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Review article

Common principles of management of poisoning

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ABSTRACT

Poisoning is bit unique as it has medico legal implications. For the correct diagnosis and appropriate management of poisoning, the case history, examination findings, information and knowledge of the toxin involved plays a critical role. The poisoning symptoms are divided into six toxidromes which helps us to identify the nature of the toxin and guides us its management. The management per se involves management of airway, breathing and circulation, topical and gastric decontamination, specific antidotes, if available, chelation therapy, haemodialysis for dialyzable toxins and supportive therapy.

Contents

1. Introduction

Poisoning involves ingesting or inhaling or coming in contact with chemical substances that damage our body. The poisoning is dose related. Almost every substance when comes in body contact, either inhalational, skin contact or ingested, can produce toxic symptoms in inappropriate amounts. Toxic doses can be determined by concentration over time. The symptoms of poisoning vary from substance to substance. The diagnosis of case of poisoning is primarily clinical and treatment is supportive with use of specific antidotes if available. Poisoning, hypersensitivity reaction, idiosyncratic reaction and intolerance all are different terms. The hypersensitivity and idiosyncratic reactions are independent of amount of substance, are sudden and can't be predicted. Whereas, intolerance is abnormal sensitivity or allergic toxic reaction to usually non-toxic amount of a substance. In 1998, Gupta et al. [1] concluded that kerosene involves in most cases of childhood poisoning (52.8% in the 1990s) followed by insecticides and

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pesticides. Gupta et al. [2] in 2004 in his study concluded the fact that in India, 51% of food commodities are contaminated with pesticide residues and out of these, 20% have pesticide residues above the maximum residue level (MRL) values on a worldwide basis. The European Commission fixes MRLs for all food and animal feed. The MRLs for all crops and all pesticides can be found in the MRL database on the Commission website. (http://ec.europa.eu/food/plant/pesticides/eu-pesticides-database/public/?event=homepage&language=EN). In 2005, Rao et al. [3] reported the 6 years data of 8040 pesticide poisoning cases from Andhra Pradesh. He reported that the overall case fatality rate was 22.6%. Kanchan et al. [4] in 2007 published five year retrospective study of 137 suicidal poisoning cases which were autopsied. The result of the study showed that in Southern India, 3rd decade of life is the most prone age for suicidal mortalities with mean age for males and females being 40.5 years and 34.4 years, respectively. Later, Kanchan et al. [5] studied 198 cases of fatal poisoning in which 68.7% deaths of total 92.9% self-poisoning cases were of organophosphate compounds related. Vaidya et al. [6] in 2018 published the data of 1003 cases and their study supported the data quoted by Kanchan et al. In 2003 Gupta et al. [7] published a study of childhood poisoning which shows that 79.7% poisoning cases were accidental and 20.2% cases have the intentional attempts that mainly in the age group >12–16 years and >16–18 years. It was also noticed that predominantly the route of administration of toxic substance was oral (96.8%) and dermal exposure (3.2%). A retrospective study reported by Srivastava et al. [8] in 2005 mentioned suicidal (53%) and accidental (47%) as the two common mode of poisoning in Indians. This study also mentioned about the route of administration of the toxin which was oral (88%), dermal (5%), inhalation and ocular (7%). Many commonly ingested non-food substances are generally nontoxic like adhesives, chalk, candles, gums, talc, etc.

2. Clinical features

The symptomology of poisoning can be broadly clustered into six types of toxic syndromes (toxidromes) which can suggest particular class of substance (Table 1).

3. Diagnosis

The diagnosis of poisoning is challenging. The suspicion of poisoning should be whenever the signs and symptoms of the patients are not explainable, especially altered sensorium. Even if a patient is known to be poisoned, the other causes of altered consciousness like central nervous system (CNS) infections, head injury, hypoglycaemia, cardiovascular accidents, different causes of encephalopathy like hepatic, hypoxic, Wernicke's etc should also be considered. The homicidal and suicidal scenario needs special attention. The voluntary self-poisoning in adults usually involves multiple toxins.

In the diagnosis of poisoning, history is usually the most important source. To begin with, first assess the patient's overall status.The information regarding the literacy level and occupation of the patient, relation of patient with other family members and neighbours, and overall personality of the patient should be sought. This information gives clues regarding the suicidal or homicidal cases which in turn give clues regarding the involvement of one or more than one toxic substance.

Physical examination helps in detecting signs suggesting particular types of substances, breath odour, needle marks, cut marks, tracks suggesting injected drug use, signs of chronic drug abuse like alcohol etc. Detailed history and examination gives clues to rule out other causes of altered sensorium.

4. Investigations

Laboratory testing in majority of cases is not of much significance. We have qualitative, not quantitative standard toxic screen tests to identify common toxins. Urine drug screening detects metabolites of drug. The blood levels of substances viz. theophylline, phenytoin, phenobarbital, methanol, lithium, iron, ethylene glycol, digoxin, carbon monoxide, aspirin and acetaminophen, help in treatment while for other major toxic substances, blood levels estimation is not of much use. Routine investigations which include complete blood count, liver and kidney function

Table 1
Common toxic syndromes (Toxidromes).

SYNDROME	CAUSES	SYMPTOMS	SIGNS
Anticholinergic	Atropine, Datura, Jahar khurani, Scopolamine, Tricyclic antidepressants	Flushing, dry skin and mucous membranes, mydriasis with loss of accommodation, altered mental status, urinary retention, fever, psychosis	Sinus tachycardia, decreased bowel sounds, functional ileus, urinary retention, hypertension, myoclonic jerks, ataxia, short term memory loss, hallucination
Cholinergic, muscarinic	Physostigmine, Carbamates(aldicarb, carbofuran, carbaryl, ethienocarb, and fenobucarb), Organophosphates, Pyridostigmine	Salivation, lacrimation, urination, diarrhea, gastrointestinal upset, emesis, diaphoresis, rhinorrhea, anxiety, confusion, ataxia, tremors, psychosis	Miosis, bradycardia, bronchospasm, bronchorrhea, hypotension
Cholinergic, nicotinic	Carbamates(aldicarb, carbofuran, carbaryl, ethienocarb, and fenobucarb), Nicotine, Black widow spider bites	Cramping, weakness, anxiety, ataxia, tremors, seizures, psychosis	Muscle fasciculations, diaphragmatic failure, hypertension, tachycardia, mydriasis, pallor
Opioid	Opioids – morphine, heroin	Depressed level of consciousness, muscular rigidity, pink frothy sputum,	Pruritus, flushed skin, urticaria, euphoria, paranoia, bronchospasm, bradypnea, hypopnea, pinpoint pupils
Sympathomimetic	Cocaine, Ephedrine, Marijuana, Ecstasy, Theophylline, Amphetamines, Caffeine	Difficulty in breathing, chest pain, fever, headache, hypertensive encephalopathy, intracranial haemorrhage, seizure	Bronchospasm, wheezing, arrhythmias, hyperthermia, accelerated hypertension, mydriasis, tachycardia, diaphoresis, acute psychosis, paranoia, delirium, bruxism
Withdrawal	Sedatives recreational drugs – Marijuana, Opioids, Barbiturates	Flu like symptoms, nausea vomiting, diarrhea, arthralgia, myalgia, abdominal and leg cramping	Mydriasis, dysphoria, piloerection
Withdrawal	Sedative-hypnotics – Benzodiazepines, Alcohol	Delirium tremens, tremulousness, psychomotor and autonomic dysfunctions	Hyperreflexia, tremors, tachycardia, hyperventilation, hyperthermia, diaphoresis, tachypnea
Withdrawal	Sympathomimetics – Amphetamine, Cocaine	Dysphoria, excessive sleep, hunger, severe psychomotor retardation, vivid and unpleasant dreams, suicidal tendency	Normal vital signs
Withdrawal	Antidepressants – Monoamine oxidase inhibitor (MAOIs), Selective serotonin reuptake inhibitor (SSRIs), Tricyclic antidepressants	Agitation, anxiety, bad dreams, dizziness, diarrhea, vomiting, flu like symptoms, electric shock like sensations	Lack of concentration, paresthesias, numbness, ataxia, vertigo

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