Short Communication

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IODINE DISTRIBUTION IN SOME NIGERIAN FISHES

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Iodine was found present in tested organs of the selected fish. The flesh of *Sadinella auritea* (F1) has the highest iodine content with an average value of 103.42 mg g^{-1} while the tissue of *Ethamalosa fimbriala* (F5) has the least with an average of 20.21 mg g^{-1} dry weight. The iodine distribution number (IDN) and coefficient of variation indicate a wide variation of iodine from one organ to another. The result obtained shows that Nigeria fishes contains sufficient iodine for dietary intake.

Iodine plays an important role in regulating the body production of energy, promote growth and development and stimulate the rate of metabolism (Davidson and Passmore 1986). Iodine deficiency is the leading cause of intellectual impairment and it is associated with neurologic and development pathology. The developing fetus, newborn and young children are the most susceptible to the effect of dietary iodine deficiency (Marberly 1994). Iodine deficiency also results in simple goitre which is characterise by the enlargement of the thyroid gland and hypothyroidism (Anonymous 1975). It may also lead to hardening of the arteries, obesity, sluggish metabolism, slowed mental reactions, heart palpitation, and irritability (Ajayi 1989). Inadequate iodine intake during pregnancy may result in the development of goitre in both mother and child (Scriba 1985). Considering the significance of iodine intake in human development when adequate amount is ingested and the deleterious effect of its deficiency, various organs (Head, gills fins, body tissue, intestine and bones) of some selected Nigeria fish have been determined for iodine level. These data will help to establish the part of the fish that contain the highest iodine concentration for human utilisation.

Six common and widely consumed fish that is *Sadinella aurita, Pseudotolithus spp, Cynglossus spp, Clarotes laticeps, Ethamalosa fimbriala* and *Clarias gariepinus* represented as F1, F2, F3, F4, F5 and F6 respectively have been selected for this work. The flesh, head, gills, fins, intestine and bones were separated in each case. Each component was air-dried and then dried in the oven at 80°C for six hours. The dried material was then powdered in a hammer mill and 0.5g of the powdered sample was digested.

Iodine content determination. 500 mg of the powdered dried sample was accurately weighed into a digestion flask followed by the addition of 6 ml of the digestion mixture. A few pieces of pumice stones were added into the flask to prevent bumping. The flask was heated until the liquid started to turn green after which the micro flame was lowered and the flask was gently heated. After the disappearance of the chloride gas, the flame was raised slowly and the liquid was allowed to boil. When the solution became colorless, fumes stated to evolve and heating was continued for another 2 to 3 min and the flask was allowed to cool. 4 ml of 13% NaOH was added to the flask and then cooled. One drop of thymol blue was added together with sufficient 13% NaOH to turn the indicator blue. The clear solution was quantitatively transferred into 50 ml Erlenmeyer flask. Sufficient 1M HCl was added which gives a definite pink color. Few drops of chlorine solution in CCl_4 were added which to decolorise the liquid. The content was then boiled until about 15 ml of the liquid was left in the flask. The mixture was cooled under tap water and a crystal of phenol was added. After sufficient cooling for at least 5 min, 1 ml of 1% KI solution was added. After about 1 min the liberation of iodine is completed and 1 ml of 5% disodium hydrogen phosphate was added. The liberated iodine was then titrated against freshly prepared 0.001M solution of sodium thiosulphate using 2 drops of starch solution (1%) as indicator. The iodine content of each sample was finally estimated from the volume of the titrant used (Asaolu and Asaolu 1998). The results obtained is an average of three determinations.

Table 1 shows the iodine content while Table 2 shows the iodine distribution number in different organs of the investigated fish.

The flesh of *Sadinella aurita* (F1) has the highest iodine content with an average value of 103.42 mg g^{-1} while the flesh of *Ethmalosa firbriala* (F5) has the least with an average value of 20.21 mg g^{-1} dry weight Table 1. In the distribution of iodine in various organs of the fish, the flesh, gills and head without gills were found to contain the highest values of iodine (Table 1 and 2). The intestine of the investigated samples contains iodine in a reasonable amount. Unfortunately, in fish processing for human consumption, both the gills and the intestine are discarded whereas the fish head becomes a delicacy (Okoye 1991; Adeyeye 1996). However,

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Table 1
Iodine content in fish (mg g^{-1}) dry weight

Fish organ	Fish type and iodine content					
	F1	F2	F3	F4	F5	F6
Flesh	176.39	160.34	148.06	36.67	19.04	47.95
Head without Gills	155.50	138.48	71.38	21.16	16.93	20.6
Fins	54.24	22.21	3.17	1.15	7.14	3.17
Gills	162.45	184.02	134.26	81.15	38.84	42.69
Intestine	40.02	27.68	31.73	19.03	21.07	21.1
Bone	31.96	10.88	25.38	10.15	18.26	16.60
Mean	103.42	77.27	69.00	28.22	20.21	25.35
SD	67.92	65.21	60.23	28.52	10.34	16.86
CV	0.65	0.84	0.89	1.01	0.51	0.66

F1, *Sadinella auritea*; F2, *Pseudolithus spp*; F3, *Cynglossus spp*; F4, *Clarotes laticeps*; F5, *Ethamalosa firbriala*; F6, *Clarias gariepinus*; CV, Coefficient of Variation; SD, Standard Deviation

Table 2
Iodine distribution number in the fish organ

Fish type	Fish organ and IDN					
	Flesh	Head without gills	Fins	Gills	Intestine	Bone
F1	1.00	0.88	0.31	8.92	0.23	0.18
F2	1.00	0.86	0.14	0.87	0.17	0.06
F3	1.00	0.48	0.02	0.91	0.21	0.17
F4	1.00	0.57	0.03	2.21	0.52	0.28
F5	1.00	0.89	0.38	2.04	1.11	0.96
F6	1.00	0.43	0.07	0.90	0.44	0.35

IDN, Iodine Distribution Number

these parts can be included in the production of animal feeds. From the iodine distribution number (IDN) and the coefficient of variation (Tables 1 and 2), it appears that the distribution of iodine varied widely from one organ to the other. Similar strends has been explained for the distribution of major elements in various organs of *Illisa Africans* (Adeyeye 1996). The IDN (Tabel 2) indicate that the gills of *Clarotes laticeps* (F4) and *Ethmalosa firbriala* (F5) contains much higher value of iodine compared to other fish organs in the samples.

The higher values of iodine in the flesh and the gills could be explained by bioaccumulative effects as it has been explained that the flesh and the gills have higher tendency for mineral concentration (Okoye 1991; Asaolu 1998). Similar observation has been reported by Katta and Mahahan (1997).

Under ordinary physiological circumstances, Greer and Astwood (1972) reported that the normal iodine requirements for man (which have been estimated on the basis of urinary and fiscal excretion studies) are in between 0.15 - 0.30 mg per day. Thus, the body tissue of Nigeria fish will supply more than daily requirement recommended even when less than 10g of the body tissues are taken in our diet. The fact that the body tissue of the selected fish contains high iodine content will be beneficial to the consumers of these fish with respect to contribution to daily iodine intake.

Key words: Iodine, Fish, Nigeria.

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