General Toxicology

Presented

By

Dr / Said Said Elshama

Professor of Forensic Medicine and Clinical Toxicology

Medical Education (DHPE)

College of Medicine - Suez University

Learning Objectives

- Definition of poison.
- Classification of poisons.
- Factors affecting poisons action.
- Management of poisoning cases .

Definition

Any substance is introduced into the body

leading to serious effects (injury, impair, kill)

Routes of intoxications :-

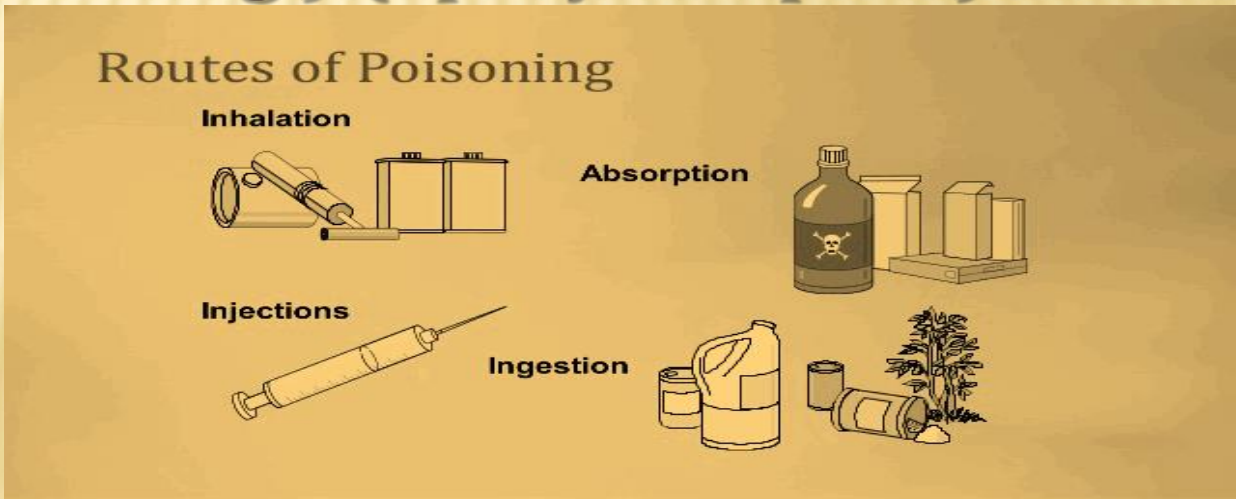
1-Ingestion (oral) (Solids, Liquids)

2-Inhalation (breathing) (Sprays ,vapors)

3-Dermal (skin)

4-Ocular

5-Injection



Classification of Poisons

Nature

Solid, liquid , gas

Organ Toxicity

Hepatotoxicity

nephrotoxicity

Action

Local

Systemic

Mixed (local , systemic)

Accumulative

Types of Toxic Exposure

Acute

Short term (less than two weeks)

Chronic

Long term (life time)

More than three months

Sub-acute

(2- 4 weeks)

Sub-chronic

Repeated exposures

(less than three months)

Types of Toxins

Chemicals

household cleaning products

Foods

Some mushrooms

Drugs

Drug overdose

Vitamins (excess of A and D)

Factors affecting poisons action

Related to the poison

1. Amount
2. Method of administration
3. Form

Related to the patient

1. Stomach (empty , gastric content and secretion)
2. Age
3. Disease
4. Tolerance
5. Idiosyncrasy
6. Hypersensitivity

DIAGNOSIS

History Taking

-Patient himself or relatives
-The name and The amount of toxin
-The time that the poisoning occurred ,
-The age and weight of the person who was poisoned
- Signs and symptoms

Examination

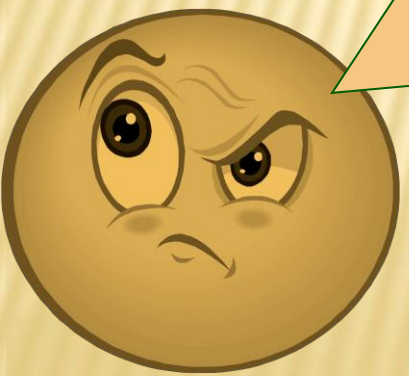
Conscious level
Vital signs

Investigations

Toxicological screen based on the history and physical exam.
Blood sample
Urine sample
Gastric sample

Clinical Picture

1. The signs and symptoms seen in poisoning are so wide and variable that there is no easy way to classify them.
2. Some poisons enlarge the pupils, while others shrink them.
3. Some result in excessive drooling, while others dry the mouth and skin.
4. Some speed the heart, while others slow the heart.
5. Some increase the breathing rate, while others slow it**.**

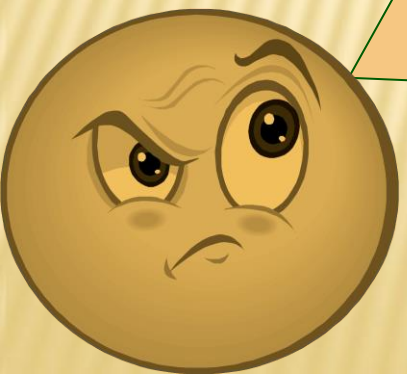


Toxidromes

Consist of groups of signs and symptoms found together with a given type of poisoning.

Anti-cholinergic toxidrome:

- **Rapid heart rate**
- **Dilated pupils**
- **Dry hot skin**
- **Retention of urine**
- **Mental confusion**
- **Hallucinations , Coma**



Unconscious patient

“Comatose”

Conscious patient

Treatment of Poisoning Case

UNCONSCIOUS PATIENT (COMATOSE)

Life-Saving Measures :-

ABC : Airway-Breathing- Circulation

Decontamination

A-General decontamination:-Remove clothes + wash the body + Irrigation of eye by water + transfer patient into fresh air in toxic gas

B- Gastric decontamination

1. Gastric lavage
2. Activated charcoal
3. Cathartic

C- Elimination

Forced diuresis - Haemodialysis

D- Antidote

ANTIDOTE

Antidotes: drugs or agents are used to cure poisoning by counteracting the poison effects.

Types :

1. **Chemical antidotes:** combine with poison such as neutralization of an acid by alkali.
2. **Physical antidotes:** prevent poison absorption such as activated charcoal .
3. **Pharmacological antidotes:** produce the opposite pharmacological effect of poison such as atropine.

- Antidotes should not be administered unless positive identification of poison has been made.
- Antidote must be administered as soon as possible after the poison introducing into the body.

Toxin	Antidote
Anticholinergic drugs	Physostigmine
Benzodiazepines	Flumazenil
Phenothiazine	Diphenhydramine
Iron	Desferrioxamine (Desferal)
Lead	Dimercaprol, EDTA, Penicillamine
Methaemoglobinaemia	Methylene blue
Opioids	Naloxone (NARCAN)
Organophosphates	Atropine and Pralidoxime
Paracetamol	N-acetylcysteine (Mucomyst)
Isoniazid (INH)	Pyridoxine (vitamin B_6)
Methanol - Ethylene glycol	Ethanol - Fomepizole
Cyanide	Hydroxocobalamin
Digitalis	Specific Fab fragments

FORCED DIURESIS

- It depends on renal drugs excretion by increasing urine output.
- It is useful only for drugs that are excreted either unchanged or as active metabolites, but it is not useful for drugs that are metabolized in liver and then excreted as inactive metabolites.
- Unionized and lipid soluble drugs are not excreted by kidney despite the increase of urine output because it is partially reabsorbed in renal tubules.
- Ionized drugs are excreted well by kidney.

FORCED DIURESIS

- Urine pH manipulation leads to increase in concentration of ionized drug.
- Acidic drugs remain ionized when it is in alkaline urine .
- Basic drugs remain ionized when it is in acidic urine.

Types of forced Diuresis:-

A. Forced alkaline diuresis
B. Forced acid diuresis.

- Drugs of a large volume distribution, its elimination by forced diuresis is limited.

DIALYSIS

Types of dialysis : hemodialysis, peritoneal dialysis, charcoal hemoperfusion and hemofiltration.

1- Hemodialysis is useful for elimination of some drugs that is characterized by low molecular weight and size, low protein binding, high water soluble, slow metabolized and inactivated.

2- Hemoperfusion permits blood to pass through a column containing activated charcoal or activated carbon leading to toxin adsorption.

Hemoperfusion is used for drugs that are characterized by a low volume distribution (1 - 8 L/kg), high lipid soluble, high protein bound and long half-life.

CONSCIOUS PATIENT

1-Decontamination

A-General decontamination:- Remove clothes + wash the body + Irrigation of eye by water + transfer patient into fresh air in toxic gas

B- Gastric decontamination

1. Emesis (mechanical or medical " ipecac")
2. Gastric lavage
3. Activated charcoal
4. Cathartic
5. Whole bowel irrigation

2- Elimination

Forced diuresis - Haemodialysis

3- Antidote

CONTRAINDICATIONS

- **Emesis (Ipecac)**
- Comatose, corrosive, kerosene, central depression, antiemetic effects, poisoning is more than 24h
- **Gastric Lavage**
- Corrosive , kerosene, convulsions, poisoning is more than 24 hr
- **Charcoal**
- Corrosive , kerosene
- **Cathartic**
- Diarrhea
- **Forced Diuresis**
- Active form of poison, shock, renal impairment, pulmonary edema, and lack of monitoring

Thank you

Thank you

Thank you

Thank you