

Total Mercury Levels in Canned and Frozen Fish Imported into Lebanon

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To supplement the limited quantity of fresh fish caught in the coastal waters of Lebanon, substantial consignments of frozen and canned fish are imported annually from various sources. The routine examination of imported fish for mercury content was initiated by the health authorities in 1974. This action was prompted by reports from various parts of the world that incriminate the entry of mercury into the food chain and indicate its impact on public health (FRIBERG & VOSTAL 1972). The monitoring programme undertaken by the Ministry of Public Health was, however, disrupted in 1976 by the political disturbances.

The objective of this paper is to report the analytical data pertaining to the total mercury levels in 407 samples of canned fish (tuna and mackerel), and 98 specimens of an assortment of frozen fish collected at random from among the imported consignments.

MATERIALS AND METHODS

Chemically-clean borosilicate glassware and mercury-free reagents were used in all digestion and analytical procedures.

A five-gram portion of the muscle tissue was sliced from the lateral side of each frozen fish specimen (scales and skin removed). The tissues were then digested and analyzed by the method described by AOAC (1970), using a flameless atomic absorption spectrophotometer. Similarly, a five-gram portion from the specimen in each can of fish was taken after chopping and mixing with a plastic knife for digestion and analysis. These portions included some of the oily liquid in the case of oil pack cans, but excluded the aqueous liquid contained in water pack cans. The reason for this is that the oily liquid is consumed together with the canned fish, while the aqueous liquid is usually discarded.

RESULTS AND DISCUSSION

The overall mean values for the two-year period (1974-75) for total mercury levels in the canned and frozen fish specimens examined were found to be as follows: (a) canned tuna, 0.30 mg/kg; (b) canned mackerel, 0.12 mg/kg; and (c) frozen fish, 0.16 mg/kg. The data for 1974 and 1975 are shown separately in Table 1. The 1974 mean value for canned tuna fish (0.30 mg/kg) was found to be significantly higher (0.05 level, Students' t-test) than that for 1975. The disparity may be partly due to variations in sources and frequency of importation from each source.

In most cases, the mean values for total mercury levels shown in Table 1 appear to be consistent with those reported in other parts of the world for market fish. Canned tuna fish, for instance, was reported to show mean total mercury levels (wet weight basis) ranging from 0.18 mg/kg (MINISTRY OF AGRICULTURE, FISHERIES AND FOOD 1971) to 0.30 mg/kg (KAMPS et al. 1972). The data obtained by PARVANEH (1979) for total mercury in canned tuna fish also yielded a mean value of 0.30 mg/kg, and a range of 0.20-0.44 mg/kg.

In contrast to these findings, our overall mean value of 0.12 mg/kg for total mercury in canned mackerel fish is significantly higher than the corresponding value of 0.03 mg/kg found in market samples in the United Kingdom (MINISTRY OF AGRICULTURE, FISHERIES AND FOOD 1971). This could be accounted for by the more rigid legislation and control measures applied in the United Kingdom. That the level of total mercury in tuna fish exceeds that in mackerel fish is supported by the findings of several investigators in that mercury levels are correlated to fish size (RIVERS et al. 1972; SUZUKI et al. 1973; KOIRTYOHANN et al. 1974; CHEEVAPARANAPIVAT & MENASVETA 1979).

Values higher than those reported here for imported frozen fish are not unusual. RIVERS et al. (1972), for instance, found a mean value of 2.0 mg/kg (wet weight) for 81 specimens of pelagic fish from the middle of the Pacific Ocean that include 42 specimens of tuna fish having a mean value of 0.45 mg/kg.

Although none of the imported fish specimens included in this project yielded total mercury levels exceeding the widely accepted tolerance level of 0.5 mg/kg, yet continuous vigilance and monitoring are indicated. Moreover, preference should be given by consumers in Lebanon to local fresh fish that are generally small in size as these have been found by HARAKEH et al. (unpublished data 1981) to be less contaminated with mercury (mean value of 0.04 ± 0.02 mg/kg, wet weight).

Table 1. Mercury Content (mg/kg, Wet Weight) in Canned and Frozen Fish Imported into Lebanon in 1974 - 1975

Fish tested*	1974		1975		Total (1974 - 75)	
	No.	Mean Range	No.	Mean Range	No.	Mean
Canned:						
1. Tuna	209	0.30 0.24-0.49	89	0.28 0.25-0.47	298	0.30
2. Mackerel	16	0.09 0.08-0.10	93	0.12 0.10-0.17	109	0.12
Total	225	0.29 0.08-0.49	182	0.20 0.10-0.47	407	0.25
Assorted frozen fish	85	0.16 0.05-0.41	13	0.16 0.08-0.25	98	0.16
Total	310	0.25 0.05-0.49	195	0.20 0.08-0.47	505	0.23

* Values for canned fish represent the mercury concentration of the contents of the cans, including the oily liquid, but excluding the aqueous liquid.

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