

## Role Of Selenium and Vitamins E And C In Combating Cadmium Bioaccumulation in The Selected Tissues of Rats: A Therapeutic Approach

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| Article History                                                                   | Abstract                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
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| <p>Received: 06 June 2023<br/>Revised: 05 Sept 2023<br/>Accepted: 25 Nov 2023</p> | <p>The aim of the present investigation is to check the therapeutic role of selenium (Se) and vitamin E and C on cadmium (Cd) induced bioaccumulation in liver, kidney and testis of Cd treated rats. Wistar strain male albino rats were treated with cadmium chloride at a dose of 1/10<sup>th</sup> of LD<sub>50</sub> /48h i.e. 22.5 mg/Kg body weight for 7, 15 and 30 days (d) time intervals. Then 15d Cd treated rats were divided into two groups. Group I supplemented with Se (1mg/kg body weight) and II group received combination of Se, vitamins E (300mg/kg) and C (200mg/kg) and observed for 7, 15 and 30days. After specific time intervals, rats were decapitated and tissues such as liver, kidney and testis were isolated and used for the estimation of Cd bioaccumulation levels by using Atomic Absorption Spectrophotometer (AAS – Shimadzu AA6300). There was a significant elevation in Cd concentrations in the test tissues with increased period of Cd treatment. Maximum Cd accumulation was found in 30d Cd treated rat kidney (42.80±0.30µg / gm). However, there was a significant reduction in Cd bioaccumulation with Se and vitamin E and C supplementation. Maximum decrease in Cd accumulation was found in 30d rat kidney (5.04 ±0.08µg / gm) supplemented with the combination of Se and vitamin E and C. Our findings clearly envisage that combined supplementation of Se and vitamin E and C is more effective in reducing the Cd body burden when compared to the individual mode of supplementation.</p> |
| <p><b>CC License</b><br/>CC-BY-NC-SA 4.0</p>                                      | <p><b>Keywords:</b> Cadmium, Bioaccumulation, Selenium, Vitamin E and C, Rat</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

### 1. Introduction

Metal toxicity have received widespread attention in recent years because of increasing amounts of heavy metals that are released into the environment and their extended persistence and toxicity to a wide variety of organisms (Honghua *et al.*, 2020; Cheng *et al.*, 2022). Development of civilization is parallely accompanied by an enhancement of environmental contamination by several heavy metals such as mercury, arsenic, aluminium, chromium, lead, cadmium etc.,

Among the heavy metals, Cd is one of the most common toxic heavy metals and is widely distributed in the environment. The accumulation of Cd is consistently increased when a certain amount is ingested continuously (Shibutani *et al.*, 2001; Genchi *et al.*, 2020). Cd has been shown to affect cells by multiple modes, making the elucidation of its mechanism of action a very complex task. It can cause damage to cell membrane and certain organelles, alter signal transduction pathways and / or affect the intracellular enzymatic systems. Chronic Cd exposure has been involved in a variety of pathological conditions such as nephrotoxicity, neurotoxicity and carcinogenicity (Sethi, *et al.*, 2006), metabolic, histological changes, membrane damage, altered gene expression and apoptosis (Usha Rani, 2000; Siraj Basha and Usha Rani, 2003; Ognjanovic *et al.*, 2008; Mehrdad *et al.*, 2017; Genchi *et al.*, 2020).

Some of the toxic effects of Cd exposure are hepatic damage, renal dysfunction, hypertension, central nervous system injury and testicular atrophy (Jeyaprakash and Chinnaswamy, 2005; Ognjanovic *et al.*, 2008; Satarug, 2018). Although Cd is widely distributed throughout the body, most of it accumulates in the liver and kidney and alters biochemical and functional changes in the organs (Satarug *et al.*, 2020; Genchi *et al.*, 2020; Balali-Mood *et al.*, 2021). Cd can provoke homeostasis alteration of physiological