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Mini Review

Toxicity of Heavy Metal pollution and the Environment

Thomas Gales*

Department of Food Technology and Nutrition Science, Nathaly Science and Technology University, Nathaly 3814, Bangladesh

ABSTRACT

The accumulation of toxic metals in food poses a health risk. Heavy metal exposure, as well as their toxicity, is a severe problem as a result of eating contaminated veggies. Soil characteristics, which play a key role in heavy metal bioavailability, influence heavy metal dynamics in the soil and their uptake by plants. The addition of organic and inorganic substances has an impact on metal mobility and absorption. A large amount of research also suggests that the age of the ground influences the modulation of metal bioavailability in plants.

Keywords: Heavy metals; Production; Human exposure; Toxicity; Genotoxicity; Carcinogenicity

INTRODUCTION

Metallic elements are defined as heavy metals. Assuming that toxicity and heaviness are linked, toxic metals even include metalloids like arsenic, which can cause toxicity at low levels of exposure [1]. Heavy metals have been reported to affect cellular organelles and components such as the cell membrane, mitochondria, lysosome, and endoplasmic reticulum [2]. Heavy metals have been reported to affect cellular organelles and components such as the cell membrane, mitochondria, lysosome, and endoplasmic reticulum. Each metal is recognised to have specific toxicological modes of action due to its unique characteristics and biomechanical properties.

Arsenic

Occurrences in the environment, industrial production, and use

Arsenic is a naturally occurring element that may be found in practically all environmental matrices at low amounts. Natural events such as volcanism and soil erosion, as well as manmade activity, contribute to arsenic poisoning in the environment. Industrially generated arsenic-containing chemicals have been utilised to make agricultural products such as insecticides, herbicides, fungicides, algaecides, and sheep dips. They've also been utilised to get rid of tapeworms in sheep and cattle in veterinary treatment [3]. Although the amount of arsenic ingested through the air, water, and soil is normally insignificant, exposure through these media can be significant in arsenic-contaminated areas. Workers in vineyards, ceramics, glass-making, smelting, refining metallic ores, pesticide production and application, wood preservation, and semiconductors can be exposed to significantly greater quantities of arsenic and other toxic chemicals

Toxicity and carcinogenicity mechanisms

Arsenic toxic effect is challenging to study since it is impacted by its oxidation state and solubility, as well as a variety of other intrinsic and external factors. The majority of human arsenic poisoning cases have been linked to inorganic arsenic exposure. One of the mechanisms by which arsenic exerts its toxic effect is through impairment of cellular respiration by the inhibition of various mitochondrial enzymes, and the uncoupling of oxidative phosphorylation.

Cadmium

Cadmium's occurrence in the environment, industrial production, and use

Cadmium is a heavy metal that poses a significant environmental and safety risk. It has an average concentration of roughly 0.1 mg/kg in the earth's crust. Cadmium is widely employed in a variety of industrial applications. Cadmium is used in the manufacture of alloys, pigments, and batteries, among other things [4].

Human exposure possibility

Human exposure to cadmium can occur from a variety of causes, including work in primary metal industries, contaminated food, cigarette smoking, and working in cadmium-contaminated environments. Cadmium can also be found in trace amounts in foods such leafy greens, potatoes, cereals, and seeds, as well as liver and kidney [5]. Cadmium levels in blood or urine are widely used to determine cadmium exposure. Environmental contamination and damage to human health to cadmium have increased considerably over the last century as a result of the continued usage of cadmium in industrial applications.

***Correspondence to**: Thomas Gales, Department of Food Technology and Nutrition Science, Nathaly Science and Technology University, Nathaly 3814, Bangladesh, E-mail: gales374@nstu.edu.bd

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Lead

Occurrence of lead in the environment, industrial output, and use

Lead is a bluish-grey metal that is found in trace levels in the earth's crust. Paints and ceramic goods, caulking, and pipe solder have all reduced their use of lead in the industrial sector, lead-acid batteries accounted for 83 percent of total utilisation, with the remainder going to ammunition (3.5%), oxides for paint, glass, pigments, and chemicals. Lead exposure has dropped dramatically as a consequence of several measures, including the eradication of lead in gasoline and the lowering of lead levels in household paints, food and drink cans, and plumbing systems

CONCLUSION

Co-exposure to cadmium and inorganic arsenic in humans resulted in more severe kidney damage than either element alone. Chronic low dose contamination to several elements is a major public health hazard in many locations of metal contamination. The mechanical basis of heavy metal reactions must be understood in order to identify health risks and regulate chemical combinations. As a result, further research is needed to better understand the molecular mechanisms and social health implications of human exposure to toxic metal combinations.

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