

Organophosphorus poisoning and its treatment

For M.Sc. 2nd Semester, prepared by B.Banik

Organophosphates are chemicals found in insecticide and used extensively in agriculture. When people, such as agricultural workers, are exposed to large quantities of organophosphates, these chemicals can be harmful. When a person develops an illness as a result of organophosphate exposure, it is known as organophosphate poisoning. Nearly 25 million cases of unintentional pesticide poisoning occur in the agricultural industry across the world each year.

Organophosphate poisoning occurs most commonly as a suicide attempt in farming areas of the developing world and less commonly by accident.

Organophosphorus pesticide self-poisoning is an important clinical problem in rural regions of the developing world, and kills an estimated 200 000 people every year. Medical management is difficult, with case fatality generally more than 15%.

Organophosphate compounds include : insecticides - malathion, parathion, diazinon, fenthion, dichlorvos, chlorpyrifos, ethion and nerve gases - soman, sarin, tabun, VX.

Organophosphorus pesticides inhibit enzyme acetylcholinesterase in synapses. Acetylcholinesterase inhibition results in accumulation of acetylcholine and overstimulation of acetylcholine receptors in synapses of the autonomic nervous system, CNS, and neuromuscular junctions.

Symptoms of mild exposure to organophosphates include:

- blurry or impaired vision
- watery eyes
- narrowed pupils
- stinging eyes
- nausea
- runny nose
- muscle twitching
- glassy eyes
- extra saliva
- headache
- muscle fatigue or weakness
- agitation

Symptoms of emergency-level exposure to organophosphate include:

- confusion
- narrow pupils
- convulsions
- coma
- agitation
- excessive secretions, such as saliva, sweat, tears, and mucus
- irregular or slow heartbeat

- *collapsing*
- *breathing that is ineffective stops*

Potential complications include:

- *paralysis*
- *fertility issues*
- *cancer*
- *metabolic disorders, such as high blood sugar levels*
- *inflammation of the pancreas*
- *excess acid in the blood*
- *brain and nerve problems*

The most common way a person experiences unintended exposure is through direct contact with the skin or from breathing in the chemicals. The pesticide is absorbed via the skin more rapidly if it is a liquid, oily, or if the skin is inflamed or has cuts or abrasions. It enters the lungs as a powder or through droplets in the air, including gas or vapors.

Treatment:

In organophosphate poisoning the primary treatments are atropine, oximes such as pralidoxime, and diazepam. General measures such as oxygen and intravenous fluids are also recommended. Attempts to decontaminate the stomach, with activated charcoal or other means, have not been shown to be useful.