

Original Research Article

Clinical profile and outcome of children presenting with poisoning or intoxication: a hospital-based study

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ABSTRACT

Background: Poisoning is a common preventable cause of morbidity and mortality in children. Most of the poisoning in children less than 5 years of age is accidental. Not much of Indian data is available particularly from this part of the country. So, authors conducted a retrospective hospital record-based study to know clinical profile and outcome of children presenting with poisoning in our set up. The objective was to study clinical profile, outcome of childhood poisoning and intoxication in Jammu District (Jammu and Kashmir) India

Methods: This was a retrospective hospital record-based study done in patients who were admitted in pediatric wards and pediatric intensive care unit (PICU) of SMGS Hospital Jammu with history of ingestion of poison or intoxication or envenomation from January 2017 to December 2017. The data collected was analyzed with SPSS 12.0 software. Demographic and etiological factors were retrospectively recorded and analyzed.

Results: There were 227 children enrolled in study with an incidence of 0.99%. Male: female ratio was 1.2:1. Most of the children were asymptomatic and majority of them arrived to the hospital in less than 2 h. The majority of our patients 115 (50.66%) were in the 13-18 years age group. Organophosphorus poisoning was the commonest poisoning seen in 51 (57.30%) patients followed by snake bite 29 (55.77%), insect bite 17 (32.69%), Phenol 14 (77.78%), kerosene 11 (12.36%) and rat poison 10 (11.23%). Alcohol problem occurred in 9 (24.32%) cases. The most frequent cause of suicide attempt were school problems, followed by conflict in the family. Route of poisoning was ingestion in 173 (76.21%) cases followed by bites 53 (23.35%) and inhalation in 1 (0.44%) case. Vomiting 105 (46.25%) was the predominant clinical feature. Aspiration pneumonia 17 (43.59%) followed by respiratory failure 7 (17.95%) were the most common complications. During treatment 67 (27.91%) received gastric lavage and 28 (12.33%) received antidotes. Overall survival was 210 (92.51%), among remaining cases 2 (0.88%) cases died in hospital and 15 (6.61%) cases left against medical advice

Conclusions: Parental health education will decrease the occurrence of childhood poisoning. Along with the parents and teachers, media also should take active steps to educate the rural population about the preventive measures from bite, stings and handling of poisonous agents.

Keywords: Children, Clinical profile, Poisoning

INTRODUCTION

Poisoning in children is a global problem and no part of the world is exempt from this calamity. It is one of the

commonest preventable emergencies encountered in pediatric practice.¹ Poisoning is also the third most common emergencies of pediatrics leading to high social and economic burden.² The high prevalence of acute

poisoning in children is attributed to the curiosity of the children especially those aged less than 5 years to virtually taste or swallow harmful substances.³ Although pediatric poisonings are considered emergencies, more than 85% of cases need no medical intervention because the ingested material is not toxic or the amount swallowed is not clinically significant.^{3,4} According to World Health Organization, more than three million poisonings occur in developing countries, particularly among agricultural workers.⁵ Ingestion is the most common route of poisoning exposure accounting for 70.0% cases, with the dermal, ophthalmic and inhalation routes each occurring in about 6.0% cases.⁶

Accidental poisoning is the twelfth leading cause of admission in the pediatric wards in India and accounts for about 1.0% of the hospitalized patients.⁷

Decrease in cases of pediatric poisoning related to drugs and pharmaceuticals is due to introduction of child proof packs and bottles, measures which are yet to be implemented in many of the developing countries. Poisoning account for 1-6% of bed occupancy in children hospitals and 3.9% in pediatric intensive care unit in India.⁸⁻¹¹

Poisoning is predominantly accidental particularly in < 5 years but might be increasingly self-inflicted in older children.¹² The cause and type of poisoning vary in different parts of the world, depending on the accessibility of poison to children, which depends upon factors such as demography, socio-economic status, education, local beliefs and customs.¹³

METHODS

This retrospective hospital record-based study was carried out over a period of one year from January 2017 to December 2017 in patients who were admitted in pediatric wards and pediatric intensive care unit (PICU) of SMGS Hospital Jammu with history of ingestion of poison or intoxication or envenomation.

All pediatric patients aged up to 18 years, with acute poisoning of any source, who were hospitalized were included. Various factors were studied:

Their histories, baseline characteristics like age, sex, address, rural/urban, date of admission/discharge, socioeconomic status, nature of poisoning (unintentional/intentional), mode/route of poisoning, type and amount of poison ingested, signs and symptoms, management given and outcome in terms of morbidity and mortality. Agents were classified according to the intended use of the product namely:

- Drugs: pharmaceuticals, traditional medicines
- Household cleaning products: soaps, washing powders, polishes, cleaning agents (carpet, window, tile, floor, drain etc.) handyman and industrial

products: fuels (excluding paraffin), paints, glues, dyes, wood products, batteries etc.

- Paraffin: kerosene
- Cosmetics: hair and nail products, make-up, deodorants, lotions
- Environmental toxins: snakes, spiders, scorpions, bees, wasps
- Antiseptics: general, topical (skin and wound)
- Pesticides: rodenticides, insecticides, fungicides, moth repellents, herbicides, fumigants.

Data was analyzed using SPSS 12.0 software. Appropriate tests of significance were applied to find out the significance of the results.

RESULTS

The total number of cases admitted in Pediatric wards/PICU of SMGS Hospital Jammu during study period were 22716, out of which 227 were of poisoning/bite cases which accounts for an incidence of 0.99%. Organophosphorus poisoning (OP) outnumbered other poisonings and Snake bite outnumbered in bites and stings.

Table 1: Socio-demographic profile of acute poisoning.

Variables	Number of cases	Percentage
Gender		
Male	124	54.63
Female	103	45.37
Age (in years)		
1-5	73	32.16
6-12	39	17.18
13-18	115	50.66
Socioeconomic status		
Class 1	3	1.32
Class 2	27	11.90
Class 3	64	28.19
Class 4 and 5	133	58.59
Demography		
Urban	75	33
Rural	152	67
Educational status of parents		
Illiterate	90	39.65
Primary and middle school	87	38.33
Higher secondary school	41	18.06
College and above	9	3.96
Type of family		
Nuclear family	163	71.81
Joint family	64	28.19

Alcohol problem occurred in 9 (24.32%) cases. Maximum number of cases were in the age group of 13-18 years (50.66%), followed by the age group of 1-5 years (32.16%). Male patients outnumbered the female patients with incidence of male to female ratio 1.2:1.

Most of the cases were from the nearby villages. Ratio between rural and urban incidence of poisoning was 2.02.

Highest incidence of poisoning was observed in children of parents with lower educational status 90 (39.65%). Cases of poisonings were more in the nuclear family 163 (71.81%) than the joint families 64 (28.19%).

Accidental poisoning 203 (89.43%) outnumbered the suicidal poisoning 24 (10.57%). Maximum cases were observed in the time interval of 12 pm to 6 pm 113 cases (49.78%). Poor scholastic performance, parental discordance, and fight with friends or sibling were the common reason cited for suicidal intent.

Table-2: Agents causing poisoning in children.

Toxic agent	Type of poison	Number of cases	Percentage
Pesticides and household products (n = 89)	Organophosphorus	51	57.30
	Kerosene	11	12.36
	Rat poison	10	11.23
	Anti-mosquito liquid	6	6.75
	Toilet cleanser	6	6.75
	Chalk	2	2.25
	Nail paint remover	1	1.12
	Wood primer	1	1.12
Bites (n = 52)	Snake	29	55.77
	Insect	17	32.69
	Scorpion	6	11.54
Drugs (n = 16)	Anti-epileptics	5	31.25
	Thyroxine	3	18.75
	Anti-psychotic	3	18.75
	Paracetamol syrup	2	12.50
	Cough syrup	2	12.50
Chemical (n = 18)	Iron syrup	1	6.25
	Phenol	14	77.78
	Corrosive acids	2	11.11
Food (n = 15)	<i>Laxman rekha</i> (Anti-cockroach Chalk)	2	11.11
	Home food	13	86.67
Others (n = 37)	Mushroom	2	13.33
	Unknown	23	62.16
	Alcohol	9	24.33
	Petrol/diesel	5	13.51

Almost all poisoning events in pre-adolescent children (<12 years of age) were accidental whereas majority of such events among adolescents (13-18 years age group) were suicidal. 96(42.29%) reached within 2 hours whereas 24 (10.57%) reached after 6 hours to hospital (Table 3).

Duration of hospital stay increased as delay in the time interval of admission to the hospital from the time of consumption of poison. Majority 157 (69.16%) cases

have received treatment from periphery situated hospitals and then referred to our hospital.

Most cases were asymptomatic, but some children developed gastrointestinal symptoms (e.g., abdominal pain, vomiting, and diarrhea), which were most common regardless of poisoning type. Vomiting 105(46.25%) was the predominant clinical feature.

However, it was notable that neurological symptoms (e.g., dizziness, drowsiness, seizure, and sedation) were more common with drug poisoning.

Although no treatment 77 (33.92%) was given in most cases, 67 (29.52) were treated by gastric lavage and 28 (12.33%) were given a specific antidote (e.g., atropine in cases of organophosphate poisoning, N-acetylcysteine in cases of acetaminophen toxicity, and anti-venom/Prazosin in cases of snake/scorpion bites respectively).

Table 3: Characteristics of poisoning in children.

Variables	Number of cases	Percentage
Mode of poisoning		
Accidental	203	89.43
Suicidal	24	10.57
Approximate time of poisoning (hours)		
6 am-12 pm	15	6.61
12 pm-6 pm	113	49.78
6 pm-12 am	99	43.61
First aid		
Received	157	69.16
Not received	70	30.84
Time to admission after poisoning		
0-2 hours	96	42.29
2-4 hours	88	38.77
4-6 hours	19	8.37
> 6 hours	24	10.57
Duration of hospital stay (days)		
1-2	175	77.10
3-7	44	19.38
>7	8	3.52

Systemic treatment was also required, but mainly involved intravenous fluids.

Antibiotics were prescribed when supportive treatment proved insufficient and secondary bacterial infection was suspected.

The route of poisoning was ingestion in 173 (76.21%) cases, bites 53 (23.35%) cases and inhalation in 1 (0.44%) case. The substance inhaled was insecticide spray. Of the total 227 cases 39 were admitted in Pediatric ICU care, 17 (43.59%) had aspiration pneumonia, 7 (17.95%) had respiratory failure, 6 (15.38%) had aspiration pneumonia with respiratory

failure, 4 (10.26%) had shock, 3 (7.69%) had aspiration pneumonia with respiratory failure with shock and 2

(5.13%) with disseminated intravascular coagulation (DIC)/Renal failure.

Table 4: Clinical Profile of poisoning.

Symptoms	Number (n=227)	Percentage	Signs	Number (n = 227)	Percentage
Vomiting	105	46.25	Odour of poison	103	45.38
Nausea	23	10.13	Abnormal lung findings	27	11.89
Pain abdomen	21	9.25	Tachycardia	26	11.45
Breathlessness	20	8.82	Cool Extremities	23	10.13
Sweating	15	6.62	Hypotension	22	9.69
Drowsiness	10	4.40	Fang Marks and bite site	7	3.09
Excessive salivation	8	3.53	Swelling	7	3.09
Diarrhea	7	3.08	Local reaction at bite sites	4	1.76
Pain and swelling at bite sites	7	3.08			
Altered sensorium	3	1.32			
Cough	6	2.64	Excessive salivation	3	1.32
Bleeding from the bite site	5	2.20	Meiosis	2	0.88

Table 5: Poisoning management (N = 735).

Treatment received	Number (n=227)	Percentage
Observation	77	33.92
Gut decontamination	67	29.52
Symptomatic management	55	24.23
Antidote	28	12.33

Table 6: Distribution of the poisoning cases according to the route of administration.

Route of administration	Number (n=227)	Percentage
Oral	173	76.21
Bites	53	23.35
Inhalation	1	0.44

Table 7: Complications associated with poisoning.

Complications	Number (n=39)	Percentage
Aspiration pneumonia	17	43.59
Respiratory failure	7	17.95
Aspiration pneumonia + respiratory failure	6	15.38
Shock	4	10.26
Aspiration pneumonia + respiratory failure + shock	3	7.69
DIC/renal failure	2	5.13

Overall survival was 210 (92.51%). Among remaining cases, 2 (0.88%) cases died in hospital and 15 (6.61%)

cases left against medical advice. The final outcome has been depicted in Table 8.

Table 8: Outcome.

Outcome	Number (n = 227)	Percentage %
Discharge	210	92.51
LAMA	15	6.61
Expiry	2	0.88

The 2 patients who died were of snake bite. They were brought late to the hospital had neurotoxic envenomation, respiratory failure with DIC and renal failure.

DISCUSSION

Childhood poisoning is a significant cause of morbidity and mortality in pediatric patients of our country. The incidence of childhood poisoning in Indian studies varies between 0.3% to 7.6%.^{14,15} It is very likely that this reporting is an underestimate of the actual magnitude of this problem as many cases go unreported.¹⁶ It is a common cause of unnatural death in children. 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. Majority of the suicidal poisoning was after consumption of insecticides most commonly Organophosphorus (OP) compounds especially in our set up. The incidence of poisoning in present study was 0.99% which was comparable to other studies. Incidence of childhood poisoning was more (50.66%) in the age group of 13-18 years. Males outnumbered females with a ratio of 1.2:1 in present study quite similar to other studies.^{10,17,18}

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.^{10,17,18} 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. It is unfortunate to see an increase in suicidal poisoning in adolescents probably due to the stress related to academic performance, bullying in school, failed relationships, conflict with parents, drug abuse, emotional insecurity to associated psychological conditions such as depression, anxiety etc. Accidental poisonings outnumbered the suicidal poisonings in present study 89.43%, which were similar to the other Indian and international studies.^{14,15,19}

Suicide or deliberate self-harm in >15 years of age group accounts for more than 3% of total deaths amounting up to 187,000 events in 2010 in India.²⁰ Deliberate self-harm is not uncommon in adolescents age group and is reported in earlier reports also.²¹⁻²³ In the present study rural cases outnumbered the urban cases, which was inconsistent with other international and Indian studies.^{19,24} 58.59% of cases were from lower socio economic status similar to another study.¹⁵ Possible factors for incidence of poisoning in lower and middle socio economic status were illiteracy, neglect of children, lack of awareness regarding the poisoning agents, lack of health education and nuclear families. It is pertinent to note that less number of cases were noted from the upper socioeconomic class 3 (1.32%). In present study more, number of cases were due to OP poisoning 51 (57.30%) followed by poisoning due to Snake bite 29 (55.77%), Insect bite 17 (32.69%) Phenol 14 (77.78), Kerosene poisoning 11 (12.36%), and Rat poison 10 (11.23%). In one study conducted in Nepal, OP was the most common cause for poisoning-led hospital admission in overall but the least common cause of childhood poisoning.²⁵ OP was responsible for childhood poisoning in only 2.4% and 4.0% children at studies done in Australia and Columbia respectively.^{26,27} In a study done in India, OP poisoning accounted for 10.1% of all childhood poisoning.¹³ Our results disagree with some studies, e.g. in Israel drugs and household cleaning products caused most cases in children aged 2-5 and 14-18 years.²⁸ Similarly, in the Greater Athens area, cigarettes were mostly implicated among infants, whereas medicinal products dominated all other childhood age groups.²⁹

Children may be inadvertently exposed to OP compounds which are available in different forms and used as agricultural and household insecticides and in the treatment of animal ectoparasite.²⁶ In western countries, such compounds are available in child resistant packaging.³⁰ These compounds are not subjected to child resistant packaging in our set up. Due to low educational

status of parents, these compounds are usually not kept away from reach of children. Therefore, OP compounds have been the most common agents of childhood poisoning in our set up. Kerosene ingestion is also common in our place lower down to OP poisoning as in other parts of India because it continues to be used as a domestic fuel.^{15,31,32} Kerosene poisoning was confined to accidental ingestion by toddlers who are attracted to it by its color and probably by the fact that many households store it in containers similar to those used for water. Ingestion of pieces of mosquito coils accounted for 6.75% of poisoning. Fortunately, these contain low concentrations of pyrethrins or synthetic pyrethroids and their toxicity is low because of poor absorption via the gastrointestinal tract.³³ No treatment was considered necessary. Anticonvulsants and psychiatric drugs are usually prescribed on a fortnightly or monthly basis so that they are available in bulk in the house. Furthermore, children see adults taking these drugs on a regular basis and tend to imitate them. Thus, it is not surprising that these drugs were so frequently ingested by children. It is not certain that colouring and sugar coating play a decisive part in accidental poisoning. However, it is unwise to add attractions to tablets known to be harmful. For instance, a toddler had ingested 10 paracetamol tablets of the lozenge type. A sweet taste may be more dangerous than colour.³⁴ Scherz, in an American study, reduced the number of poisoning episodes in a local community from 149 to 17 by the use of child resistant containers³⁵ However, safer packaging is not a substitute for parental vigilance, child guidance or safe storage principles. It offers an additional measure of safety at little or no additional expenditure of thought or effort by the parent.³⁵

Dutta AK in their study on childhood poisoning have reported that various regions in the country showed variation in types of poisoning which could be attributed to different geographical and socio-economic background.¹⁶ Children over 5 years are at risk of snake bite because they are involved more in outdoor games. Most cases of snake bite occurring in rainy season and the incidence varies in India due to different pattern of rainfall and agricultural activities. Majority of cases were admitted within first 6 hours and this helps in assessment of severity of envenomation and administration of anti-snake venom.¹³ The most common route of poisoning (Table 5) was oral ingestion 173 (76.21%), similar with other studies followed by snake bite 53 (23.35%) and inhalation in 1 (0.44%) case.^{23,36,37} Inhalational poisoning is rarely seen among children and elderly, but cases may occur.³⁸ In present study, children received various forms of treatment in the hospital 67 (29.52%) received gastric lavage, others received atropine/Pralidoxime/Anti Snake venom/ Prazosin as an antidote 28 (12.33%) similar to a study done in Ethiopia.⁵

In present study, 210 (92.51%) of children with poisoning were improved and 15 (6.61%) patient left hospital against medical advice to their home as most of them had

consumed kerosene/ OP in small quantities and were admitted to observed for complications. Our mortality was just 2 (0.88%). Gupta et al reported a 4.3% mortality rate. Lucas recorded a mortality of 0.7% and Ellis et al also reported a low fatality rate (0.74%).^{36,39,40} Singh et al studied pattern of pediatric poisoning in a large north Indian tertiary care centre and observed a significant decline in kerosene poisoning in the decade 1980-89 compared to 1970-79. Their data showed a mortality rate of 12.5%.¹³ Patients who were brought late to the hospital and need for mechanical ventilation was significantly associated with fatal outcome.

Laws and regulations

A comprehensive preventive strategy must include laws supported by enforcement. In 1970, the United States introduced child-resistant packaging in its Poisons Prevention Packaging Act, which proved quite effective and is one of the best-documented successes in preventing the unintentional poisoning of children.

Limitations of the study: The retrospective nature of the study is a limitation. This may be responsible for non-availability of data on some of the aspects. Furthermore, this is a single centre study, and it is therefore difficult to generalize the results and to calculate the rate of poisoning in the entire Indian population. Despite these limitations, this article provides valuable information on accidental childhood poisoning in a developing country. Furthermore, it suggests some approaches to prevent these hazards.

CONCLUSION

In conclusion, authors would like to suggest some measures which may help to reduce the incidence as well as the morbidity and mortality of childhood poisoning in India. Keep agrochemicals under lock and key. Advice should cover cupboard/cabinet lock use and provision of free or low-cost locks for low-income families. Keep kerosene oil containers tightly stoppered and out of reach of children. Do not store kerosene oil in water bottles/soft drink bottles and publicize the dangers of inducing emesis following kerosene oil ingestion. Educate people regarding proper disposal of unused medicine. Advise parents not to ingest medicine in front of children as they are great imitators. Label all medicine and fix red warning labels on bottles containing preparations for local use. Educate school children in all aspects of childhood poisoning. Advise drug manufacturers to desist from making drugs more attractive to children. Keep toddlers under strict supervision as accidental poisoning chiefly occurs in this age group. Keep drugs prescribed on a fortnightly or monthly basis, such as psychiatric drugs and anticonvulsants in child-resistant containers.

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