HEAVY METAL MONITORING IN RED MULLET *MULLUS BARBATUS* (L.1758) FROM IZMIR BAY (EASTERN AEGEAN SEA-TURKIYE) 1999-2001.

Ugur Sunlu

Ege University, Faculty of Fisheries, Dept. of Hydrobiology, 35100 Bornova Izmir, Turkiye - sunlu@sufak.ege.edu.tr

Abstract

Bio-monitoring of heavy metal levels in edible parts of *Mullus barbatus* (L.1758) was conducted in Izmir bay during two years period. Moreover, some physico-chemical parameters, also have been analysed in the same region. The levels of trace elements in edible parts of demersal finfish *M. barbatus* (L.1758), sampled from Izmir bay have ranged between; 0.14-0.55 µg Cd/g wet weight, 0.80-2.60 µg Pb/g w.w., 0.11-0.50 Cu/g w.w., 6.59-11.21 µg Zn/g w.w., 2.12-13.25 µg Fe/g w.w. Generally heavy metal levels are lower than the results in fish tissues reported from Mediterranean regions.

Key words; Bio-monitoring, Heavy metals, Mullus barbatus, Izmir bay.

Introduction

Heavy metals are a major anthropogenic contaminant of estuarine and coastal waters. Their inputs include urban run-off, industrial effluents, mining operations and atmospheric depositions, and may be in particulate or dissolved forms. Although many are essential biological elements, all have the potential to be toxic to organisms above certain threshold concentrations, and for the protection of aquatic biota it is important that these limits not be exceeded in aquatic environments.

Determination of heavy metal levels in marine organisms are usually preferred than the measuring of the metal concentrations in seawater and sediment samples. Metal concentrations in seawater are very low and show wide fluctuations. Marine organisms can be used as monitors to give information on concentrations of heavy metal or changes in metal availabilities in the surrounding environment (1, 3).

Red mullets, being bottom dwellers to a certain extent, are species that tend to concentrate contaminants to a higher degree than other species due to high mobility. For this reason it was recommended by as monitoring species. A number of studies have determined the trace metal concentrations in Izmir Bay and Eastern part of the Aegean Sea (2).

The aim of this study was to determine the trace metal concentrations (Cd, Pb, Zn, Cu, Fe) in edible tissues of the demersal finfish *M. barbatus* caught from Izmir Bay during two years period. Further more the present study, discusses the temporal variations of the heavy metals.

Study Area;

The Bay of Izmir extends about 24 km in the East-West direction and its average width is about 5 km. It is roughly L-shaped. From the standpoint of its topographical and hydrographical characteristics, the Bay consists of three sections: the Inner, Middle and the Outer Bay (Fig. 1).

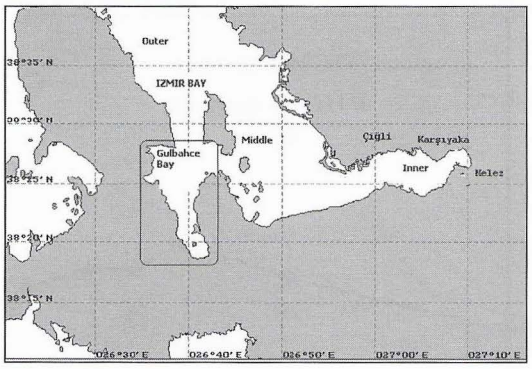

Fig.1. Map of Sampling Area.

Izmir Bay receives pollutants from direct urban effluents, industrial activities and the sewage of 3 million inhabitants of City. For this reason Izmir Municipality decided to construct "Izmir Big Channel" Waste-Water Project in 1969. But unfortunately Water treatment Construction could not be completed until the end of 2002. In 2000-January half of the water treatment plant opened and 65% of the sewage water started to treat until January 2000. At the end of the plant construction in 2002, the pollutant levels of the Inner Bay water decreased slowly and remediation period began (3).

Methodology

During the period November1999-October 2001 *M. barbatus* were caught by trawl from Gulbahce Area which is located in middle part of Izmir Bay (Fig. 1). At the same time some physico-chemical environmental parameters has been measured. Deep sea water temperature has been measured by 0.1°C sensitive thermometer, dissolved oxygen (Winkler method) were measured on board ship whereas salinity was determined with Harvey method and the pH values were measured by pH Electronic Papier Hanna Instrument.

Dorsal muscle of Red mullet were taken from similar size speciemens. Tissues were homogenised with blender; approximately 5-7 g of homogenate was then digested with 5:1 HNO_3:$HClO_4$ under reflux, filtered and diluted with double distilled water. Metal samples were measured by a PYE Unicam SP-9 AAS. Metal values were determined by direct aspiration using air-acetylene flame. Intercalibration fish muscle homogenate samples (IAEA-142/TM) were used as a quality control sample (4).

Results and discussion

The variability in metal concentrations of marine finfish depends on many factors, either environmental (metal concentrations in sea water, temperature, salinity, dissolved oxygen, pH, etc.) or purely biological (species, tissues, organs, feeding conditions, etc.).

Minimum, maximum and average values of some physico-chemical environmental parameters which are related to trace metal accumulation in deep waters of Gulbahce area were changed in; 11.0-26.4, 19.8° C for temperature, 33.76-39.21, 36.58 for psu, 7.15-8.20, 7.60 for pH and 5.20-8.50, 7.40 mg/l for dissolved oxygen.

The levels of trace elements in edible parts of demersal finfish *M. barbatus* (L.1758), sampled from Izmir bay have ranged between; 0.14-0.55, 0.19 µg Cd/g wet weight, 0.80-2.60,1.40 µg Pb/g wet weight, 0.11-0.50, 0.27 µg Cu/g wet weight, 6.59-11.21, 7.60 µg Zn/g wet weight, 2.12-13.25, 8.05 µg Fe/g wet weight .

Conclusions

In conclusion, we have carried out analyses on the levels of trace metals in the muscle tissues of *M. barbatus* from middle part of Izmir Bay. Lead concentrations are similar to those reported in fish from Mediterranean countries. Cadmium, iron, zinc and copper levels are lower than the results in fish tissues reported from Mediterranean regions. Some generalizations can be inferred from the mean trace metal levels in fish. The order of the metal concentrations found in *M. barbatus* was **Fe>Zn>Pb>Cu>Cd**.

Generally, the Inner Bay which is a shallow water body having a limited water exchange with the Outer bay and the open sea. According to metal results, a dominant source of metal contamination from urban and industrial activities and less important inputs from continental and agricultural orgins. Metal concentrations distribution in biota indicate higher levels in inner parts of Izmir Bay. Pollution of the Inner Bay is effected on biodiversity very negatively. Only indicator marine organisms can live in inner part of Izmir bay for recent years.

The Middle Bay is a transition zone, and with such characteristics it must be monitored very carefully in the future phases of the monitoring programme. This area relatively far from anthropogenic sources so that these site was affected very little by chemical contamination.

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