

Acute and Chronic Pesticide Poisoning: Clinical Evaluation and Management

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ABOVE THE STUDY

Pesticides play a crucial role in modern agriculture by protecting crops from pests and improving food production. However, their widespread use has also led to significant concerns regarding human health and environmental safety. Pesticide poisoning remains a major public health issue worldwide, particularly in agricultural regions where occupational exposure is common. Exposure may occur through inhalation, ingestion, dermal absorption, or accidental contamination of food and water. Depending on the duration and intensity of exposure, pesticide poisoning may present as either acute or chronic toxicity, each requiring distinct clinical evaluation and management approaches.

Acute pesticide poisoning typically results from a single high-level exposure and often manifests rapidly. Common causes include occupational accidents, improper handling of pesticides, accidental ingestion, and intentional self-poisoning. Organophosphates and carbamates are among the most frequently implicated pesticide groups in acute poisoning cases. These compounds inhibit acetylcholinesterase activity, leading to excessive accumulation of acetylcholine at nerve synapses and neuromuscular junctions.

Clinical manifestations of acute pesticide poisoning vary depending on the specific chemical involved but commonly include nausea, vomiting, abdominal cramps, excessive salivation, sweating, muscle twitching, blurred vision, respiratory distress, and altered mental status. Severe cases may progress to seizures, respiratory failure, cardiovascular instability, and death if not promptly treated. Early recognition of these symptoms is essential because rapid intervention can significantly improve patient outcomes.

In contrast, chronic pesticide poisoning results from repeated low-level exposure over extended periods. Agricultural workers, pesticide applicators, and individuals living near treated fields are at increased risk of chronic exposure. Unlike acute poisoning, chronic toxicity often develops gradually and may be difficult to recognize due to its nonspecific clinical presentation. Long-term exposure has been associated with neurological disorders, cognitive impairment, endocrine disruption,

reproductive abnormalities, respiratory diseases, and an increased risk of certain cancers.

The clinical evaluation of suspected pesticide poisoning begins with a thorough exposure history. Information regarding the type of pesticide, route of exposure, duration of contact, and use of protective equipment can provide valuable diagnostic clues. Physical examination should focus on identifying characteristic signs of toxicity and assessing the severity of organ system involvement. Laboratory investigations may include complete blood counts, liver and kidney function tests, electrolyte measurements, and toxicological analyses. Measurement of plasma and red blood cell cholinesterase activity is particularly useful in cases involving organophosphate and carbamate poisoning.

Management of acute pesticide poisoning requires immediate stabilization of the patient. Initial treatment focuses on airway protection, breathing support, and circulatory stabilization. Removal from the exposure source and decontamination are critical steps in preventing further absorption of toxic substances. Contaminated clothing should be removed, and exposed skin should be thoroughly washed with soap and water. In selected cases, gastrointestinal decontamination may be considered following ingestion.

Specific antidotal therapy plays an important role in certain pesticide poisonings. Atropine remains the primary antidote for organophosphate and carbamate toxicity, helping to reverse muscarinic symptoms. Oxime compounds such as pralidoxime may be administered to reactivate acetylcholinesterase and improve neuromuscular function. Supportive care, including oxygen therapy, mechanical ventilation, seizure control, and intensive monitoring, may be necessary for severely affected patients.

Management of chronic pesticide poisoning focuses primarily on reducing further exposure and addressing long-term health consequences. Occupational safety measures, including proper use of personal protective equipment, regular health monitoring, and workplace education, are essential components of prevention. Patients with chronic toxicity may require multidisciplinary care involving neurologists, pulmonologists,

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Received: 18-Aug-2025, Manuscript No. JCT-25-42285; **Editor assigned:** 20-Aug-2025, PreQC No. JCT-25-42285 (PQ); **Reviewed:** 03-Sep-2025, QC No. JCT-25-42285; **Revised:** 10-Sep-2025, Manuscript No. JCT-25-42285 (R); **Published:** 17-Sep-2025, DOI: 10.35248/2475-3181.25.15.599.

Citation: Collins E (2025). Acute and Chronic Pesticide Poisoning: Clinical Evaluation and Management. J Clin Toxicol. 15:599.

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endocrinologists, and other specialists depending on the affected organ systems.

In conclusion, both acute and chronic pesticide poisoning represent significant challenges in clinical toxicology. Acute poisoning requires rapid recognition and emergency treatment to prevent life-threatening complications, while chronic

exposure demands long-term monitoring and preventive strategies. Improved awareness, early diagnosis, appropriate clinical management, and effective public health interventions are essential for reducing the burden of pesticide-related illness and protecting vulnerable populations from toxic exposure.