

IMPACT OF FOUR ESSENTIAL TRACE ELEMENTS IN COMBATING CADMIUM BIOACCUMULATION IN LIVER AND KIDNEY OF RAT

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Abstract

Cadmium (Cd) is a toxic heavy metal that enters humans and animal bodies via different industrial products, environmental pollution and different contaminated foods. The present study is carried out to investigate the impact of four individual trace elements selenium (Se), copper (Cu), zinc (Zn) and iron (Fe) on accumulation of Cd in selected tissues such as liver and kidney of Wistar male albino rats. The rats were treated with Cd at specific time intervals of 7, 15 and 30 days (d) and then 15d Cd treated rats were supplemented with the above four essential trace elements for specific time intervals. Rats were treated with cadmium chloride (CdCl_2) at dose of $1/10^{\text{th}}$ LD_{50} i.e. 22.5 mg / kg body weight. The trace elements at a dosage of 1 mg / kg body weight of Se, 16mg/kg body weight of Cu, 12 mg / kg body weight of Zn and 40 mg / kg body weight of Fe were given as supplements. After the specified time intervals, rats were sacrificed and the tissues were analysed for Cd accumulation before and after supplementation by Atomic Absorption Spectrophotometer (Shimadzu – AA 6300). Results revealed significant Cd accumulation in liver and kidney tissues before supplementation to trace elements and there was significant reduction in Cd accumulation in the select tissues after due supplementation with the four essential trace elements. Moreover, the 30d Fe supplemented rat kidney showed more reduction ($9.512 \pm 0.438 \mu\text{g/g}$) in Cd body burden followed by 30d Se supplemented kidney ($9.696 \pm 0.449 \mu\text{g/g}$). The results are extensively discussed on the importance of the selected trace elements to environmental exposures of heavy metals.

Key words : Cadmium bioaccumulation, essential trace elements, rat liver and kidney.

Introduction

Cadmium (Cd) is a common toxic heavy metal and is widely distributed in

the environment due to its use in battery, plastics, fertilizer industries, cigarette smoking. Some of the toxic effects of Cd exposure are hepatic damage, renal dysfunction, hypertension, central nervous system injury, anemia and testicular

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