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.

Key words: Processed product, changes, product preservation, nutritional content, *Pseudotolithus elongatus*

INTRODUCTION

Fish contains an important component that is suited for human dietary and it also provides the much needed nutrient that is not available in cereal based diets (Clucas and Sutcliffe, 1981). According to Teutscher (1990) and Saiasthi (1994), it is a good source of animal protein and it provides about 30-80% of the protein intake of the coastal people of West Africa. Furthermore, Olomu (1995), Kreuzer and Heen (1982) and Waterman (1973) have also pointed out that fish is rich in protein with amino acid composition which is essential for the maintenance of a healthy body, and it compared very well with egg, milk and meat in the nutritional value of its protein. Fish, as soon as it is caught is susceptible to damage and the facilities for processing, storing and distributing the fish caught are inadequate or non-existent in most cases. For this reason there is enormous waste through spoilage of both fresh and dried fish (UNIFEM, 1988; FAO, 1981; Rawson, 1996). There is therefore, need for preservation of fish which generally slows down spoilage. These methods are done so as to increase its shelf-life (Cihazala, 1994). Canning and freezing are preservation methods which are rarely used in the artisanal sub-sector, basically due to cost and non-availability of equipment and cold storage system (Eyabi-Eyabi, 1998). The methods that are commonly employed are the traditional techniques such as salting, baking, etc.
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 (50-180°C), the preservative effects of smoke components (phenols, aldehydes, ketones, organic acids etc.) and for purpose of product development due to changes in organoleptic, nutritional, chemical and physical properties during processing (Abraham-Olukayode and Oramadike, 2011). 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 color. 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 (Abraham-Olukayode and Oramadike, 2011). This study is essential because about 75% of artisanal catch and 20% 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±2°C 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 550°C for 5-6 h until the sample was completely free from carbon particles in a carboline Sheffield LMP3 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 using Microsoft excel.

RESULTS AND DISCUSSION
The result of the proximate composition 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. The moisture, lipid and protein content of the fresh P. elongatus in Table 1 showed a high moisture content (79.50%) low lipid (0.80%) and protein (18.25%) content as compared to the processed fish samples. 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. elongates in Table 1 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 in Table 2 showed a strong correlation between the processed P. elongatus, smoke-dried and sun-dried $R^2$ is 0.99, smoke-dried and oven-dried $R^2$ is 0.98 and smoke-dried and salt sun-dried $R^2$ is 0.98. There was no correlation between the fresh and the processed P. elongatus.

CONCLUSION

It can therefore be concluded that processed P. elongatus has higher nutritional value more than the fresh fish sample as shown from the result gotten from this study. We therefore suggest that those that are protein deficient can best build their muscle from the consumption of P. elongatus. We also 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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REFERENCES


