

Soil pollution and its effect on human health – a review article

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Abstract : Soil pollution is an emerging health issue with a huge impact on wellbeing of human life. It can affect human health in multiple ways and can result in wide range of symptoms involving skin to organ damages and cancers. Raising proper awareness for the prevention of soil contamination is very important to combat with this issue and thus conserving soil which is the foundation of our health.

IndexTerms - Contamination, Anthropogenic, Awareness

INTRODUCTION

Soil pollution is an alarming issue worldwide and has recently emerged as a great threat to our agro-ecosystem stability. It refers to the contamination of soil with a chemical or substance that has adverse effects on any non-targeted organism. [1],[2]. The presence of soil borne pathogens and chemical pollutants in a higher-than-normal concentration affects the human health on exposure via direct inhalation, ingestion, dermal contact and indirectly via drinking water and dietary intake of agricultural products in which they are accumulated [3].

Types and sources of soil pollution:

Soil pollution also interchangeably used as soil contamination is of two types, i.e., point source and diffuse soil pollution. The first one occurs when contaminants are released in a particular area and its source can be easily identified. Point source pollution is usually seen in urban areas and are anthropogenic. On the other-hand diffuse pollution is spread over wide areas without any single identifying source which makes it challenging to track the severity and extent. Sources can be divided as geogenic and anthropogenic. Geogenic sources are the naturally occurring substances in the soil of an area whose concentration vary from the background threshold of concentration or the natural events which release toxic elements into the environment. Heavy metals, radionucleotides, radioactive gases, asbestos in rocks and soils can be considered as naturally occurring substances which are harmful for human health. Natural events like volcanic eruptions, forest fire or a cosmogenic event resulting in the presence of meteorites, cosmic dust samples or naturally occurring poly aromatic hydrocarbons in the soil also pose a high risk to the human health as inhalational injuries. Anthropogenic activities like widespread industrialization, mining, urban and transport infrastructures, waste and sewage generation and disposal, Military activities and wars, agricultural and livestock activities are some of the significant sources of soil pollution with an impact on the environment and human health. [4]. Deforestation is another anthropogenic activity which leads to soil erosion and release of sequestered contaminants which may flow down in the rivers and contaminate the water thus indirectly resulting in various health hazards [5].

Effect on human health:

Ingestion of soil contaminated with various pollutants like heavy metals (mercury, lead, cadmium, arsenic etc.) pesticides (organophosphates, DDT) can lead to symptoms of local and systemic toxicity. For example, arsenic is a heavy metal whose bioaccumulation may lead to skin changes, chronic lung and liver diseases, polyneuropathy, hypertension, anemia weakness and even some cancers. Drinking ground water contaminated with arsenic is one of the major causes of arsenic toxicity in the world [6].

Consumption of contaminated agricultural products lead to a vast spectrum of diseases in human ranging from prenatal developmental abnormalities, miscarriage, sexual dysfunction to cardiac, neurological diseases, speech, visual, hearing impairment and even cancers and leukemias [4].

Emergence of antimicrobial resistant pathogens in the soil due to longterm low level exposure to antimicrobial agents disposed in soil, transference of the resistome (extrachromosomal antibiotic resistant plasmids) and mutated genes lead to persistent and difficult to treat infections [1].

Soil pollution may alter the basic characteristics such as acidity, salinity in such a way that the soil becomes unhealthy for agricultural activities and becomes useless and barren and the loss of crops may lead to indirect damage to human health through starvation and famine. Many beneficial soil organisms like earthworms, good bacteria may die and affect the quality of crops[7].

There can be multiple health problems like organ damage, cancer, nervous system failure taking place as direct poisoning by the polluted land like children playing on land filled with toxic waste get exposed and that may result in various health problems issues above [7]

Soil dusts contaminated with harmful chemicals can vaporize, aerosolise in the environment and during catastrophes like volcanic eruptions and forest fires the toxic contaminants get released in the atmosphere which cause inhalational injuries and chronic lung diseases in the population [8].

CONCLUSION

Soil is very important for human health as this thin crust on the surface of earth provides support to all terrestrial life and regulates the ecosystem. Controlling the soil pollution is of utmost importance in order to preserve the soil fertility and increase the productivity. There has been uproar in the previous decades about air, water pollution and climate change but soil pollution has not been given much importance until recent years. The inability to visualize, perceive and assess the extent of soil pollution makes it a hidden health hazard. Management of soil pollution should focus on prevention of contamination and strict laws and rules should be formulated, implemented, and established. Awareness on this issue should be increased by conducting more research on the assessment on remediation of soil pollution [9].

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