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Water Contamination through Pesticide & Their Toxic Effect on Human Health

Mahipal Singh Sankhla[1], Mayuri Kumari[2], Kirti Sharma[3], Ravindra Singh Kushwah[4], Rajeev Kumar[5]
[1]*Junior Research Fellow, Department Chemical Engineering, Malaviya National Institute of Technology- MNIT, Jaipur .*
[2]*M.Sc. Forensic Science, Division of Forensic Science, Galgotias University, Greater Noida.*
[3]*M.Sc. Forensic Science, Department of Biotechnology, Baba Saheb Bhimrao Ambedkar University, Lucknow, India.*
[4]*Student of M.Sc. Chemistry, College of Basic and Applied Sciences, Pacific University, Udaipur.*
[5]*Assistant Professor, Division of Forensic Science, Galgotias University Greater Noida.*

Abstract: Water is the most simple structure block of human life or Fresh water is essential for human health. The use of pesticides and nitrogen fertilizers in agriculture has grown dramatically over the past many year to contaminated water. Environmental exposure of humans to pesticide is common effects in acute and chronic health effects, including acute and chronic neurotoxicity (insecticides, fungicides, fumigants), lung damage (paraquat), chemical burns (anhydrous ammonia), and infant methemoglobinemia (nitrate in groundwater). A variety of cancers also have been linked to exposure to various pesticides, particularly hematopoietic cancers. Immunologic abnormalities and adverse reproductive and developmental effects due to pesticides also have been reported. The health effects associated with pesticides do not appear to be restricted to only a few chemical classes. Therefore, enhanced efforts are needed to control or eliminate human exposures wherever possible. Research also is needed to better characterize and quantitate the adverse effects of agrichemicals on human health.
Key-Words: - Water, Pesticides, Health Effects.

I. INTRODUCTION

Water is essential for life. No living being on the planet Earth can survive without it. The major part of water on earth is marine water which cannot be used without processing by human beings. The only available fresh water which could be used for drinking purposes arises from the ground water. The percent volume of it, how- ever, is sufficient to cater the need of the living beings, provided it would have been of high quality. Water quality is important in our lives because it is essential to support physiological activities of any biological cell [1]. Water pollution occurs when unwanted materials enter in to water, changes the quality of water and harmful to environment and human health [2,3]. Water is an important natural resource used for drinking and other developmental purposes in our lives [4]. Safe drinking water is necessary for human health all over the world. Being a universal solvent, water is a major source of infection. According to world health organization (WHO) 80% diseases are water borne. Drinking water in various countries does not meet WHO standards [5]. 3.1% deaths occur due to the unhygienic and poor quality of water [6]. Many water pollutants are reported to act as toxic chemicals. The pesticides are designed and developed keeping in view killing the insects-pests in general and thus they are not species specific. Their application methodologies are designed to ensure that these chemi-cals come in contact with the target pests to kill them avoiding the non-target organisms. These target pests, however, are simply species of animals that share many of the same characteristics of other animals. One of these characteristics is a susceptibility to certain toxins. In other words, a chemical that is toxic to one animal also may be toxic to other forms of animal life. Although it might take a larger dose of pesticide to harm humans than pests such as insects, many pesticides are still toxic to humans. The doses needed to kill a pest effects the humans in many ways such as disruption in function of sex hormones and reproductory performance [7-10]. The pesticides act as xenohormones (mimicking the action of endogenous hormones) or otherwise interfering with en- docrine processes, hence have been collectively catego-rised as endocrine disruptors [11].

A. Sources of Contamination in water

Sewage It is reported that 75 to 80% water pollution is caused by the domestic sewage. Waste from the industries like, sugar, textile, electroplating, pesticides, pulp and paper are polluting the water [12]. Polluted river have intolerable smell and contains less flora and fauna. 80% of the world's population is facing threats to water security [13]. Large amount of domestic sewage is drained in to river and most of the sewage is untreated. Domestic sewage contains toxicants, solid waste, plastic litters and bacterial contaminants and these toxic materials causes water pollution [14]. Industrial Waste

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Effluent that is drained in to river without treatment is the major cause of water pollution [12]. Hazardous material discharged from the industries is responsible for surface water and ground water contamination. Contaminant depends upon the nature of industries. Toxic metals enter in to water and reduced the quality of water [15]. 25% pollution is caused by the industries and is more harmful [16].

B. population Growth

Increasing population is creating many issues but it also plays negative role in polluting the water [15]. Increasing population leads to increase in solid waste generation [17]. Solid and liquid waste is discharged in to rivers. Water is also contaminated by human excreta. In contaminated water, a large number of bacteria are also found which is harmful for human health [16]. Government is incapable to supply essential needs to citizens because of increasing number of population. Sanitation facilities are more in urban areas than rural areas. Polythene bag and plastic waste is a major source of pollution. Waste is thrown away by putting it in to plastic bags [16].

C. Urbanization

It is estimated that three core people of urban areas defecate in open. 77% people are using flush latrines and 8% are using pit latrines. Urbanization can cause many infectious diseases. Overcrowding, unhygienic conditions, unsafe drinking water are major health issues in urban areas. One quarter of urban population is susceptible to disease [12].

D. Pesticides And Fertilizers

Pesticides are used to kill bacteria, pest and different germs. Chemical containing pesticides are directly polluting the water and affect the quality of water. If pesticides are excess in amount or poorly managed then it would be hazardous for agriculture ecosystem [18,19]. Only 60% fertilizers are used in the soil other chemicals leached in to soils polluting the water, cyanobacteria are rich in polluted water and excess phosphate run off leads to eutrophication. Residues of chemicals mix with river water due to flooding, heavy rainfall, excess irrigation and enter in the food chain. These chemicals are lethal for living organisms and many vegetables and fruits are contaminated with these chemicals [12,20].

E. Human Exposure to Pesticides through Water

More water is consumed per kilogram of body weight than any other item in the diet [21]. Drinking water comes from a variety of water sources, including surface water and groundwater, as well as public water and private well systems. There are also vast geographic and seasonal variations in quality of drinking water and amount of pesticide residues. Because of these factors and a limited amount of available information, risk estimates on exposure to pesticides from water intake and the health effects of that exposure are currently unavailable. Despite unknown information about exposure and hazards, the National Academy of Sciences (NAS), in its 1993 review Pesticides in the Diets of Infants and Children, noted that since pesticide residues in water generally tend to be low, the contribution in ingested food prepared by using water is expected to be low, except in areas where the water is contaminated at above-average levels [22]. A number of pesticides have been found in drinking water sources at concentrations above EPA limits and of potential concern to human health [23]. In that same report, NAS recommended that pesticide exposure through drinking water be evaluated along with other dietary exposures to determine exposure risks [24]. According to USGS, insecticides in urban streams are a concern for downstream water suppliers and possibly for recreational users [25]. Similarly, the high levels of herbicides in water in agricultural areas are of concern to residents drinking the contaminated water, and have already caused health problems for some communities. For example, in Kentucky, researchers discovered that in counties where drinking water is contaminated with triazine herbicides such as atrazine, there are increased numbers of breast cancer cases [26]. In southern Iowa, researchers found that the number of babies with low birth weights is linked to herbicide-contaminated drinking water [27]. Additionally, a study in Missouri found that men in rural areas have lower sperm counts and quality than men in urban areas. The men with lower sperm counts and quality have higher concentrations of metabolites of the pesticides alachlor, diazinon, and atrazine in their urine, and the researchers believe that "…it is likely that men are ingesting these chemicals through their drinking water" [28].

F. Effects of Pesticides on Human Health

Perhaps the largest regional example of pesticide contamination and human health is that of the Aral Sea region. UNEP (1993) [29]. Linked the effects of pesticides to "the level of oncological (cancer), pulmonary and hematological morbidity, as well as on inborn

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deformities and immune system deficiencies". Human health effects are caused by 1) Skin contact: handling of pesticide products, 2) Inhalation: breathing of dust or spray and 3) Ingestion: pesticides consumed as a contaminant on/in food or in water. Farm workers have special risks associated with inhalation and skin contact during preparation and application of pesticides to crops. However, for the majority of the population, a principal source is through ingestion of food which is contaminated by pesticides. Degradation of water quality by pesticide runoff has two principal human health impacts. The first is the consumption of fish and shellfish that are contaminated by pesticides; this can be a particular problem for subsistence fish economies that lie downstream of major agricultural areas. The second is the direct consumption of pesticide-contaminated water. WHO (1993) [30]. Has established drinking water guidelines for 33 pesticides. Many health and environmental protection agencies have established "acceptable daily intake" (ADI) values that indicate the maximum allowable pesticide daily ingestion over a person's lifetime without appreciable risk to the individual. For example, [31] studying substituted phenols, tetrachlorohydroquinone, a toxic metabolite of the biocide pentachlorophenol, was found to produce significant and dose-dependent DNA damage. The harmful effects of pesticides are 1) Death of the organism, 2) Cancers, tumors and lesions on fish and animals, 3) Reproductive inhibition or failure, 4) Suppression of immune system, 5) Disruption of endocrine (hormonal) system, 6) Cellular and DNA damage, 7) Teratogenic effects (physical deformities such as hooked beaks on birds), 8) Poor fish health marked by low red to white blood cell ratio, excessive slime on fish scales and gills, etc., 9) Intergenerational effects (effects are not apparent until subsequent generations of the organism) and 10) Other physiological effects such as egg shell thinning. These effects are not necessarily caused solely by exposure to pesticides or other organic contaminants, but may be associated with a combination of environmental stresses such as eutrophication and pathogens [32,33]. Pesticides are commonly found in water. The ground-water from some US and Canadian provinces has been reported to contain the residues of 39 pesticides and their metabolites [34]. The calculation of level of allowable pesticide for water is made depending on the exposure of children and adults exposure; the children being 4 times more vulnerable to the pesticide toxicity than adults [35]. Residues of pesticides that are "severely restricted" be-cause of their serious effects on human health were also found in significant quantities in the water sources. The pesticide residues exerting serious effects on human health enter the water supply through leaching from soil into ground water [1].

G. Absorption of Pesticides through Skin and Respiratory Routes

The reports available indicate that the infants and children absorb more pesticides and their residues, insect repellents and pediculocides than the adults through their skin and produce toxicity [33]. It leads to alterations in behavioral pattern and several diseases syndromes such as encephalopathy, ataxia, seizures, muscle cramps, frequent urination and coma [30,31]. However, farmers generally get exposed to the pesticides via spraying of these chemicals into the fields. The absorption of pesticides in farmers through cutaneous and respiratory routes predominantly contributes to the overall pesticide toxicity in them which has been reported to cause non-Hodgkins lymphoma [32].

II. DISCUSSION

Water pollution is a worldwide issue and world community is facing worst effects of contaminated water. The toxicologist have continually detected the Pesticide concentration in various water bodies, plants, vegetables, etc. Major sources of water pollution are discharge of domestic and agriculture wastes, population development, extreme use of pesticides and fertilizers and urbanization. Insecticides have polluted almost every part of our environment as insecticide residues are found in soil and air, and in surface and groundwater through the country, and urban insecticide uses contribute to the problem. Pesticide are found in water is due to natural processes or human activities. Human health is directly affected by the consumption of polluted water, fish, fruits, vegetables, and plants etc. which are the main sources of food for humans. Studies show that agricultural activities that have released hazardous and toxic constituents in thereby, led to contamination of drinking water in these areas.

III. CONCLUSION

Pesticide are present at higher levels should be removed from drinking water for human safety. There is a need to maintain control on disposal of industrial waste or Agriculture waste in water bodies and to bio-monitor the trace elements in the water and other eatables. It is suggested that there must be proper waste disposal system and waste should be treated before entering in to water & soil. Pesticide uptake by plants and successive accumulation in human tissues and biomagnifications through the food chain causes both human health and environment concerns Pesticide containing agricultural runoff enter in aquatic environment, and harm to aquatic plants and animals. These technologies are recommended for field applicability and commercialization in the developing countries also where agriculture, urbanization, and industrialization are leaving a legacy of environmental degradation Iran must

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formulate appropriate agricultural policies at a national level to enhance the extension services and educate farmers to reduce fertilizer application for sustainable development.

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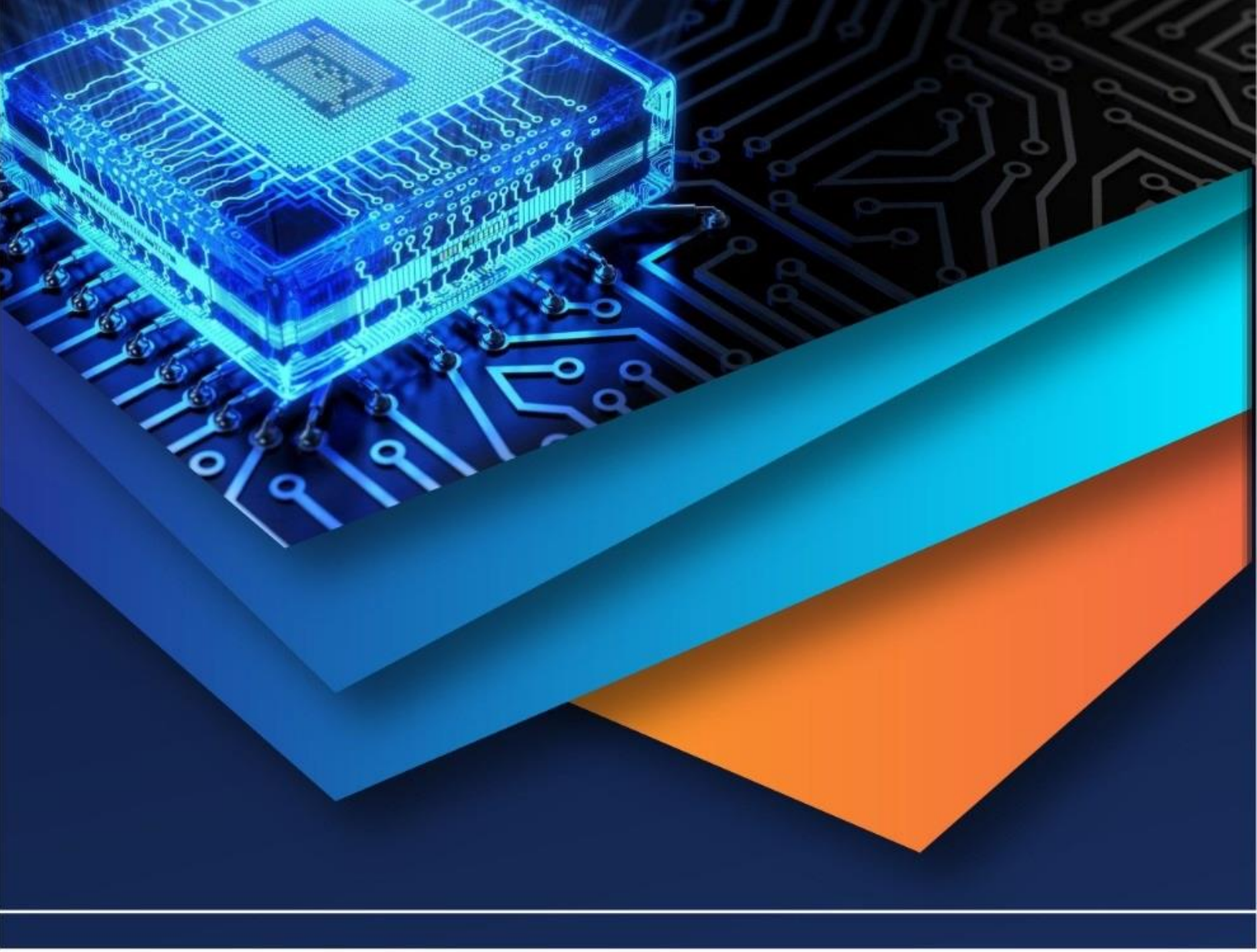

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