CADMIUM AND LEAD CONTENT IN MUSCLE TISSUE AND LIVER OF THREE FISH SPECIES FROM THE EASTERN PART OF MIDDLE ADRIATIC

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Abstract

Concentrations of harmful trace metals (Cd and Pb) were determined in edible tissue and liver of three commercially important fish species from the eastern Middle Adriatic. Levels found for cadmium and lead were not indicative of pollution. Cadmium concentration in fish tissues was lower, whereas lead level was in the range of values reported for other coastal areas of the Mediterranean. The edible tissue of the investigated species was not harmful for human health.

Keywords : Adriatic Sea, cadmium, lead

Introduction

The fish meat is an important component of the diet in the Croatian coastal region. In this connection we report lead and cadmium levels in muscle tissue and liver of three commercially important fish species (hake, *Merluccius merluccius*; red mullet, *Mullus barbatus*; and pandora fish, *Pagellus erythrinus*) from the eastern Middle Adriatic.

Methods

Fish samples were collected by the bottom trawl at 26 locations in coastal and open waters of the eastern Middle Adriatic (Fig. 1), during June and July of 1995. Sampling and pre-treatment of samples were performed according to UNEP/FAO/IAEA/IOC (1). After sample digestion (2), the analyses of Cd and Pb were performed by graphite furnace atomic absorption spectrophotometry (GF-AAS) on instrument Perkin Elmer 1100 B. The accuracy of analytical procedure was tested using certified reference materials (DORM-1, TUNA FISH, DOLT-1 and TORT-1).

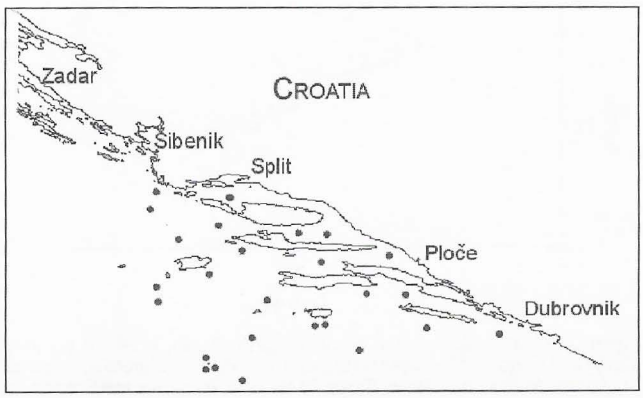

Figure 1. The eastern Middle Adriatic with geographical locations of sampling sites.

Results and Discussion

Cadmium concentration in the muscle tissue ranged from 4.2 to 18.8 $\mu g\ kg^{-1}$ wet weight, while concentrations of lead ranged from 60 to 170 $\mu g\ kg^{-1}$ w. wt. (Fig. 2), depending on the fish species. Values found for cadmium are lower than most values previously reported for the Adriatic and Mediterranean, whereas lead concentrations fall within the range of values reported for coastal areas of the Mediterranean (3, 4).

Cadmium and lead concentrations in liver (Cd : 10–408 $\mu g\ kg^{-1}$ w. wt; Pb : 69–827 $\mu g\ kg^{-1}$ w. wt.) are similar to the results of recent studies for the Mediterranean (5). Generally, liver has accumulated higher levels of trace metals than the muscle tissue. In addition, liver concentrations showed 2-3 times higher variation of values in comparison with the muscle tissue. Differences between trace metal concentrations in analysed tissues are the result of different physiological functions of muscles and liver (2, 6).

Overall cadmium levels in the edible tissue of investigated species are 8-12 times lower than the maximum permited value for fresh fish, whereas lead levels are 11-12 times lower in comparison to the maximum permited value (7) (Fig. 2). Since the average daily intake of Cd and Pb through this source in Croatia (8) constitutes a very small fraction of the Provisional Tolerable Daily Intake (9), we have concluded that eadible tissue of selected species is not harmful for human health.

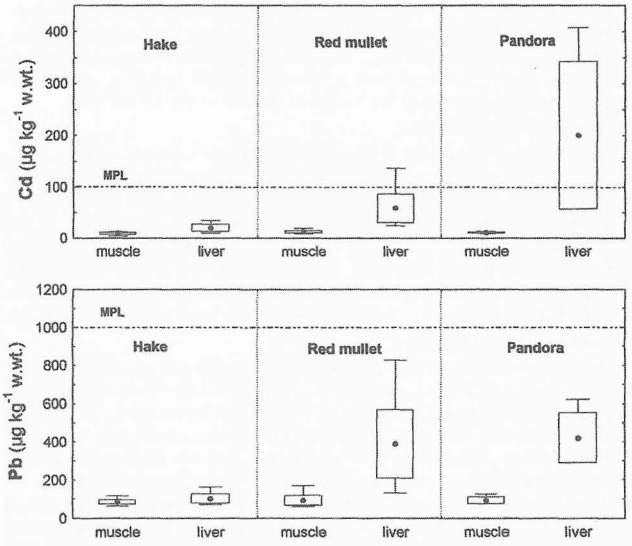

Figure 2. Trace metal content in selected tissues of three fish species from the Eastern Middle Adriatic. Dots represent average values; lower and upper box edges represent average ± 1 SD; outlier bars are minimum and maximum values. Dashed lines (– • –) present Maximum Permissible Levels for fresh fish in Croatia.

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