

## Histopathology of the Liver and Gills of Grey Mullet (*Mugil cephalus* L.), Fed with Dietary Amino-acid cysteine under Exposure to Heavy Metals Cu and Zn

Javad Ghasemzadeh<sup>1\*</sup>

Zahra Norouzi<sup>2</sup>

Mahmood Sinaei<sup>3</sup>

Omid Koohkan<sup>4</sup>

Hasan Zadabbas Shahabad<sup>5</sup>

1. Assistant Professor,  
Department of Fisheries, Faculty  
of Marine Sciences, Chabahar  
Maritime University, Chabahar,  
Iran

2. M.Sc. Student, Department of  
Fisheries, Faculty of Marine  
Sciences, Chabahar Maritime  
University, Chabahar, Iran

3. Assistant Professor,  
Department of Fisheries,  
Chabahar Branch, Islamic Azad  
University, Chabahar, Iran

4. Technical Officer, Department  
of Fisheries, Faculty of Marine  
Sciences, Chabahar Maritime  
University, Chabahar, Iran

5. Technical Officer, Department  
of Fisheries, Faculty of Marine  
Sciences, Chabahar  
Maritime University, Chabahar,  
Iran

**Corresponding author:**

jghasemz@gmail.com

**Reception date:** 2017/01/01

**Acceptance date:** 2017/03/14

### Abstract

Histopathological changes in the liver and gills of grey mullet (*Mugil cephalus* L.) fed with diets containing amino-acid L-cysteine and exposed to heavy metals copper and zinc was investigated in 2016 at Chabahar Maritime University. The aim of this research was the determining of the effects different concentrations of amino-acid L-cysteine on the liver and gill tissues of grey mullets, against the pollution of these metals. For this purpose 300 grey mullet juveniles with an average weight of  $27.4 \pm 3$  g were captured from the coastal waters of Chabahar Bay, and after adaptation to the laboratory conditions and artificial feeding, were divided into seven treatments (one control group, three Cu treatment and three Zn treatments). In this study, the experimental fishes were exposed to heavy metals Cu and Zn (20% more than their natural concentration in the coastal waters of the University), and fed with four diets containing (0, 25, 50 and 100 percentage) of cysteine relative to the cysteine content of the basal diet for 45 days. At the end of culture period (45 days) random tissue samples from the gills and liver of all treatments were taken, and after dehydration, fixation in paraffin, discoloration and clearing were stained by hematoxylin and eosin solutions. The results of microscopic observation of prepared samples revealed that the severity of tissue damage in treatment three (with 100% cysteine) was the most; while in treatment one (with 25% cysteine) was the least compared with other treatments. Moreover, the diet containing 25% cysteine was more efficient compared to the other diets with higher cysteine content (50 and 100%), in terms of severity of damages, while in the higher concentrations of cysteine, the severity of damages was intensified concurrent with the effects of the heavy metals. Therefore, the obtained results proved that the amino-acid cysteine improves the detoxification process by influencing the metabolism of metals in fish, and reduction of the harmful action of heavy metals on the histopathological changes of the liver and gills. Besides the liver and gill tissues can be used as suitable indicators for the assessment of histopathological changes inflicted by heavy metals in mullet fishes.

**Keywords:** Histopathology, Heavy metal, Grey mullet, Cysteine, Copper, Zinc.