

General Toxicology

Toxicology:

- Since of medicine which deal with poisoning, its diagnosis and management.

Branches of toxicology:

- Environmental, industrial, radiation & military.

Poison:

- Any product or substance that harms someone if it used in the wrong way by wrong person or in the wrong amount (dose).
- Any substance which when introduce to the body it causes harmful effect and death.
- **Everything** in this world is poison if used in wrong way.

Example of possible poisoning includes:

1. Some of house hold product (flash, Clorox, Corrosive)
2. Chemical at work or in the environment.
3. Drugs (prescription –over the counter-, herbal)
4. Snack, Spider & scorpion bites.

Classification of poisons:

1. **According to their mode of action:** *أهم تقسيمية*
 - Poisons with **local action**: sulfuric acid زَيْ موية النار
 - Poisons with **remote action**: act after absorption (any drugs like :Morphine, Atropine).
 - Poisons with **both local and remote actions**: irritant (heavy metals) like arsenic or lead
 - **Local or remote**: Both have a period between intake and effect
2. **According to the organs affected;**
 - Hepatotoxic: Alcohol, barbiturate , phosphorous, **Paracetamol**, anesthesia,
 - Cardiotoxic: Atropine, B-blockers, **Digitalis**
 - Nephrotoxic; **antibiotic**, Aminoglycoside, gentamycine, cyclosporin.

3. According to the chemical nature: (not very important)

- Acidic poison, organic, inorganic... etc
- Arsenic most common in crimes because:
 1. Its available
 2. Period between effect and intake 12-38 hrs.
 3. Deposit in bone 2-3year after death.
 4. Patients die from gastroenteritis → (dehydration)

Factors affecting the action of poisons:

1. **Age** of person; children are less in body weight die in little amount.
2. **Personal hypersensitivity:** allergy-anaphylaxis (Asprin, Pencilline, Iodine)
3. **Tolerance;** need large dose to produce same effect , if the therapeutic dose 10mg like morphine but the tolerated people need larger dose.
4. **Idiosyncrasy;** Abnormal response to drugs → opposite to their action (Genetic role).sudden unexpected effect .
5. **State of health:depends on physical fitness**
Poor health which in small dose for physically ill patient cause liver +kidney disease. نحيف او سمين
6. **Condition of the stomach**
 - When the stomach is **empty** the action of poison is very **rapid**.
 - Type of the food
 - ✘ Fatty meal + Fat **insoluble** poison (**Arsenic**) → **No** toxicity or take longer time.
 - ✘ Fatty meal + Fat soluble poison (**phosphorus**) → Rapid effect.
7. **Synergism.** Take two substances (or more) which exaggerate the action of the other.
 - ✘ Alcohol + Barbiturate=CNS depressant
8. **State of the poison.** Gas (**Fastest**) then Liquid then solid ریا وسکینه
9. **Methods of administration.** The most rapid mode of administration is by **inhalation** then IV then IM pump.
10. **Dose of poison. (The most important factor)**
 - ✘ **high** dose → ↑ poison effect
 - ✘ Over dose (very high dose)→ Protection due to vomiting → ↓ effect of poison.

Diagnosis of poisoning:

1. *History and circumstantial evidences*; الظروف المحيطة بالحدث

- Suicide, (bottle of drugs, suicidal note, Hx. of depression)
- Accident, (Food poisoning)
- Homicidal, (Sign of fighting)

2. *Clinical picture. (Signs & symptoms)*

- Contract pupils in morphine .organophosphorous.
- Dilated pupils in Atropine, Cocaine, Anti cholinergic drugs (Atropine like action, e.g. Antidepressant)
- Red skin in carbonic monoxide (carboxyhemoglobin) and cyanide (cytochrome oxidase inhibitor).
- Flushed face and red mouth in atropine and alcohol poisoning.
- Patches around the mouth in corrosives.-
- Characteristic smell of the mouth in cases of opium, cyanide (Bitter almond اللوز المر), Arsenic, Kerosene, alchole and phenol (Detol), Acetone.
- Fever in Atropine (Antispasmodic), salicylate (antipyretic (over dose) → suicidal in female.), kerosene and tricycles antidepressants.
- Coma in morphine b.alchol.barbituraite organophosphorus, antisectidides and carbon monoxide.
- Convulsions in
 - ✘ oxalic acid ملمعات النجف → Ca oxalate → Hypocalcemia,
 - ✘ Strychnine (increase the appetite),
 - ✘ Ergot (after labor common for uterine contraction) .insecticides and atropine.
- Slow pulse in morphine and digitalis poisoning.
- Rabid pulse in atropine. Nicotine and corrosive poisoning.

3. *Radiopacity of poisons*:

- There are a number of tablets with different chemical compositions that exhibit varying degrees of radiopacity.
- Barium, Enteric coated tablets, Tricyclic antidepressant, Antihistaminic, Heavy metals (lead).

4. *Chemical analysis*:

- The most important evidence of poisoning is by chemical analysis.

- ***In the living:*** samples are taken from vomit, gastric lavage, blood, urine & stool. Also can be taken from the hair & nails (heavy metals, addict).
- ***In the dead:***
 - ✘ Blood from the heart or more better from femoral vein (for decontamination)
 - ✘ Stomach and its contents and part of the intestine.
 - ✘ Parts of the liver, kidney, Brain, lung, spleen should be submitted to analysis

5. Autopsy in suspected poisoning (PM):

6. Screening tests: (rapid test)

- These are various tests to evaluate the type (and regularly measure the amount) of legal and illegal drugs that a person has taken.
- Done by:
 - ✘ Each country has its own medical reports about the most common used drugs.
 - ✘ These drugs (panadol, Salicylate, barbiturate... etc) undergoing special tests (KETS) or color test.
 - ✘ We put a reagent on a sample of urine or blood → Special color (if the drug exists)
 - ✘ E.G: Salicylate + Ferrechloride → The urine become Blue

General treatment of poisoning:

- There are eight essentials of overdose management that may be considered for the patients with poisoning.
- All or some of them may be used for the patient according to his clinical state.
- ***N.B. Treatment of the presenting clinical condition is the main priority regardless the type of the poison.***
 1. Decontamination: Wash out the poison.
 2. Supportive care: Stabilize the vital sign (ABC`s)
 3. Prevent further exposure to the poison e.g. lead poisoning in lead factory
 4. Removal of the unabsorbed poison from the stomach. By: vomiting , gastric lavage , purigation (laxatives)
 5. Inactivation of the poison remaining in the stomach (Adsorption) ادمصاص
 6. Enhancement of excretion . Through the lung, kidney and liver .

7. Administration of an antidote. 2-3% of cases only
8. Symptomatic treatment .

1. **Decontamination:**

A. Skin

- E.g. Corrosive , acid , insecticide (Farmers).
- Steps of decontamination .
 - 1) Wear protective clothes and gloves .
 - 2) Remove the patient's contaminated cloths, because its source of absorption.
 - 3) Flush the exposed area with copious quantities of lukewarm water or saline. If the substance is lipid use soap.
 - 4) **Don't** use neutralization because it may generate heat, which can potentially create worse injury.

B. Eye

- E.g. corrosive agents (like spray which used by ladies or polices) and solvents can rapidly damage the cornea {irritant}.
- Toxins that are readily absorbed through the skin can also be absorbed through the cornea .
- Step of decontamination :
 - 1) Flush the exposed eyes with copious quantities of tepid (cold) water or saline.
 - 2) Wash carefully the upper and lower conjunctival fornices. Use at least 1 liter to irrigate each eye.
 - 3) Check the pH of the tears,
 - ✘ To know the irritant substance,
 - ✘ Wash until the pH return normal
 - 4) Don't use neutralizing agent.(acid +alkaline →heat)

C. Inhalation

- E.g. irritant gases and fumes (chlorine gas very dangerous may cause laryngeal edema and death)
- Toxins that are absorbed through the respiratory tract (CO , cyanide , hydrogen sulphide , organoph. ,insecticides , ect)
- Steps of decontamination :
 - 1) Ensure adequate respiratory protection for your self and other care providers.
 - 2) Remove the victim from exposure.
 - 3) Administer humidified O₂ and assist ventilation (if necessary)
 - 4) Observe for evidence of upper respiratory edema (manifests as stridor and hoarseness') or non-cardiogenic pulmonary edema (manifests as dyspnea , tachypnea, cyanosis and hypoxemia) .

2. Supportive care:

- Important aspect in the management of the poisoned patient is supportive care.
- Commonly, patient will detoxify the poison as the ingested compound is metabolized by normal body process. (When the amount of the poison is small).
- Support of the vital signs, in addition to good pulmonary hygiene, will enhance any of the other more specific methods.
- The patient should be observed on a cardiac monitor until medically cleared.
- 30 – 40 % of poisoned patients can be treated with supportive care.
- The drug will be progressively eliminated over the next 12 to 36 hours in most patients, and usually this is all the care that is necessary.

إذا جا مريض يقول انه خذا اي drug نشوف ال vital signs ونخليا under observation
إذا والله طبيعي خلاص لانو اي دوا زي ماقلنا يطلع خلال ال12ساعه الجاية

Done 😊

GOOD LUCK

Reham almuhaya