

POSSIBLE PROTECTION OF CALCIUM AGAINST CADMIUM
INDUCED BIOACCUMULATION AND ALTERATIONS IN
SELECTED OXIDATIVE STRESS ENZYMES IN THE FRESH WATER
TELEOST, *OREOCHROMIS MOSSAMBICUS* (TILAPIA)

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ABSTRACT

Cadmium (Cd) is a toxic metal even in low concentrations with no functional role in biological systems. The present study was carried out to know the protective effects of calcium (Ca) in reducing the Cd accumulation and Cd induced oxidative stress enzyme alterations in the selected tissues of fresh water fish, *Oreochromis mossambicus*. After acclimatization, fish were exposed to sub lethal concentration of Cd ($1/10^{\text{th}}$ of $LC_{50}/48\text{h}$, i.e., 5ppm) for 7, 15 and 30 days (d) period. Then 15d Cd exposed fish were subjected to Ca supplementation (1ppm) for 7, 15 and 30d time intervals. After specific exposure periods tissues like gill, kidney and brain were isolated and used for Cd bioaccumulation and for the assay of superoxide dismutase (SOD), catalase (CAT) and lipid peroxidation (LPO) levels in both control as well as experimental fish. Cd concentration levels significantly increased in all the test tissues with the increased period of exposure. Maximum Cd accumulation was found in 30d Cd exposed kidney tissue ($22.353 \pm 0.41 \mu\text{g} / \text{g wet wt. of the tissue}$). Progressive elevation in LPO levels were observed during Cd exposure and maximum elevation of LPO was found in 30d Cd exposed kidney tissue ($21.692 \pm 0.193 \mu\text{moles of malondialdehyde (MDA) formed} / \text{g wet wt. of the tissue}$). Further the activity levels of SOD and CAT were significantly inhibited. However with Ca supplementation there was significant decrease in Cd bioaccumulation and elevation in the activity levels of the oxidative stress enzymes. Maximum activity levels of SOD (0.601 ± 0.008 superoxide anion reduced / mg protein / min) and CAT ($0.512 \pm 0.006 \mu\text{moles of } \text{H}_2\text{O}_2 / \text{mg protein} / \text{min}$) was observed in 30d Ca supplemented fish kidney. LPO was significantly inhibited in the 30d Ca supplemented brain than the other tissues. Our findings elucidate the beneficial role of Ca as vital supplement in reducing the Cd burden in the fresh water fish *Oreochromis mossambicus*.

Keywords : Cadmium, Tilapia, Calcium supplementation.

INTRODUCTION

In aquatic ecosystem, heavy metals are considered as the most important pollutants, since they are present throughout the ecosystem and are detectable in critical amounts. Among heavy metals, Cd is considered as a major aquatic heavy metal pollutant in many parts of the world¹.