

Comparative nutritional studies on fresh and smoked *Clarias genepinus* (Catfish) and *Tilapia nilotica* (Tilapia) fishes

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ABSTRACT

*This study compares the nutritional parameters of fresh and smoked *Clarias genepinus* and *Tilapia nilotica* fishes based on the proximate analysis of the samples from major market in Ilorin metropolis using standard methods. The results shows that fresh and smoked Catfish and Tilapia fishes samples contain $72.72 \pm 5.01\%$, $52.15 \pm 3.51\%$ and $17.12 \pm 0.83\%$, $12.30 \pm 1.01\%$ moisture content, total protein was $16.04 \pm 3.00\%$, $18.24 \pm 2.15\%$, and $57.61 \pm 6.05\%$, $62.04 \pm 4.21\%$ and fats was $4.49 \pm 0.23\%$, $12.10 \pm 1.01\%$ and $2.07 \pm 0.04\%$, 5.88 ± 0.51 . This study provides nutritional information on the two sampled fishes in their fresh and smoked forms. It thus confirms the hypothetical belief that smoked fishes has higher protein values than fresh fish and added that more fats are present in dry fish than fresh fish. Thus, recommended for aged and diseased in provision of much richer nutrients.*

Keywords: Fish, Nutrition, Proximate analysis, *Clarias genepinus*, *Tilapia nilotica*

INTRODUCTION

Fish belongs to phylum chordate and class Pisces. They are divided according to the types of skeleton they have either as cartilaginous or Bony fishes. They include sardines, herring, salmon, cod, and tilapia, with herring and salmon canned and exported from Europe and America to all countries of the world [Nelson, 2006]. Catfish (*Clarias genepinus*) is a fresh water fish with variety of body shapes, with no scale some are cylindrical body, with a flattened ventrum for benthic feeding [Bruton, 1996], and some use the skin for cutaneous breathing [Nelson, 2006]. Tilapia inhabits fresh water and is found in shallow streams, ponds, rivers and lakes [Chapman and Frank, 1992] and cannot survive in temperate climate. They are fast growing, lean and short-lived, with primarily vegetarian diet thus contains low level of mercury [McCrary *et al.*, 2005]. It is low in saturated fat, calories, carbohydrates and sodium, potassium, phosphorus, niacin, selenium, vitamin B₁₂ and is a good protein source [Trewavas, 1983].

Fish spoils naturally, and ancient people had used different kinds of techniques to preserve fish [Varron, 2011]. The heat of the sun and air cause the fish to dry by reducing moisture content to 75% or less depending on its oil level. But sun-drying may expose fish to attack by insect, vermin, and contamination by sand and dirt with no control over drying time [Donald, 1983]. Refrigeration by chilling or freezing and smoking are other ways of fish preservation. The smoking method does not only preserve but give fish desirable odour and flavour. The process involves cleaning, brimming, soaking, drying and smoking for about 30 to 45minutes with 85°C using hardwoods and or plant leaves [Mario, 2011].

The principal component of fish muscle (water, fat, and protein) must be preserved with little or no change. The protein in level of 20% is present in the muscles of fishes. These muscles are of two types i.e. the light and dark

which are mostly separated when cooking [Nelson, 2006]. Fat varies from species to species and from season to season, with ranges in content of fat soluble vitamins A, D, E and K [Krug, 1960]. Water is the main component as much as 80% in lean fish and 70% in fatty fishes [Pearson, 1980]. The nutrition experts say protein from fish is better than even that of beans plant because they contain essential amino acids needed to build and repair cells in the body [Alfred, 1985]. The iodine in fish prevents goitre or enlargement of thyroid glands. The hormone thyroxin regulates some body's processes [Alfred, 1985].

The aim of this study is to comparatively determine the basic nutrients in two common commercial types of mostly locally grown fresh fish and smoked fish in our communities.

MATERIALS AND METHODS

Collection and Preparation of Sample

The samples of the fish types were bought from reliable fish sellers at Unity road Ilorin, Kwara State. The fishes were then cut open and immediately a portion was used in moisture content determination. The remaining fishes were dried in oven at 60°C for 30minutes, the temperature of oven was reduced to 40°C because the initial higher temperature was to remove most of water that may lead to spoilage of the fish by microorganism, while the lower temperature was to ensure the volatile and vital nutrients in fishes were not lost along with bound water in the fishes flesh. They were then grounded with mortar and pestle into fine powder and stored in a dried plastic container with cover until when used for various analysis.

Proximate Determination of Nutrients: Proximate analysis was carried out on the samples and they were analyzed for carbohydrates, moisture, crude protein (N x 6.25) [Johann Kjeldahl, 1848 – 1900], and crude fat in accordance with AOAC [2000] procedures. Crude fibre was determined by the method described by [Whitehouse *et al.* 1945] while the ash determination was as described by [Pearson 1981]. According to FAO [1986] and food analysis encyclopaedia of analytical sciences, carbohydrate was determined by Anthrone reagent method [Loewus, 1952].

RESULTS

Table 1: Showing the Proximate Content of the Catfish

Nutrients	Fresh	Smoked
% Ash	1.33±0.02	6.40±0.03
% Crude fibre	2.31±0.03	5.40±0.42
% Moisture content	72.72±5.01	52.15±3.51
% Protein	16.04±3.00	18.24±2.15
% Carbohydrates	0.92±0.00	1.80±0.01
% Fats	4.49±0.22	12.10±1.01

Table 2: Showing the Proximate Content of the Tilapia Fish

Nutrients	Fresh	Smoked
% Ash	24.16±2.01	15.76±1.15
% Crude fibre	1.91±0.23	1.06±0.01
%Moisture content	17.12±0.83	12.30±1.01
% Protein	57.61±6.05	62.04±4.21
% Carbohydrates	3.67±0.42	2.57±0.34
% Fats	2.07±0.20	5.88±0.51

DISCUSSION

The observed reduction in moisture content on smoked sample was due to loss of moisture during smoking as observed also by [Salan *et al.*, 2006]. This was based on report of [Kumolu and Ndimele, 2001] which asserted that spoilage of fish resulting from action of enzymes and bacteria can be slowed down during smoking. The percentage of total protein, ash and fats were significantly higher in smoked fish's samples than fresh, which was in line with report of [Oily,1983] that smoking results in concentration of nutrients like protein and fat [Puwastein *et al.*, 1999, Gokoglu *et al.*, 2004, Tao and Linchun, 2008].

CONCLUSION

Since, there is no negative effect on the nutrient composition of fish on smoking, rather a significant increased in content of vital nutrients were observed. However, the carbohydrate was lowered, which could result in loss of energy value of the fish when eaten.

From these comparative studies of the fresh and smoked fishes, the proximate assay results showed high level of protein and mineral elements in the samples irrespective of preservation method, which assist in growth and resistance to diseases [Elsie, 1996]. The crude fibre also adds bulk to digestive waste and in elimination of toxic substances from the body.

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