

# PROXIMATE AND MINERAL COMPOSITION OF SELECTED FRESHWATER FISHES FROM MOBIL FISH MARKET IN MINNA, NIGER STATE

Ayanwale A.V.<sup>1</sup>; Akinleye.B.I and Adama B.S.<sup>2</sup>

<sup>1</sup> Department of Biological Sciences, Federal University of Technology, Minna.

<sup>2</sup>Biology Unit, Centre for Preliminary and Extra – Mural Studies, Federal University Of Technology Minna, Niger State.

## ABSTRACT

Samples of three species of fresh water fishes (about 500g) namely *Tilapia zilli*, *Clarias anguillaris* and *Lates niloticus* were sourced from Mobil fish market in Minna Niger State, to determine their proximate and mineral composition using standard procedures on dry weight basis. The results indicated no significant difference ( $P \geq 0.05$ ) in percentages of proximate composition among the fishes sampled. Moisture content in fish samples was ranged from 75.55 to  $77.20 \pm 0.76\%$ , while lipid contents were between  $2.22 - 4.14 \pm 0.48\%$ . Ash contents were however in the range of  $1.26 - 2.27 \pm 0.35\%$  while crude protein contents were in the range of  $14.13 - 16.14 \pm 0.67\%$ . Potassium showed no significant difference ( $P \geq 0.05$ ) among the fishes sampled, but there was significant difference ( $P < 0.05$ ) in Sodium ( $0.15 - 0.32 \pm 0.45\%$ ), Calcium ( $0.57 - 0.74 \pm 0.18\%$ ), Magnesium ( $0.67 - 0.89 \pm 0.12\%$ ), among three fish species. The values obtained were within the recommended range of World Health Organization (WHO). Therefore, the freshwater fish species investigated have high nutritive value; as such their utilization will assist in solving health and nutritional problems.

Keywords : Proximate, Mineral elements, Freshwater fishes, Minna.

## INTRODUCTION

Fish is widely accepted because of its palatability, low cholesterol and tender flesh (Eyo, 2001). It is the cheapest source of animal protein and other essential nutrients required in human diet (Sadiku and Oladimeji, 1991). Fish may be the sole accessible and or affordable source of animal protein for poor households in urban or semi urban areas (Bene and Heck, 2005). Fish as a source of nutrient; have made important contributions to adequate supply of micro – nutrient such as vitamins and minerals (FAO, 2000). The measurement of some proximate profiles such as protein content, lipids, and ash content of fishes is often necessary to ensure that they meet the dietary requirements and commercial specifications (Watchman, 2000; Anon, 2000). Fawole *et al.* (2007) who analysed the elemental and proximate composition of certain freshwater fishes observed that the species contained appreciable concentrations of Sodium, Potassium, Phosphorous, Magnesium, Calcium and Iron, suggesting that the fish species could be used as a good source of minerals. In addition, the values of the proximate composition obtained for these species were highly pronounced especially the crude protein thus making the fishes to be good sources of protein as well.

However, information on the mineral and proximate composition of fishes sold in Minna

is scanty, despite the high acceptability and consumption of fishes in the area (Sadiku and Oladimeji, 1991). Therefore, the aim of this study was to determine the proximate and mineral composition of some readily available commercial freshwater species in Minna, Nigeria.

## MATERIALS AND METHODS

Fresh *Tilapia zilli*, *Clarias anguillaris* and *Lates niloticus* of approximately 500g were bought from Mobil Fish Market in Minna, Niger State and refrigerated below  $4^{\circ}\text{C}$  prior analysis.

## PROXIMATE ANALYSIS

Specimens of each fish species were oven-dried in an electric oven between  $70 - 80^{\circ}\text{C}$ , until the samples had constant weight. They were washed and weighed for analysis in their dry state.

Proximate composition of the following nutrients was determined using standard procedures of Association of Official Analytical Chemists (AOAC, 2000): Moisture, Crude Protein, Ash content, and Lipid. All proximate components were analysed in six replicates and reported as means, on percentage dry weight basis.

## MINERAL ANALYSIS

This was done by triple acid digestion, according to the method described by Hassan and Umar (2004). Calcium and Magnesium were analysed using atomic absorption

spectrophotometer (Alpha 4 model), while flame photometer (corning 400Uk) was used for Sodium and Potassium analyses.

#### DATA ANALYSIS

Statistical analysis of all data collected was conducted using Analysis of Variance (ANOVA) and Least Significant Difference (LSD).

#### RESULTS AND DISCUSSION

The results of the proximate composition of the experimental fish species are shown in Table 1. The moisture content in all the samples were generally high, ranged from 75.55% in *C.*

*anguillaris* to 77.20% in *L. niloticus* with no significant difference ( $P \geq 0.05$ ). However, the crude protein, ash content and Lipid values in all the samples were relatively low and also indicate no significant difference ( $P \geq 0.05$ ).

The results of the mineral content are shown in Table 2. There was no significant difference ( $P > 0.05$ ) in Potassium content across the fish species ranged from 0.39 – 0.55%. Sodium, Calcium and Magnesium, however, showed significant difference ( $P \leq 0.05$ ) among the fish species. Sodium was significantly lowest (0.15%) in *T. Zilli*, Calcium and Magnesium were lowest in *C. anguillaris* (0.57 and 0.67%, respectively).

**Table 1: Mean Proximate Composition of Fish species from Mobil Market, Minna**

FISH Species	MOISTURE	PROTEIN	ASH	LIPID
<i>Tilapia zilli</i>	76.66 <sup>a</sup>	15.66 <sup>a</sup>	1.35 <sup>a</sup>	2.38 <sup>a</sup>
<i>Clarias anguillaris</i>	75.55 <sup>a</sup>	14.13 <sup>a</sup>	1.26 <sup>a</sup>	4.14 <sup>a</sup>
<i>Lates niloticus</i>	77.20 <sup>a</sup>	16.14 <sup>a</sup>	2.27 <sup>a</sup>	2.22 <sup>a</sup>
Standard Error ±	0.76	0.67	0.35	0.48

Values with same superscript along columns are not significantly different ( $P \leq 0.05$ ).

**Table 2: Percentage means of mineral content of species from Mobil Market, Minna**

FISH SAMPLE	MAGNESIUM	POTASSIUM	SODIUM	CALCIUM
<i>Tilapia zilli</i>	0.55 <sup>a</sup>	0.15 <sup>a</sup>	0.74 <sup>b</sup>	0.89 <sup>b</sup>
<i>Clarias anguillaris</i>	0.41 <sup>a</sup>	0.32 <sup>b</sup>	0.57 <sup>a</sup>	0.67 <sup>a</sup>
<i>Lates niloticus</i>	0.39 <sup>a</sup>	0.33 <sup>b</sup>	0.72 <sup>b</sup>	0.74 <sup>b</sup>
Standard Error ±	0.11	0.45	0.18	0.12

Values with same superscript along the column are not significantly different ( $P \leq 0.05$ ).

All the species of fish studied had high moisture content. High moisture content has been similarly reported in other fresh water species (Abdullahi, 2001; Effiong and Tafa, 2005). The values of crude protein in the fish species studied indicated that they are rich source of protein to consumers as reported by Effiong and Mohammed (2008) who also worked on *C. anguillaris* from Monnai and cover dam fishing settlements in the Lake Kainji area, Nigeria. This finding is similar to that reported by Mumba and Jose (2005). However, Abdullahi (2001) observed that the protein content of fish might vary with species, due to certain factors such as the season of the year, effect of spawning, migration and type of food available.

The low ash contents reported among the fish species studied is in agreement with the results of Effiong and Mohammed (2008), who also documented low ash content values among the fresh water species studied. On the contrary, Effiong and Fakunle (2009) reported high ash

content in *Clarias gariepinus*, *Oreochromis niloticus*, *Lates niloticus* etc, which they attributed to the fish species, season, sex or food availability. The low lipid content recorded in this study contradicted the observations of Effiong and Fakunle (2009), who reported high fat content only in *Synodontis membranaceus*. Such differences may be due to species-related variations in food absorption and conversion capacities of the fishes, as earlier alluded to by Adewoye and Omotosho (1997).

The species examined contained appreciable concentrations of sodium, potassium, calcium and Magnesium suggesting that the fish species could serve as good sources of dietary minerals (Fawole *et al.*, 2009). The low potassium concentration encountered in this study agreed with the findings of Abdulkarim and Abdullahi (2009) who reported low Potassium concentration in the mineral contents of some fresh water fishes from Mairuwa reservoir, Faskari in Katsina State. The low concentration

of Potassium among the fish species studied is not in agreement with the works of Effiong and Fakunle (2012), who reported high concentrations of Potassium among fish samples from Lake Kainji in Niger State. The high concentration of Sodium and Calcium contents recorded among the fish species agreed with the results of Effiong and Fakunle (2009) who reported high values of Sodium and Calcium in some commercially important fishes from Lake Kainji, Nigeria. The significantly lower Magnesium content recorded in *Clarias gariepinus* during this study may be attributed to differential availability in the habitats of the fishes as well as ability of the fish species to absorb Magnesium and other organic elements from their diet and the environment where they lived (Adewoye and Omotosho, 1997).

### CONCLUSION

The findings of this study revealed that the three (3) fish species investigated were rich in protein content and low in lipids thus, making them suitable sources of animal protein for the residents of Minna. In addition, the crude protein content of the fish species did not differ significantly; therefore, there is no nutritional basis for the discrimination presently exhibited towards fish species in the area, often resulting in the over – pricing of certain species, e.g. *Clarias* in the area. It is hoped that the findings of this study will promote the patronage of fish, as a cheap and effective way of achieving the Millennium goal of adequate protein supply for all.

### REFERENCES

- Adewoye, S. O., Fawole, O. O. and Omotosho, J.S. (2003). Concentrations of selected elements in some fresh water fishes in Nigeria. *Science Focus*, 4:106-108.
- AOAC (2000). Official Methods of Analysis 17<sup>th</sup> Ed, Association of Official Analytical Chemists Washington, D.C.
- Abdulkarim. B. and Abdullahi S. A (2009). Studies on the proximate and mineral content analysis of three fresh water fishes of the families schilbeidae Morymridae and Mockokidae in Mairuwa Reservoir. Faskri, Kastina State Nigeria *Kastina Journal of Pure and Applied Science* 1(I): 17- 22.
- Abdullahi, S.A. (2001). Investigation of Nutritional status of *Chrysichthys nigrodigitatus*, *Barus filamentous* and *Auchenoglanis occidentalis*: Family Barigidae. *Journal of Arid Zone Fisheries*, 1:39-50.
- Adewoye, S.O. and Omotosho, J.S. (1997). Nutrient Composition of some freshwater fishes in Nigeria. *Biosci. Res. Commun.*, 11 (4): 333-336.
- Anon, (2000). Communication from the Commission to the Council and Parliament Conf. (2000) 724 *Brussade European Commission*, 20Pp.
- Bene, C. and Heck S. (2005). Fish and food security in Africa. *NAGA World Fish Centre Quarterly*, 28 (3 and 4): 8-13.
- Effiong, B.N and Mohammed, I (2008). Effect of seasonal variation on the nutrient composition in selected fish species in Lake Kainji, Nigeria. *Nature and Science*, 6 (2):1-5.
- Effiong, B.N. and Fakunle, J.O (2009). Effect of wood type on the nutrient composition of Smoked dried *Citharinus citharus*. Proceeding of the 24<sup>th</sup> Annual Conference of fisheries society of Nigeria, Akone Pp.16 - 18
- Effiong, B.N. and Fakunle, J.O. (2012). Proximate and mineral content of Traditional Smoked fish species from Lake Kainji, Nigeria. *Bulleting of Environment, Pharmacology and life sciences*, Vol.1, Issue (4): Pd 43 – 45.
- Effiong, B.N. and Tafa, J.L. (2005). Proximate composition of nutrients in adult *Clarias gariepinus*, *Heterobranchus longifilis* and their hybrid. Proceedings of the 20<sup>th</sup> Annual conference of Fisheries Society of Nigeria, 14th-18th Nov. 2005 pp. 550-553.

- Eyo, A.A. (2001). Fish Processing Technology in the Tropics. *National Institute for Freshwater Fisheries Research. University of Ilorin Press, Nigeria.* Pp.66 -70.Nigeria.
- Fawole, O. O., Ogundiran, M. A, Ayandiran T.A. and Olagunju, O. F. (2009). Proximate and Mineral Composition in some fresh water fishes in Nigeria . *Internet Journal of food safety, Vol.9, Pp.52-55*
- Food and Agriculture organisation (2000). Post mortem change and handling of caught fish by Terushiga Moto Hiro . *Nigeria Journal of fishing 1 (6) : 26*
- Hassan, L. G. and Umar, K. J. (2004). Proximate and mineral compositions of seeds and Pulp of African Locust Beans (*Parkia biglobosa* L.). *Nigerian Journal of Basic and Applied Sciences, 13:15-27.*
- Mumba, P.P. and Jose, M. (2005). Nutrient composition of selected fresh and processed fish species from Lake Malawi: A nutritional possibility for people living with HIV/AIDS. *International Journal of Consumer Studies, 29 (1):72-77.*
- Sadiku, S.O.E. and Oladimeji.A.A(1991). Relationship of proximate composition of *Lates niloticus* (L), *synodontis* Schall RES. *Common. 3(1), 29 – 40.* AOAC (2000). □ Official methods of Analysis □ 17<sup>th</sup> Ed; *Association of official Analytical chemists Washington D.C.*
- Watchman, J.J (2000). Composition and Quality of fish, Edinburgh, *Torry Research Station.* Food and Agriculture Organization (2000). Post-mortem change and handling of caught fish by *Terushiga Moto Hiro. Nigeria Journal of fishing, 1(6): 26.*