



Review Article

An Overview of Poisoning

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ABSTRACT

Poison is a substance that, even when used in small doses, can result in harm, disease, or death. In terms of total global deaths, poisoning ranks as the 45th most serious public health issue. Suicidal, homicidal/criminal, and unintentional poisonings are the most frequent types. OP insecticides are widely available and could be abused for suicidal purposes. Supportive measures, prompt gastrointestinal (GI) decontamination, extracorporeal techniques of toxin elimination, and antidote delivery form the basis of treatment. Establishing suitable regulations, including new guidelines and updates to current treatment protocols, counseling and educating the public about the dangers of poisoning and the safe use and storage of chemicals.

INTRODUCTION

Poison is a material (solid, liquid, or gaseous) that, when ingested into or in contact with any portion of a live organism, causes disease or death by local or constitutional effects, or both. As a result, practically everything is poison (Biswas., 2012).

CATEGORIES OF POISONING: (V.V.Pillay., 2013.), (Krishnan Vij, 2011,).

Pharmaceuticals: Paracetamol, Aspirin, Benzodiazepines, Phenytoin, Tricyclic Antidepressants, Barbiturates, Opioids.

Insecticides and pesticides: Organophosphate,

Chlorine, Pyrethroids, Super warfarin, Furadon, Parathion and Endosulphan.

Plants and Animals: Snake or Scorpion bite, Bees or Wasps sting, Insect sting, Oleander, Dhatura and Oduvanthalai. **Chemicals:** Inorganic: Mercury, arsenic, lead, copper, Sulfur and Hair Dye (Paraphenylenediamine). • Organic: Rotenone, Pyrethrum, Nicotine and Neem Oil.

EPIDEMIOLOGY OF POISONINGS:

More than 1 million illnesses are thought to be caused annually by poison, either directly or

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indirectly. However, this number may just represent the tip of the iceberg because most poisoning cases, particularly in Third World countries, go unreported (Biswas., 2012). India has one of the highest rates of poisoning in the world (CibisevA, 2007). The toxic exposure is thought to be the leading cause of deaths annually (V.V.Pillay., 2013.). According to WHO estimates, there may be 1 million major unintentional poisonings per year, and 2 million people are hospitalized for pesticide-related suicide attempts (Organization., 2016.).

CAUSES:

Poisoning has a wide range of accidental, intentional, and industrial causes (Krishnan Vij, 2011.). Common sources of poisoning include painkillers, cosmetics, personal care items, household cleaners, sedatives, hypnotics, and antipsychotic medications, as well as foreign bodies, toys, and other objects. Another risk that raises people's anxiety about toxins is snake bite (CS., 1930).

TYPES OF POISONING:

1. Acute poisoning: It is brought on by ingesting too much of a poison in one dose or over the course of a short period of time (Biswas., 2012) (V.V.Pillay., 2013.) (Kumar SV, 2010).
2. Chronic poisoning: It is brought on by decreasing doses over time, which leads to a steady worsening (Biswas., 2012) (V.V.Pillay., 2013.). Sub-acute poisoning: That is sub-acute has a symptom of both acute and chronic poisoning (Krishnan Vij, 2011.).
3. Fulminant poisoning: Massive doses of can result in fulminant toxicity, toxin that occasionally causes quick death with no prior symptoms (V.V.Pillay., 2013.) (Krishnan Vij, 2011.).

ACTION OF POISONS:

Typically, poisons have three different modes of action: locally, remotely, and both locally and remotely.

Locally acting: These only have an effect where they are applied, such as the skin or mucosa, as with corrosive poisons (Levine RR, 2000.).

Remotely acting: These only take effect after being taken into the bloodstream, such as narcotic poisons.

CLASSIFICATION OF POISONS:

Depending on their mechanism of action, physical condition, medicolegal classification, and toxicological character, poisons can be categorized into a variety of groups.

- A. On the basis of their method of action, poisons can be divided into (i) Corrosive Poisons. (ii) Irritant poisons, (iii) Neurotic Poisons, (iv) Cardiac Poisons, and (v) Asphyxiants (Biswas., 2012) (Dr G.S Bajpai).
- B. Poisons can be divided into (i) solid, (ii) liquid, and (iii) gaseous poisons based on their physical states.
- C. The classification of poisons according to the motive for the crime includes homicidal, suicidal, accidental, abortifacient, stupefying agent/poisons, cattle poison, and used for malingering (Sumbria Tarlok* Sharma Amit I, 2015).

POISONING SEVERITY SCORE:

The PSS is a system for categorizing both adult and pediatric poisoning cases. Regardless of the kind and number of agents involved, this system should be utilized to categorize acute poisonings (V.V.Pillay., 2013.). The most severe symptomatology (containing both subjective symptoms and objective indicators), as well as the overall clinical history, should be considered when applying the PSS. Simple instructions come with the score (Organization, 2016.). The severity grading awarded to a case is based on the most severe symptom(s) or sign(s) seen. The presence of a certain symptom is checked against the chart.

SEVERITY GRADES (Persson H, 1998):

NONE (0): No symptoms or signs related to poisoning. MINOR (1): Mild, transient and



spontaneously resolving symptoms. MODERATE (2): Pronounced or prolonged symptoms. SEVERE (3): Severe or life-threatening symptoms. FATAL (4): Death.

MORTALITY RATE FROM POISONING:

The mortality rate from poisoning depends on the cultural and geographical characteristics of different communities. It is dramatically higher in low-income and underdeveloped countries compared with developed countries (Toxicological Chemistry, LVIV–2009, 1784).

This mortality rate depends on awareness about poisoning, the availability of treatment facilities and presence or absence of qualified personnel (Sharma BR, 2002). Children under 15 years in age approach most accidental poisoning cases but thankfully they are associated with relatively low mortality. The most suicidal exposures are seen individuals over 15 years in age but approach high Mortality (V.V.Pillay., 2013.).

MEDICOLEGALASPECTS OF POISONING:

The motivation behind its administration is what truly distinguishes a medicine from a poison. If a chemical is administered with the goal of saving a life, it is considered medicine; if it is administered with the goal of causing bodily harm, it is considered poison (Biswas., 2012). When a poison, stupefying substance, or intoxicating agent is administered with the aim to harm someone or aid in the commission of an offense, it is a violation of Section 328 of the IPC and is punishable by up to 10 years in jail. The 1958 amendment and 1960 repeal of this law. It addresses the import of poisons into India, the granting of licenses for the ownership of specific poisons, and limitations on the sale of these poisons (mainly chemicals), over which control is to be exerted (CibisevA, 2007).

CLINICAL PRESENTATION:

Patients with poisoning who arrived at the hospital included those with impaired consciousness (14.0%; Glasgow Coma Scale (GCS) less than 10),

abnormal body temperature (24.6%), including hyperthermia (BT 37.5°C) and hypothermia (BT 36.0°C), abnormal heart rate (12.8%) including tachycardia (heart rate > 120 beats/min) and bradycardia (heart rate 60 beats/min), shock status and respiratory insufficiency (Sumbria Tarlok* Sharma Amit1, 2015).

FEATURES INDICATIVE OF CHRONIC POISONING:

- i. After the administration of a suspected food, liquid, or medication, symptoms are amplified.
- ii. A overall decline in the patient's state as a result of malaise, cachexia, depression, and other factors (Biswas., 2012).
- iii. Consistent bouts of vomiting and diarrhoea.
- iv. When the patient is taken out of his routine environment, the symptoms go away.
- v. The presence of poisonous traces in the stool, urine, blood, or vomit (V.V.Pillay., 2013.).

ROUTES OF ELIMINATION:

The kidneys and the skin mostly expel the toxin that has been absorbed. Additionally, bile, milk, saliva, mucus, and serous fluids can be used. Vomit and faeces contain the unabsorbed part (Acharya S, 2014).

FACTORS CHANGING THE EFFECT OF POISONS:

Liquids react more slowly than gases and vapours. Poisons that are liquids spread more fast than those that are solids, and fine powders spread more quickly than coarse ones. The route of administration and form of the compound also alters the effect. It also depends on the age and health condition of the patient (Toxicological Chemistry, LVIV–2009., 1784).

GENERAL MANAGEMENT OF POISONED PATIENT:

The major goal of treatment is to keep the patient alive by paying attention to respiration and circulation while aiding in the patient's ability to eliminate the poison through metabolism or excretion.

1. Stabilization

If there are any potential life-threatening issues, they should always be evaluated and addressed during the initial survey. The ABCD of resuscitation calls for special focus on the airway, respiration, circulation, and CNS depression.

Airway: By placing, sucking, inserting an artificial nasal or oropharyngeal airway, or by endotracheal intubation, create a patent airway.

Breathing: If a mechanical ventilator or a bag-valve-mask device is required, help the patient by giving additional oxygen.

Circulation: Calculate tissue perfusion and take a pulse and blood pressure reading.

Depression of the CNS: For the purpose of assessing the mental state of head injury patients in the intensive care unit, the Glasgow Coma Scale (GCS) was created (Heard K, 2004). Inducing coma can be caused by a variety of substances, thus identifying the poison will need much intelligence and skill (Gupta, 2007).

2. Evaluation

If the patient is not experiencing a crisis and is awake, speaking normally, and has a normal pulse, carry out a comprehensive check. In terms of treatment, the focus should be on fundamentally supportive actions.

Hypothermia: If a patient is not experiencing cardiac arrest due to hypothermia, gradual warming is preferred (Karikalan T, 2014).

Hypotension: The majority of patients benefit from empiric therapy, which includes a 200 ml IV bolus of 0.9% saline or another isotonic crystalloid up to a maximum of 1-2 l. If that doesn't work, inject 5–15 g/kg/min of dopamine (Aggarwal A, 2018).

Hypertension: Give phentolamine, 2–5 mg IV, or nitroprusside sodium, 0.28–0.8 g/kg/min IV, for chronic hypertension.

Convulsions: Give lorazepam, 2-3 mg IV over 1-2 minutes, or midazolam, 5-10 mg IM if IV access is not right away available. Give phenobarbital

(15–20 mg/kg slowly IV over 30 minutes) or phenytoin (15 mg/kg IV over 30 minutes) if the convulsions persist (Morrison EE, 2020) (Ponampalam R, 2001).

Hypothermia: By stripping off all clothing, sprinkling the patient with lukewarm water, and fanning them, it is actively treated. Use a nondepolarizing neuromuscular blocker (such as pancuronium or vecuronium) to cause neuromuscular paralysis if this fails to work.

3. Decontamination

Eye Decontamination: Irrigate liberally with regular saline or water for at least 15 to 20 minutes. Never use alkaline or acidic irrigation solutions (Hakim A, 2014).

Skin Decontamination: Cutaneous absorption happens frequently, especially when it comes to chemicals used in agriculture and industry like phenol, hydrocyanic acid, aniline, organic metallic compounds, phosphorus, and the majority of pesticides.

The following actions can be performed to reduce absorption:

- i. Persons who have been exposed should thoroughly wash with a non-germicidal soap after rinsing with cold water. Rinse once more under cold water.
- ii. Corroded regions need to be heavily watered or salted for at least 15 minutes. Use of "neutralizing solutions" is prohibited.
- iii. Take off all infected apparel. It is advisable to totally strip the patient and dress them in new clothes or cover them with a fresh bed sheet (V.V.Pillay., 2013.).

Gut Decontamination:

The best time to perform gastric lavage (stomach cleaning) is within an hour of ingesting any poison, while it can be done up to six hours later. A 36-40 French orogastric tube (22-28 French tube for minors) is used to progressively deliver and aspirate around 5 ml fluid per kilogram of body weight during gastric lavage. It is done repeatedly



until clear, odourless fluid emerges (GA., 1978.).

Complications:

Aspiration is a typical complication that affects 10% of patients, and significant complications such esophageal and stomach perforation and tube placement in the trachea affect 1% of patients (Kavalci G, 2008). Emesis They should only be used if achieving gastric lavage is problematic. If the medullary centers are still sensitive, vomiting may result. Only a cognizant patient should be given the injection to induce vomiting due to the risk of aspiration of gastric contents.

Gastric Lavage

Ipecac syrup (for use at home; 30 ml for adults, 15 ml for children); for accidental ingestions. Only if a patient has consumed a dose of a poison that poses a life-threatening risk and shows up at the hospital within 1 to 2 hours of ingestion could lavage be considered. The most popular tube is the Ewald tube, which is made of soft rubber and has a funnel at one end. When using, confirm that the inner diameter is at least 36 to 40 French sizes. The diameter for a child should be at least 22 to 28 French (Ryle's tube may be adequate (Poison Severity Score. IPCS/EAPCCT Grading of acute poisoning. 1998).

4. Removal of Poisons

This can be done using a variety of methods, including diuresis, peritoneal dialysis, hemodialysis, hemoperfusion, etc. Any poison can be eliminated from the bloodstream using hemodialysis, exchange transfusion, charcoal or resin hemoperfusion, hemofiltration, plasmapheresis, or peritoneal dialysis (Levine RR W. C.-B., 2000.).

5. Antidote Administration

It neutralize poisonous substances to offset their effects.

A. Mechanical/Physical Antidotes:- It stops the absorption of toxins or mechanically neutralizes them.

B. Chemical Antidotes:- When coming into touch with poison, they either oxidize it or produce harmless or insoluble chemicals to counteract the effects of the poison (Biswas., 2012) (V.V.Pillay., 2013.).

Universal Antidote:- In situations where the type of poison consumed is unknown or when it is suspected that two or more poisons were consumed, the universal antidote—a combination of physical and chemical antidotes—is utilized.

Action:

It works mechanically by absorbing and holding onto substances, particularly alkaloid toxins, within its pores, allowing the charcoal-toxin complex to be expelled with feces. The holes in the network absorb 100–1000 mg of medication per g of charcoal.

PREVENTION STRATEGIES:

Reducing the prevalence of poisoning and associated injuries requires early intervention and preventive measures. Knowing the overall pattern of poisoning in a specific area will aid in early case detection and treatment, lowering the rate of fatality and morbidity (Schmertmann M, 2008). To effectively reduce OP and drug poisoning, rigorous laws must be established against the sale and availability of agricultural field products and over-the-counter medicines. Conducting educational campaigns for the mothers in rural areas can reduce accidental poisoning by pediatric groups.

ESTABLISHMENT OF A POISON INFORMATION CENTRE:

In accordance with the degree of the inquirer, the center offers toxicological knowledge and guidance on how to treat poisoned individuals (A Sharma, 2014). The Center has created manuals, pamphlets, and management cards for the prevention and treatment of various poisonings. Thus, the Center offers a service that has substantial health advantages, lowers poisoning-related morbidity and mortality, and provides the

community with large financial savings (Churi S, 2012).

CONCLUSION:

Poisoning is a serious health issue that requires immediate treatment. By conducting educational programs to avoid poisoning in rural areas and by offering counseling services and poison information services to the public, the mortality and morbidity caused by poisoning can be decreased. The patterns of the most prevalent poisoning agents and their emergency management must be understood by those working in the health care industry. Poison information centers (PICs), which can assist in identifying poisons, managing cases, and disseminating information to the public about poison protection, should be networked with other PICs in India and in developed countries.

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