Heavy Metals as Possible Contaminant

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The introduction of harmful substances to humans and other living organisms by different means into the environments is termed as pollution. It is caused by several means that are produced in higher concentrations than usual and they can be some harmful solids, liquids, or gases and are called as pollutants.

Among the pollutants responsible for health hazards, these 'heavy metals' are measured as one of the most important environmental pollutants. Heavy metals are the term used for those metals which have density five times higher of water and have toxicity. They are essential to environment but becomes toxic when are available in excess amount. They are posed a great concern because they have a chain of transfer of from contaminated soil to ground water, crops, food chain, animals and ultimately to humans.

Heavy metals are non-biodegradable contaminant hence they have a large spectrum to effects seen especially among children who are more sensitive than adults. Their dissolved forms exaggerate through circulators in the biosystem, majorly the food chain, and results into elevated concentration in humans (Duruibe *et* al., 2007).

Generally, some of these heavy metals are toxic like mercury, cadmium, lead, arsenic and other They are important compounds. types of contaminants found in fresh crops tissues and in foods. They are classified in groups of basic metals, metalloids and transition metals. Among them, transition metals are found majorly. Toxicity of metalloids varies according to the oxidation state and concentration status. At a specific oxidation state they are termed as trace metals and in another oxidation state they are highly toxic. Not all metals are toxic to organisms. Some are essential even at a low concentration and reveal toxic state with increased concentration. (Al-Musharafi SA, 2016)."

Heavy metal-sources

These metals are emitted both by natural and anthropogenic activities into the environment. They

increase metal concentrations to a level which is harmful to the environment.

They are also found in rocks in different chemical forms, and recovered as minerals sulphides, such as iron, arsenic, lead, zinc, cobalt, gold, selenium and antimony. Some metals are found during the mining processes, or in open and partially covered pits and are transported through wind and flood. Most of the water bodies and environmental air are polluted through the mining activities."

The use of fertilizers and pesticides in agriculture is the second most important source of heavy metal pollution. Theses metals are found in fertilizers and also in some pesticides as micronutritional or bicidal components either a naturally occurring contaminant or introduced when waste materials are used to formulate fertilizers product (ISHS, 2001).





The partially treated or mostly the untreated disposals are directly dumped in to the water bodies and these wastages majorly are accumulated with variety of chemicals including heavy metals. Due to scarcity of water bodies in many areas, the water from these contaminated water bodies is used in the agricultural practices by farmers. Manure may contain harmful chemicals that cause harm to fauna, despite their easy availability and rich nutrients content. Their accumulation also depends upon the species of plant, as well as other factors including temperature, moisture, organic matter, pH; nutrient availability and others. Their concentration in crops may vary among local, regional and country level (Zurera and Morena, 1984; Hu *et al.*, 2014).

They can also be introduced into environment during erosion by rain as well as groundwater stream flow to soil. As a result of increased industrialization and urbanization in every part of the country, there are cases of growing environmental pollution and more heavy metal levels in soil, vegetation, water, food, milk and human body. Crops become more contaminated with heavy metals if they are grown on contaminated soil polluted by mining, industrial or domestic sewage sludge, pesticides and fertilizers, transportation or marketing nearby polluted areas where food items are easily exposed to air pollution (Kumar *et al.*, 2018).

Metals contamination through such crops of vegetables, tubers, fruits and milk attributed to sources human activities such as melting of metals or metalloids, other mineral works and also other industry and factory, or as a result of impact of fertilizers and pesticides containing these metals, which would contaminate the nearby environmental as well as extension of cities and their development. Food items can also be contaminated by the soil, water or air pollution and other then irrigation land, food items get polluted by mining, vehicular of industrial exhaust or during their transit and transportation, marketing and local food processing methods (Salhotra and Verma, 2017).

Heavy metals contamination in food

Heavy metals enter human body through ingestion of contaminated food, inhalation from the

atmosphere, drinking contaminated water, and due to skin contact with agriculture, pharmaceutical, manufacturing, residential and industrial areas. Air pollution contaminates vegetables during transportation and marketing and elevates levels of heavy metals in vegetables (Walker *et al.*, 2012).

More than half of the world's population depends on ground water for survival. The ground water being in direct contact with soil, rock and plateaus, those constituents of this source might contaminate the ground water. Water is able to dissolve, absorb and adsorb with many compounds. Because of wide diversity of contaminate affecting the water resources, surface (Nardi *et al.*, 2009)."

Industrial effluents pollute freshwater with heavy metals and may precipitate and get absorbed on solid surface thus remaining suspended in water and then these metals are taken up by fauna Farm animals feed on these contaminated grass and water then becomes susceptible to environmental pollution from heavy metals (Javed *et al.*, 2013)."

Variance of heavy metals concentration among vegetable to vegetable may be attributed for the type of heavy metal (Jassir *et al.*, 2005). The consumption of milk and milk products as cheese, yogurt and milk powder is always important and has increased however they play an important role in human nutrition (Khalil and Soliem, 2013).

Heavy metals health effects

They can have negative effect on the metabolism process of living organisms when ingested through food or drinking water and gets absorbed and found exceeding the maximum limits. Some metals show more side effects on human health as they can be easily accessed through food intake even though they are not important for biological functions. In comparison to adults, children seem to be more sensitive for the accumulation of such metals (Ojedokun and Bello, 2016).

Excessive accumulation of toxic metals can lead to numeral serious health issues as well as deplete essential nutrients in human. Long term exposure to theses environmental toxicants can negatively affect human preliminarily from their early embryogenic



stage and throughout the postnatal life (Cao *et al.*, 2016). Moreover their delayed consumption can cause damage in mental and central nervous system functions and lead to chronic accumulation in vital organs thus causing disruption of numerous biochemical processes, such as cardiovascular, bone diseases, nervous, lungs, kidney, liver and others (Raikawar *et al.*, 2008). Symptoms help to identify the contaminant as they are the first indicators of contamination. And as a result of metal poisoning, symptoms include intellectual disability in children, dementia in adults, and other issues like central nervous system disorders, kidney diseases, liver disease, insomnia, depression, emotional instability and vision disturbances (Flora *et al.*, 2008)."

If this toxicity of toxic metals exposure remained unrecognized or improperly treated; it may increase significant medical problems by showing a greater impact on increasing the morbidity and mortality rate. Their application in domestic, industrial and agriculture influences wider distribution in the environment raising serious concerns over their latent health effects on humans. Toxicity that arises from sudden contact to significant quantities of metals usually leads to multiple organ systems defects. Health outcomes of toxic metals depend upon the type of element, route and duration of exposure and to a greater level on individual's vulnerability (Jan et al., 2011)."

Conclusion

Heavy metals have become a chronic concern globally. They are a major environmental pollutant and have drawn attention due to their serious health implications. A drastic increase of urbanization and industrialization has increased soil pollution. Accumulation of these toxic metals in plants through polluted soil and water is the chief source of crops and vegetation contamination and their consumption by human and animals in food chain becomes risky. Crops which are grown in suburban and urban areas of developing and developed countries are the main source of heavy metals accumulation.

In developing countries, heavy metals investigation is gaining attention. And analyses of toxic metals in food and their permissible levels in food items have been carried out by different public and governmental organizations, along with their occurrence in soil, water and food, and long term exposure at local, regional and global scales has been investigated in various researches.

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