

Impacts of organophosphate residues on environmental and biological systems

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ABSTRACT

The utilization of agricultural pesticides is one of the primary issues in rural and urban crop-cultivated areas, with the majority of chemicals moving through air water and other natural sources. Organophosphate exposure might be caused by the absorption in body tissue like skin and breath. Toxicity which are not specifically connected to pesticide toxicity, include nausea, vomiting, and dizziness. The goal of this study is to understand the relationship between farmer's physical, mental, and social health and their exposure to organophosphate.

Introduction

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Several organophosphate complexes are pesticides that are commonly used for the control of insect routes. Pesticides cover a variety of compounds including, antifungals, weedkillers, rodenticides, molluscicides, nematodes, plant growing regulators, and others. The classification of Pesticides is based on its chemical makeup, mechanism of action, toxicity and application method. However, the chemical composition is most effective way to classify organophosphate. The toxicity of organophosphate is due to inhibition of the enzyme acetylcholinesterase (AChE). The concentration of acetylcholine in synapse increases when acetylcholinesterase is inhibited. Due to buildup of acetylcholine in synapse nicotinic, muscarinic and central-peripheral toxicity occurs.

Method and Mode of transmission:

Atmosphere: Air is polluted by pesticides via drift. Pesticide spray drift occur while spraying the ground or during midair applications. Organophosphate exposure also happens through breath, direct crop-dusting, volatilization and cutaneous contact. The pesticide is dispersed in environment due to application method, temperature and wind speed. People's clothes are polluted by dirty air of residential areas close to farms. Pesticides present in air is spread or cracked by sunlight, water or placed in soil.

Aquatic system: Organophosphate enters surface water through irrigation, industrial, agricultural waste, run-off from agricultural farms, and transport during rainfall from the area of rain fall and industrial waste. For organophosphate pesticides superficial water, crushed water, unused water, and intake water have been examined.

Occupational Exposure: During production of organophosphate insecticides takes place in close proximity to one another, factory worker exposed. Exposure by oral, cutaneous or breathing routes can be occur during product growth, production, transport, and usage for handling in household or usage as human and animal medication.

Accidental Exposure: People can be exposed to organophosphate through home, therapeutic use, during unintentional pollution rising from manufacture, storing, transportation, usage or removal. The hazard of contact to contaminated food is small as compare to accidental substances contamination because particles from accurate crop-dusting should not leave any active residues in diet provided an acceptable break has accepted between spray and sale of product [1].

Environmental Impact:

Organophosphate pesticides are extensively used to manage weeds, illnesses and agricultural crops. On the other hand, these pesticides are present in atmosphere, water system and cause severe environmental problems. Pesticides are observed as most dangerous poisons because of their stability, flexibility, and long-term effects on living species. Pesticides in air, water, soil has impact on health of people effects who existed in societies located near agriculture areas. Pesticide remains in the air can be carried by wind, surface water, and soil can be enter into close streams, which are main source of drinking water for local population. Swimming in water may expose children to pesticide residues fish and other aquatic organisms may also be polluted. Contamination in agricultural soil, deposits and water was discovered primary cause of

pollution. Water pollution due to organophosphates is also a main problem for our environmental decline from these xenobiotics. Agricultural area for vegetables, cotton, and horticultural crops are the main source of water pollution due to pesticides. The main environmental problem associated to pesticides are soil, water or air pollution that cause to damage the plants, birds, wildlife, fish and crops.

Biological Impact

When pesticide or insecticide are sprayed to crops some residues of pesticide may deposit in crop and cause harmful effect in body such as;

Neuronal damage; organophosphate exposure cause buildup of acetylcholine on synapses consequences in fast and significant excitotoxicity and malfunctioning of cholinergic nerve cell in the brain. Stimulation of muscarinic acetylcholine receptors might also interrupt the excitotoxic lesions equilibrium, resulting in seizures and respiratory depression.

Oxidative stress; Toxicity caused by organophosphate exposure is main mechanism of oxidative stress in human and investigational animal. Hyperglycemia occurs in oxidative stress due to organophosphate poisoning.

Cancer; consumption of specific goods which containing pesticide residue such as fish, aquatic seafood and drain or other dairy goods demonstrates a link among cancer risk and some exact insecticides remains. Pesticide residual levels of organochlorine pesticides were found to be greater in cancer patients.

Reproductive disorders; Human must avoid the foods having high level of pesticides, like fish, chicken and goat induce reproductive issues. Ingesting of high pesticide residue fruit and root vegetable was related with minor overall blood serum count may contribute to decrease fertility in men. Pesticide exposure may lead to decrease productiveness, initial and late pregnancy loss, and increased period to pregnancy, unprompted abortion, and early birth in female, as well as genetic abnormalities in sperm, decreased sperm count, and genetic alterations in sperm, reduced sperm count, germinal epithelium damage, and altered hormone function in male.

Psychological effects; Behavioral alterations such as changes in psychomotor presentation, memory, language and attitude with depression, nervousness and irritability.

Preventive measures to reduce pesticide residues in food grains, vegetables and fruits

One of the approaches used to decrease the outcome of pesticide remainder in food is to eat **organic food** rather than non-organic food.

Washing is the second means described to decrease pesticide residue in food. Washing may reduce pesticide residue in food. To decrease pesticide residue washing with water and several chemical solutions for local and marketable applications is essential. **Processing treatment** as washing, cracking, dismissing or heating that the common of food reservoir prior to ingesting are a crucial element important to decrease any residue left on yields at crop. **Rational** use of pesticide includes pesticide selection, quantity rates, dilution, control, and incidence of application, handling intervals and application method, safety measures, and restrictions [2].

Management

Decontamination and first aid; For alternative treatment of organophosphate poisoning cleansing and first aid is preferred. Decontamination is required to reducing the organophosphate. It must be considered that the other workers, such as paramedic's staff are not infected. Gastric lavage must be effective for unconscious patients. Within 30 minutes of injection gastric lavage must be effective. Organophosphate is rapidly absorbed from digestive tract.

Treatment

Supportive Care; Patient must be transferred to a ward for maintenance of heart rhythm, blood pressure and breathing rate. Suction of respirational and oral secretions is used to remove organophosphate doses that may induce respiratory distress.

Specific treatment; Atropine functions as an antidote by inhibiting the acetylcholine at muscarinic receptors. Atropine opposite the unnecessary parasympathetic stimulation which are consequences of acetylcholinesterase inhibition. Atropine is effective in reversing the muscarinic outcome of poisoning it has no influence on CNS effects. As a result, **Oximes** is used to treat cholinergic and nicotinic symptoms.

Pralidoxime is most often used oxime. It can only be used in combination with Atropine [3].

Conclusion

Organophosphate residue is used for the prevention of harmful effects of Pest, insect and other such vectors in agriculture as well as other parts of world. On the other hand, farmers suffered from both severe and long-lasting toxicity due to organophosphate exposure. Farmer's value of life scores are inferior to usual people life score from biological and societal perceptions. Government health programs must give importance to well-being promotion and teaching system about organophosphate harmful effects, preventive measures and treatment.

References

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