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ACUTE HUMAN LETHAL TOXICITY EFFECTS OF SOME PESTICIDE FAMILIES

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ABSTRACT

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INTRODUCTION

All pesticides must be toxic, or poisonous, to be effective against the pest they are intended to control. Because pesticides are toxic, they are potentially hazardous to human, animals, other organisms, and the environment. Therefore, people who use pesticides or regularly come in contact with them must understand the relative toxicity and potential health effects of the product they use.

The toxicity of the pesticides is its capacity or ability to cause injury or illness. The toxicity of particular pesticides is determined by subjecting test animals to varying dosages of the active ingredient and each of its formulated products. The active ingredient is the chemical component in the pesticide product that controls the pest. The two types of toxicity are acute and chronic. Acute toxicity of pesticide refers to the chemical's ability to cause injury to a person or animal from a single exposure, generally or short duration. The four routes of exposure are dermal (skin), inhalation (lungs), oral (mouth), and eyes and skin irritations.

Suicide and deliberate self-harm using pesticides is a major but under-recognised public health problem in the developing world. Each year 250,000–370,000 thousand people die from deliberate ingestion of pesticides. These deaths are responsible for about a third of suicides globally; the World Health Organization (WHO) now recognizes pesticide poisoning to be the single most important means of suicide worldwide. Within the rural developing world, high levels of pesticide use with storage at home increases the risk of acute poisoning.

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Table 1. Signs and symptoms of acute exposure for several fungicide active ingredients.

Serial No.	Active Ingredient	Brand Name	Signs and Symptoms
1.	Azoxystrobin	Abound, Quadris	Irritating to skin, eyes, respiratory tract
2.	Captan	Captol, Orthocide	Irritating to skin, eyes, respiratory tract
3.	Chlorothalonil	Bravo, Daconil	Irritation to skin, mucous membranes of the eye, respira tory tract. Allergic contact dermatitis
4.	Copper Compounds	Bordeaux mixture, Copper sulfate	Irritating to skin, eyes, respiratory tract Salts are corrosive to mucous membranes and cornea Metallic taste, nausea, vomiting, intestinal pain
5.	Mancozeb	Dithane M-45, Manzate 200	Irritating to skin, eyes, respiratory tract
6.	Maneb	Dithane M-22, Manzate	Irritating to skin, eyes, respiratory tract Skin disease in occupationally exposed individuals
7.	Pentachloro nitrobenzene	PCNB, Terraclor	Allergic reactions
8.	Sulfur	Cosan, Thiolux	Irritating to skin, eyes, respiratory tract Breath odor of rotten eggs Diarrhea Irritant dermatitis in occupationally exposed individuals
9.	Thiram	Polyram-Ultra, Spotrete-F	Irritating to skin, eyes, respiratory mucous membranes
10.	Ziram	Cuman, Vancide	Irritating to skin, eyes, respiratory tract Prolonged inhalation causes neural and visual disturbances

Table 2. Signs and symptoms of acute exposure for several herbicide active ingredients.

Serial No.	Active Ingredient	Brand Name	Signs and Symptoms
1.	2,4-dichloro-phenoxyacetic acid	2,4-D, Barrage	Irritating to skin, mucous membranes Vomiting, headache, diarrhea, confusion Bizarre or aggressive behavior Muscle weakness in occupationally exposed individuals
2.	Acetochlor	Harness, Surpass	Irritating to skin, eyes, respiratory tract
3.	Atrazine	Aatrex, Atranex	Irritating to skin, eyes, respiratory tract abdominal pain, diarrhea, vomiting Eye irritation, irritation of mucous membranes, skin reactions
4.	Dicamba	Banvel, Metambane	Irritating to skin, respiratory tract Loss of appetite (anorexia), vomiting, muscle weakness, slowed heart rate, shortness of breath Central nervous system effects
5.	Glyphosate	Rodeo, Roundup	Irritating to skin, eyes, respiratory tract
6.	Mecoprop	Kilporp, MCPP	Irritating to skin, mucous membranes Vomiting, headache, diarrhea, confusion Bizarre or aggressive behavior Muscle weakness in occupationally exposed individuals
7.	Metolachlor	Bicep, Dual	Irritating to skin, eyes
8.	Paraquat	Gramoxone	Burning in mouth, throat, chest, upper abdomen Diarrhea, Giddiness, headache, fever, lethargy Dry, cracked hands, ulceration of skin
9.	Pendimethalin	Prowl, Stomp	Irritating to skin, eyes, respiratory tract
10.	Propanil	Propanex, Stampede	Irritating to skin, eyes, respiratory tract

Table 3. Signs and Symptoms of Acute Exposure For Several Insecticide Active Ingredients.

Serial No.	Active Ingredient	Brand Name	Signs and Symptoms
1.	Acephate (organophosphate)	Orthene	Headache, excessive salivation and tearing, muscle twitching, nausea, diarrhea Respiratory depression, seizures, loss of consciousness Pinpoint pupils
2.	Aldicarb (N-methyl carbamate)	Temik	Malaise, muscle weakness, dizziness, sweating Headache, salivation, nausea, vomiting, abdominal pain, diarrhea Nervous system depression, pulmonary edema in serious cases
3.	Carbaryl (N-methyl carbamate)	Sevin	Malaise, muscle weakness, dizziness, sweating Headache, salivation, nausea, vomiting, abdominal pain, diarrhea Nervous system depression, pulmonary edema in serious cases
4.	Chlorpyrifos (organophosphate)	Dursban	Headache, excessive salivation and tearing, muscle twitching, nausea, diarrhea Respiratory depression, seizures, loss of consciousness Pinpoint pupils
5.	Endosulfan (organophosphate)	Thiodan	Itching, burning, tingling of skin Headache, dizziness, nausea, vomiting, lack of coordination, tremor, mental confusion Seizures, respiratory depression, coma
6.	Malathion (organophosphate)	Cythion	Headache, excessive salivation and tearing, muscle twitching, nausea, diarrhea Respiratory depression, seizures, loss of consciousness Pinpoint pupils
7.	Methyl Parathion (organophosphate)	Penncap-M	Headache, excessive salivation and tearing, muscle twitching, nausea, diarrhea Respiratory depression, seizures, loss of consciousness Pinpoint pupils
8.	Phosmet (organophosphate)	Imidan	Headache, excessive salivation and tearing, muscle twitching, nausea, diarrhea Respiratory depression, seizures, loss of consciousness Pinpoint pupils
9.	Pyrethrins (natural origin)		Irritating to skin and upper respiratory tract Contact dermatitis and allergic reactions—asthma
10.	Pyrethroids (synthetic pyrethrin)	Cypermethrin,	Permethrin Abnormal facial sensation, dizziness, salivation, headache, fatigue, vomiting, diarrhea Irritability to sounds or touch Seizures, numbness

Fungicides

The acute toxicity of fungicides to humans is generally considered to be low, but fungicides can be irritating to the skin and eyes. Inhalation of spray mist or dust from these pesticides may cause throat irritation, sneezing, and coughing. Chronic exposures to lower concentrations of fungicides can cause adverse health effects. Most cases of human fungicide poisonings have been from consumption of seed grain. To prevent these types of poisonings, fungicide treatment now includes a brightly colored dye to clearly indicate that the seed has been treated.

Herbicides

In general, herbicides have a low acute toxicity to humans because the physiology of plants is so different than that of humans. However, there are exceptions; many can be dermal irritants since they are often strong acids, amines, esters, and phenols. Inhalation of spray mist may cause coughing and a burning sensation in the nasal passages and chest. Prolonged

inhalation sometimes causes dizziness. Ingestion will usually cause vomiting, a burning sensation in the stomach, diarrhea, and muscle twitching.

Insecticides

Insecticides cause the greatest number of pesticide poisonings. The most serious pesticide poisonings usually result from acute exposure to organophosphate and carbamate insecticides. Organophosphate insecticides include chlorpyrifos, diazinon, dimethoate, disulfoton, malathion, methyl parathion, and ethyl parathion. The carbamate compounds include carbaryl, carbofuran, methomyl, and oxamyl. Organophosphates and carbamates inhibit the enzyme cholinesterase, causing a disruption of the nervous system. All life forms with cholinesterase in their nervous system, such as insects, fish, birds, humans, and other mammals, can be poisoned by these chemicals.

CONCLUSION

All pesticides have the potential to be harmful to humans, animals, other living organisms, and the environment if used incorrectly. The key to reducing health hazards when using pesticides is to always limit your exposure by wearing PPE and use a low-toxicity pesticide when available. Reading the label and practicing safe work habits will minimize hazards from the use of pesticides.