



EFFECTS OF CHEMICAL PESTICIDES ON HUMAN HEALTH

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ABSTRACT

The industrialization of agriculture has made natural ecosystems more chemically burdened. Agrochemicals known as pesticides. Use of pesticides is common in controlling weeds and insect infestation in agricultural fields as well as a variety of pests and disease carriers such as mosquitoes, ticks, rodents, and mice in homes, workplaces, shopping centers, and public areas their exposure through numerous pathways such as residues in food and drinking water, inhalation, ingestion, eye, and dermal contact. Although these risks can have short-term effects e.g., skin and eye irritation, headaches, dizziness, and nausea, or long-term effects e.g., cancer, asthma, infertility, allergy, Parkinson's disease, and birth defects on human health. It is challenging to determine the risks because of the interaction of many variables, including the duration and intensity of exposure, the type of pesticide (in terms of toxicity and persistence), and the environmental characteristics of the affected areas.

Keywords: pesticide, agrochemical, cancer, allergy, asthma.

INTRODUCTION

Pesticides are compounds or mixes of substances that are mostly employed in agriculture or in public health protection programs to protect plants from pests, weeds, or diseases as well as humans from vector-

borne illnesses like malaria, dengue fever, and schistosomiasis. They include insecticides, herbicides, nematicides, fungicides, molluscicides, rodenticides, plant growth regulators, and other compounds. It is

generally used to prevent illnesses spread by vectors, including crop protection, food preservation, and significant roles in commercial as well as food-based industrial practices, i.e., aquaculture, agriculture, food processing, and storage. Any living bodies, either animals or plants, which are harmful to humans or animals are known as pests. Pesticides are chemical compounds that are used to either kill or prevent the growth of pests. In addition to killing insects or weeds, pesticides can be toxic to a host of other organisms including birds, fish, beneficial insects, and non-target plants. Pesticides are known to have possible toxicological modes of action to induce oxidative stress, mitochondrial dysfunction, and endoplasmic reticulum (ER) stress in living organisms. The numerous negative health effects that have been associated with chemical pesticides include, among other effects, dermatological, gastrointestinal, neurological, carcinogenic, respiratory, reproductive, and endocrine effects. Furthermore, high occupational, accidental, or intentional exposure to pesticides can result in hospitalization and death.

Acute effect of pesticides on human

Acute health problems may occur in workers that handle pesticides, such as abdominal pain, dizziness, headaches, nausea, vomiting, and diarrhea as well as skin and eye problems stinging eyes, rashes, blisters, skin irritations, and death. Exposure to pesticides in agricultural work can cause serious risks to the respiratory system causing chronic cough, wheezing and expectoration, decreased lung capacity, asthma, farmers' lungs, and bronchitis.

Chronic effect of pesticides on human

Consuming such fruits and vegetables that have been cultivated in pesticide-contaminated soil and water over an extended period, recovering from a heavy dose, or continuously absorbing the chemicals by workers, farmers, etc. accumulation raises the level of toxin concentration inside body organs and leads to chronic illnesses like neurotoxicity, necrosis, asthma, reproductive issues, cardiac problems, diabetes, Parkinson's disease development, anxiety, depression, attention deficit and hyperactivity disorder (ADHD),

and cancers like leukemia and non-Hodgkin lymphoma, among others.

Cancer - The most dangerous impacts of pesticides for both adults and children are caused by their carcinogenic effects, according to a substantial body of research that shows how they induce cancer in multiple organ systems. People exposed to this exposure develop bladder, thyroid, and brain cancer, leukemia as well as childhood and adulthood. However, other factors like age, family history of cancer, diet, and lifestyle should also be considered. Numerous pesticides are to blame for the cancer issue, but breast cancer is the most common in all cancer types and is associated with organophosphorus (malathion and parathion) that affect cell growth and proliferation.

Endocrine Complications -Endocrine issues are another potential adverse effect of pesticides. Most pesticides function as agonists to activate a variety of hormone receptors, including androgen receptors, estrogen receptors, pregnancy receptors, nuclear hormone receptors, and aryl hydrocarbon receptors. Male hormones that might affect human fertility were particularly suppressed. A healthy male reproductive system depends on testosterone and other androgens, which are blocked by agricultural chemicals. They may also affect the function of endogenous hormones and behave as hormones in the endocrine system; when they do this, they are known as endocrine-disrupting chemicals.

Infertility and Sterility - Infertility and sterility in both men and women have been related to pesticides. Low sperm counts and infertility in men who work on farms or who are regularly exposed to pesticides may be caused by exposure to solvents and pesticides.

Most pesticides, especially organophosphorus, have an adverse effect on the male reproductive system through mechanisms such as decreased sperm motility and density, suppression of spermatogenesis, decreased testis weights, decreased sperm counts, viability, and density, and sperm DNA damage. The structure of DNA can be changed.

Brain Damage- Pesticides have also been linked to brain damage and can cause neurotoxic effects or

chemical damage to the nervous system in those who use these chemicals on a regular basis. Gardeners and farmers are the most at risk for developing long-term brain damage and suffering from brain problems such as Mild Cognitive Dysfunction (MCD), which affects the ability to speak smoothly and identify words, colors, numbers, Parkinson's disease, along with cognitive function, dementia, and Alzheimer's diseases. Pesticides also damage the brain and cause developmental problems in children.

Birth Defects- Birth defect from pesticide exposure is another growing concern for pregnant women, adults, and children. The link between pesticides and birth defects has been tied to the use of household sprays that kill garden insects, ants, mosquitoes, and fleas. These potent chemicals are used to attack the nervous system of insects and kill them but may pose an even greater risk to the unborn baby's health and increase the risk for oral clefts, neural tube defects, heart defects, and limb defects. during Exposure of the fetus in the mother's womb case congenital anomalies, and genetic diseases onset due to disruption of their DNA during development. Endocrine disruption side effects are seen both during and after birth.

Genetic defect - DNA is an important biomolecule present in living organisms that carries hereditary information and controls the biological synthesis of proteins and enzymes. It acts as the key molecular target of drugs and environmental chemicals such as pesticides. Pesticides interact with DNA and cause conformational changes that could induce gene mutations and lead to adverse health consequences such as carcinogenesis.

Respiratory Disorders- Another concerning side effect of exposure when spraying, fumigation, or ingestion of pesticides is respiratory disorders, including wheezing, chronic bronchitis, asthma, and farmer's lung. Regular exposure to pesticides increases your risk of developing respiratory problems.

Organ Failure- Pesticides may be to blame for an increase in organ failures around the world. For example, there have been an alarming number of deaths related to either chronic kidney disease or intestinal

nephritis in India over the last seven years. Most of the victims worked in agriculture and were constantly exposed to high levels of pesticides and ate foods with pesticide residue.

Skin - Skin irritation is another possible side effect of pesticides because the skin is the most likely to come into contact with these harmful chemicals. Since pesticides can be absorbed through the skin and into the bloodstream, it can easily cause cutaneous toxicity, rashes, and skin infections such as ringworm and athlete's foot. If enough pesticide is absorbed through the skin, it could cause severe toxic reactions and internal health problems.

Eye: Exposure to vapors, clouds of dust, or aerosols can cause local effects on the smooth muscles of the eyes. The most common effects are irritation, burning sensation, itchiness, blurring of vision, and watering of the eyes.

GLOBAL CONSUMPTION OF PESTICIDE

The global pesticide consumption in 2019 was approximately 4.19 million metric tons, where China was by far the largest pesticide-consuming country (1.76 million metric tons), followed by the United States (408 thousand tons), Brazil (377 thousand tons), and Argentina (204 thousand tons) (Fernández, 2021). In southeast Asia, WHO reported an annual increase in pesticide usage with 20% of developing countries as pesticide consumers, including Cambodia, Laos, and Vietnam. India belongs to one of the major pesticide-producing countries in Asia, having 90 thousand tons annual production of organochlorine pesticides including benzene hexachloride and DDT. The population most at risk of suffering health problems as a result of pesticide exposure is made up primarily of farm workers, pest control workers, or other agricultural industry employees, as well as other environmentally vulnerable people who live close to farms or agricultural fields or those who are exposed to household pesticides.

CONCLUSION

Pesticide is extensively used nowadays in agricultural industries to increase production by protecting the crops from a potential threat, it is also used in homes

and other public places to prevent insect and other unwanted creature, increase used of pesticide their exposure to human also increased, due to their long life These chemicals do not degrade easily and found in the area and on products on which they used and their presence and exposure to human cause a serious threat to humanity worldwide. Pesticide exposure is not only harmful to adults, but young children and fetuses during their developmental period are more vulnerable to these pesticides due to their weak and inactive immune systems. According to our studies, we found that pesticides are very harmful if they are exposed to humans, but we cannot completely be banned or restricted their use due to the economic and medical importance of killing vectors. But we reduce their exposure and effect, by using specific safety measures for farm workers and reducing the exposure of children and pregnant females.

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