

# Pattern of Poisoning in Children, an Experience From a Teaching Hospital in Northern India

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## Abstract

Poisoning is a common medical emergency in children. Most of the poisoning in children is accidental. Unfortunately, the incidence of deliberate poisoning among adolescents is increasing due to changing familial and social conditions in our society. Study design: prospective analysis of poisoning seen in children between January 2010 and December 2013 in an academic center of northern India. Results: Eighty one children (Boys 45, 55%; age median [range] 13 [1-18]) were included. All poisoning episodes were either suicidal (38, 46.9%) or accidental (43, 53.1%). Most of the poisoning events in pre-adolescent children were accidental (34/35, 97%) and among adolescents (13-18 years age group) were suicidal (37/45, 80.4%). The most commonly ingested poisoning agent was kerosene (10/35, 28.6%) in <12 age group and organo-phosphorus compound (8/37, 21.6%) in adolescents. Conclusion: We need to take preventive measures for accidental and intentional poisoning in pre-adolescents and adolescents age group respectively.

## Key Words

Poisoning, Intoxication, Childhood Emergency, Envenomation

## Introduction

Poisoning is a global problem. Most recent estimate of World Health Organization (WHO) suggests 180 thousands deaths in 2010 due to various poisoning agents (1). Poisoning is relatively less common in children and is mostly accidental than adults. Poisoning account for 1-6% of bed occupancy in children hospitals and 3.9% in pediatric intensive care unit in India (2-4). Poisoning is predominantly accidental particularly in < 5 years but might be increasingly self-inflicted in older children (5). Poisoning agent varies, between the countries as well as within the country, according to children accessibility of poison which is influenced by socio-economic status, education, local beliefs' and customs of the community.

Understanding about nature and severity of poisoning is crucial for appropriate and effective management. We have nationwide data from developed countries about the profile of poisoning in children but similar statistics is lacking from resource poor countries such as India. However, available limited data suggests childhood poisoning as a considerable cause of morbidity or mortality in India. The present study was carried out with an objective to assess the profile of childhood poisoning at our center.

## Material and Method

This retrospective analysis of prospectively collected data was conducted in a tertiary care teaching hospital

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at Dehradun, in Uttarakhand. Children (< 18 years) presented with acute poisonings, envenomation, or insect bites to emergency department between January 2010 and December 2013 were included. Relevant clinical details were collected in a pre-defined data entry form. Children with allergic drug reaction or food poisoning were excluded.

### Statistical Analysis

Data were entered and analyzed using SPSS v 15. Numerical data is expressed as median with range and categorical data is expressed as ratio and proportions. Categorical data is compared using Chi-square test and numerical data is compared using non-parametric Mann-Whitney U test. Level of significance is kept at  $p < 0.05$ .

### Results

Total of ninety children were enrolled during study period. Nine of them were excluded due to incomplete data. Eighty one children (Boys 45, 55%; age median [range] 13 [1-18]) were included in final analysis. Age and sex distribution of the children is summarized in *table 1*. All poisoning episodes were either suicidal (38, 46.9%) or accidental (43, 53.1%) and none were homicidal. More children belonged to urban ( $n=60$ , 74.1%) than to rural habitat ( $n=21$ , 25.9%). Most of the poisoning took place at home (87.6%) with few incidents in other settings such as school, playground etc (12.35%). Distribution of gender and place of living, in accidental or suicidal nature of poisoning, are given in *table 2*.

Poor scholastic performance, parental discordance, and fight with friends or sibling were the common reason cited for suicidal intent. Almost all poisoning events in pre-adolescent children (< 12 years of age) were accidental (34/35, 97%) whereas majority of such events among adolescents (13-18 years age group) were suicidal (37/45, 80.4%). The most commonly ingested poisoning agent was kerosene (10/35, 28.6%) in <12 age group. Adolescents used organo-phosphorus compound (8/37, 21.6%) most commonly as a suicidal agent. Different poisonous agents encountered in our series are summarized in *table 3*. Among the various hydrocarbons, kerosene poisoning was most commonly seen with other hydrocarbons being diesel, turpentine oil, and gasoline (petroleum). Implicated pesticides were organo-phosphorus or organo-chlorine compounds, commonly used by farmers in field and orchards, but a few were

household insecticides (Mortein®, 5). Besides 5 cases of poisoning with unknown drugs, known drugs incriminated were sedatives ( $n=3$ ), losartan ( $n=2$ ), and single incidents of antipsychotic, antiepileptic, paracetamol, and sulphonamide drug. Envenomation, predominantly seen in boys (7/10, 70%), included snake bite ( $n=7$ ), followed by one each of insect bite, bee sting, and scorpion sting. Ingested corrosive agents were toilet acid ( $n=3$ ), Harpic® ( $n=2$ ), and a case of Lysol®. All four incidents of hanging happened in adolescents, equally distributed between boys and girls. At first interaction, our children had following symptoms (*table 4*)

About one fourth of children received primary treatment prior to being referred to our center. Boys and girls were brought to our center after median (range) delay of 2.0 (0-20) and 2.0 (1-15) hours respectively ( $p=0.15$ ). Thirty four (41.9%) children presented within one hour of poison ingestion. Delay in bringing the children from urban and rural areas to the hospital were 2 and 2.5 hours respectively ( $p=0.32$ ). The median duration of hospital stay was 2.0 (0-20) days. Toxin was identified and appropriate antidote, if available, could be instituted for 19 children. Eight of the admitted children who required mechanical ventilation, had organo-phosphorus. Seventy seven (95%) children had favorable outcome and rest died or discharged on request in unstable condition. Four of children died.

### Discussion

Poisoning is a commonly encountered emergency which is uncommon in children than adults. It is a common cause of unnatural death in children. Unfortunately poisoning in children is becoming more common due to easy access of poison, temperamental and behavioral changes in children, increased screen media exposure, unreasonable parental expectations etc. Majority of poisoning in children are accidental. Accidental poisoning reflects an ambiguous picture with children being susceptible because of their naturally curious nature and tendency to mouth everything. Reduction in incidence of accidental poisoning is observed because of improved child resistant packaging, and heightened parental awareness. It is unfortunate to see an increase in suicidal poisoning in adolescents probably related to the stress related to academic performance, peers, family, and social life. Akin to experience published from poison control

**Table 1. Case Distribution According to Age and Sex**

Age group (years)	Total: n (%)	Boys (%)	Girls (%)
0-5	30 (37)	17(56.7)	13(43.3)
6-12	5 (6.2)	3 (60)	2 (40)
13-18	46 (56.8)	25(54.3)	21 (45.6)
Total	81 (100%)	45(55.5)	36 (44.5)

**Table 2. Case distribution of poisoning, sex and demographic status**

Poisoning	Boys (%)	Girls (%)	Rural (%)	Urban (%)
Accidental (n=43)	23 (53.5)	20 (46.5 )	11 (25.6)	32 (74.41)
Suicidal (n=38)	22 (57.9)	16 (42.1 )	10 (26.3)	28 (73.7)

**Table 3. Distribution of poisoning agent consumed**

Agent	n (%)
1 Pesticides, insecticides	24 (29.6)
2 Hydrocarbons	21(25.9)
3 Drugs/ medications	14 (17.3)
4 Snake bite	7 (8.6)
5 Non-snake bite/stings	3 (3.7)
6 Corrosives	6 (7.4)
7 Hanging	4 (4.9)
8 Misc.	2 (2.5)
Total (%)	81(100)

**Table 4. Clinical Presentation of Children with Poisoning**

Symptom	n	Percentage
Vomiting	54	66.7 %
Altered sensorium	28	34.7%
Tachycardia	22	27.2%
Seizure	16	19.8%
Meiosis	16	19.8%
Abdominal pain	15	18.5%
Chest crepitation	13	16.0%
Salivation	10	12.3%
Tachypnea	9	11.1%
Fever	8	9.9%
Hypertension	8	9.9%
Renal failure	6	7.4%
Diarrhea	5	6.2%
Mydriasis	3	3.7%

centre, New Delhi (6), a major proportion of affected children were <5 in age. This age group is vulnerable to household accidental poisoning due to inquisitive nature,

oral exploratory nature, and recently acquired mobility and hand skills. Several other experiences from India have shown similar results (2, 4, 7).

Similar to previously published experience, from India (8-10) and other countries across the globe (11, 12), we also have seen relatively higher proportion of boys than girls which was sustained across the all three age groups. This gender bias is maintained in adult as well (9, 13). Male dominance could be due to one of the several reasons as more aggressive and exploratory nature, relatively more freedom in society particularly in Asian countries including India, higher level of stress partially due to expectation and social responsibilities in a typical Indian family, referral bias towards boys for hospitalization over girls (3, 14, 15). The lower gender imbalance in our series could be due to preponderance of urban population, where gender bias is relatively subdued, and home as site of accident which nullifies the outdoor risk factors favoring poisoning in boys. Suicide or deliberate self-harm in >15 yrs of age group accounts for more than 3% of total deaths amounting upto 187,000 events in 2010 in India (16). Deliberate self-harm is not uncommon in adolescents age group (17, 18) and is reported in earlier reports also (6). A countrywide estimate suggests about 10,000 suicides deaths in children between 5-14 years of age (19). The reason for this could be anything ranging from poor school performance, bullying in school, failed relationships, conflict with parents, drug abuse, emotional insecurity, to associated psychological conditions such as depression, anxiety etc. All, except one, cases of suicidal poisoning happened in adolescents which is similar to the finding in other studies (6, 20).

Hydrocarbons, insecticides and drugs were the most commonly identified agents of poisoning in our study. Among hydrocarbons, kerosene poisoning was most common. Kerosene ingestion was also noted to be the commonest cause of accidental poisoning in our study. This was observed in age category less than 5 years, reason being its mistaken identity as water when kept in soft drink bottles as is usually stored in rural India. All cases of kerosene poisoning in this study were successfully discharged without complications. Other studies have reported Kerosene as the most common poisoning agent (5, 10, 21). Kerosene poisoning is common in our community because of easy availability as a source of cooking fuel in almost every house, particularly in rural India, low cost, tasteless and non-irritant nature during ingestion. Despite of increased use of cooking gas in India,

decadal trend has not shown in significant decline in proportion of kerosene related poisoning (10). Kerosene is presently being marketed in blue color to prevent its mistaken ingestion which trend to attract children towards these vibrant colors resulting in accidental poisoning.

Pesticides were the cause of poisoning in around one fifth of our children and mainly included organo-chlorine and organo-phosphorus compounds. Easy availability of these agents with agriculture being the main occupation of people in northern India, lack of legislation for sale, and lack of identifiable storage may be the cause of pesticide poisoning. Most of the suicidal poisoning was after consumption of insecticides most commonly organ-phosphorus compounds.

Drug poisoning has been observed as an important cause in our series, constituting 17.3% cases. Drug poisoning is more common in India, particularly urban population, due to easy availability of dangerous medicines as over the counter drugs without any prescription.

Thirty four (42%) patients presented to us within one hour of ingestion. However it was observed that majority of the patients who reported early belonged to urban regions. The average time delay before presenting to our hospital was 3.6 hours for urban children and 8.1 hours for rural. The hilly and difficult mountainous terrain of rural Uttarakhand could be the cause for this marked variation in time delay. Symptomology observed closely reflected the route of toxic ingestion. Vomiting was the commonest symptom as all of our children had oral route of toxin ingestion.

Four of 81 children died (4.9%) which is well in range with other national studies. There has been decrease in mortality over years as also brought forward in our study and this could be due to improved health care facilities including intensive care in this state, 40% children reported early to hospital, 25% had received primary emergency care before being referred to our tertiary center. Eight of our patients required artificial respiratory support and this was mainly following insecticide poisoning. One out of these eight only one had the untoward outcome of non-survival with remaining seven being discharged successfully.

## Conclusion

Poisoning is a common cause of morbidity and mortality among children. We need to take measures to prevent accidental and intentional poisoning in pre-adolescents and adolescents age group respectively. This calls for various preventive measures such as better and child resistant storage, strengthening of Pesticide Act and health education including adolescent counselling. We would also like to point out the need for regional toxicological centers which could help the treating physician in identification of agents on basis of symptoms and the management thereof.

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