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Comparison of microbiological and proximate analysis of *Synodontis nigrita, Chrysichthys nigrodigitatus* and *Mormyrus rume in* Olomore Market, Abeokuta, Ogun State, Nigeria

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Abstract

The study was carried out to compare the microbiological and proximate analysis of fresh Synodontis nigrita, Mormyruss rume and Chrysichthys nigrodigitatus sold at Olomore market Abeokuta Ogun State. This fish are always available at Olomore market and other fresh fish market around Abeokuta and its environment. The protein, carbonhydrate,moisture, and ash of the fishes was based on the chemical method of analysis of the Association of Official Analysis (AOAC.1990). Data for each sp. were subjected to analysis of variance (ANOVA). The Results show no significant difference in moisture content of Chrysichthys nigrodigitatus (70.99 ± 1.09%), Mormyrus rume (67.30 ± 4.08%) and Synodontis nigrita (67.33 ± 1.99%). The crude protein content of Chrysichthys nigrodigitatus (12.10 ± 0.74%), Mormyrus rume (15.48 ± 1.63%) and Synodontis nigrita (10.73 ± 0.61%). For carbohydrate content we have Chrysichthys nigrodigitatus (1.15 ± 0.13%9), Mormyrus rume (2.09 ± 0.20%) and Synodontis nigrita (2.04 ± 0.10%). Fat content of Chrysichthys nigrodigitatus (7.15 ± 1.29%) Mormyrus rume (8.97 ± 1.9%) and Synodontis nigrita (8.62 ± 0.89%) and for ash content of Chrysichthys nigrodigitatus (6.33 ± 0.69%), Mormyrus rume (4.89 ± 0.21%) and Synodontis nigrita (8.85 ± 0.27%). For crude protein there was significant different ($p < 0.05$) same with fat content, ash content, and carbohydrate content ($p < 0.05$) unlike moisture content and dry matter content which is (28.57 ± 1.55%), (32.50 ± 4.08%) and (32.67 ± 1.99%) in Chrysichthys nigrodigitatus, Mormyrus rume and Synodontis nigrita. Result showed total bacteria count from (1.9 to 3.8 x 10^6 cfu/ml) from Chrysichthys nigrodigitatus while (2.8 to 4.7 x 10^6 cfu/ml) was obtained for Synodontis nigrita and (2.6 to 3.8 x 10^6cfu/ml) for Mormyrus rume. The micro-organism isolated were Pseudomonas spp. Escherichia spp., Klebsiella spp., Staphylococcus spp., Proteeus spp. and Micrococcus spp. On biochemical characterisation the following bacteria was isolated Pseudomonas spp., Escherichia spp., Klebsiella, spp. staphylococcus spp., Proteus spp. and Micrococcus spp.

Keywords: Haematology, sex-reversal, Growth parameters, nutrient utilization, S. melanotheron.

Introduction

Fish and fish product constitute more than 60% of the total protein intake in adults especially in the rural areas. They are widely accepted on the menu card and form a much-cherished delicacy that cuts across economic, religious and educational barriers (Adeleye 2001).

Fish is a major source of protein and its harvesting, handling, processing and distribution provide livelihood for millions of people. It is a most important animal dietary protein available in the World, and it represents about 14% of all animal protein on a global basis, (Abolagba and Mella, 2008). Fish is regarded a healthier meat option due to the high content of long chain poly unsaturated fatty acids (LCPUFA'S), which are associated with improving health and preventing disease of old age (Kabaherda et al., 2009). In Nigeria, fish constitutes 40% of animal protein intake. Infact, (Ames2001) reported that fish represents a significant proportion of between 30-80% of total annual protein in the diet of consumers either as fresh or cured fish is a particularly important protein sources in regions where livestock is relatively scarce. In Nigeria, fish is eaten fresh, preserved or processed (smoked) and form a much-cherished delicacy that cut across socio-economic, age, religious and educational barriers (Adebayo-tayo et al., 2008)

In Nigeria, the fisher folks and sellers of aquatic products neglect the importance of hygiene practice on these products by exposing them to all sorts of pathogens in the markets place where consumers purchase and consume mostly without further processing such as washing, cooking or heating. Microbial contamination could also be due to unhygienic conditions in harvest areas like open poultry manure industrial effluents and sewage disposal into the water bodies in which fish inhabit.

The study was carried out to investigate micro-organism present in fresh selected fish and by so doing identify bacterial loads prevalent in the selected fresh fish obtained and also to know the proximate composition present in selected fresh fish sold in Olomore market, Abeokuta, Ogun State.

Material and Methods

The samples were collected from Olomore market. A total of 9 samples which comprised 3 different species of (*Synodontis nigita, Chrysictithys, nigrodigitatus, Mormyrus rume*) were purchased and collected in a sterile aluminum foil and the samples were transported to the microbiology laboratory in a well covered ice cooler for analysis and these samples were labeled G1, L1, I1, G2, L2, I2, G3, L3, I3. A sterile dissecting blade was used to dissect the fish to get the gill, liver and intestine of the fish of different species in a sterile container and analyzed immediately.The materials needed for this experiment include glasswares (conical flasks, micropipettes, test tube, petri dishes) and they were washed with detergents.

Results

Table 1: Proximate composition weight of fresh *C. nigrodigitatus*, *M. rume* and *S. nigrita* from Olomore market Abeokuta, Ogun State.

Composition %	Chrysichtys nigrodigitatus	Mamyrus rume	Synodontis nigrita
Moisture	70.99 ± 1.09^{a}	67.30 ± 4.08^{a}	67.33 ± 1.99^{a}
Crude protein	$12.10 \pm 0.74^{a&b}$	15.48 ± 1.63^{b}	10.73 ± 0.61^{a}
Crude fat	7.15 ± 1.29^{b}	8.97 ± 1.90^{b}	8.62 ± 0.89^{b}
Ash	6.23 ± 0.69^{a}	4.89 ± 0.21^{a}	8.85 ± 0.27^{b}
Crude carbohydrate	1.15 ± 0.13^{a}	2.09 ± 0.20^{b}	2.04 ± 0.10^{b}

Mean value in the same column with the same superscript are not significantly different.

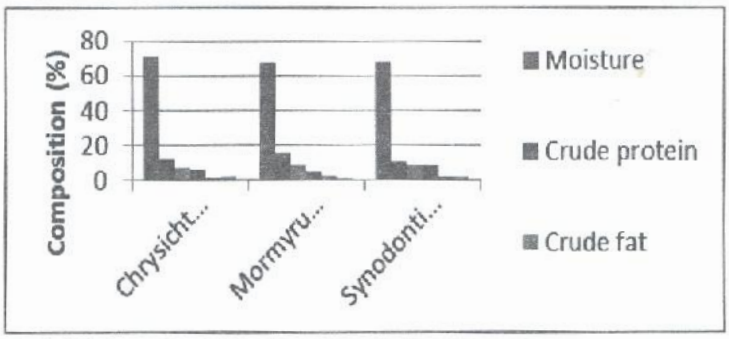

Fig. 1: Proximate composition of fresh fish from Olomore market.

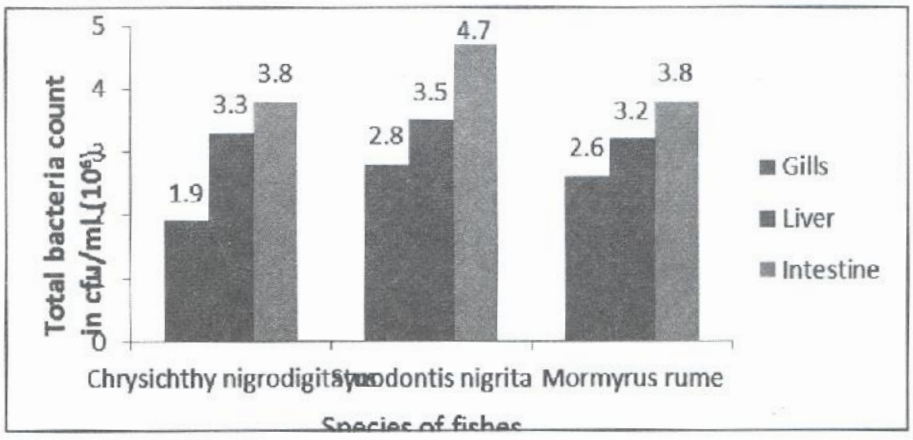

Fig. 2: Total bacteria count in the fresh fish from Olomore market.

Table 2: Biochemical test of the bacteria isolated from the fish samples—*C. nigrodigitatus, M. rume* and *S. nigrita*).

Label	Grain	Motility	Glucose	Lactose	Manitol	Maltose	Indole	Methyl Red	Voges proskauer	Citrare	H_2S	Sucrose	Urea	Oxidase	Coagulase	Catalase	ISOLATE
A	–	+	+	–	+	+	–	+	+	+	+	+	+	+	NA	+	*Psedomonas spp.*
B	–	+	+	+	+	+	+	+	–	–	–	NA	–	–	NA	+	*Escherichia spp.*
C	–	–	+	+	+	+	–	–	–	+	–	+	–	–	–	+	*Klebsiella spp.*
D	+	–	+	+	+	+	NA	+	–	+	–	+	+	–	–	+	*Staphylococcus spp.*
E	–	+	+	–	–	–	–	+	–	+	+	+	+	–	+	+	*Proteus spp.*
F	+	–	+	+	+	+	NA	+	–	NA	NA	+	NA	+	–	+	*Micrococcus spp*
G	–	+	+	+	+	+	–	+	–	+	+	–	–	–	–	+	*Citrobacter spp.*

Discussion

The proximate composition of analyzed samples of mean value of *C. nigrodigitatus, M. rume* and *S. nigrita* as shown in Table 1. The proximate composition of the fish sample, *C. nigrodigitatus, M. rume* and *S. nigrita* ranged from (67.30 ± 4.08%) to (70.99 ± 1.09%). The moisture content was within previously reported range in other fish spp (Osibona et al. 2006). Usually moisture and lipid contents in fish fillets are inversely related and their sum is approximately 80 percent (FAO, 1999). However this value was compared with the US/RDA (1994) of 100g. There was no significant difference ($p > 0.05$). The value of ash was higher in *S. nigrita* (8.85 ± 0.27) than *M. rume* (4.89 ± 0.21) and *C. nigrodigitatus* (6.23 + 0.69). For the fat content of *C. nigrodigitatus, M. rume* and *S. nigrita* ranged from (7.15 ± 1.29) to (8.97 ± 1.90). The higher concentration of the fat content is usually indicative of a high eating and processing quality. The lipid level in the fish tissue is definately due to the influence of food (Onyia et al., 2007). The crude carbohydrate values ranged from (1.15 ± 0.13) to (2.09 ± 0.20). There was significant difference between them ($P < 0.05$). The proximate composition of the fish samples revealed crude protein contents ranges from (10.73 + 0.61) to (15.48 ± 1.63). The concentration of the crude protein content were within the ranges previously reported for *C. gariepinus* and other fishes (Murray and Burt, 1977; Afolabi et al., 1984; Eyo, 2001; Osibona et al., 2006; Onyia et al., 2007). For crude fibre content the values ranges (1.28 ± 0.15) to (2.44 ± 0.13) and there was significant different between them ($p < 0.05$).

This shows the pathogenic bacteria that are present in the organs of the fresh fish in Olomore market, Abeokuta. The total count (in cfu/ml) of bacteria and fungi present in the organs of fresh fish *C. nigrodigitatus, M. rume* and *S. nigrita* were analyzed. The total bacteria for C. *nigrodigitatus* (1.9 to 3.8 x 10^6), *S. nigrita* (2.8 to 4.7 x 10^6) and *M. rume* (2.6 to 3.8 x 10^6). According to International Commission on Microbiological specification for food (ICMSF, 1986), the maximum recommended bacteria count for good quality product is 5.0 x 10^5 (5.710g cfu/ml) and the maximum for marginal acceptable quality products is 1.0 x 10^7 (710g cfu/ml). The bacteria load obtained from the fresh fishes *C. nigrodigitatus, S. nigrita* and *M. rume* obtained from Olomore markets were higher than the recommended value. Therefore, the fishes are not suitable for human consumption. Moreover, the presence of organism could be as a result of handling during fishing and transportation to the market place.

Different types of bacteria were isolated and identified from the organs of the fish samples *C. nigrodigitatus, S. nigrita* and *M. rume* (analyzed). Bacteria family include *Pseudomonas spp, Staphylococcus spp* dominated the sample followed by *Escherichia spp, Klebsiella spp, Micrococcus spp.* and *Proteus spp* which occurred least in the samples. The bacteria group of *Staphylococcus spp* according to (Robert, 2011) reported that it was one of the most common causes of human disease and they constitute the normal flora of the human skin and mucous membrane without resulting in a diseased condition. This bacteria class may also cause superficial systemic infections such as boils, impetigo and folliculitis while more serious and more common infections could be pneumonia, bacteremia and other infections of the bones and wounds.

Venugopal (2002) had observed that incidence contamination of fish particularly by pathogens may occur prior to harvest, during capture, processing and distribution. Huss et al. (2000) have pointed out that some pathogenic bacteria are naturally present in the aquatic (Clostridium botulinum type E, pathogenic vibro sp., Aeromonas) and the general environment (C. botulinum, type A and Listeria monocytogenes) may therefore e found on live or raw fish. Many studies such as the one done Montville et al. (2002) have similarly concluded that, during handling and preparation, bacteria may e transferred from contaminated hands of food workers to food and subsequently to other surfaces. Synder (1998) also found that low infectious doses from organisms such as shigella and the E. coli were linked to hands as a source of contamination. Other studies such as done by Keji et al. (2004) identified equipment as a major source of microbial contamination. With the value reported in this report. It is therefore suggested that consumer should be educated on the adverse effect of using untreated water or polluted water for processing as these could serve as sources of microbial contamination. However, the processors/handlers/sellers should observe strict hygienic measures so that they will not serve as source of chance inoculation of microorganisms.

Conclusion and Recommendation

The nutrient composition shown that there is higher moisture content and least carbohydrate content in fresh fishes. Chrysichthys nigrodigitatus, Synodontis nigrita and Mormyrus rume gotten from Olomore market in Abeokuta Ogun State. The study has shown that there is high microbial load in fresh fishes gotten from Olomore market Abeokuta Ogun State, the fresh fish available in our market contain some micro-organisms and this has effects on the human health. The market environment

determines the microbiological quality of fresh fish and handling are factor responsible for the contamination of fresh fish in markets. However the following are hereby recommended:

i. Handling, processing and preservation of the fish and other sea foods must be hygienically done.

ii. Consumers of fresh fish and other sea foods should wash and subject these products to further cooking or heating so as to deactivate all heat labile microorganisms present.

The appropriate authority such as federal department of fisheries, ministry of Agriculture and other relevant agency responsible for food safety and hygiene should ensure compliance with public health and hygienic procedure should ensure compliance with public health and hygienic procedure.

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