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Arsenic Concentration in Canned Tuna Fish and Sardine

Jirair V. Karapetian and Abdulah M. Shahmoradi
Department of Toxicology, College of Pharmacy, Tehran University, Tehran, Iran

INTRODUCTION

The concentration of heavy metals in marine fishes has received much interest in recent years. Heavy metal contamination may arise from urban and industrial wastes as well as from agricultural and natural sources. Many of these trace heavy metals are important in the maintenance of normal physiological function of the body. While others are well known to be toxic to the ecosystem as a whole and to man in particular.

Considerable interest has been focused on arsenic due to its high toxicity. This interest has been directed towards the commercial and sports fishes since high levels of arsenic in these species represent a potential human health hazard.

Within the past 10 years, the use of marine fishes of Iran as a source of food was highly increased by iranians and people of other countries. In the present investigation, the arsenic concentration in two commercial canned fishes of Iran, tuna fish and sardine, was determined to find the degree of their contamination with arsenic and to control human health hazards. Besides, the results were compared with previous reports.

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METHOD

Twenty samples of canned tuna fish of the Persian Gulf and ten samples of canned sardine of the Caspian Sea were collected following a formal statistical plan. Collected samples were obtained from the Iranian Marine Fisheries Service. The entire content of cans were grinded and homogenized in a mortar. According to the AOAC (1975) method, accurately weighed samples were digested in a mixture of nitric-sulfuric acid and determined by the silver diethyldithiocarbamate spectrophotometric method. Each sample was determined for five times, and mean of the determinations were calculated.

RESULTS AND DISCUSSION

The range of arsenic concentrations in the canned tuna fish and sardine were 0.65-1.00 and 0.9-1.20 ppm, respectively, and the mean of the concentrations were 0.78 and 1.00 ppm, respectively.

A brief list of later researches on arsenic concentration in fishes is given in Table 1. However, arsenic concentrations in different species had shown greatest variation (ZOOK et al. 1976). Arsenic concentrations in canned tuna fish and sardine of Iran, compared with the reported data, is in acceptable range. Relatively higher concentrations in canned sardine of the Caspian Sea is possibly due to the closed nature of the sea, which provides higher contamination. Lower concentrations of arsenic reported in the fishes of the Mississippi River were due to the sedimentary load of the Mississippi which carried the largest amount of heavy metals, and probably prevented their accumulation in the biota (HARTUNG 1974).

TABLE 1

Reported concentrations of arsenic in fishes

Type and Origin of Tested Fishes	Arsenic Conc., ppm	References
34 Commonly consumed seafoods in USA	2.6	ZOOK et al. 1976
Frozen fish, fish oil, and fish meal	0.84	BUGDAHL and VON JAN 1975
Fish and shrimp of the Mississippi River	0.366	HARTUNG 1974
Marine fish and invertebrates from the Pacific coast of Canada	0.4-37.8	LEBLANC and JACKSON 1973
North Atlantic finfish	1.0	WINDOM et al. 1973
Canned sea and fresh water fish	1.0	STANCULESCU et al. 1972

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