state and were transported to the Fish Biology Laboratory of Federal College of Freshwater Fisheries Technology, New Bussa, Niger State Nigeria. The ten (10) were carefully sorted out and rinsed in an ionized water to ensure that attached residue were got rid-off before subjecting them to the various processing procedures. Five samples each were subjected to salting and frozen storage. Salting was carried out by immersing the samples in 80% salt for 24 hours before they were placed on the smoking kiln using Chorkor Banda for twelve (12) hours at a temperature of 70^0C, while freezing was carried out by storing the samples in a functional deep freezer (Thermacool) for seven (7) days at -4^0C, and there after it was also smoked using Chokor Banda. The processed samples were oven dried for 48 hours at 85-90^0C to constant weight before grinding them with a Kenwood blender into a powder form. The grounded samples were kept in labeled dried plastic containers as A (Salted) and B (Frozen) prior to analysis at the Chemistry Laboratory of National Institute of Freshwater Fisheries Research, New Bussa, Niger State. Proximate analysis of the samples was done according to the methods of AOAC (2000).Nitrogen was determined by the micro-kehdjal method as described by Pearson and the percentage to crude protein by multiplying 6.25. The Crude Protein, Crude Ash and Crude Fats were also determined. The result of the proximate analysis was the subjected to one way ANOVA(using SPSS17).

III. Results

The proximate composition of salted and frozen Synodontismembranacea is presented in Table 1. The moisture content (%) ranged from $59.21^a \pm 0.13$ for frozen samples and $21.24^b \pm 0.17$ for the salted samples. The protein content (%) showed a slight range of variation between $12.41^a \pm 0.08$ for salted samples and $10.04^b \pm 0.13$ frozen samples. Fat content (%) was the highest in fish subjected to frozen value of $20.14^a \pm 0.08$. Ash content was of higher percentage (%) in frozen samples with salted samples with value of $28.32^a \pm 0.31$ compared to frozen samples.

TABLE 1: Proximate composition of salted and frozen Synodontismembranacea

Parameters (%)				
Treatment	Moisture	Protein	Fat	Ash
Salted	$21.24^b \pm 0.17$	$12.41^a \pm 0.08$	$15.46^b \pm 0.12$	$28.32^a \pm 0.31$
Frozen	$59.21^a \pm 0.13$	$10.04^b \pm 0.13$	$20.14^a \pm 0.08$	$18.41^b \pm 0.10$

Mean with different superscript are significantly different ($p<0.01$)

IV. Discussion

The processing methods, salting and frozen storage altered the percentage fat and protein of the Synodontismembranacea. The vital nutrients of fishes have been known to depend largely on the methods of storage. Ojewoleetal. (2003) reported that processing methods and storage may have accounted for the differences observed in composition and gross energy content of all test samples. Although freezing as a common practice in the meat and fishing industry, has been known to preserve the quality for an extended time, and offer several advantages such as minimum deterioration in product, colour, flavor and texture (Obuz and Dikeman, 2003). In this study frozen storage reduced both the percentage protein and fat decreased with frozen storage (Omotosho and Olu, 1995, Kamal et al.,1996, and Arannilewa et al 2005). This reduction in percentage protein is explained by (De Reay 1993), while reduction in percentage fat is associated with oxidation of the fat (Josephson and Lindsay, 1989).Proximate composition of fish involved the determination of moisture, protein, fat and ash content. Fish protein is a high quality protein that is easily digestible and fish diets reduce levels of cholesterol in the blood, thereby reducing risk of heart disease. Shearer (1994) and Morris (2001) stated that protein and ash content do not vary as oftenas lipid, since it is not necessarily impacted by diet but mainly by species type, genetic characteristics and size. Frozen samples had the highest moisture content of $59.21^a \pm 0.13$ compared with the salted samples with lowest moisture content with the $21.24^b \pm 0.17$. The low value obtained from the salted samples could be attributed to osmotic effect which exudes moisture from the fish tissue. Frozen storage recorded the least protein and ash contents. The low protein content in frozen samples are in agreement with the findings of Arrannilewa et al, (2005 and Saliu (2008).The low fat content could be as a result of

oxidative process taken place during frozen storage. There were high significant differences among the different preservative methods ($P<0.05$) in terms of the proximate composition analysis. Based on the proximate composition of the (Synodontismembranancea), salting is suggested as the best preservative method over frozen. It gave the best desirable preservative attributes of low moisture content, high organic matter, moderate lipid content and high protein content. The result also shows that salted Synodontismembranacea are nutritionally superior to frozen ones. Salting is comparatively cheaper, easily adaptable and readily available in Nigeria.
Conclusion and Recommendation This study shows that there exist significant difference in the nutritional composition of fish using different method of preservation further study need to be carried out to examine effect of other methods of preservation on the nutritional composition of fish.

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