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ESTIMATION OF THE HEAVY METALS IN THE POISONOUS RABBIT FISH LOCATED ON THE SHORES OF DERNA LIBYA

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Abstract

The concentration of metals in the animal organs can be a reasonable guide to public health standards and for the organism condition as well. Each environmental pollutant, and metals are of particular concern, to their potential toxic effect and ability to bio accumulate in aquatic ecosystems. The present work was carried out to compare some heavy metals of the rabbit fishes in Derna city. In the present study the concentration of four heavy metals; lead (Pb), Chromium (Cr), cadmium (Cd) and Nickel (Ni), were estimated in Fish fin, liver tissue, eyes and skin of rabbit fish species; Euthynnus all the Libyan coast plays an important role in terms of biodiversity and productivity of Mediterranean marine ecosystem. This study is outlined to survey potential dangers for human populaces through angle admissions. It enhances the information about anthropogenic impacts in Derna (Libya). The levels of lead (Pb), cadmium (Cd), Chromium (Cr) and Nickel (Ni), in Fish fin, liver tissue, eyes, meat and skin of rabbitfish. The results appeared that impressive distinction in metal concentrations among fish organs. The highest concentrations of lead (Pb) in the fish fin. While, Nickel (Ni) the lowest concentration in the skin.

Keywords— *Rabbit fish, Heavy metals, Libya and Derna*

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INTRODUCTION

Chimaera monstrous a, also known as the rabbit fish or rat fish, is a northeast Atlantic and Mediterranean species of cartilaginous fish in the family Chimaeridae.[1] The rabbit fish is known for its characteristically large head and small, tapering body. With large eyes, nostrils, and tooth plates, the head gives them a rabbit-like appearance, hence the nickname “Rabbit fish”. They can grow to 1.5 meters (5 ft) and live for up to 30 years [1].

Fish, meat and meat products are important for human diet in many parts of the world because they contribute to solve the glo- bal food problem and provide the well-known proteins, minerals, vitamins and trace element contents. Concern around the impacts of anthropogenic contamination on the biological systems is developing. Heavy metals from man-made contamination sources are ceaselessly discharged into the oceanic and earthbound biological systems. Contamination with heavy metals is a serious

threat because of their toxicity, bioaccumulation and biomagnifications in the food chain[2].

Libya is nearly self-sufficient in angle with a moo evaluated per capita utilization of new angle items of roughly 7 kg year -1[3]. Nearly 95% of the total catches are for direct human consumption [4]**.** Contaminations of marine environment with heavy metals have been receiving worldwide attention, especially in developing countries like Libya, and have become a challenge for scientists. Metals triggered in the aquatic environment by atmospheric deposition and erosion of the geological matrix, or through anthropogenic sources [5]**.** Follow metals are first sullying specialists which weakened the sea-going biological systems due to their poisonous quality, determination, wealth, and ensuing bio-accumulation, and all have the potential to be harmful to living living beings [6]. Overwhelming metals can be emphatically collected in dregs and biomagnified along the sea-going nourishment chains. Because of the non-degradability of heavy metals, toxic effects are often observed at points far away from the sources [7]**.** Fish lie in a higher level of the food chain, and they are widely used to biologically monitor the level of metal pollution in aquatic ecosystems [8]**,** as angle may expend huge sums of a few metals from the water [9]. Poisonous bioactivity may posture genuine dangers to ordinary metabolic forms. In angle, gills are considered to be the overwhelming location for contaminant take-up since of their anatomical and/or physiological properties that amplify retention proficiency from water [10]. Moreover, metal distribution between the different tissues depends on the mode of exposure, i.e., dietary and/or aqueous exposure, and can serve as a pollution indicator [5]**.** Heavy metals enter the sea-going nourishment chain through the stomach related tract and non-dietary courses over porous films such as the muscle and gills straightforwardly utilization of water and nourishment. Levels of heavy metals in fish frequently reflect levels found in sediment and water of the particular aquatic ecosystem [11]**.** The main objectives of this work were: Study the content of heavy metals in Mediterranean Sea rabbitfish in Derna (Libya).

MATERIALS AND METHODS

This study was conducted on rabbit fish in Libya were collected from the sea fishing harbor in Derna city during two periods, in November 2016 and September 2017. The samples were covered with ice to keep them from decomposition and brought to the laboratory of the Faculty of Sciences, Omar almokhtar University, and fish were dissected, organs extracted, separated from the intestines and kept in sterile bottles at -20 ° C . The wet digestion method was followed by placing 1 gm from the organ tissue in a 250 ml beaker and then adding 10 ml of nitric acid (65%), and left for 24 hours at room temperature [12]**.** The samples are then filtered into beakers and placed on a hot plate with the addition of distilled water (25 ml) and kept in glass bottles to estimate the heavy metals (Pb, Cr, Cd, Ni) in the studied fish organ tissue.

Result

The mean values ± standard deviation o**f** lead (Pb), cadmium (Cd), Chromium (Cr) and Nickel (Ni) concentrations in the rabbit fish are given in Table 1.

Fish is highly recommended as animal protein source instead of mutton in order to avoid high cholesterol level. So, the quality of fish is of a special concern. Moreover, fish has been successfully employed in bio-monitoring programs of a wide range of pollutants including heavy metals in order to assess the quality of marine environment [13]. All examined metal concentrations were determined on a wet weight basis. In addition, metal levels in muscle tissue of these species were compared with the maximum. The levels of heavy metals concentration (Pb, Cr, Cd, Ni) in the different organs of the studied species are illustrated (Table 1 and figure 1 to 4).

Table1: Trace metals concentrations (mg/l) in skin, eyes, fish fin, liver and meat of rabbitfish Derna, Libya 2017.

Organs	Pb	Cd	Ni	Cr
Skin	1.600± 0.0587^{c}	0.026± 0.0004^{e}	0.052± 0.0021^{c}	0.511± 0.0053^{b}
Eyes	1.763± 0.0368^{bc}	0.484± 0.0298^{a}	0.032± 0.0158^{b}	0.5266± 0.0159^{b}
Fishfin	1.833± 0.0127^{b}	0.368± 0.0298^{b}	0.0325± 0.0157^{b}	0.5276± 0.0121^{b}
Liver	1.320± 0.0178^{d}	0.0217± 0.0043^{c}	0.3320± 0.0132^{b}	0.3890± 0.0055^{a}
Meat	2.181± 0.0437^{a}	0.127± 0.0038^{d}	0.590± 0.0052^{a}	0.4256± 0.0078^{c}

Values are expressed as means ± SE. Mean values within a row not sharing a common superscript letters (a, b, c,d,e) were significantly different,p<0.05.

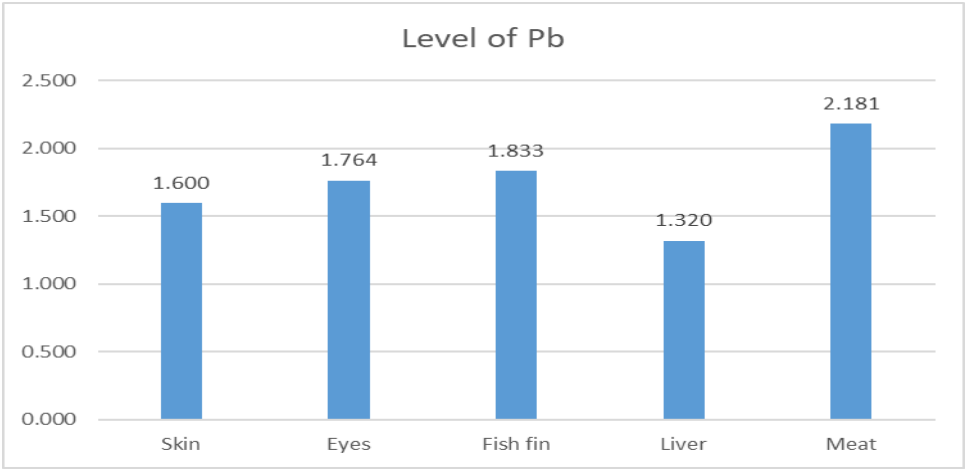

Figure1. The symmetry between the concentration of level of lead (Pb) in organs of rabbitfish.

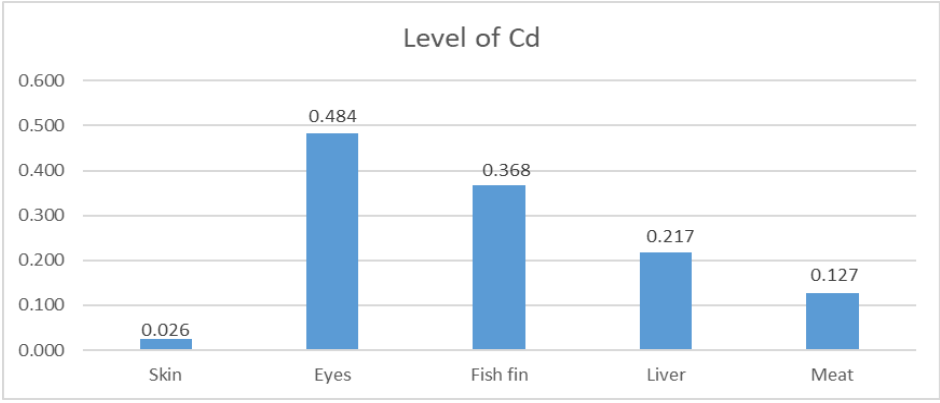

Figure2. The symmetry between the concentration of level of cadmium (Cd) in organs of rabbitfish.

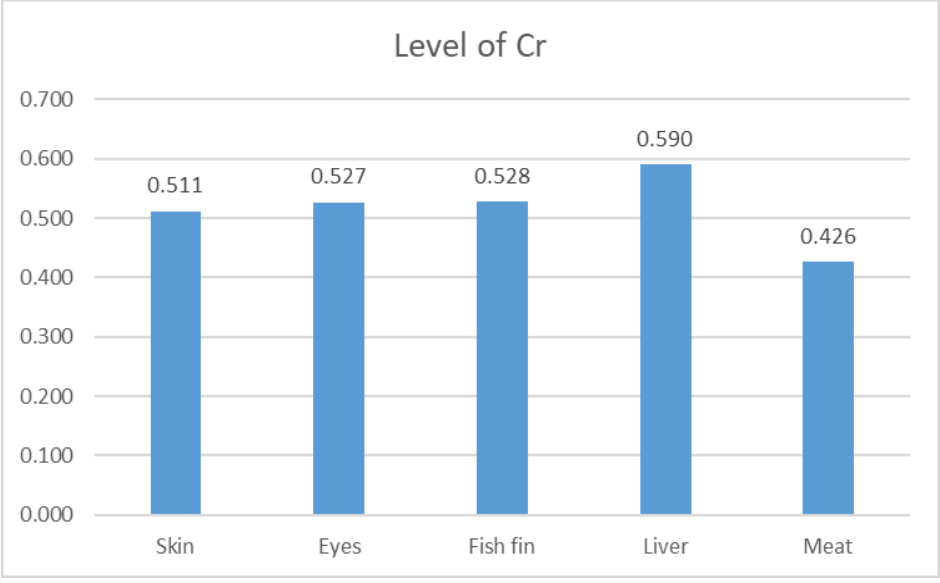

Figure3. The symmetry between the concentration of level of Chromium (Cr) in organs of rabbitfish.

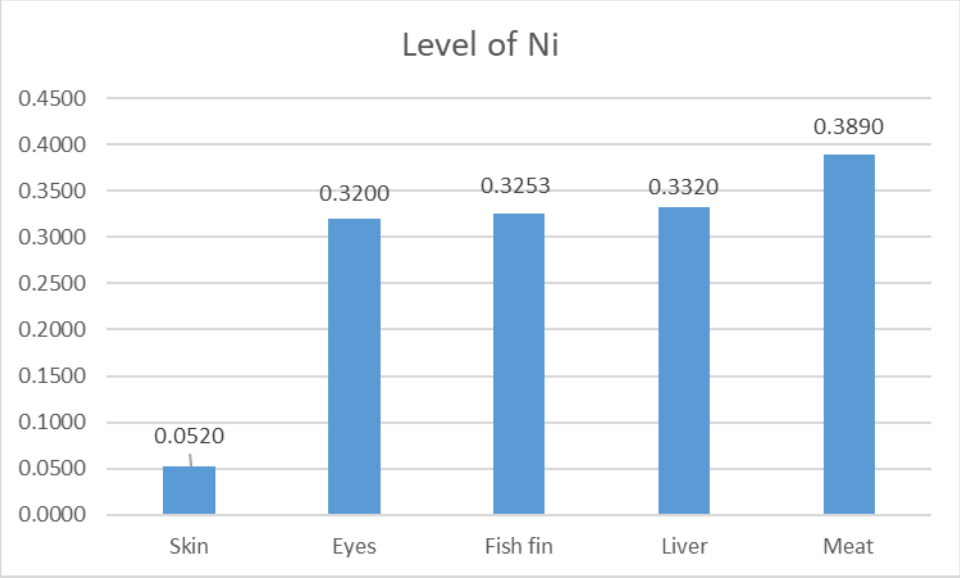

Figure4. The symmetry between the concentration of level of Nickel (Ni) in organs of rabbitfish.

DISCUSSION

Some heavy metals, such as Pb, Cr, Cd and Ni have important role in the ecosystem, while others are not essential and toxic when it reaches the body. The essential metal become toxic when their concentration becomes higher than that allowed [14]. The physiological changes of fish used as indicators of pollution aquatic ecosystems [15]. Study of heavy metals concentration in the liver is an indicator suitable to metal contamination [16]. And it has a higher potential for bioaccumulation of heavy metals due to its function in detoxification [17]. In this study concentration of heavy metal was highest than other metals in the meat tissue in the rabbit fish, this result agreement with several results of studies for rabbitfish [18-22]. In the present study concentration of heavy metals showed a difference depending on rabbitfish during 2016-2017. This may be due to the difference in where these species live on the coast. (different distances and depths). or may be due to dietary habits and metabolic activity [23]. The study of the concentration of heavy metals in non migratory fish is an indicator of the pollution of aquatic ecosystems [20]. Lead was present in the high-concentration in the meat However, the obtained results for lead are higher than the standard permissible levels, 0.4 mg/kg [24] and 0.5 mg/kg [25]. Lead is known to induce reduced cognitive development and intellectual performance in children and increased blood pressure and cardiovascular disease in adults. [26] reported that Cd effects on fish include gill and kidney damage, poor bone mineralization, and delayed growth. The main source of Cd exposure in humans is through food consumption. Cadmium is known to be an endocrine annoying substance and may cause development of prostate cancer and breast cancer in humans [27]. High levels of Cd ingestion can cause acute renal failure in humans [28]. The main mechanism of toxicity of Cd is the antagonistic interaction between the uptake of Ca^{2+} and Cd^{2+}, which disrupts Ca^{2+} absorption leading to growth reduction [29]. Fish have the ability to accumulate heavy metals at concentrations higher than that in water due to they feed on algae and small organisms as well as organic matter in the aquatic environment [30]. Concentration of heavy metals increases in tissue of fishes directly through movement of the water to the gills or through body surface or indirectly through food chain via digestive track [31,32]. Bioaccumulation of heavy metals varies between species, ages and sex of tissue the organism. The target tissue of these minerals is the most active tissue in metabolic processes such as liver, kidney and gill [33]. The heavy metal bind with proteins, enzymes and amino acids and causes an imbalance in the tissue functions [34].

Conclusions

The Libyan coast plays an important role in terms of biodiversity and productivity of Mediterranean

marine ecosystem. This study is designed to assess potential risks for human populations via fish intake. It enhances the information about anthropogenic impacts in derna port (Libya) to understand the distribution of pollutants encourage appropriate common policies to predict potential risk zones for stakeholders. The levels of lead (Pb), cadmium (Cd), Chromium (Cr) and Nickel (Ni), in Fish fin, liver tissue, eyes, meat and skin of rabbit fish species in derna Port (Libya).

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