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Detoxing & Remediating Land, Air, and Water & Implications on Human and Animal Health

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Introduction

Currently, due to increased industrialization, chemicals of all types and heavy metals continue polluting water, air, and soil, causing food contamination and hurting the general body health and wellbeing of people. Persistent organic pollutants and heavy metals from the most cause of environmental pollutants are delivered through the food that people eat. The continued chronic exposure to accumulated pollutants is linked to the development of non-communicable diseases that include diabetes, obesity, chronic respiratory disease, cardiovascular diseases, and cancer (Mehrandish, Rahimian, & Shahriary, 2019). Research also shows that toxic trace element accumulation within the body causes metabolic disorders that induce obesity or overweight and increased energy intake among victims of diabetes and obesity. Additionally, the diets that obese people take the lead to trace nutrient imbalance. To manage obesity, such people are encouraged to have a sufficient intake of minerals and vitamins. One of the popular means of promoting toxin removal and reduced weight includes the use of a detox dieting strategy. The process helps with improved life quality and enhanced health. Some contradictory research shows controversial outcomes, with some studies showing no scientific evidence for detox diets and health benefits (Stocker et al., 2017). Besides, others consider such diets as harmful to the body. However, the study of food-based nutrients shows their potential ability in modulating metabolic pathways that detoxification processes have. It is evident that nutrients and food extracts regulate toxins' eventual excretion and transduction. The detoxification diets include calorie-restricted foods that involve beverages, single fruits, and vegetables. Beverages include vinegar, tea, saltwater, lemon juice, and other drinks having micronutrients.

Zeolites Detoxification

The detoxification of soil using zeolites has been investigated, and studies show that there is a positive action in adding natural zeolite in toxic metals and plant growth. The natural zeolites react to toxic metals found in polluted soil or water, such as Cd, Zn, Pb, and Ni. By adding zeolite to the soil that has been polluted, the element increases the level of biomass in the plant tissue by doing away with the toxicity stress of common metal ions. The zeolite also increases the nutrition levels of the plant. After using zeolite in the soil, the heavy metal concentration decreased within the plant tissues Ni > Cu > Cd > Zn in that order. Similarly, the toxicity leach-ability in metal elements was reduced in the order of Cu > Cd > Ni > Zn. These outcomes are evidenced in the use of natural zeolites at the level of 12.5% w/w. The increase in soil pH that is noticed in the process does not affect the growth of plants. However, the addition of the zeolite mineral led to metal stress toxicity decrease and soil

fertility improvement. Similarly, the availability of zeolites in the soil reduces the general trends of the three factors of transfer such as shoots-roots, roots-soil, and shoots-soil. On the side of soil, outcomes of the investigation show that using natural zeolites reduces the solubility levels of toxic metals significantly due to the organic complexation effect and other processes taking place in the soil, such as cation-exchange retention, surface complexation sorption, and pH rise. These processes are categorized into two, such as cation exchange and pH value, with the latter being of greater importance than the other one during plant growth.

However, studies indicate the fact that the successful impact of natural zeolite in the remediation process of heavy metals is not similar in all soil types that have been polluted. Some studies show that adding natural zeolites with clinoptilolite elements leads to eliminating Ni accumulation by 11.695 in oats planted in sandy, silty loam soils. In that case, the conclusion is that natural zeolites have a smaller efficiency in soil remediation than a case of Ni. Data shows that the reason for the clinoptilolite selectivity during the absorption of ions from heavy metals is 'Pb > Cd > Cs > Cu (II) > Co (II) > Cr (III) > Zn >Ni (II) > Hg (II).' Additionally, the granulometric composition of soil shows no negligible action.

The natural zeolite efficiency in the transfer reduction of the metal ions towards the upper plant parts through the stabilization of toxic metal ions in contaminated soils has also been analyzed. The investigation has included the action of metal ions and other mineral combinations, including bentonite. Research shows that the concentration of Cd (II) and Pb (II) in plant growth on sand soils enriched with bentonite is higher compared to the plants found on soils enriched with natural zeolite sand cultures. The fact shows that the heavy metal ions that the zeolite absorbs become less bio-available and less mobile than clay minerals. The case is caused by the various desorption mechanisms within the two minerals phases. The ion chemisorption and exchange is the main mechanism of adsorption of the lead ions onto natural zeolite.

Similarly, the ion exchange becomes the main process in the adsorption control of toxicity of metals on bentonite. In the case of Cd ions, the level of desorbed toxic elements from the natural zeolite is lower than those of bentonite. Cd encapsulation or surface precipitation was formed on the natural zeolite. The toxic elements get adsorbed on the surface of natural zeolite, with more than 70% of the Cd ions being in non-exchangeable forms (He et al., 2015). Clinoptilolite is a zeolite material that occurs naturally that helps in detoxification through human medicine intake. It has high detoxification properties and many potential benefits for people's health. This fact has led to increased use of clinoptilolite-based medicine and products. Zeolites have various health benefits, but more focus is on the use of the material in detoxification. The zeolite material helps to eliminate different body contaminants and also intestinal amelioration. The clinoptilolite materials provide direct detoxification properties.

For instance, the KLS-10-MA is a clinoptilolite sorbent material that controls lead accumulation within the intestine by over 70 percent, as shown by a mice experiment (Liu et al., 2016). The material also has antiviral and antibacterial effects. With the increased use of the material, E. Coli prevalence decreased significantly. It fights the antimicrobials that carry the virus, such as virulence and resistance genes. Clinoptilolite has antiviral properties demonstrated on the herpes simplex type 1 virus, human adenovirus, and human enteroviruses such as echovirus seven and coxsackievirus B5 (Liu et al., 2016). The material also increases immune cell counts, such as activated T-lymphocytes HLA-DR+ and T-helper cells CD4+. The NK CD56+ cell counts are led to decrease, indicating the detoxification nature of zeolites.

Vitamin C Detoxification

Vitamin C or ascorbic acid has been investigated and confirmed to be a potent antioxidant with various roles within the human body. It has been notably neutralized and protected the body against reactive oxygen species and free radicals. Vitamin C is also used in cleansing by flushing out toxins within the body if the intake levels are increased. The element elevates the levels of glutathione in red blood cells. The glutathione and vitamin C operate synergistically in the body, with the former being one of the most powerful antioxidants in the body as it helps in its detoxification process (Tampa et al., 2017). Glutathione has a key role in detoxifying the pathways in the liver.

On the other hand, vitamin C has a key role in controlling enzymatic reactions in the liver. The ascorbic acid reduces liver enzymes besides reducing oxidative stress levels through hepatotoxicity. In that case, vitamin C protects the liver by freeing it from inflammation and damage.

The ascorbic acid is also present in the body cells at milli-molar levels. It protects these cells against different forms of oxidant injury at physiologically relevant concentrations. For instance, in the micro-vascular and human umbilical vascular endothelial cells, vitamin C carries out TNFα–induced apoptosis and controls the toxicity levels of nitrogen dioxide and 'hypoxia- reoxygenation-induced apoptosis' in the umbilical vascular endothelial cells. Other vitamin C functions in the body cells include fighting against apoptosis and cell death caused by β-amyloid in the neuroblastoma SH-SY5Y body cells (He et al., 2015). On a similar note, vitamin C has a protective impact in the THP-1-derived macrophages against the toxicity induced by oxidized LDL. Additionally, the acid also decreases the oxidative damage caused by the AAPH in the THP- 1 cells through cell pretreatment.

Vitamin C is the main preventative agent of damage to the free radicals. The body requires vitamin C to absorb various minerals, including calcium and iron, properly. Without enough vitamin C in the body, the body's skin will not have enough collagen, which is a key connective tissue in skin formation. Vitamin C has also been noted to help the body in preventing adrenal exhaustion through the support of the adrenal glands. According to research, people who have a lot of vitamin C in their bodies, especially in the blood, can live for long compared to people with less levels of vitamin C (He et al., 2015). Combined detoxification of toxins and pollutants can be achieved through immune system boosting with vitamin C. The process involves detox flushing using ascorbic acid to enhance longevity and the body's overall health. Vitamin C benefits obtained through flushing are most helpful to people suffering from allergies, influenza, and chemical exposures.

Research shows that obese people have about 5-12 percent lower intake of micronutrients and high chances of nutrient inadequacy, unlike people with normal weight. Obese people have a poor intake of vitamin C, with 13% and 8% of men and women showing vitamin C deficiency concentrations (Lim, Sharma, & Thompson, 2018). Medical and nutrition professionals advocate for vitamin C flushing to boost its level in the body and encourage detoxification. Notably, small levels of vitamin C lead to reduced levels of bacterial overgrowth in the intestines, the elevation of lipopolysaccharide or LPS circulation, and enteric bacteria transcytosis, which induces reduced levels of inflammation. Similarly, large-dose supplements of vitamin C that are ingested orally lead to reduced absorption of vitamin C in the intestines. Excess vitamin C remains within the gut lumen from where the body benefits from its potentially exerted effects on the microbiota function and composition as well as intestinal cells.

People are recommended to take1 000 milligrams of vitamin C supplements in half glass with purified or filtered water in 20-30 minutes, recording the amount of vitamin C intake (Andresen, Peiter, & Küpper, 2018). People are supposed to repeat the intake until a soupy watery stool has been obtained. After flushing the vitamin C, one needs to take it at smaller doses after four-hour intervals in several days to develop a tapioca thick stool. On the experience of diarrhea, one should reduce the dosage. Thorough detoxification can be recommended though not necessary. The optimum flushing of vitamin C starts early in the day before one eats anything. Two to four hours are needed to detoxify, but more time may be needed in some cases. Adequate water is required during the flushing using sole water or bone broth rich in minerals to replace the trace minerals the body might lose in the process.

Trace Minerals

Trace minerals are obtained from the foods people eat. They include the micro-minerals that the body requires to function well. These include iron which helps to carry oxygen in red blood cells and helps with metabolism, Zinc is useful in the enzymes. It helps make protein and genetic elements boost immunity, sperm production, sexual maturation, and general growth and wound healing. Iodine is found within the thyroid glands and regulates growth, metabolism, and development. Selenium is an antioxidant, while copper helps iron metabolism in the enzymes. Manganese is found in most enzymes; fluoride develops bones and teeth and prevents decaying in teeth (Andresen, Peiter, & Küpper, 2018). Chromium supports insulin in regulating blood sugar levels in the body, while molybdenum is part of many enzymes. The various foods and herbs that provide trace minerals to the body improve body health and enhance

longevity. They help nourish the body with trace minerals, vitamins, and minerals to attain optimum function. They lead to natural detoxification, strengthen the blood, organs, neurological and lymphatic systems, and GI tract, and create homeostasis. Trace minerals help to cleanse the digestive tract. Alginic acid from herbs combines with heavy metal ions in the intestines like mercury, barium, zinc, cadmium, mercury, strontium, and lead. The metals bind with the alginic acid for smooth removal from the body.

The dieting detoxification programs such as the hypocaloric Mediterranean diet and lemon diet have a deficient intake of calories that enables people to have between 500 and 1000 kcal in a day (Atobatele, & Olutona, 2015). They are effective in the reduction of body fat and weight. However, people find such a dietary intervention hard to maintain as it leads to a shortage of vitamins, minerals, and fiber. They have been attributed to stress and binge eating as well. During fasting, low-calorie diets allow weight loss besides leading to various problems related to health. They cause malnutrition, headache, muscle weakness, fatigue, dizziness, reduced life quality, nervousness, and gastrointestinal disturbance. Studies related to the clinical use of detox diets show that such diets have adverse effects on the body. Generally, the impact of detoxification diets has been investigated on obesity and weight loss in the short run.

Homeostasis involves the ability to have the body balance maintained. Increased toxins within the body affect the natural homeostasis flow, making the immune system react against them. The effect creates imbalance and diseases as the microbiomes get damaged (Kraljević Pavelić et al., 2018). A healthy system of immunity that the toxins have not overloaded can fight them off on getting the signs. However, a weak immune system by heavy metal toxins cannot eliminate the pollutants as required in the body, and thus various symptoms are noticed.

The liver enzymes become nourished after the body gets the required balance of trace minerals, vitamins, and minerals. The liver operates well as it can fight against the toxins in a better manner. However, most of the pet foods available chemicals and vaccines have heavy metals such as mercury that affect the normal function and structure of the kidney and liver (Eroglu, Emekci, & Athanassiou, 2017). Over people and animals have a higher susceptibility to the heavy metal and toxin burden, but their body can benefit from the detoxification by having the blood, lymphatic, organs, and neurological systems cleansed. Detoxification provides the body with a new sense of life. Various toxins in the body affect the function of lymphatic and neurological systems, but detoxification using trace minerals helps in safe removal using super-foods and herbs.

Conclusion

Research shows that many human activities have led to the pollution of land, air, water, and the general element. These avenues have faced increased pollution by heavy metal contaminants and unwanted gases, which end up ingested into the body system. The overall effect of these contaminants is poor health and wellbeing due to increased chances of developing communicable diseases. The water people take, the foods they eat, and the water they are drinking are contaminated with high levels of heavy metal elements such as lead, cadmium, iron, copper, and manganese. These heavy metal ions increase the level of toxicity in the body and thus require detoxification to eliminate the toxins from the body. There are various methods of detoxifying the body to cleanse it or remediation of the land, water, and air to reduce contaminants. People are encouraged to use vitamin C supplements and foods to boost the levels of ascorbic acids in the body to boost the way enzymes and the liver function. The process eliminates some toxins in the intestines and leads to the opening up of the liver pathways. The trace minerals available in most foods and herbs also help with body detoxification and health improvement. The minerals help remove some of the heavy metal ions in the body, especially those within the intestines and food duct. Zeolites also have an element identified as clinoptilolite that helps eliminate heavy metals from the body. The body's detoxification helps boost the immune system so that the body can fight against the toxins with more ease. Low-calorie diets are part of trace mineral control in the body as well as toxin elimination. Obese and diabetic people must feed on well-balanced diets to control their body weight and fat. Thus, zeolites, vitamin C, and trace minerals can be balanced well enough to obtain an optimum body function that enhances the wellbeing and health of an individual.

References

1. Andresen E, Peiter E and Küpper H. "Trace metal metabolism in plants". Journal of Experimental Botany 69.5 (2018): 909-954.
2. Atobatele OE and Olutona GO. "Distribution of three non-essential trace metals (Cadmium, Mercury, and Lead) in the organs of fish from Aiba Reservoir, Iwo, Nigeria". Toxicology reports 2 (2015): 896-903.
3. Eroglu N, Emekci M and Athanassiou CG. "Applications of natural zeolites on agriculture and food production". Journal of the Science of Food and Agriculture 97.11 (2017): 3487-3499.
4. He Z., et al. Heavy metal contamination of soils: sources, indicators, and assessment (2015).
5. Kraljević Pavelić S., et al. "Critical review on zeolite clinoptilolite safety and medical applications in vivo". Frontiers in pharmacology 9 (2018): 1350.
6. Lim DJ, Sharma Y and Thompson CH. "Vitamin C and alcohol: a call to action". BMJ Nutrition, Prevention & Health 1.1 (2018): 17-22.
7. Liu B., et al. "Effects of replacing inorganic trace minerals with organically bound trace minerals on growth performance, tissue mineral status, and fecal mineral excretion in commercial grower-finisher pigs". Biological trace element research 173.2 (2016): 316-324.
8. Mehrandish R, Rahimian A and Shahriary A. "Heavy metals detoxification: A review of herbal compounds for chelation therapy in heavy metals toxicity". Journal of Herbmed Pharmacology 8.2 (2019): 69-77.
9. Stocker K., et al. "Characterization and utilization of natural zeolites in technical applications". BHM Berg-und Hüttenmännische Monatshefte 162.4 (2017): 142-147.
10. Tampa M., et al. "Vitamin C and thiobarbituric acid reactive substances (TBARS) in psoriasis vulgaris related to psoriasis area severity index (PASI)". Revista de Chimie 68.1 (2017): 43-47.