Research Paper

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Impact of Chromium on Lactate in different types of muscles of a fresh water fish, Labeorohita

Zoology

KEYWORDS : Chromium, muscles, Labeo rohita and Lactate

M. Cynthia Sailaja	Department of Zoology, S.V. University, Tirupati – 517502
J. Vijay Kumar	Department of Zoology, S.V. University, Tirupati – 517502
K. Jayantha Rao	Department of Zoology, S.V. University, Tirupati – 517502

ABSTRACT

Chromium is a metallic elementconsidered as heavy metal treated as major pollutant. Lactate is the major end product of anerobic glycolysis in muscle. Muscle is the nutritional part of the fish.The present investigation was carried out to study the effect of chromium on Lactate in selected muscle tissues of a fresh water fish,Labeorohita. The alterations in Lactate activity on exposure to sublethal concentration (1/10 of LC50, 96hrs) of chromium for 7 days and 30 days was investigated in the present study. In the present investigation cardiac muscle is found to have higher Lactate content compared to the rest of the tissues and the sequence is as follows: PR > CR > PP > CW > CM

Introduction:-

Chromium is a metallic element which can exist in several valence states.However, in the aquatic environment it is always found in trivalent or hexavalent. Hexavalent chromium is the strong oxidizing agent which reacts readily with reducing agents. Chromium salts are used extensively in the metal finishingindustry as electroplating, cleaning agents, and as mordants in thetextile industry. Theyare also used in cooling waters, in theleather tanning industry, in catalytic manufacture, in pigments andprimer paints, and in fungicides and wood preservatives.Cr(VI)is considered the toxic form because it readily crosses cell membranes and reduced to Cr(III)which complexes with intracellular macro molecules, including genetic material, and is ultimately responsible for the toxic and mutagenic capacities of chromium (Farag et al., 2006; Li et al., 2010; Rahman et al., 2012; Venkatramreddy and Paul, 2011).

Fish, as an aquatic organism assimilate metals by ingestion of articulate material or food in water or by ion-exchange of dissolved metals through lipophilic membranes (e.g. the gills) Mendil et al., 2005) which accumulates in various tissues (Ahmad et al., 2010; Haque et al., 2005; Mohiuddin et al., 2011).

Material& Methods:-

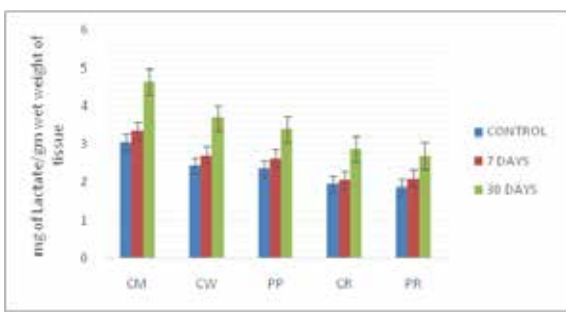
Labeo rohita is a fresh water major carp commonly found in AP. Labeo rohita ranging in weight from 15 ± 2 gms and length of 10 ± 2 cm were procured from local ponds and transported to the laboratory, treated with 0.05 % KMnO4 solution for 2 min to avoid dermal infection.Fishes were kept in large cement tanks and supplied with clean de-chlorinated tap water and acclimatized for about two weeks prior to the experiment under natural photo period with constant aeration. During this period the fish were fed with commercial fish feed twice a day. Analytical grade chromium as Potassium dichromate supplied by BDH was used as a metal toxicant throughout the experiment.

Fishes were divided into three groups containing 10 fishes each with the Ist group serving as control without any treatment. The group II, III fish were exposed to sublethal concentration (1/10th of LC_{50} /96 hrs, 10 ppm) of Potassium dichromate for 7 days and 30 days after determining LC_{50} values (Finney, 1964). At the end of the each exposure period fishes were sacrificed and the muscle tissues like Pectoral pink, Pectoral red, Cardiac, Caudal white and Caudal red were isolated.

Results:-

Lactate is the major end product of anerobic glycolysis in muscle. In the present study cardiac muscle is found to have highest lactic acid content compared to the rest of the tissues (Fig.1)and the sequence is as follows: PR > CR > PP > CW > CM

Fig.1: Lactate levels in different muscles of Control and Experimental fish. Labeo rohita



Discussion:-

Lactic acid is the major end product of anerobic glycolysis in muscles. As the fishes having single circulatiry route; heart pumps reduced blood that is relatively low in oxygen and high in Co2 (Lagleret al., 1977). This could be the reason, that cardiac muscle in control fish has shown high amount of lactate. Caudal white and pectoral pink muscles have higher amounts of lactate than pectoral red and caudal red. Due to glycogenolysis pectoral pink and caudal white muscles shows higher lactate content and may be due to oxidative glycolytic nature pectoral red and caudal red muscles have shown lesser amounts (Fig.1). Highest lactic acid content was shown by the cardiac muscle may be due to partial catabolism of fatty acids and proteins which serve as additional source of lactate (Shul Man, 1972).

In the present investigation lactate content increased significantly in both 7 days and 30 daysexperimental fish (Fig.1). The increasing order for both 7 and 30 days is as follows: PR > CR > PP > CW > CM

The increase inlactic acid may be due to break down of glycogen and proteolysis.The consistent increase in the tissues is may be due to prevailing hypoxic conditions in the animal with the failure of respiratory lamellae(Girija, 1987) in gills. Due to aerobic nature in red muscle and anaerobic nature in white muscle of control fish have shown higher lactate amount in cardiac muscle followed by caudal white, pectoral pink, caudal red and pectoral red (Fig.1). Under sublethal concentrations of chromium lactate content is increased and pyruvate content decrease due to prevalence of anaerobiasis in fish (Azhar Baig, 1988).

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