HEAVY METALS LEVELS IN SOME FISHES AND MOLLUSCS FROM SİNOP PENINSULA OF THE SOUTHERN BLACK SEA, TURKEY

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Abstract

In the present study five heavy metal (zinc, copper, cadmium, lead and cobalt) concentrations in bottom fishes, *Mullus barbatus* L., 1758, *Merlangius merlangius euxinus* (Nordmann, 1840), *Spicara smaris* (L., 1758), *Raja clavata* L., 1758 and in the Mediterranean mussel *Mytilus galloprovincialis* Lamarck, 1819, the sea snail *Rapana venosa* (Valenciennes, 1846) from the Sinop coasts of the Black Sea have been measured by atomic absorption spectrophotometer for monitoring metal pollution in the coastal water. Significant differences in metal concentrations were found between the species ($P<0.05$). Similar significant differences were found with regard to different metals ($P<0.05$). The concentrations of Pb, Cd and Co were not detected in fish species. The same it can be said for Co and Pb in molluscs species. The other metal levels in the Mediterranean mussel and the sea snail were significantly higher than those in fishes.

Keywords : Metals, Fishes, Mollusca, Black Sea.

Introduction

Heavy metals are a major anthropogenic contaminant of estuarin and coastal waters. Their inputs include urban run-off, industrial efluents, mining of operations and atmospheric depositions, and may be in particulate or dissolved forms. Most living organisms need small amounts of some essential metals such as iron, manganese, copper and zinc for their vital processes [2]. However these metals become toxic when they exceeded certain limits [4]. The non-essential metals cadmium, lead, mercury and silver are toxic even at relatively low concentrations [2]. Heavy metal pollution of marine biota is of environmental concern worldwide. [3] pointed out that for an organism to be a useful indicator of heavy metal pollution, there should be a simple relationship between heavy metal levels in the environment and in the organism. Both bivalve molluscs and gastropod molluscs represent organisms commonly employed as bioindicators, and used as a monitor of baseline environmental metal concentrations. Fish, also, are widely used as sentinels of contamination in the aquatic environment. Some fish species, in particular, may accumulate metals many orders of magnitude above background concentrations and thus, demonstrate their potential as bioindicators of pollution [5].

Material and Methods

Study Area

Samples of fishes and molluscs species were collected monthly by trawl, dredge and scuba diving equipment from the upper-infra littoral zone of the Black Sea, at depth of 20 meters or less from during the period January 2005-February 2006.

Six to fifteen individuals from each species were collected from each sampling stations and were rinsed in clean sea water and then placed in plastic bags and frozen at -21°C until their analysis. The tissues of the fish and molluscs were prepared for analysis according to the method described by [1]. Whole fillets and liver were prepared separately from individual fish which were then cut into small pieces and homogenised. Five to ten gram samples of wet muscle tissue and liver tissue were placed in silica flasks and wet digested with 20 ml of $HClO_4$:HNO_3 at 105 °C for 24 h. The filtered extracts were brought to 25 ml with HNO_3 (70%) and diluted [1]. The solutions were analysed by using a 929 UNICAM Atomic Absorption Spectrophotometer for metals.

Results and discussion

The concentrations of heavy metals in edible parts of demersal fishes ranged between; 1758; 0,380-2,714 μg Cu/g ; 1,424-63,290 μg Zn/g for *Mullus barbatus,* 0,913-8,952 μg Cu/g ; 8,862-163,277μg Zn/g for *Merlangius merlangius euxinus,* 0,610-4,161μg Cu/g ; 6,234-57,743 μg Zn/g for *Spicara smaris* and 0,496-9,356 μg Cu/g, 6,601-35,873 μg Zn/g for *Raja clavata*, all values being expressed on dry wt basis.

The concentrations of heavy metals in edible parts of mollusc species *Mytilus galloprovincilis* and *Rapana venosa* ranged between; 4,301-10,960 μg Cu/g; 0,305-4,878 μg Cd/g; 24,862-519,701 μg Zn/g and 10,458-79,167 μg Cu/g; 0,273-11,535 μg Cd/g; 2,678-104,025 μg Zn/g, respectively, all values being expressed on dry wt basis.

These results showed that the concentrations of heavy metals in organism depend on not only organism and metal but also different geographical location. The levels of metals for all fish species were well below the permitted levels, while the Mediterranean mussel and the sea snail showed higher levels. In conclusion, the heavy metal concentrations of fish in the Black Sea do not present any danger to human health or human consumption. Whereas, this cannot be said for molluscs.

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