PROXIMATE COMPOSITION OF *Pseudotolithus elongatus* SUBJECTED TO DIFFERENT PROCESSING TECHNIQUES

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ABSTRACT

The changes that occur on proximate composition of some common fish processing methods used in Nigeria were studied in order to determine the nutritional content of the processed products. Traditional (smoke drying and sun drying) and modern (electrical oven drying) methods of processing were used to process Pseudotolithus elongatus and the results were compared with the fresh sample to determine the changes that occur during processing. The results for the fresh sample of P. elongatus were 79.50%, 1.50%, 0.8% and 18.2% for moisture, ash, lipid and protein. For the processed products, the moisture content for smoke-dried, sun-dried, salt sun-dried and oven-dried fish were 27.00%, 21.83%, 19.50% and 20.17% . Oven dried had the highest protein content (69.87%) while salt sun-dried had the lowest (54.90%). Lipid content was highest in sun-dried (6.6%) and lowest in smoke-dried (4.6%). Correlation between smoke-dried and sun-dried were $r^2 = 0.99$, smoke-dried and oven-dried were $r^2 = 0.98$ and smoke-dried and salt sun-dried were $r^2 = 0.98$. There was no correlation between the fresh and the processed P.elongatus. The

present findings revealed that processing affect the nutritional composition of fish.

Keywords: Processed products, preservation, nutritional content

INTRODUCTION

Fish constitute a very important component of the diet for many people and often provides the much needed nutrient that is not provided in cereal based diets (Clucas and Sutcliffe, 1981). It was reported by Teutscher (1990); Saisithi (1994) that it provides between 30% and 80% of the total animal protein intake of the coastal people of West Africa. Additionally, Olomu, (1995); Kreuzer and Heen (1962); Waterman (1976) have also highlighted that fish is rich in protein with amino acid composition very well suited to human dietary requirements, comparing favourably with egg, milk and meat in the nutritional value of its protein.

Fish is however susceptible to damage as soon as it harvested. Some factors responsible for this include the prevailing high temperatures in Nigeria and the facilities for processing, storing and distributing the fish caught that are frequently inadequate or non-existent in most cases. There is therefore enormous waste through spoilage of both fresh and dried fish (UNIFEM 1988; FAO 1981; and Rawson 1996). Preservation of fish therefore generally slows down spoilage. Preservation methods are applied with an intention to making the fish safer and extend its shelf-life (Cihazala 1994)

Preservation methods such as canning and freezing are technologies that are hardly used in the artisanal sub-sector, basically due to cost and non-availability of equipment and cold storage system (Eyabi-Eyabi, 1998). The methods commonly

used are the traditional techniques such as salting/brining, sun-drying and smoking, which also increase fish availability to the consumers (Abolagba *et al*; 1996). The heat and dryness associated with hot smoking reduces the water activity of the food (fish) thereby limiting microorganisms, a prerequisite for spoilage (Abolagba and Osifo, 2004).

The smoking of fish has the objectives of preservation basically due to dehydration, high temperature of smoking (50-180⁰C), the preservative effects of smoke components (phenols, aldehydes, ketones, organic acids e.t.c) and for purpose of product development due to changes in organoleptic, nutritional, chemical and physical properties during processing.

The drying of fish sometimes accompanied by salting prior to drying involves the removal of moisture and other volatile (dehydration) and the introduction of salt until the attainment of the right texture, flavor and colour. Preservation is through moisture removal and the presence of salt which at the right level inhibits chemical, microbial and enzymatic activities and also attack by biological agents.

This study is essential because about seventy-five percent of artisanal catch and twenty percent of industrial catch is handled smoked/dried and distributed traditionally and that there is inadequate information relating to losses due to traditional handling and processing of *P.elongatus*.

The study is aimed at determining the chemical composition of *P. elongatus* and how it changes during processing. It is also with a view to provide nutritional data for dietary planning.

MATERIALS AND METHODS

SAMPLING

Fresh fish samples were purchased from the artisanal fisherman at Makoko fish market Lagos. They were transported aseptically in an insulated ice bag to the Nigerian Institute for Oceanography and Marine Research Victoria Island Lagos. They were smoked using traditional oven

and electrical oven, dried with salt and without salt in abroad day sunlight. The processed samples were taken to the Nigerian Institute for Oceanography and Marine Research laboratory for analysis.

Chemical Analysis

Changes in proximate composition of fish due to processing

Proximate analyses were carried out in triplicate determination on the samples after dressing before and after processing where analysis were carried out on meat only. These analyses included the following: moisture content, total lipid, crude protein and ash. The moisture content was estimated by drying samples to constant weight at 103±2⁰C using the oven dry method (AOAC, 1994). Lipid determination was carried out using the modified Bligh and Dyer procedure (AOAC, 1994) for the wet sample while the Soxhlet extraction method was used for the processed method. The ash content of the fish was determined by igniting the sample at 550⁰C for 5-6 hours until the sample was completely free from carbon particles in a carbolite Sheffield LMF3 muffle furnace while the total nitrogen was determined by the Kjeldahl method as described by Vlieg, 1984 and a factor of 6.25 was used for converting the total nitrogen to crude protein content of the fish sample.

Statistical analysis: Pearson's correlation analysis was carried on all observation.

RESULTS

The result of the proximate composition as shown in table 1 showed that the fresh sample of *P.elongatus* had 79.50% moisture, 1.5% ash, 0.8% lipid and 18.20% protein. For the processed sample the highest protein was found in oven-dried (69.87%) and lowest in salt sun-dried (54.90%). A strong correlation between the processed *P. elongatus*, smoked and sun-dried were $r^2 = 0.99$, smoked and oven-dried were $r^2 = 0.98$ and smoked and salt sun-dried were $r^2 = 0.98$. There was no

correlation between the fresh and the processed *P. elongatus*.

Table 1: Proximate composition of fresh and processed *P. elongatus*

	Moisture (%)	Ash (%)	Lipid (%)	Protein (%)
Fresh	79.50	1.50	0.80	18.20
Smoke-dried	27.00	5.33	4.60	63.07
Sun-dried	21.83	4.83	6.60	66.74
Oven-dried	20.17	5.10	4.86	69.87
Salt sun-dried	19.50	10.75	5.82	54.90

DISCUSSION

The moisture, lipid and protein content of the fresh *P. elongatus* showed a high moisture content (79.50%) low lipid (0.80%) and protein (18.25%) content as compared to the processed fish sample. The fish belonged to high-protein (15-20%) low oil category. It contained lower calorie content per unit of protein than do fatty fish, meats or poultry, and an ideal source of animal protein for use in controlling diets. Fishes with lipid content below 5% are considered lean (Stansby, 1982 & Ackman, 1989) and hence *P. elongatus*. The lipid content also falls within the range (0.5-5%) as previously detected in fish (Mendez et al., 1996). The high tissue protein content may result from the equally high protein content of their diets (fish items; crustaceans, mollusks, algae and diatoms). Moisture content for the fresh sample was within the range as reported by (Gallagher *et al*, 1991) and according to FAO 1999, moisture and lipid contents in fish fillets are inversely related and their sum is approximately 80% with other components accounting for the remaining 20%. The result for the ash content (1.50%) indicated that *P. elongatus* is a good source of minerals such as calcium, potassium, zinc, iron and magnesium.

The result of the processed product for *P. elongatus* showed a significant increase in the protein, lipid and ash content and a reduction in the moisture content as compared to the fresh sample. The highest protein content was noticed in oven-dried (69.87%) while the lowest was found in

salt- sun dried (54.90%). Statistical analysis showed a strong correlation between the processed *P. elongatus*, smoke-dried and sun-dried were $r^2 = 0.99$, smoke-dried and oven-dried were $r^2 = 0.98$ and smoke-dried and salt sun-dried were $r^2 = 0.98$. There was no correlation between the fresh and the processed *P. elongatus*. From the results obtained from this work, we suggest that those that are protein deficient can best build their muscle from the consumption of *P. elongatus*. We therefore recommend that appropriate technologies for improving the availability and productivity of this fish sample should be developed. However, it is suggested that a larger group of the commonly available fish species should be analysed so as to offer a wider choice to consumers

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