

Antidotes

Sr. No.	Classification of Pesticides	
1	Organophosphates	Some of the
		<p>Acephate, Chlorfenvinphos, Chlorpyrifos, Diazinon, Dichlorvos, Dimethoate, Ethion, Edifenphos, Ethephon, Fenitrothion, Fenthion, Formothion, Kitazin, Malathion, Methyl Parathion, Monocrotophos, Oxy-demeton Methyl, Phorate, Phenthoate, Phosalone, Phosphamidon, Pirimiphos Methyl, Quinalphos, Temephos, Thiometon, Trichlorofon</p>
	<p>leading molecules in group (Few examples)</p>	
	SYMPTOMS	<p>Organophosphates are readily absorbed through skin, inhalation or by digestion and cause inhibition of blood cholinesterase. Treatment is required urgently. The diagnosis could be confirmed by determining blood cholinesterase activity.</p> <p>The symptoms of poisoning caused by various organophosphates do not differ very much. The initial symptoms are giddiness, headache and nausea. As poisoning progresses, cold sweating, possibly vomiting, cramp like abdominal pains, diarrhoea, blurred vision, muscular twitching (in the eyelids) may occur. In severe cases, laboured breathing, wheezing, excessive sweating, salivation, mental confusion, convulsion, progressive cardiac and respiratory failure and coma.</p>
	TREATMENT	<p>Maintain adequate respiratory and cardiac function. Obtain and secure an unobstructed airway by suction, if necessary, from pharynx and trachea. IF necessary, give artificial respiration and/or oxygen.</p>

Inject atropine sulphate intravenously in a dose of 2-4 mg. for an adult (0.04 to 0.08 mg/kg body weight for children) every 5-10 minutes until signs of atropinisation occur (e.g.) Dry mouth and usually dilated pupils. Maintain atropinisation for atleast 24-48 hours and carefully observe the patient as further atropinisation is stopped. It may be necessary to recommence treatment if signs of poisoning return.

Convulsions and anxiety can be treated with 5-10 mg. of diazepam injected intramuscularly. While keeping the patient fully atropinised, administer also an oxime, if available, cholinesterase reactivator e.g. 2-PAM 1000-2000 mg IM or IV for adults (25 mg/kg body weight for children), or Toxogonin (Merck) 250 mg for adults (4-8 mg/kg body weight for children). Repeat if necessary after 1-2 hours.

Morphine, phenothiazines, Succinylchloride, xanthenederivative, epinephrine and barbiturates are contraindicated.

2 Carbamates

Some of the leading molecules in group (Few examples)

Aldicarb, Carbaryl, Carbofuran, Propoxur, Thiobencarb

SYMPTOMS

The mode of action and symptoms of carbamates poisoning are similar and essentially identical as those caused by the Organophosphates; however, features tend to be of quicker onset and shorter duration.

TREATMENT

Atropine therapy as indicated for Organophosphorous compounds.

Oximes such as 2-PAM, P2S, Toxogonin should not be administered.

Morphine, Phenothiazines, succinylchloride, xanthenederivative, epinephrine and barbiturates are also contraindicated.

Convulsions can be treated with diazepam (valium, Roche)

3 Organochlorines

Some of the leading molecules in group (Few examples)

Aldrin, BHC, Chlordane, DDT, Dicofol, Endosulfan, Heptachlor, Lindane.

SYMPTOMS

Organochlorine pesticides are highly persistent and fat soluble which can cause systemic poisoning. The action of organochlorine compounds on the central nervous system is of paramount importance in acute poisoning.

Symptoms include nervousness, headache, dizziness, nausea, vomiting, lack of co-ordination, tremors, diarrhea. Severe intoxication may cause convulsions and weakness in legs.

TREATMENT

Obtain and secure an unobstructed airway by suction, if necessary, from pharynx and trachea. If necessary, give artificial respiration.

			<p>Control convulsions by administering anticonvulsants like diazepam or paraldehyde, soluble barbiturates (Phenobarbital upto 0.7 gm per day or pentobarbital 0.25 to 0.5 gm per day)</p> <p>10% Calcium gluconate to be given I.V.</p> <p>In severe cases, it is necessary to protect vital organs like liver by injecting corticosteroids and kidney by dialysis.</p> <p>Give fat free diet with high proteins, carbohydrates and calcium.</p> <p>Adrenalin derivatives are contraindicated, since they may induce ventricular fibrillation.</p> <p>Do not give morphine, theophylline or aminophylline.</p> <p>Patients who have had one or more convulsions should be kept under close observation for atleast 24 to 48 hours.</p>
4	Dithiocarbamates	Some of the leading molecules in group (Few examples)	Ferbam, Mancozeb, Maneb, Thiram, Zineb, Ziram
		SYMPTOMS	Dithiocarbamates are generally of low toxicity but exposure to them followed by alcohol ingestion may produce headache, palpitations, nausea, vomiting and flushed face.
		TREATMENT	No specific treatment is available and symptomatic therapy only is possible.
5	Synthetic	Some of the	Cypermethrin, Deltamethrin, Fenpropathrin, Fenvalerate, Fluralinate, Permethrin, Lambdacyhalothrin.
	Pyrethroids	leading molecules in group (Few examples)	
		SYMPTOMS	Synthetic Pyrethroid insecticides are of a moderate order of acute oral toxicity and a low order of acute percutaneous toxicity. Irritation of oro-nasal mucosae, salivation, convulsive seizures. Some pyrethroids may cause facial sensations, which are not associated with systemic poisoning. The effects are reversible and no specific treatment is necessary.
		TREATMENT	In case of severe skin exposure in handling or application, typical sensations of exposed skin, especially of face may appear which can be described as tingling, burning or numbness. These sensations will wear off in the course of a few hours.
			The treatment is symptomatic.
			In case larger amounts have been ingested, perform gastric lavage.
			Administration of activated charcoal followed by saline Cathartic with Sodium sulphate solution.

Control seizures with injectable diazepam or barbiturates.

6	Dinitrophenolic Compounds	Some of the leading molecules in group (Few examples) SYMPTOMS	Binapacryl, Dinitrophenol, Dinoseb DNOC, PCP Dinitrophenols affect oxidative phosphorylation and poisoning, thus lead to sudden increase in metabolic rate. Nitrophenols can be absorbed in toxic amount through oral, respiratory or dermal routes. They are toxic to kidney, liver and central nervous system. Yellow staining of the skin in the presence of white sclera may give a clue to exposure to some Dinitrophenols. Symptoms, increased respiratory rate, sweating, lethargy and insomnia, nausea, restlessness, thirst, raised body temperature, rapid heart beat or unconsciousness. In case of chronic poisoning, symptoms such as nervousness, sweating, unusual thirst and loss of weight have been observed.
		TREATMENT	Reduce the fever by sponge wash, ice, fan, etc. Administer oxygen therapy, if necessary. Adequate emptying of stomach and the use of activated charcoal is important, followed by saline cathartic with Sodium Sulphate Solution. Ensure adequate intake of fluid. Do not use antipyretics.

7	Bipyridyliums	Some of the leading molecules in group (Few examples) SYMPTOMS	Diquat, Paraquat Bipyridyliums are dangerous when swallowed and harmful if inhaled or absorbed through skin, Lung fibrosis may develop. Prolonged skin contact causes skin irritation which may be severe. Initially (within hours) - irritation of mouth and throat with nausea, vomiting, abdominal pain and diarrhea (often bloody). Later (1-3 days) - signs of kidney and liver damage. Progressive pulmonary failure due to extensive lung damage might occur. For Diquat only - a profuse watery diarrhea also occurs which can lead to shock. For paraquat only 5-14 days after poisoning, progressive dyspnoea may occur resulting in death from respiratory failure.
		TREATMENT	Induce vomiting unless unconscious. Give gastric lavage and leave the gastric tube in situ. Give one litre of 30% aqueous suspension of Fuller's earth together with Sodium Sulphate. Repeat administration of Fuller's earth and Sodium Sulphate until Fuller's earth is seen in stool. This normally takes between 4 and 6 hours from starting the treatment. If Fuller's earth is not available, give charcoal 50 gm in 150 ml of water or 8 beaten egg whites. Avoid the use of oxygen therapy for the first 48 hours.

Induce hemodialysis or hemoperfusion if facilities available.

Because of possible kidney damage, urine output must be monitored.

Large doses of Vitamin C and E as antioxidants are said to be helpful if given early.

8 Zinc and

Some of the

Aluminium
Phosphides

leading
molecules
in group
(Few
examples)

These phosphides react with water and hydrochloric acid in the gastro-intestinal tract to produce phosphine gas.

SYMPTOMS

If inhaled, phosphide causes fall of blood pressure, dyspnoea, pulmonary edema, collapse, vomiting, cardiac arrhythmia, convulsion and coma. Renal damage and leucopaenia after several days.

If ingested severe gastroenteritis with nausea, vomiting and severe abdominal pain develops in case of poisoning. These symptoms are followed by cough, dyspnea and pulmonary edema. Severe poisoning might result in liver and kidney failure.

TREATMENT

Gastric lavage, morphine for the relief of abdominal pain, administration of 100% oxygen for pulmonary edema, anticonvulsant therapy, high doses of corticosteroids and blood transfusion for the treatment of shock and haemorrhage.

9 Anticoagulants -

Some of the

Rodenticides

leading
molecules

Bradifacoum, Bromadiolone, Chlorophacinone Coumachlor, Coumoruryl, Warfarin

	in group (Few examples)	
	SYMPTOMS	The anticoagulant rodenticides cause inhibition of prothrombin synthesis. Exposure to multiple doses are required until prothrombin levels are sufficiently depleted to result in haemorrhage. Nausea, vomiting and diarrhea upon ingestion. Bleeding from nose, gums, gastrointestinal and urinary tracts, internal bleeding leading to shock and coma.
	TREATMENT	Remove ingested product by giving orally activated charcoal and saline cathartic. Repeated prothrombin level determinations are important. To restore blood clotting, give Vitamin K, Phytonadione 15-25 mg to adults and 5-10 mg to children orally in mild cases. In several cases, give Agnamephyton 5-10 mg to adults, 1-5 mg to children, I.M or I.V.
10	Mercurials	Some of the leading molecules in group (Few examples)
	SYMPTOMS	MEMC, PMA Mercury compounds are toxic and persistent. They affect the nervous system and may cause permanent damage. They may cause severe skin problems. Symptoms of poisoning may be slow and delayed. Tingling of fingers, tongue, tips may occur. Headache and shakiness may develop. In acute poisoning, there may be signs of gastrointestinal irritation. There may be loss of peripheral vision, loss of coordination, especially in speech and gait. Contact with skin may cause blisters or dermatitis. Peripheral vascular collapse may also occur.
	TREATMENT	Give milk or white of egg and then induce vomiting or perform gastric lavage. Give gastric lavage, high colonic irrigation with sodium formaldehyde sulphoxylate solution. Inject freshly prepared 100 to 200 ml of sodium formaldehyde sulphoxylated solution intravenously. For later treatment, give sodium citrate 1 to 4 g. every 4 hours by mouth. Give 100 ml of 10 per cent calcium gluconate solution intravenously for muscular spasm.
11	Fumigants	Some of the leading molecules in group (Few examples)
	SYMPTOMS	Ethylene Dibromide, ED/CT, Methyl Bromide, Sodium Cyanide. Fumigants present greatest hazards since used in enclosed areas. There are a variety of chemicals which are used as gases for controlling pests in stored products.

		<p>The poisonous gases breathed in, cause respiratory irritation and damage to the lungs. They also depress the Central Nervous System and may cause liver damage. Itching dermatitis and blistering of skin and corneal ulceration are some of the typical effects. If ingested, there may be nausea, vomiting, dizziness, convulsions, staggering, coma and respiratory failure.</p> <p>TREATMENT Administer artificial respiration or oxygen.</p> <p>Administer Aminophylline, initially with normal liver function, give 1 mg/kg slowly I.V. as a loading dose, followed by 0.6 mg/kg per hour as a maintenance regime.</p> <p>Morphine : as needed, if there is no sign of respiratory depression.</p> <p>Furosamide : Adults : 40 mg. slowly I.V.</p> <p>Children 0.5 to 1.5 mg/kg slowly I.V.</p> <p>Treatment given above is general and the instructions on the label should be followed for specific poisoning.</p>
<p>12 Ureas</p>	<p>Some of the leading molecules in group (Few examples)</p> <p>SYMPTOMS</p>	<p>Diuron, Diflubenzuron, Isoproturon, Methabenzthiazuron, Metoxuron</p> <p>Where no antidote is recommended or none is available, use some general measures to prevent absorption of the poison. Give activated charcoal 50 gram in 400 ml. Water as an absorbant for pesticide remaining in intestinal tract in a dose of 5 ml/kg body weight orally or by gastric lavage. Remove and repeat administration if necessary. For elimination of toxic substances from the bowel use a cathartic such as sodium or magnesium sulphate at a dose of 30 g. in 250 ml. Of water by mouth. The quantity of the liquid given should not exceed 50 ml / 10 kg body weight.</p> <p>Where the poisoning agent is known and where an antidote is recommended on the label, this should not be administered as indicated.</p> <p>TREATMENT No specific antidote, treat symptomatically</p>
<p>13 Acids</p>	<p>Some of the leading molecules in group (Few examples)</p> <p>SYMPTOMS</p>	<p>Dalapon, 2,4-D (Na salt, amine and ester MCPA, TCA)</p> <p>Where no antidote is recommended or none is available, use some general measures to prevent absorption of the poison. Give activated charcoal 50 gram in 400 ml. Water as an absorbant for pesticide remaining in intestinal tract in a dose of 5 ml/kg body weight orally or by gastric lavage. Remove and repeat administration if necessary. For elimination of toxic substances from the bowel use a cathartic such as sodium or magnesium sulphate at a dose of 30 g. in 250 ml. Of water by mouth. The quantity of the liquid given should not exceed 50 ml / 10 kg body weight.</p> <p>Where the poisoning agent is known and where an antidote is recommended on the label, this should not be administered as indicated.</p>

<p>14 Triazines</p> <p>Some of the leading molecules in group (Few examples)</p>	<p>TREATMENT</p> <p>SYMPTOMS</p>	<p>No specific antidote, treat symptomatically</p> <p>Atrazine, Simazine</p> <p>Where no antidote is recommended or none is available, use some general measures to prevent absorption of the poison. Give activated charcoal 50 gram in 400 ml. Water as an absorbant for pesticide remaining in intestinal tract in a dose of 5 ml/kg body weight orally or by gastric lavage. Remove and repeat administration if necessary. For elimination of toxic substances from the bowel use a cathartic such as sodium or magnesium sulphate at a dose of 30 g. in 250 ml. Of water by mouth. The quantity of the liquid given should not exceed 50 ml / 10 kg body weight.</p> <p>Where the poisoning agent is known and where an antidote is recommended on the label, this should not be administered as indicated.</p>
<p>15 Amides</p> <p>Some of the leading molecules in group (Few examples)</p>	<p>TREATMENT</p> <p>SYMPTOMS</p>	<p>No specific antidote, treat symptomatically</p> <p>Alachlor, Butachlor, Propanil</p> <p>Where no antidote is recommended or none is available, use some general measures to prevent absorption of the poison. Give activated charcoal 50 gram in 400 ml. Water as an absorbant for pesticide remaining in intestinal tract in a dose of 5 ml/kg body weight orally or by gastric lavage. Remove and repeat administration if necessary. For elimination of toxic substances from the bowel use a cathartic such as sodium or magnesium sulphate at a dose of 30 g. in 250 ml. Of water by mouth. The quantity of the liquid given should not exceed 50 ml / 10 kg body weight.</p> <p>Where the poisoning agent is known and where an antidote is recommended on the label, this should not be administered as indicated.</p>
<p>16 Anilines</p> <p>Some of the leading molecules in group (Few examples)</p>	<p>TREATMENT</p> <p>SYMPTOMS</p>	<p>No specific antidote, treat symptomatically</p> <p>Fluchloralin</p> <p>Where no antidote is recommended or none is available, use some general measures to prevent absorption of the poison. Give activated charcoal 50 gram in 400 ml. Water as an absorbant for pesticide remaining in intestinal tract in a dose of 5 ml/kg body weight orally or by gastric lavage. Remove and repeat administration if necessary. For elimination of toxic substances from the bowel use a cathartic such as sodium or magnesium sulphate at a dose of 30 g. in 250 ml. Of water by mouth. The quantity of the liquid given should not exceed 50 ml / 10 kg body weight.</p> <p>Where the poisoning agent is known and where an antidote is recommended on the label, this should not be administered as indicated.</p>
<p>17 Benzimidazoles</p> <p>Some of the leading molecules</p>	<p>TREATMENT</p>	<p>No specific antidote, treat symptomatically</p> <p>Carbendazim, Thiphanate Methyl</p>

		in group (Few examples)	<p>SYMPTOMS Where no antidote is recommended or none is available, use some general measures to prevent absorption of the poison. Give activated charcoal 50 gram in 400 ml. Water as an absorbant for pesticide remaining in intestinal tract in a dose of 5 ml/kg body weight orally or by gastric lavage. Remove and repeat administration if necessary. For elimination of toxic substances from the bowel use a cathartic such as sodium or magnesium sulphate at a dose of 30 g. in 250 ml. Of water by mouth. The quantity of the liquid given should not exceed 50 ml / 10 kg body weight.</p> <p>Where the poisoning agent is known and where an antidote is recommended on the label, this should not be administered as indicated.</p> <p>TREATMENT No specific antidote, treat symptomatically</p>
18	Morpholines	Some of the leading molecules in group (Few examples)	<p>SYMPTOMS Where no antidote is recommended or none is available, use some general measures to prevent absorption of the poison. Give activated charcoal 50 gram in 400 ml. Water as an absorbant for pesticide remaining in intestinal tract in a dose of 5 ml/kg body weight orally or by gastric lavage. Remove and repeat administration if necessary. For elimination of toxic substances from the bowel use a cathartic such as sodium or magnesium sulphate at a dose of 30 g. in 250 ml. Of water by mouth. The quantity of the liquid given should not exceed 50 ml / 10 kg body weight.</p> <p>Where the poisoning agent is known and where an antidote is recommended on the label, this should not be administered as indicated.</p> <p>TREATMENT No specific antidote, treat symptomatically</p>
19	Copper	Some of the leading molecules in group (Few examples)	<p>SYMPTOMS Where no antidote is recommended or none is available, use some general measures to prevent absorption of the poison. Give activated charcoal 50 gram in 400 ml. Water as an absorbant for pesticide remaining in intestinal tract in a dose of 5 ml/kg body weight orally or by gastric lavage. Remove and repeat administration if necessary. For elimination of toxic substances from the bowel use a cathartic such as sodium or magnesium sulphate at a dose of 30 g. in 250 ml. Of water by mouth. The quantity of the liquid given should not exceed 50 ml / 10 kg body weight.</p> <p>Where the poisoning agent is known and where an antidote is recommended on the label, this should not be administered as indicated.</p> <p>TREATMENT No specific antidote, treat symptomatically</p>
20	Carboxyanilides	Some of the leading molecules in group (Few examples)	<p>SYMPTOMS Where no antidote is recommended or none is available, use some general measures to prevent absorption of the poison. Give activated charcoal 50 gram in 400 ml. Water as an absorbant for pesticide remaining in intestinal tract in a dose of 5 ml/kg body weight orally or by gastric lavage. Remove and repeat administration if necessary. For elimination of toxic substances from the bowel use a cathartic such as sodium or magnesium sulphate at a dose of 30 g. in 250 ml. Of water by mouth. The quantity of the liquid given should not exceed 50 ml / 10 kg body weight.</p> <p>Where the poisoning agent is known and where an antidote is recommended on the label, this should not be administered as indicated.</p> <p>TREATMENT No specific antidote, treat symptomatically</p>

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		<p>TREATMENT No specific antidote, treat symptomatically</p>
21	Sulfones	<p>Some of the leading molecules in group (Few examples)</p> <p>Tetradifon</p>
		<p>SYMPTOMS Where no antidote is recommended or none is available, use some general measures to prevent absorption of the poison. Give activated charcoal 50 gram in 400 ml. Water as an absorbant for pesticide remaining in intestinal tract in a dose of 5 ml/kg body weight orally or by gastric lavage. Remove and repeat administration if necessary. For elimination of toxic substances from the bowel use a cathartic such as sodium or magnesium sulphate at a dose of 30 g. in 250 ml. Of water by mouth. The quantity of the liquid given should not exceed 50 ml / 10 kg body weight.</p> <p>Where the poisoning agent is known and where an antidote is recommended on the label, this should not be administered as indicated.</p>
		<p>TREATMENT No specific antidote, treat symptomatically</p>
22	Chlormequat Chloride	<p>Some of the leading molecules in group (Few examples)</p>
		<p>SYMPTOMS Where no antidote is recommended or none is available, use some general measures to prevent absorption of the poison. Give activated charcoal 50 gram in 400 ml. Water as an absorbant for pesticide remaining in intestinal tract in a dose of 5 ml/kg body weight orally or by gastric lavage. Remove and repeat administration if necessary. For elimination of toxic substances from the bowel use a cathartic such as sodium or magnesium sulphate at a dose of 30 g. in 250 ml. Of water by mouth. The quantity of the liquid given should not exceed 50 ml / 10 kg body weight.</p> <p>Where the poisoning agent is known and where an antidote is recommended on the label, this should not be administered as indicated.</p>
		<p>TREATMENT Inject neostigmine as and when necessary</p>