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MERCURY CONTENT OF SOME CANNED SEAFOOD COLLECTED FROM NIGERIAN RETAIL MARKETS

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ABSTRACT

Twenty samples of canned seafood consisting of tuna, mackerel, sardines, prawn and shrimp were collected from retail operations in Victoria Island, Lagos, Nigeria. Mercury content in these canned seafood were determined after digestion by the Association of Official Analytical Chemists methods. The mercury contents for all the canned seafood products have concentrations well below the permissible EU levels for this toxic metal. Their contribution to the body burden can therefore be considered negligible and the canned seafood products seem to be safe for human consumption.

INTRODUCTION

Fish provide a healthful source of dietary protein, and are relatively low in cholesterol and high in omega-3 (n-3) fatty acids (National Research Council, 2000). Several studies have documented the long-term cardioprotective benefits for adults as well as the reproductive benefits of eating fish. However, benefits may be offset by the presence of contaminants, particularly methylmercury (MeHg) and polychlorinated biphenyls (PCBs), which have been reported in many fish species from many localities (Environmental Protection Agency [EPA], 1998). Over more than three decades studies have shown positive correlations between mercury levels in humans and fish consumption (Bjormberg et al., 2003).

Contaminants in fish are particularly detrimental for developing fetuses and young children (Jacobson et al., 1989, 1990; Institute of Medicine [IOM], 1991; Sparks and Shepherd, 1994; Jacobson and Jacobson, 1996; Schantz, 1996; National Research Council, 2000). Methyl mercury interferes with the architecture of the developing brain, disrupting microtubule assembly (Graff et al., 1993) and interfering with the temporal sequencing of cell adhesion molecules that guide neuronal migration and connections (Dey et al., 1999). Some studies have shown an association between contaminant levels in fish, fish consumption by pregnant women, and deficits in neurobehavioral development in children (Weihe et al., 1996; Jacobson and Jacobson, 1996; Grandjean et al., 1998). Thus, assessing the levels of mercury in canned seafood is important from a public health perspective.

The present study was carried out to determine the current levels of total mercury in imported canned seafood in Nigeria which are frequently consumed by the populace and also carry out sensory analysis on them, with the purpose of ascertaining whether the concentrations would exceed the maximum level fixed by European Commission decision.

MATERIALS AND METHODS

Sample collection: Twenty canned seafood samples consisting of tuna, mackerel, sardines, prawn and shrimp

imported from different countries were obtained from the retail operations in Victoria Island, Lagos.

Apparatus and reagents: All glassware was soaked over night in 10% (v/v) nitric acid followed by washing with 10% (v/v) hydrochloric acid and rinsed with double distilled water and dried before using. A Perkin Elmer Analyst 100 atomic absorption spectrophotometer equipped with a deuterium background corrector was used for the determination of heavy metals. All reagents used were of analytical reagent grade.

Sample preparation and digestion: After opening each can, oil was drained off and the meat was homogenized thoroughly in a food blender with stainless steel cutters. Samples were then taken and digested promptly as follows: 2g of homogenized sample was weighed and placed into a 150ml conical flask. To this was added 5 ml concentrated sulphuric acid, and then heated at 70^0C for 2 hr. (or until the sample was completely digested). The mixture was cooled and 25 ml of 6% potassium permanganate solution was added to the cooled solution. The mixture was heated at 70^0C for 2 hr, and then cooled. 10 ml hydroxyl ammonium chloride was added to the solution, to reduce excess permanganate. The mixture was then diluted to 50 ml in a volumetric flask, with distilled water. A blank (distilled water) solution was carried out through the same process. 5ml of 1000mg/l stock standard was diluted to 200ml to give 25mg/l intermediate stock standard. From this, three working standards were prepared in the range 0.001-0.005mg/l. Mercury and cadmium was determined by direct aspiration of the sample solution into the $N0_2$/acetylene flame. The blanks and calibration standard solutions were also analysed in the same way as the sample solutions.

RESULTS AND DISCUSSION

Twenty samples of canned seafood were analyzed for mercury (Table 1). The results shows that the mercury contents for all the canned seafood products have concentrations well below the permissible EU levels for this toxic metal. Their contribution to the body burden can therefore be considered negligible and the canned seafood products seem to be safe for human consumption.

The levels of toxic elements in shellfish are related to age, sex, season and place (Kagi and Schaffer, 1998).It is also reported that cooking reduces the amount of some metals (Atta et al., 1997). .

Moreover, the advances of new packaging technology, especially the use of cans with lacquered walls and mechanical seam, reduce or, in most cases, eliminate the leaching of heavy metals into the food.

CONCLUSION

The result of this study shows that imported canned seafood products are safe for human consumption.

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Table 1: Mercury content of some imported canned seafood

S/N	Canned seafood products	Mercury mg/kg
1.	Tuna Flakes in Vegetable Oil (Starkist)	<0.01
2.	Light Tuna Chunks in Oil (Bumble Bee)	<0.01
3.	Skipjack Tuna Salad (John West)	<0.01
4.	Tuna in Mayonnaise (John West)	<0.01
5.	Tuna Steak in Sunflower Oil (John West)	<0.01
6.	Tuna Steak in Brine (John West)	<0.01
7.	Tuna Flakes in Sunflower Oil (John West)	<0.01
8.	Tuna Flakes in Brine (John West)	<0.01
9.	Tuna Chunks in Sunflower Oil (John West)	<0.01
10.	Tuna Chunks in Brine (John West)	<0.01
11.	Mackerel in tomato sauce (Geisha).	<0.01
12.	Mackerel in tomato sauce (Toma).	<0.01
13.	Sardines in vegetable oil (Titus).	<0.01
14.	Portuguese sardines in sunflower oil.	<0.01
15.	Princes sardines in tomato sauce.	<0.01
16.	Gomes da Costa sardines in tomato sauce.	<0.01
17.	Boneless sardines in sunflower oil (John West).	<0.01
18.	Pescamar sardines in tomato sauce.	<0.01
19.	Prawns in brine (John West).	<0.01
20.	Shrimps in brine (John West).	<0.01

Note: EU Permitted levels for mercury in canned seafood = 0.5 mg/kg