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WHAT IS A PESTICIDE ?

defined as any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating pests.

- Pests can be insects, rodents, weeds and a host of other unwanted organisms.

WHAT IS A TOXIC SUBSTANCE:

Any substance which is harmful to the environment and humans. There are naturally occurring toxins and synthetic toxins.

Toxic Substance

Synthetic Toxins

- Pesticides
- Industrial chemicals
- Household products

Natural Toxins

Poisonous plants

Poisonous animals

Classification of pesticides :

- Insecticides (insects)
- Herbicides (weeds)
- Fungicides (fungi, molds)
- Rodenticides (rodents)

There are also acaricides (mites), molluscicides (snails, other mollusks), larvicides (larvae), and pediculicides (lice).

INSECTICIDES

- ✓ organophosphates :
  - Ethyl parathion ,mevinphos malathion.
- ✓ sarin, soman, tabun, TEPP(tetraethyl pyrophosphate).
- ✓ Carbamates
  - Aldicarb , carbofuran, carbaryl (Sevin).
- ✓ propoxur (Baygon)
- ✓ Organochlorine
  - Aldrin, DDT(Dichlorodiphenyltrichloroethane), chlordane, dieldrin.
- ✓ endrin, lindane,
- ✓ Pyrethroids (Cismethrin , pyrethrin I and II)

RODENTICIDES & FUNGICIDE

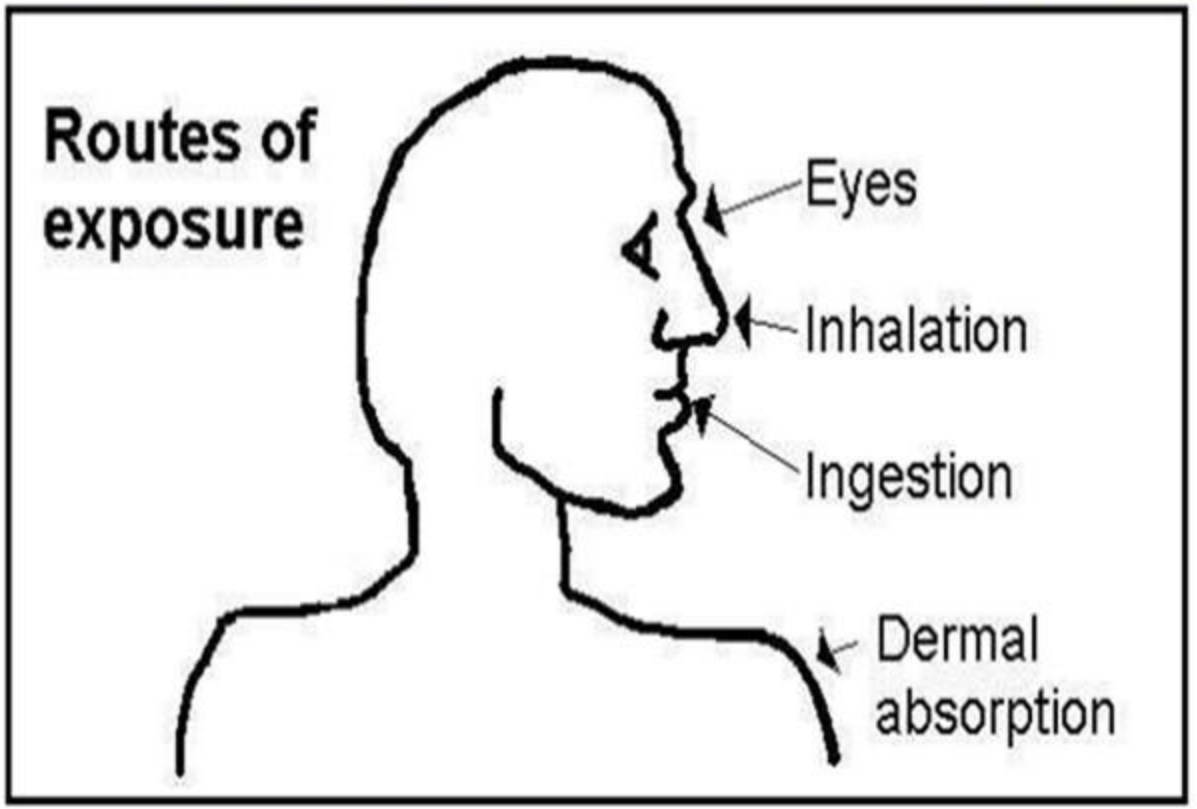
- Zinc phosphide
- Coumarins
- Brodifacoum
- Dithiocarbamate

HERBICIDES

- Paraquat
- Propanil
- Glyphosate
- chlorophenoxy

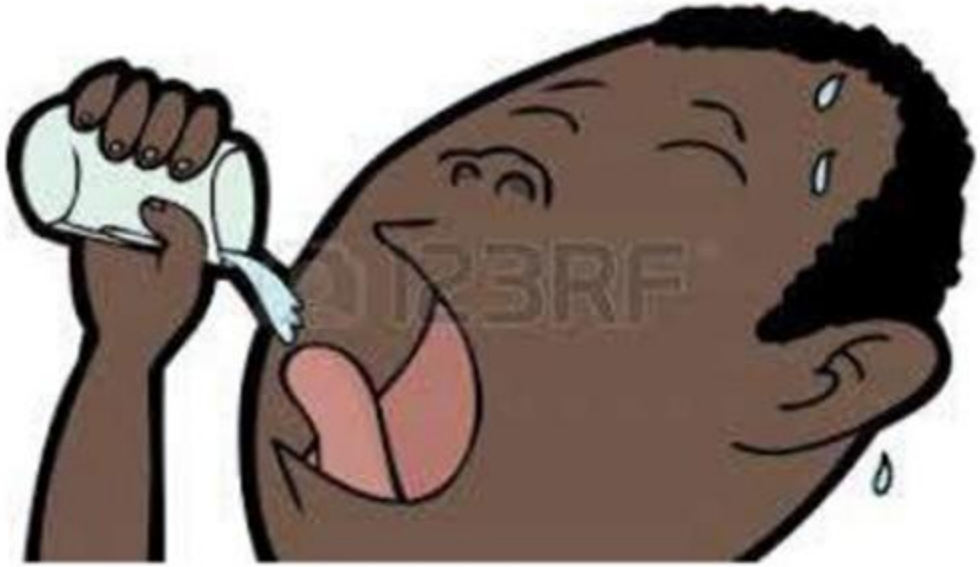
Type and rout of POISONING

- Oral
- Inhalation
- Dermal
- Eye contact



ORGANOPHOSPHATES AND CARBAMATES

Organophosphorus Poisoning



Group of chemicals share a common mechanism of cholinesterase inhibition and hence can cause similar symptoms:

- Phosphorylation of the acetylcholinesterase (AChE) at nerve endings.
- Loss of available AChE results accumulation of acetylcholine at receptor sites and effector organ to become over stimulated by the excess acetylcholine.

CLINICAL FEATURES:

- Eye contact: Irritation or pain, lacrimation, swelling, blurring of Vision.
- Inhalation: Cough, difficulty in breathing, bronchitis, pneumonia.
- Ingestion: Nausea, vomiting, diarrhoea, sweating, salivation, small or pin point pupils, muscle twitching, fasciculation.

- Clinical Features are based on excessive cholinergic stimulation. Unlike organophosphate poisoning, carbamate poisoning tend to be of shorter duration because the inhibition of nerve tissue AChE is reversible.

Management of Organophosphate and Carbamate poisoning:

- Poor air entry into the lungs due to bronchospasm.
- Excessive sweating
- bradycardid
- Hypotension
- Miosis

Atropine The following features of cholinergic syndrome is an indication for atropine therapy. In adults, atropine (1 to 2 mg I.V)

counteracts the excessive bronchial and autonomic secretions and normalizes heart rate. The dose is repeated every 5 to 10 min, depending on improvement of respiration.

Once atropinized clinical features:

- Clear lungs
- Adequate heart rate (>80 than beats/m.)
- Blood pressure (>80 than 80 mmHg systolic)
- Dry skin
- Pupils no longer pinpoint

- Excess atropine causes confusion, urinary retention, hyperthermia, bowel ileus and tachycardia.
- in this condition atropine should be ceased and the patient reviewed after 30 min to see whether the features of toxicity have settled.
- For convulsions give diazepam 5-10 mg IV slowly (Paediatric dose 0.2 mg/kg).

Repeat if necessary. Up to 40mg/day can be given orally as maintenance dose continue diazepam for 3-4 days after a convulsions have been controlled. 10ml of 10% calcium gluconat IV can also be used t control convulsions.

ORGANOCHLORINES

Very few organochlorines are used now as pesticides, are very toxic ingested or inhaled. Some are readily absorbed through the intact skin.

CLINICAL FEATURES:

- Skin contact: Dermatitis.
- Inhalation: Inhalation can give rise to irritation of eyes, nose, throat and cough.
- Ingestion: Nausea, vomiting, diarrhoea, convulsions dizziness, abdominal pain, headache and coma.

PYRETHRINS & PYRETHROIDS

Pyrethrin is an insecticide extracted from Chrysanthemum flower

Synthetic compounds structurally related to pyrethrins are known as pyrethroids.

CLINICAL FEATURES:

- Inhalation: Allergic manifestations such as wheezing.
- Ingestion: After ingestion pyrethrums have low toxicity, vomiting, epigastric pain and diarrhoea are the common features
- Eye contact: Lacrimation, odema of the eyelids.
- skin contact: Allergic dermatitis

PARAQUAT

(Bipyridyl derivatives) is a widely used herbicide in Sri Lanka. It is a safe herbicide because it is inactivated by contact with soil. Paraquat is commonly used as suicidal poison in this country.

- Paraquat has life threatening effects on (the gastrointestinal tract, kidney, liver, other organs. The lung is the primary target organ of paraquat poisoning.
- Recently a new paraquat formulation with Insteon technology (containing an alginate that converts to a gel under stomach acid conditions, increase levels of emetic and purgative) was developed in order to reduce oral toxicity, However ingestion of it is still very likely to be lethal.

- Skin contact: prolonged contact will produce blistering, and ulceration absorption across intact skin is slow, abraded or eroded skin allows efficient absorption.

Management of Paraquat poisoning

- an absorbent (Fuller's earth or Activated charcoal) should be given orally or via a nasogastric tube as early as possible.
- The dose of Fuller's earth is 1 llitre of 15% s suspension (Paediatric dose 15 ml/kg body weight).
- If Fuller's earth is not available give activated charcoal 50-100g dissolved in ml of water (Paediatric dose 15 ml/kg y weight).

PROPANIL & CHLOROPHENOXY COMPOUNDS

- Propanil is a selective herbicide of low toxicity. However, in self poisoning with large doses methaemogloningemia is cause, which can be fatal

- Chlorophenoxy compounds are well absorbed from the gastrointestinal tract. They are less well absorbed from the lung. Cutaneous absorption appears to be minimal.

Management of Propanil poisoning

- If symptoms of methaemoglobinaemia are present (tachycardia, tachpnea or confusion) or if the levels are over 30%, give 1% methylene blue 0.1 ml/kg IV over 5 minutes. The same dose may be repeated within 1 hour if there is no improvement.
- If IV preparation is not available give methylene blue 300 mg daily orally. If methylene blue is not available give ascorbic acid 1 g IV twice daily

RODENTICIDES

Coumarins, indandiones and brodifacoum are used as rodenticides. They are fairly safe for human beings due to the low concentration of the active ingredient. Their toxicity is due depression of the synthesis of s Factors essential for coagulation of blood.

Management of Rodenticide poisoning

- If there has been no bleeding, but the Prothrombin time (PT is prolonged, give vitamin K 50 mg orally two to four times a day (paediatric dose 0.4mg/kg/dose).
- For prolonged PT with less severe bleeding, give vitamin K1 10 to 15 mg SC or (for a child 1 to 5 mg)
- In severe hemorrhage with prolonged (PT) give vitamin K1 20 mg by slow IV injection (0.6mg/kg for children under 12 years).
- In severe bleeding, it may be necessary to give fresh frozen plasma or fresh blood.

GLYPHOSATE

exerts its herbicidal action by inhibiting the enzyme 5-enolpyruvylshikimate-3- phosphate synthase, responsible for the synthesis of an intermediate in the biosynthesis of various amino acids.

Ingestion of concentrated formulations may cause epigastric pain, dysphagia, nausea, vomiting, oral ulceration ,diarrhoea and haematemesis in severe cases leading to hypovolemic shock .

FIRST AID

Skin contact:

- Remove contaminated clothes carefully.
- Wash the skin with running water for at least 15 minutes.
- Do not use any local application without seeking medical advice.

Eyes contact :

- Wash eyes with running water for at least 15 minutes.
- Do not use any eye drops without seeking medical advice.
- If there is visual impairment seek medical advice from an Ophthalmologist.

Inhalation :

- Remove the patient away from the source and encourage deep breathing of fresh air.

Ingestion:

- Do not induce emesis because some pesticides have corrosive effects and some may contain hydrocarbons as solvents.
- If patient is semiconscious or unconscious keep the patient in Neck extended position