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OF ADVANCED RESEARCH****RESEARCH ARTICLE****ZINC AND IRON SUPPLEMENTATION: A POSSIBLE DEFENSE AGAINST
CADMIUM INDUCED BIOACCUMULATION IN LIVER AND KIDNEY OF MALE
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Key words:Cadmium, Bioaccumulation, Trace
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Cadmium (Cd) is a highly toxic, non-essential heavy metal with many industrial uses that can contribute to a well – defined spectrum of diseases in animals as well as in humans. The present study is carried out to know the possible role of trace elements like zinc (Zn) and iron (Fe) supplementation to combat cadmium induced bioaccumulation in liver and kidney of Cd treated rats. Wistar strain male albino rats were treated with cadmium chloride at a dose of $1/10^{\text{th}}$ LD₅₀ / 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 three groups. The first group received Zn (12 mg/Kg), second group Fe (40 mg/Kg) alone and third group supplemented with both Zn and Fe and observed for again 7, 15 and 30d long sojourn. After the specific time intervals, rats were decapitated and tested for bioaccumulation levels of Cd by Atomic Absorption Spectrophotometer (AAS – Shimadzu AA6300). There was a significant elevation in Cd concentrations in both the test tissues with increased period of Cd treatment. Maximum Cd accumulation was found in 30d Cd treated rat kidney ($31.5782 \pm 0.499 \mu\text{g} / \text{gm}$ wet wt. of the tissue). However there was significant reduction in Cd bioaccumulation with Zn and Fe supplements both individually and in combination suggesting their vital role in heavy metal detoxification. Maximum decrease in Cd accumulation was found in 30d rat kidney ($8.327 \pm 0.450 \mu\text{g} / \text{gm}$ wet wt. of the tissue) supplemented with the combination of Zn and Fe. Our findings clearly envisages that combined supplementation of Zn and Fe is more effective in reducing the Cd body burden when compared to the other modes of supplementation i.e. Zn and Fe alone in the male albino rat

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INTRODUCTION:

Metal toxicities 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. Development of civilization is paralelly accompanied by an enhancement of environmental contamination by many heavy metals such as mercury, arsenic, aluminium, chromium, lead, cadmium etc.,

Among the heavy metals, Cd is one of the common toxic heavy metal 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). 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 eg. 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; Haki *et al.*, 2005; Ognjanovic *et al.*, 2008).