

Profile of acute childhood poisoning in South India: A prospective study

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Abstract

Introduction: Childhood poisoning is a frequent cause of admissions to paediatric emergency wards.

Objective: To ascertain the major causative agents and mortality of childhood poisoning and to compare them with previous studies.

Method: A prospective observational study was conducted in JSS University Hospital, Mysore, India from November 2013 to April 2015. All children below 15 years of age with poisoning admitted to the paediatric ward were included. Those with food poisoning, snake bite and scorpion sting were excluded.

Results: A total of 105 children with poisoning below 15 years of age were admitted contributing to 1.58% of the total admissions. Majority of the cases (84.7%) were below 5 years of age. Males constituted 58% of cases and 63% of cases were from rural areas. Accidental poisoning was the commonest mode seen in 90% of cases. Hydrocarbons (32.4%), pesticides (21.9%), drugs (20.9%), and household compounds (18.09%) were the offending agents. Kerosene poisoning alone contributed to 24.8% of cases. The commonest mode of presentation was vomiting seen in 59% of patients. While tachycardia (38.1%) and tachypnoea (24.8%), were commonly observed, more than half of the cases had no abnormal findings. One patient died due to organophosphorus poisoning giving a mortality rate of 0.95%.

Conclusions: In this study 90% of poisoning in children were accidental in nature. Kerosene poisoning alone contributed to 25% of cases.

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Introduction

Childhood poisoning is a frequent cause of admissions to paediatric emergency wards¹. The global death rate from poisoning in persons below 20 years of age is 1.8 per 100 000 population². It constitutes 0.33% -7.6% of total paediatric hospital admissions in India and mortality has ranged from 0.64-11.6%³. While kerosene is the most common agent in developing countries, drugs, household products and pesticides are common agents in developed countries². In a vast country like India, with regional differences in geographical and socio-economic background, there are variations in the types and frequency of childhood poisoning³.

Objectives

To ascertain the major causative agents and mortality of childhood poisoning and to compare them with previous studies.

Method

A prospective observational study was carried out from November 2013 to April 2015 at the department of paediatrics of JSS hospital, Mysore, India. All admitted childhood poisoning cases <15 years of age formed the study group. Children with snakebite, scorpion sting and food poisoning were excluded. The study was approved by the JSS hospital ethical committee. Consent was taken from the parents. All the relevant details were collected using a structured questionnaire. The patient's symptoms and signs present were noted along with, time of poisoning, place of poisoning, poison consumed, volume consumed, route of poisoning, circumstances of consumption and time of presentation. All cases were managed appropriately depending on the type of poisoning and severity. The descriptive statistics were done by measuring mean, median, standard deviation and proportions. The inferential statistics were done using Kruskal Wallis test. SPSS software version 21.0 was used for all measurements.

Results

During the study period a total of 105 children below 15 years of age with poisoning were admitted. Total cases admitted to paediatric department during the same period was 6624. Out of these, poisoning cases constituted 1.58% of total admissions. Majority of the poisoning cases (n=89, 84.7%) were below 5 years of age. Cases both below 1 year and above 5 years of age constituted 15.2% each. The incidence of poisoning cases was higher among males (58.1%) than females (41.9%).

About 63.8% of poisoning cases hailed from rural areas as compared to 36.2% from urban areas (Table 1).

Table 1: Demographic characteristics of poisoning in children (n=105)

Variable	Number (%)
<i>Age group</i>	
<1 year	16 (15.2)
1-<3 years	56 (53.3)
3-<5 years	17 (16.2)
5-10 years	11 (10.5)
>10 years	05 (04.8)
<i>Gender</i>	
Male	61 (58.1)
Female	44 (41.9)
<i>Locality</i>	
Urban	38 (36.2)
Rural	67 (63.8)
<i>Method of poisoning</i>	
Accidental	95 (90.4)
Suicidal	05 (04.8)
Homicidal	04 (03.8)
Experimental	01 (01.0)

The commonest mode of poisoning was accidental (90.4%) (Table 1). All the suicidal cases were observed in the age group of 11-15 years.

The distribution of type of poisoning is shown in Table 2.

Hydrocarbon class of compounds constituted the biggest chunk of cases followed by pesticides, drugs and household compounds (Table 2). In the miscellaneous group, fire-cracker poisoning and nut poisoning were commonest followed by ingestion of surgical spirits, castor seeds and unidentified seeds. Among hydrocarbons, kerosene was the commonest offending agent. Among pesticides, pyrethroids organophosphate and zinc-phosphide were commonly involved. Benzodiazepines and antipsychotics were the drugs being commonly involved. Corrosives (acid) and Eucalyptus oil were the common household items (Table 2).

Table 2: Distribution of type of poisoning (n=105)

Poison category	Number (%)
Hydrocarbon	34 (32.4)
Kerosene	26 (24.8)
Thinner	07 (06.6)
Petrol	01 (01.0)
Drugs	22 (20.9)
Benzodiazepine	03 (02.9)
Risperidone	02 (01.9)
Paracetamol	02 (01.9)
*Others	15 (14.1)
Pesticides	23 (21.9)
Pyrethroids	13 (12.4)
Organophosphates	05 (04.8)
Zinc phosphide	04 (03.8)
Organochlorine	01 (01.0)
Household	19 (18.1)
Corrosive (acid)	06 (05.7)
Eucalyptus oil	05 (04.9)
Camphor	04 (03.8)
Corrosive (alkali)	01 (01.0)
Fabric whitener	01 (01.0)
Chalk lime	01 (01.0)
Shikakhai powder	01 (01.0)
Miscellaneous	07 (06.7)

*Others: Gamma benzene, lead, telmisartan, levosalbutamol, levocetirizine, ofloxacin, cyproheptadine, moxonidine, iron, montelukast, cetirizine, amitryptiline, thyroxine, deriphylline, ondansetron, olanzapine, unknown---one each

The route of poisoning was ingestion in all cases. The mean time lapse before reaching hospital was 7.29 hours and time lapse was greatest (11.27 hours) in the hydrocarbon group. First aid management was given in 33.3% (stomach wash 26.6% and activated charcoal 6.7%) of patients who directly came to our hospital within one hour of ingestion. Vomiting was the commonest symptom (59%) followed by cough (19%), lethargy (12.4%) and hurried breathing (11.4%). About 19% of cases were asymptomatic (Table 3).

Table 3: Clinical features of poisoning in the study group (n=105)

Symptom	Number (%)	Sign	Number (%)
Vomiting	62 (59.0)	Normal	56 (53.3)
Cough	20 (19.0)	Tachycardia	40 (38.1)
Drowsiness lethargy	13 (12.4)	Tachypnoea	26 (24.8)
Hurried breathing	12 (11.4)	RS involvement	19 (18.1)
Convulsions	07 (06.7)	CNS involvement	15 (14.3)
Loose stools	06 (05.7)	Smell of compound	13 (12.4)
Fever	06 (05.7)	Fever	07 (06.7)
Pain in abdomen	05 (04.8)	Low SpO2 (<93)	06 (05.7)
Hoarseness of voice	02 (01.9)	Hypotension	03 (02.9)
Tremors	02 (01.9)	Prolonged CFT	02 (01.9)
Refusal of feeds	01 (01.0)	CVS involvement	02 (01.9)
Excessive cry	01 (01.0)	GIT involvement	02 (01.9)
Headache	01 (01.0)	-----	-----

RS: respiratory system, CNS: central nervous system, SpO2: oxygen saturation, CFT: capillary filling time, CVS: cardiovascular system, GIT: gastrointestinal tract

Clinical examination at admission was normal in more than half the number of cases. Abnormal findings observed commonly were tachycardia, tachypnoea, respiratory involvement and central nervous system involvement (Table 3). Ingested agents (poison) were smelt by the clinician in 12.4% of cases (Table 3).

Out of the 105 cases, one child with organophosphorus poisoning died (Table 4).

Table 4: Outcome of poisoning (n=105)

Outcome	Number (%)
Discharged	93 (88.6)
Discharged against medical advice	11 (10.5)
Death	01 (0.95)

Discussion

Due to the curiosity of children, poisonous substances are often inadvertently ingested by them in the home and its surroundings². Poisoning is a significant cause of morbidity and mortality in paediatric patients, worldwide². It is responsible for 0.3% to 7.6% of total admissions in paediatric department at various hospitals across India^{3,4}. In the present study poisoning accounted for 1.4% of admissions in our paediatric ward.

We observed that poisoning was most common in children in the age group of 1-3 years and similar observations were made by others³⁻⁵. Young children because of their inherent curiosity, close proximity to the ground and tendency to put things in their mouths are frequently subject to accidental poisoning⁴. Poisoning death rates are highest in infants, while non-fatal poisoning seems to be commoner in 1-4 year old children². However, in a study by Sharma *et al* 76.5% of cases were aged between 11-18 years⁶. We observed male predominance which is a common feature in most

series^{3,4,6}. Poisoning is commoner in boys than girls all over the world². However, females (51.6%) were more commonly affected compared to males in a study conducted by Sahin *et al* from Turkey¹.

The majority of our patients were rural natives as our hospital caters to a large rural area which is similar to studies from North India^{7,8}. Studies by Surjit Singh *et al* and Gupta *et al* showed higher urban proportion of 72.3% and 61.6% respectively^{5,9}. The common method of poisoning in our study was accidental (90.6%) which is similar to many other studies^{4,8}. In a review of 10 years data from North India accidental poisoning accounted for 78% of cases⁵. However, Jose *et al* reported suicidal mechanism to be the commonest accounting for 70.2% of cases¹⁰. In a study by Aziz *et al*, 56.9% cases were suicidal, 39.2% were accidental and 3.9% cases were homicidal¹¹. They also reported that all poisoning in children less than 12 years of age were accidental while it was suicidal in the majority of cases between 12-18 years of age¹¹. All the suicidal cases in the present study were observed in the age group of 11-15 years showing the preponderance of adolescents to suicide. One of our 12 year old boys tried to experiment the effect of drug by ingesting risperidone tablets which was prescribed for his grandfather.

Majority of poisoning was due to hydrocarbons, drugs, insecticides and household products in our study which is similar to study done by Kohli *et al* and Rathore *et al*^{4,12}. A ten year study from Chandigarh also revealed kerosene as one of the common agent accounting for 25% of all poisoning cases⁵. Even with the increasing usage of liquid petroleum gas (LPG) for cooking and availability of electricity in rural areas, we found in our study kerosene to be the major cause of accidentally ingested poison. Similar to our study Lucas from Sri Lanka also concluded that rural people store

kerosene in empty soft-drink bottles and keep within easy reach for the young child playing on the floor¹³. As evident from the few studies from North India, the incidence of kerosene poisoning has dropped over the years with increasing use of LPG and availability of electricity even in rural areas^{3,5}. Even in countries like Pakistan and Sri Lanka kerosene is the common agent of poisoning accounting for 50% and 36% of cases respectively^{13,14}. However, Sharma *et al* observed only 4.9% of their cases were due to kerosene poisoning while majority were insecticide poisoning cases⁶. They explain that this may be due to most of their cases being in the age group of 11-15 years and majority from rural areas where insecticides are routinely kept in houses.

We observed drugs as offending agents in 26% with sedatives and antidepressants being commonly implicated. However, drugs accounted for more than half the cases of poisonings in developed countries¹³. Data from national poisons information centre, AIIMS, New Delhi reveals that of the total 995 poisoning cases in children below 18 years of age, 21.7% were due to drugs¹⁵.

Pesticides accounted for 21%, in that more than half of them were due to pyrethroids in the present study. Lucas also reported ingestion of mosquito coils in 6% of cases in Sri Lanka¹³. Pyrethroids, mosquito repellents are used extensively in India because of the fear of dengue which has become an important cause of childhood mortality. Fortunately their toxicity is low because of poor absorption from the gut¹³. Poisoning due to organophosphorus compounds was observed in 5 children and all of them were from rural areas. Organophosphates were the commonest offending agent in various other studies^{7,8,16}. Camphor and eucalyptus oil are used commonly in most Indian households and if ingested can affect central nervous system causing status epilepticus and death.

Common symptoms in our study were vomiting (59%), cough (19%) lethargy (12.4%) and hurried breathing (11.4%) in the order of decreasing frequency. Vomiting is also the commonest symptom in most other studies^{4,16}. In more than 50% of cases in our study there were no signs.

The mortality in childhood poisoning ranges from 0 to 11.6% in India, whereas in Pakistan it is 2.5 - 13.6%^{3,4,14}. A study from Sri Lanka had 0.7% mortality¹³. We observed death in one child due to organophosphorus poisoning which accounted for 0.95% mortality. While Kohli *et al* reported no deaths in their study and Sharma *et al* reported a mortality rate of 6% in their cases^{4,6}. In a study from Chandigarh overall mortality was 12.5% and all deaths were in the age-group of 11-15 years and

were mostly due to consumption of aluminium phosphide which has no specific antidote⁵. In some countries poisoning death rates are highest in infants, while non-fatal poisoning seems to be commoner in children 1 to 4 years old².

Kerosene is the main substance responsible for accidental poisoning in children as this is neither sold in proper containers nor stored properly in households. Educating parents regarding storage of medicines and common household chemicals will reduce this preventable cause of childhood morbidity and mortality.

Conclusions

In this study 90% of poisoning in children were accidental in nature. Kerosene poisoning alone contributed to 25% of cases.

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