EVALUATION OF HEVY METALS IN DIFFERENT TISSUES OF RED MULLET

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ABSTRACT

The concentration levels of mercury, lead, cadmium and chrome were measured in muscle and liver tissue of Red mullet (*Mullus barbatus*). Fish samples were collected and purchased from the main fresh fish market of Tirana. A total of 40 samples of muscle and liver tissue were determined by using atomic absorption spectrophotometer (AAS). The results of the study showed that Hg levels (p=0.001) varied significantly between tissues of Red mullet samples. Based on the results concentration level of Hg, Pb and Cr measured in muscle samples tissue resulted to be within the permissible levels for human consumption set by EC legislation. Cadmium made an exception (0.09 mg/kg ww). The results of our study gives important information on heavy metal contamination of Red mullet tissues. Furthermore the data suggests that Red mullet should be object of further monitoring with the aim to safeguard Tirana

Keywords:*Heavy metals, Red mullet, Muscle tissue, Liver tissue*

MATERIALS AND METHODS

Sample collection and preparation

The fish species named red mullet *(Mullus barbatus)* was collected during Summer 2011- 2013. Fish samples of red mullet (originated from Adriatic Sea), were purchased at the main fresh fish market of Tirana. The study included 20 samples of muscle and liver tissue of red mullet. The mean weight of fish species was 55 g. The fish samples were first, identified, weighed, catalogued and conserved at - 18°C and then they were sent for further investigation to the Laboratory of Toxicology, Institute of Veterinary and Food Safety, Tirana.

Determination of heavy metals

A total of 40 samples of muscle and liver tissue of red mullet were evaluated for the concentration level of mercury (Hg), lead (Pb) cadmium (Cd), and chrome (Cr) by using an Atomic Absorption Spectrophotometer (AAS). Both tissues of fish species were homogenized in a blender; and then they were dried at 100 ºC. One g of sample was weighed and then treated with 10 ml of HNO_3 and 5 ml of concentrated H_2SO_4 and let in overnight. The next day they were dried at 150º C for at least, 30 minutes and 50 ml of it were put into a normal flask, and filled with tap water. The heavy metals were measured by ICP-OES, Optima 2100 Dv produced by Perkin Elmer.

INTRODUCTION

The contamination of fishery products due to contamination of aquatic environment is becoming an important issue all world wise. These decades the terrestrial and aquatic environment has been contaminated by persistent chemical pollutants such as heavy metals. They originated both by natural and anthropological sources. Heavy metals are chemical substances which are present not only in the aquatic environment but also in animals who lives into near contact with it. The affinity of such substances to accumulate and bioaccumulate in tissues of fish species may pose a real threat to consumers health by eating them. Fish species are the most appreciated food by consumers, because they are rich on proteins, unsaturated essential fatty acids, minerals and vitamins. Albanians costal area in know to be rich with a large variety of wild fish species. Benthic species as red mullet are an important part of it. Red mullet is a carnivore benthic fish species which is characterized by an excellent white meat. These specie is one of the most appreciated wild fish species by Albanians consumers. Actually in Albania exist a gap of information about the pollution of fish wild species from chemical compounds as heavy metals. According to these fact the purpose of the study was to evaluate and monitor the concentration level of mercury, lead, cadmium and chrome in different tissues of this typical wild fish species as red mullet and then compare the results with the EC legislation.

RESULTS AND DISCUSSION

Table 1 . Average mean values of Hg, Pb, Cd and Cr in muscle and liver tissue of red mullet (mg/kg wet weight)
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	Fish species: red mullet (*Mullus barbatus*)			
Heavy metals				
	Mean	**SD**	**SE**	**p***
Hg _muscle	0.0169	0.0255	0.0057	**0.001**
Hg_liver	0.0915	0.0688	0.0154	
Pb_muscle	0.0215	0.0723	0.0162	**0.956**
Pb_liver	0.0227	0.0545	0.0122	
Cd_muscle	0.0998	0.2089	0.0467	**0.790**
Cd_liver	0.1126	0.1093	0.0244	
Cr_muscle	0.1350	0.2927	0.0655	**0.902**
Cr_liver	0.1255	0.1017	0.0227	

** student test*

RESULTS AND DISCUSSION

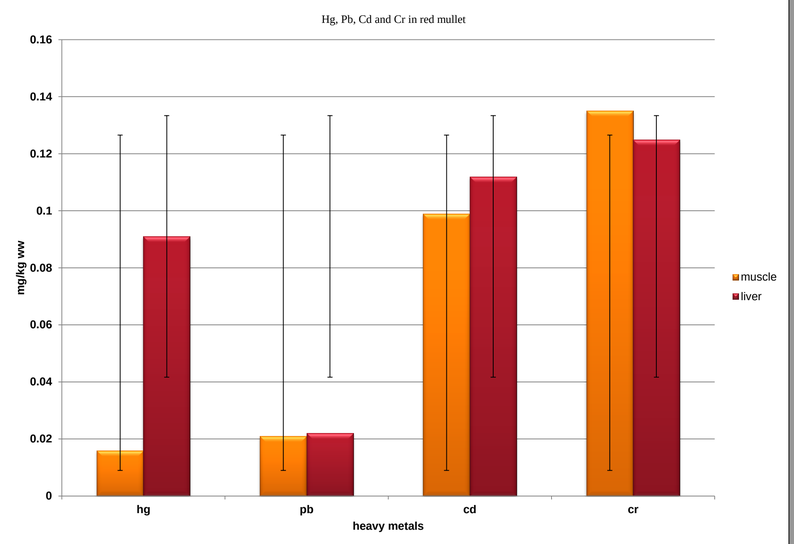

Figure 1: Average concentration levels and SD of heavy metals in tissues of red mullet (mg/kg wet weight)

The results obtained from these point of the study (Tab.1 and Fig.1) revealed that the concentration level of Hg and Pb in red mullet species is lower than the maximum permitted level for human consumption set by EC regulation (Hg – 1.0; Pb - 0.30 mg/kg wet weight, EC, 2006 & 2008). In the case of cadmium (Tab.1, Fig.1) the average mean concentration level in muscle tissue exceeded the maximum values for human consumption (Cd – 0.050 mg/kg wet weight, EC, 2006 & 2008).

CONCLUSIONS

The result obtained in this study revealed that tissues of red mullet are contaminated at different levels of heavy metals. The concentration levels of heavy metals measured in muscle tissue of these wild species resulted to be within the permissible levels for human consumption set by EC legislation. Cadmium made an exception. According to EC values the levels of heavy metals in red mullet doesn't pose risk for Albanian consumers. Referring to the results the highest levels of heavy metals found in liver tissue of fish doesn't shows risk for consumer because they are excluded as food for human consumption.