



A Study of Epidemiology and Outcome of Poisoning in children up to the age of 14 years

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Abstract

Background: *Poisoning is the 3rd most common injury treated in emergency rooms for children less than 16 years of age. The cases range from accidental ingestion in toddlers to intentional overdoses in adolescents. The reported incidence of childhood poisoning in various studies varies as the causes of poisoning depend on many factors. Continuing morbidity and mortality due to poisoning is a serious challenge to the paediatricians and public health officials.*²

Material and Methods: *This was a prospective cohort study conducted at Hi-Tech Medical College And Hospital over the period of two years. All children below 14 years presenting to the Emergency department and Inpatient department of Paediatrics were included in the study. A detailed history taking and examination were done and their clinical profile and outcome were noted.*

Results and Conclusion: *Kerosene poisoning was found to be the most common type of poisoning in the study followed by animal bites and household products. Majority of the poisonings were reported from the middle class socioeconomic group and predominantly males.*

Keywords: *Poisoning, hydrocarbon, epidemiology.*

Introduction

Poisoning in children is one of the commonest emergencies encountered in paediatric practice. Children below the age of five years constitute about 15% of unintentional poisoning related deaths³. A survey of 16 middle-income and high-income countries revealed that, of the different external causes of unintentional injury death among children aged between 1 and 14 years, poisonings ranked fourth in 2000–01, after road traffic crashes, fires and drowning.⁴

Poisonings occur when substances are ingested, inhaled, injected or absorbed through the skin in quantities that are harmful to the body⁵. The various reasons of poisoning depend on many factors such as education, socio-economic status, local beliefs, disregarding behaviour of parents, customs and type of population, whether urban or rural⁶. Effective preventive and therapeutic approaches in childhood poisoning should be based on appropriate knowledge of general epidemiologic data to assist emergency

department personnel on the proper management of poisoning cases.^{7,8}

The factors determining the severity of poisoning and its outcome in a child are interrelated. They are the type of poison, the dose, the formulation, the route of exposure, the age of the child, the presence of other poisons, the state of nutrition of the child and the presence of other diseases or injuries. The window between the time of ingestion and time of presentation plays a vital role in determining the outcome of the child. Most children are immediately brought to the emergency

department but in some cases the child could be out playing and the realization that he/she had ingested some substance only sets in after some time. The prolongation in these windows of opportunity leads to increased morbidity and mortality.

In India, the reports for fatality in poisonings ranged between 0.6% and 11.6%.⁹

According to the Who world report child injury prevention, the common agents in childhood poisoning are Table.1

Table.1 The most common agents involved in childhood poisoning according to WHO report

<ul style="list-style-type: none"> ➤ Over-the-counter preparations • Paracetamol • Cough/ cold remedies • Vitamins and iron tablets • Antihistamines • Anti-inflammatory drugs. ➤ Paraffin/kerosene. ➤ Poisonous plants. ➤ Animal or insect bites 	<ul style="list-style-type: none"> ➤ Prescription medications • Antidepressants • Narcotics • Analgesics • Illicit drugs. 	<ul style="list-style-type: none"> ➤ Household products • Personal care products • Bleach • Disinfectants • Detergents • Cleaning agents • Cosmetics • Vinegar 	<ul style="list-style-type: none"> ➤ Pesticides • Insecticides • Rodenticides • Herbicides
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Identification of an ingested substance in most cases can be done through proper history taking and identifying the proper signs and symptoms Table 2. Estimating the amount of ingested toxin can be challenging but can be obtained by

methods such as estimation of the amount of items/tablets missing from a package and the amount of liquid remaining in the bottle from which the child has ingested etc.

Table 2 Symptoms observed in poisoning according to severity

Mild Symptoms	Moderate symptoms	Severe symptoms
Restlessness	Vomiting	Convulsions
Irritability	Trembling	Coma
Headache	Temperature	Tachycardia
Loss of appetite	Disorientation	Tachypnea
Nausea	Diaphoresis	Hypotension
Drowsiness	Tachycardia	Respiratory distress
Loose stools	Blurring of vision	Cardiopulmonary arrest
Stiffness in the joints	Difficulty breathing	Hyperthermia
Thirst	Incontinence	Loss of consciousness
Fatigue	Confusion	Severe Muscle twitching
Passing cough	Cramps	Status epilepticus
Weakness	Drooling	
	Decreased bowel sounds	
	Abnormalities in blood pressure	
	Loss of muscle control /muscle twitching	
	Persistent cough	

Table 3 Signs and symptoms, diagnosis and treatment of different poisons in the study population

<p>Hydrocarbon poisoning Ingestion of Petroleum products, Oils like paraffin and turpentine Intentional breathing, huffing, bagging, sniffing of the fumes of glues, paint/thinners, solvents, cleaning sprays, gasoline, or fluorocarbons used as refrigerants or propellants in aerosols</p>	<p>Lung irritation Coughing dyspnoea Cyanosis Choking Chemical pneumonitis Arrhythmia ventricular fibrillation (sudden sniffing death syndrome) Nausea Vomiting sore throat pruritus Diarrhoea Melena hematemesis Headache lethargy Drowsiness Poor coordination Stupor or coma Seizures</p>	<p>History of contact Examination for residue on clothes or on person Full Blood Examination Urea Electrolytes and Creatinine LFT Chest x-ray Blood gas analysis MRI (suspected brain damage)</p>	<p>Decontamination Prevention of aspiration O2 Supplementation & Bronchodilators for pneumonitis Intubation, Mechanical ventilation 12 lead ECG & cardiac monitoring for 4 hours Electrolyte correction Benzodiazepines for seizures Antibiotics in diagnosed infection *Activated charcoal is contraindicated as they lead to increase in aspiration</p>
<p>OTC medication poisoning</p>	<p>Flushing of skin Dryness of mouth Pain in abdomen nausea vomiting Auditory problems (ringing) Tachycardia Vomiting Hematemesis Constipation Hallucinations Mydriasis Hyperactivity seizures Dizziness Sleepiness Dyspnoea confusion unconsciousness</p>	<p>History Blood tests Urine tests</p>	<p>Emetics Gastric lavage Nasogastric (NG) tube Suctioning N-acetylcysteine (NAC) Activated charcoal Anticonvulsants Sedatives Vasopressors Intubation/Mechanical Ventilation Very rarely Transplant of liver may be necessary</p>
<p>Prescription medication overdose</p>	<p>Antidepressants Anticholinergic effects <ul style="list-style-type: none"> Xerostomia Blurred vision, mydriasis Urinary retention Hypoactive or absent bowel sounds Pyrexia Myoclonic twitching Cardiovascular effects <ul style="list-style-type: none"> Sinus tachycardia Prolonged QRS and QT intervals Heart block Peripheral vasodilatation Hypotension Cardiogenic shock Ventricular dysrhythmias Asystole CNS effects <ul style="list-style-type: none"> Drowsiness Restlessness </p>	<p>Complete blood cell count (CBC) Electrolyte levels (with determination of anion gap) Urinalysis (UA) Blood gases Chest radiography Serum cyclic antidepressant levels Electrocardiogram (ECG)</p>	<p>Decontamination Activated charcoal Sodium bicarbonate therapy (Alkalinizing agent and Management of Cardiovascular Toxicity) Vasopressors(non responsive persistent hypotension) Phenylephrine norepinephrine Inotropic agents (heart failure) Dopamine Dobutamine Antiarrhythmic agents (arrhythmias) Lidocaine Magnesium sulphate Benzodiazepines (seizures)</p>

	<ul style="list-style-type: none"> • Extrapyramidal signs • Rigidity • Ophthalmoplegia • Respiratory depression • Delirium • Seizure(amoxapine) • Coma <p>Cardiotoxicity (maprotiline)</p> <p>Opioid overdose triad</p> <ol style="list-style-type: none"> a. pinpoint pupils b. unconsciousness c. respiratory depression. 		<p>Lorazepam Diazepam Phenobarbital</p> <p>IV fluids (hypotension)</p> <p>Gastric lavage within one hour of ingestion has to be weighed against adverse effects like vomiting, aspiration, and esophageal perforation. Cardiac monitoring for dysrhythmias Ventilatory support</p>
<p>Pesticide poisoning</p> <p>From air because of spraying, unhygienic handling of food, Accidental ,voluntary ingestion Organophosphates and carbamates</p>	<ul style="list-style-type: none"> • Anxiety • Emotional lability • Restlessness • Confusion • Ataxia • Tremors • Seizures • Coma • Apnea <ul style="list-style-type: none"> • Impaired memory • Confusion • Irritability • Lethargy • Psychosis • Chronic organophosphate-induced neuropsychiatric disorders • Respiratory: Muscarinic, nicotinic, and central effects contribute to respiratory distress in acute and delayed organophosphate toxicity • Muscarinic effects: Bronchorrhea, bronchospasm, and laryngeal spasm, respiratory failure is the most life-threatening effect • Nicotinic effects: weakness and paralysis of respiratory oropharyngeal muscles • Central effects: respiratory paralysis • Cardiac abnormalities: Sinus tachycardia, sinus bradycardia, extrasystoles, atrial fibrillation, ventricular tachycardia, ventricular fibrillation Hypotension, hypertension, and noncardiogenic pulmonary edema • Gastrointestinal 	<p>atropine therapeutic trial plasma cholinesterase RBC cholinesterase CXR ECG blood gases</p>	<p>Decontamination Cleanse with soap and water to hydrolyse organophosphate solutions. Oxygenation, intubation (in most cases necessary) Atropine pralidoxime</p> <p>Irrigation of eyes in case of eye exposure</p>

Exclusion criteria

Children presetting with other chronic diseases with similar clinical features were excluded.

Children whose appropriate authorities did not consent for the study were excluded.

All children up to 14 years of age were included in the study and by using a predesigned proforma. Prior informed proper consent was taken from all the study participants and respective parents/guardians.

Statistical Analysis was done using IBM SPSS software. Pearson's chi-squared test was used to determine the significant difference between the expected frequencies and the observed frequencies in both groups. P values <0.01 were taken as significant findings.

Results and Discussion

The Total number of patients admitted in our inpatient ward during the study period was 2338. Number of cases admitted in paediatric intensive care unit (PICU) was 630. Among these cases admitted with complaints of poisoning were 126 cases which accounted for 5.39% of total admissions and 20% of PICU admissions.

A total of 79 cases (62.7%) were male and 47 (37.3%) were female. P value was 0.23. It was found to be non significant.

The median time to hospital visit from the time of poisoning was 5.4 hours. Twenty-one (16.67%) children were induced vomiting. A few children were given milk and others water. The mean duration of hospitalization for the children was 13.5 days

Table 4 Incidence of Poisoning in Relation with Age Group

Age Group	No. of cases	Incidence	P = 0.21
< 1 year	18	14.29%	
1-5 years	43	34.13%	
5-10 years	38	30.16%	
>10 years	27	21.43%	
Total	126	100%	

The age distribution of the study population was between 1-14 years. Most cases of poisoning occurred in the age group of 1-5 years (14.29%). 43(34.13%) cases were between age group between 1-5 years. 38 (30.16%) were between 5-

10 years and 27 (21.43%) were above 10 years of age. In the present study, 93 (73.81%) cases were from Urban areas and 33 (26.19%) cases were reported from the surrounding rural areas .

Table 5 Distribution of study population according to socioeconomic status

Grade	No. of Cases	Percentage
I	5	3.97%
II	34	26.98%
III	59	46.83%
IV	28	22.22%
Total	126	100%

The cases were divided into four socioeconomic groups based on modified kuppuswamy scale. Most cases 59(46.83) were reported from Lower middle class (Grade III) followed by Upper middle class (Grade II) , 28 (22.22%) upper lower (Grade IV) and 5(3.97%) Upper lower socioeconomic groups.

Table 6 Type of poisoning in the study population

Type of Poisons	No. of Cases	Percentage
Over the counter medications	10	7.94%
Prescription medications	2	1.59%
Household products	18	14.29%
Pesticides	2	1.59%
Kerosene/Paraffin oil	66	52.38%
Animal bites	19	15.08%
Poisonous plants	1	0.79%
Miscellaneous	9	6.35
Total	126	100%

In the present study, Kerosene/Paraffin oil poisoning was the most common type of poisoning accounting to 66(52.38%) of the total poisonings. Animal bites were the second most common with 19 (15.08%) cases closely followed by household product poisoning 18(14.29%) . The causative substances for household poisonings were liquid fabric conditioners, Dettol and venigar in the study population. In animal bites, Scorpion bites 71.9% were more common followed by snake bites 28.1 % . Different types of medications leading to poisoning in the study population were Paracetamol, chlorpromazine, haloperidol, benzene hexachloride, and some ayurvedic products. Poisonous plant poisoning included a case of mushroom poisoning. Miscellaneous cases included poisoning from eating days old food, mosquito repellent liquid ingestion etc.

A total number of 99.21% cases were accidental ingestions and 0.79% was suicidal. One case of pesticide poisoning was voluntary ingestion. The child did not want to be sent to a hostel and following a quarrel with parents, she ingested a pesticide. The outcome in this particular case was death.

Table 7 System wise symptoms noted due to poisoning in the study population

System	No. of Cases	Percentage
Respiratory System	72	57.14%
Gastrointestinal System	58	46.03%
Central nervous system	36	28.57%
Cardiovascular system	17	13.49%
Other	41	32.54%

Respiratory problems like respiratory distress, cough were found the most commonly occurring 72(57.14%) in the study followed by gastrointestinal problems 58(46.03%) and other symptoms 41(32.54%) like hyperhidrosis etc

Table 8 Outcome of poisoning in the study population

Outcome	No. of Cases	Percentage
No. Sequelae	119	96.44%
With Sequelae	6	4.76%
Death	1	0.79%

In this study, 119(96.44%) cases recovered without any Sequelae. 6(4.76%) cases of poisoning recovered but had sequelae over a period of time like severe oesophagitis and gastritis. They were followed up regularly and treated symptomatically. Only one poisoning resulted in death and that was a case of organophosphate poisoning.

Conclusion

Out of all cases poisonings accounted for 5.39% of total admissions and 20% of PICU admissions signifying that the burden of poisonings in paediatric health practice is ever so significant. The children between 1-5 years were most affected and the most common poisoning was kerosene/ hydrocarbon poisoning. Many children were forced to vomit by induction which is actually contraindicated in poisonings such as

hydrocarbons as they could lead to aspiration pneumonitis. With poisoning being such a prevalent problem understanding the presentations, epidemiology of the various poisons can help ease the burden of the problem.

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