

Toxicology LEC 4.Dr.Siham .A.W

Pesticides:-

Pesticides : are Drugs or chemicals that are used to kill pests.

Pests can be insects, weeds, fungi, rodents or other unwanted organisms.

They are includes:-

1-Insecticides

2-Herbicides

3-Fugicides

4-Rodenticides

Insecticides:-are drugs used to kill insects of the body animal surface and plants .

Application techniques in using insecticides:-

1-Spraying

2-Dipping

3-Dusting

4-Lotion

5-shampooing

6-Feed additive

7-Injection

Classification of insecticides:-

1-Organophosphates (organophosphorus compounds).Like –Malathion

-Parathion -dichlorvos, Diazenon- Coumaphos.

2-Organochlorines (chlorinated hydrocarbons).Like – DDT(dichlorodiphenyltrichloroethane)-Lindan-Aldrin- Dieldrin-Chlordan.

3-Carbamates esters.Like –Carbaryl-Aldicarb-Methomyl-Propoxur.

4- Pyrethroids. Like Pyrethrins-

Organophosphate compound insecticides:-

Mechanism of action:-

OP Inhibit the enzyme choline esterase in nervous tissue ,neuromuscular junction and skeletal muscle.so this inhibition is irreversible lead to accumulation of acetylcholine at the nerve endings so it (ACH)cause .Muscarinic effect ,Nicotinic effect, and CNS effect .which result in parasympathetic hyperstimulation.

Effect of organophosphate compounds:-

1-Muscarinic effect :-

Salivation ,Lacrimation ,Urination ,and there is bronchoconstriction that cause difficulty in breathing and miosis.

2-Nicotinic effect :- Muscle twitch and muscle fasciculate ,example abdominal muscle and paralysis.

3-CNS effect:- Convulsion and depression .

Clinical signs of OP toxicity :-is neurotoxicity .

Diagnosis of OP poisoning :-

1-Depend on signs and symptom .

2-OP inhibition cholinesterase enzyme and lead to decrease in plasma cholinesterase and RBC ACHE.

3-Measure by whole blood for ACHE activity.

Treatment of OP poisoning :-

1-Give atropine sulphate by I.V. injection (antidote) repeated every 15 min (full atropinization).

2-Give Oximes 2 PAM and pralidoxime this enzyme reactivate phosphorus group and let enzyme ACHE ,only effective in early stage of poisoning .

3-Give Diphenhydramine due to has muscarinic action.

4- Give Diazepam to treatment convulsion .

Organochlorines (chlorinated hydrocarbons).Like –
DDT(dichlorodiphenyltrichloroethane)-Lindan-Aldrin- Dieldrin- Chlordan.

Mechanism of action(Toxicity):-

Organochlorine act on Na/K ion channels and effective on transmission of ions in CNS and PNS.

Signs of poisoning :-

1-Hyper excitation in nervous system .

2-Muscle spasm.

3-Twitching of muscle .

4-Chewing and Licking movement .

5-Clonic –tonic seizures .

6- Abnormal posture.

7- Have been associated with egg-shell thinning and have estrogenic effect in birds.

Diagnosis :-

1-depend on case history.

2-clinical signs .

3- lab examination for organochlorine in liver.

Treatment of poisoning :-

1-Diazepam (valium) to control the convulsion .

2-Activated charcoal for oral administration .

Carbamates esters.Like –Carbaryl-Aldicarb-Methomyl-Propoxur.

Mechanism of action of Carbaryl :- Inhibit the enzyme choline esterase in nervous tissue ,neuromuscular junction and skeletal muscle.so this inhibition is reversible lead to accumulation of acetylcholine at the nerve endings so it (ACH)cause .Muscarinic effect ,Nicotinic effect, and CNS effect which result in parasympathetic hyperstimulation.

Like the Effect of organophosphate compounds:-

Muscarinic effect

Salivation ,Lacrimation ,Urination ,and there is bronchoconstriction that cause difficulty in breathing and miosis.

Nicotinic effect :- Muscle twitch and muscle fasciculate ,example abdominal muscle and paralysis.

CNS effect:- Convulsion and depression.

The signs of poisoning:- is similar to signs of organophosphorus toxicity .The diagnosis also similar to organophosphorus .

Treatment of Carbaryl poisoning :-

1-Atropine sulphate .

2-Oximes.

Pyrethrins and Pyrethroids:- Pyrethrin is natural insecticide produce from extract of Pyrethrum flowers (genus Chrysanthemum) while pyrethroids is synthetic insecticide have two form :-type 1 and type 11, the type 11 contain α -cyano-moiety while type 1 not contain .

1-Type 1 pyrethroid example permethrin .

2- Type 11 pyrethroid example cypermethrin and fenvalerate .

Mechanism of action:-

1-Type 1 act on Na channel in axonal membrane ----decrease and slowing inward Na conductance, suppress K outflow .

Also may inhibit ATPase enzyme and decrease action potential amplitude and generation of repetitive nerve impulses.

2-Type 11 pyrethroid Act by interfering with binding of GABA and glutamic acid at receptor site.

Toxicity of Pyrethrin and Pyrethroid :-

Varies widely between 25-10000 mg/kg p.o in rodent ,cat susceptible to these compound .

Clinical signs :-

Most poisoning occur in dog and cat ,cat and fishes extremely sensitive ,clinical signs of pyrethrins and type 1 and type 11 pyrethroid appear within hours following exposure and, include :-

Salivation ..Vomiting ..Tremor...Ataxia....Hyperexcitability..

Seizure..Depression finallydyspnea may cause death.

Recovery within 24-72 hr .if the animal death not occur.

Diagnosis :-

1-Case history.

2-Clinical signs .

3-Chemical analysis (skin,brain,liver,blood).

Treatment :-

1-Dermal exposurewash by water and soap.

2-Oral exposureemetic ,cathartics, gastric lavage .used in first hours of poisoning (4 hr) and when the animal not suffer from seizure.

Also activated charcoal and saline cathartics and sorbitol which decrease absorption and aid in eliminate of posion .

3-Supportive therapyDiazepam ,phenobarbital.

4-Atropine sulfate to decrease salivation in early stage.



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