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Orginal Research Article

Estimation of Cholesterol Content in *Synodontis Budgetti* from Amassoma, Tombia, Swali and Otuokpoti Rivers in Bayelsa State

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Abstract: The investigation was carried out to estimate cholesterol content in *synodontis budgetti* from amassoma, tombia, swali and Otuokpoti Rivers in bayelsa state using the gas chromatography. The result obtained showed the cholesterols content from Otuokpoti River (5.67±0.17), from Amassoma River (5.34±0.02), from Swali River (5.17±0.02), from Tombia River (5.12±0.02). The cholesterol content in synodontis budgetti showed a significant decrease ($p<0.05$) in Okuokpoti, Amassoma, Swali and Tombia Rivers. All cholesterol content showed significant difference ($p<0.05$) relative to each other. The differences in cholesterol content of fish samples synodontis budgetti from the four rivers may be as a result of age, gender, diet, geographical origin and season of the fish.
Keywords: investigation, *synodontis budgetti*, Amassoma River.

INTRODUCTION

According to the Food and Agriculture Organization (FAO), it is estimated that 3 billion people around the world consume fish and other marine organisms as a source of protein (Enrique Murillo, *et al.*, 2013). Lipids are the predominant source of energy for fish. The mechanisms by which fish allocate energy from lipids for metabolism, development, growth and reproduction are critical for understanding key life-history strategies and transitions. Lipids are the major source of nutrition in marine fishes. They are considered an efficient biochemical means of concentrating large amounts of stored energy at small space. The cells of white fat tissue, called adipocytes, are responsible for lipid synthesis, release and storage in the organism. The genus *Synodontis budgetti* commonly known as the up-side down catfish belongs to the family *Mochokidae* which is made up of three genera, *Mochocus, Synodontis* and *Chinoglanis.*it is the largest genus of the catfishes of the order *Siluriformes,* and most widely distributed. The specie, *Synodontis budgetti* of the genus *Synodontis*, occur through most of the freshwaters of sub-saharan Africa and the Nile river system, but are restricted to water system within the tropics. They can be found in large rivers, small fast-flowing streams and massive African rift lakes. Synodontis was one of the most abundant genera in the Nile system. *Synodontis* is the most common genus of the *Mochokidae* family and of great commercial importance in the inland waters of Nigeria and West Africa (Akombo *et al.*, 2016). Fish is of high nutritional value due to its high protein content, excellent quality of lipids (omega 3 and 6 series) and low level of total fat, saturated fats and cholesterol (Magobe, *et al.*, 2015). Surveys aimed at establishing the influence of n-3 fatty acids on various health conditions have shown their positive effects, both in disease prevention and health status improvement. The human brain consists of 60% lipids, of which 33% are n-3 fatty acids. Cholesterol is a waxy fat-like substance that is present in all animals but not in plant. It is not soluble in blood and so has to be carried in the bloodstream by molecules called lipoproteins. Lipoproteins are named based on their density. The high density lipoprotein (HDL) is 'good' and transports cholesterol to the liver for further processing. Low density lipoprotein is 'bad' fat and when oxidized gets deposited in the walls of arteries contributing to arteriosclerosis. The former is so named because it is known to contain less cholesterol and more phospholipids and apoproteins than the later. HDL is present in higher amount in fish lipids, whereas the LDL is more abundant in other animal fats and contains more of the saturated fatty acids (SFA).

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MATERIAL AND METHODS

The sample (3.0g) was weighed into the labeled porous thimble; 200ml of the petroleum ether was measured and then added to a dried 250ml capacity flask. The covered porous thimble with the sample was placed condenser of the Soxhlet extractor. Extraction was done for 5hrs.

The porous thimble was removed with care and the petroleum ether in the top container (tube) was collected for reuse. The extraction flask was removed from the heating mantle arrangement when it was almost free of petroleum ether. The extraction flask with the oil was oven dried at 105^{o}C for the period of one (1) hour. The flask containing the dried oil was cooled in the desiccator and the weight of the cooled flask with the dried oil was measured using gas chromatography. The results (means ± standard deviation) were calculated as both the weight percentage (fatty acid profile) and the concentration (mg/g dry tissues).

RESULT

Showing Cholesterol content of fish samples *Synodontis budgetti* from Otuokpoti, Amassoma, Swalli and Tombia River.

RIVERS	CHOLESTEROL
OTUOKPOTI RIVER mg/100g(DW)	***Synodontis budgetti*Mean±SD** 5.67±0.17
AMASSOMA RIVER mg/100g (DW)	***Synodontis budgetti*Mean±SD** 5.34±0.02
SWALI RIVER mg/100g (DW)	***Synodontis budgetti*Mean±SD** 5.17±0.02
TOMBIA RIVER mg/100g (DW)	***Synodontis budgetti*Mean±SD** 5.12±0.02

Values are mean of three determination ± SD. S

The mean (±SD) values of total fat and Cholesterol content of fish samples *Synodontis budgetti* determined from the four different rivers; Otuokpoti (5.67±0.17), Amassoma (5.34±0.02), Swali (5.17±0.02) and Tombia Rivers (5.12±0.02) Bayelsa State are significantly different ($p<0.05$).

All the cholesterol content in *Synodontis budgetti* showed a significant decrease ($p<0.05$) in Otuokpoti, Amassoma, Swali, and Tombia Rivers. All cholesterol showed significant difference ($p<0.05$) relative to each other. The differences in Cholesterol content of fish samples *Synodontis budgetti* from the four rivers may be as a result of age, gender, diet, Geographical origin and season of the fish.

DISCUSSION

The result obtained from the Determination showed a significant variation in the lipid profile of *Synodontis Budgetti* found in Amassoma, Tombia, Swali and Otuokpoti River respectively. The fish species *Synodontis Budgetti* studied belong to High fat fish (> 8%) category, going by the classification of Ackman. The lower side of the lipid range (5.12±0.02) is in line (5.12±0.02) with some literature report. Apart from the issues of seasonal variations between dry and rainy seasons which are known to affect fat content of fishes, spawning activities can use-up the fat reserves and give very low fat levels. Other causes of variation in fat content are (as already mentioned) attributed to geographical differences and particularly the feed-type. Of the total cholesterol determined, HDL values were higher than their corresponding LDL levels and of which was also in consonant with literature report. However it was observed that the presence of trans fatty acids could have a lowering effect on the body's HDL cholesterol - an effect which underscores the need to keep the level of the former low (not to rise above % of total energy intake), if the HDL level should be maintained. The levels of PUFA determined from fishes in OR, AR & SR were similar; but were all higher than that from TR'. The specie *Synodontis Budgetti* from Otuokpoti river was the major contributor of PUFA in each study location, thereby confirming the fact that location differences is one of the major factors in nutrient accumulation. The present study therefore supports the production of aquaculture of C G. Prominent PUFAs in fishes in OR were C20:4, C20:5 and C22:6; while those of AR included, together with the above acids, the C18:2. Fishes from SR and TR featured mostly the C18:3, C20:3; and C18:2, C20:3, C20:4, C22:2, C20:5, C:22:6 acids respectively, and agreed with literature reports. Still among the PUFAs, C18:2 (linoleic) was prominent in fishes from TR, AR & LR. The C18:3(linolenic) was more prominent in SR fishes. Both acids are vital for growth and development and therefore must be provided in the diet since the body cannot synthesize them. With them available, the body can synthesize arachidonic and other eicosanoids. The variations recorded in the concentration of nutritional components in the fish examined could have been as a result of the rate in which these components are available in the water body and the ability of the fish to absorb and convert the essential nutrients from the diet or the water bodies where they live (Yeannes and Almandos, 2003).

In addition, since the chemical composition of synodontis was found to vary with sex, seasons, size, age and locality of catch, therefore, it is essential to determine and evaluate for different species of the fish in relation to these factors.

(Otitologbon, *et al.*, 1997) reported similar findings and attributed this to the dominance of the lipid in the water body where the fish lives.

(Effiong and Mohammed 2008) reported that nutrient content of fish is influenced by several factors such as feeding, processing method, habitat etc.

Lipid content of *Synodontis Budgetti* from Otuokpoti River increased significantly than to Amassoma, Swali and Tombia River as these may be as a result of the population level. The high level of this lipid in *Synodontis Budgetti* may be attributed to the rate in which they are available in the water body and the ability of the fish to absorb it from their diets and the environment where they live.

CONCLUSION

The fishes studied belong to High Fat Fish category. The fat accumulation was related to species type, nature of feed and hence geographical location. Cholesterol was the prominent fat followed by HDL and LDL in that order. Lower levels were determined from the study areas in Swali and Tombia than in Otuokpoti and Amassoma. The fish, *Synodontis Budgetti* from otuokpoti seemed more nutritionally promising in terms of essential fatty acid (EFA) content. It is therefore recommended for culture production as it contained reasonable levels of EFA and showed higher values of total PUFA when compared to the other fishes from other the habitats studied. The present study has therefore provided good sources of fish oils rich in essential polyunsaturated fatty acids particularly EPA, DHA and the n- 6 PUFA - eicosatetraenoic acid (arachidonic acid). Increased fish production in Otuokpoti and Amassoma areas in Nigeria is recommended so as to provide more EFAs needed for good health.

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