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Original Research Article

Study of clinical profile and outcome of children presented with poisoning in tertiary care hospital

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ABSTRACT

Background: Poisoning is a common paediatric emergency. Worldwide estimate suggests that the rate of poisoning in under 20 years is 1.8 per one lakh population and for India it ranges between 0.6 to 11.6%.
Methods: The study was conducted at B. J. Medical College Ahmedabad and Civil Hospital, Ahmedabad. A prospective analytical study consisting of total 110 patients, admitted in the intensive care unit during the period from June 2018 to November 2018 with inclusion criterion of children <12 years of age, presented with history of consumption of poisonous substances/insect bite irrespective of signs and symptoms excluding cases of food poisoning and idiosyncratic drug reactions. Detailed proforma was filled after taking necessary consent from the parents. Routine investigations and gastric samples for forensic analysis were sent in all irrespective of type or route of poisoning. Specific investigations done wherever required. Analysis of outcomes done using chi square.
Results: The most common age group was 3-6 years with male to female ratio of 1.5:1. 99.1% poisoning were accidental with hydrocarbon poisoning being the most common of all (27.2%), followed by household substance poisoning in 20.9%. Snakebite was the most common insect bite (10.9%). The average duration of stay was 3.9 days, 8.1% children died with maximum mortality happened in children presented after 6 hours of intoxication.
Conclusions: Management of poisoning requires immediate advice and first aid, followed by a directed treatment. Decontamination, enhanced elimination, antidotes, and supportive care are commonly used to manage poisoning cases.

Keywords: Antidote, Hydrocarbon, Intoxication, Insecticide

INTRODUCTION

Poisoning an emergency is quite prevalent in paediatric population. It can occur when poisonous substances are ingested, inhaled or absorbed through the skin contact in quantity that is sufficient to harm the body. Majority of childhood poisonings are accidental, occur at home environment and hence preventable.

Younger children are more susceptible to poisoning because of their relative increase in surface area and less developed physiology.[2] Inhalational route of poisoning is also vulnerable due to increased respiratory rate and minute ventilation that delivers a higher dose in a shorter time for many airborne toxins.[3]

Accidental poisoning is common in toddlers and preschool children because they have an exploratory tendency for the substance by taking it into the mouth.[4] Suicidal poisoning in the adolescents is due to poor adjustment with family members and less tolerance in stress.

The management of poisoning should be prompt; hence it is always useful to have a beforehand knowledge of common poisons, their progress and effects in the body.

Management includes first aid followed by decontamination, enhanced elimination, antidotes and supportive care.

The present study is intended to find out the epidemiological factors, clinical profiles and the outcome of various poisoning in children admitted at intensive care unit at the tertiary care centre.

METHODS

This is a prospective analytical study of 110 patients enrolled in the span of 2.5 years from June 18 to Nov 2020, at Civil Hospital, B. J. Medical College, Ahmedabad, Gujarat, India.

All children less than 12 years of age admitted in intensive care unit with history of poisoning/ intoxication or signs and symptoms of suspected poisoning were the subject of interest.

Idiosyncratic reactions to drugs and food poisoning were excluded from the study.

Children admitted were studied regarding age, sex, social demographic data. Informed consent was obtained from parents and care givers of the children before including them in the study. Details of the poison was noted as name, type of agent, route of exposure, time of arrival to hospital after poison exposure and manner of poisoning. Clinical examination was done, vitals of the patients noted, systemic examination done. Necessary investigations were done according to type of poisoning. Routine blood investigations like blood count, renal and liver function test were done in majority of patients. Radiological investigation like x-rays and barium study done when required. Some specific investigations like coagulation profile were done in cases of snake poisoning and suspected DIC, cholinesterase enzyme level was done in suspected organophosphorus poisoning, cardiac markers were done in scorpion bites for suspected myocarditis. Treatment was given according to the standard protocol. Finally, outcome was noted.

Data for analysis were collected from the detailed proforma filled at the time of admission, from the ICU register and central medical record.

The data were entered to generate master chart in MS excel. The data were analysed using statistical methods and test like chi square test. The results were compared with the previous studies and discussed.

Ethics

Ethical permission was obtained from the institutional ethical committee prior to conducting study. It includes consent form, detailed proforma and brief about the aims and methods of study. The confidentiality of all patients was maintained.

RESULTS

Present study included 110 cases of poisoning in children which accounted for 0.48% of total paediatric patients.

Max no. of poisoning cases observed in the age group of 3-6 years (41.8%), followed by age <3 years (39%).

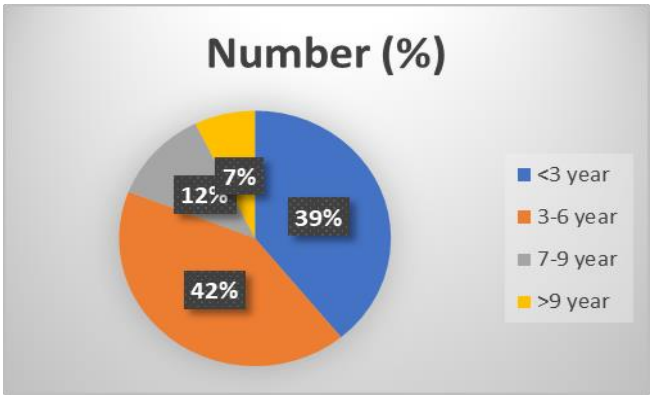

Figure 1: Age distribution.

The male to female ratio was 1.5:1. Poisoning cases were more common amongst lower class (89.8%) compared to middle and upper class.

Table 1: Socioeconomic division, (n=110).

Socioeconomic status	N	Percentage (%)
Upper	0	0
Upper middle	11	10
Lower middle	32	29
Upper lower	39	35.4
Lower	28	25.4

In 98.1% children, the mode of poisoning was accidental. One baby was victim of homicidal attempt following ingesting mosquito repellent liquid (given by his mother).

Types and agents of poisoning

The 77.2% children brought to the health facility within 6 hours of incidence, the rest (22.8%) presented late.

Only 37.2% patients received various pre-referral treatment (CPR, fluid administration, induced vomiting and antidote).

Hydrocarbon poisoning was the most common poisoning (27.2%). Amongst kerosene ingestion was most frequent (15.4%).

Household poisoning was next in order observed in 20.9%. Bleaching powder was the most common household substance consumed (8.1%).

Animal bite observed in 14.5% cases, of which snake bite comprises 10.9% and scorpion bite 3.6% respectively.

Table 2: Types and agents of poisoning, (n=110).

Types	Subtypes	N	Percentages (%)	Total (%)
Hydrocarbon	Kerosene	17	15.4	30 (27.2)
	Turpentine	10	9	
	Diesel	3	2.7	
Corrosive	Acid	5	4.5	6 (5.4)
	Caustic soda	1	0.9	
Insecticide	Organophosphorus	4	3.6	12 (10.9)
	Organochloride	3	2.7	
	Mosquito repellent (Pryethroid)	5	4.5	
Animal	Snake	12	10.9	16 (14.5)
	Scorpion	4	3.6	
Irritants	Cracker fluid	1	0.9	1 (0.9)
Drugs	Tab levothyroxine	2	1.8	14 (12.7)
	Tab isoniazid	1	0.9	
	Tab valproate	1	0.9	
	Clonidine	1	0.9	
	Risperidone	2	1.8	
	Tab lorazepam	1	0.9	
	Jamalgota (Croton tiglium)	1	0.9	
	Syrup cephalexin	1	0.9	
	Unknown	4	3.6	
Plant	Ratanjyot (Jatropha seeds)	5	4.5	5 (4.5)
Agricultural	Urea fertiliser	1	0.9	1 (0.9)
Unknown	Unknown substance	2	1.8	2 (1.8)
Household	Bleaching powder/solution	9	8.1	23 (20.9)
	Perfume	1	0.9	
	Naphthalene balls	3	2.7	
	Silica gel	1	0.9	
	Peppermint oil	1	0.9	
	Gum	1	0.9	
	Utensil cleaning agent	1	0.9	
	Washing powder	1	0.9	
	Dettol antiseptic liquid	1	0.9	
	Rat killer (bromadiolone)	2	1.8	
	Hand sanitizer	2	1.8	

Accidental ingestion of various drugs was seen in 12.7%. Insecticide poisoning (10.9%), corrosive poisoning (5.4%) and Jatropha poisoning (4.5%) were other common poisonings.

Oral ingestion was the most common route (83.6%), followed by dermal route due to animal bite in 14.6% and by inhalation route in 5.4%.

The 21.8% patients were asymptomatic. Vomiting (61.8%) was the most common symptom followed by altered sensorium (26.3%), abdominal pain (20%) and breathing difficulty (19.1%). Mucocutaneous lesions like erosion due to corrosive ingestion and cellulitis/ wet gangrene due to animal bite was seen in 14.5% patients.

Abnormal hemogram (52.7%), altered LFT (7.2%), altered RFT (5.4%) and altered blood gas analysis (14.5%) were detected on routine investigations. Low cholinesterase level was detected in 3.6%.

Treatment modalities

Gastrojejunostomy was performed later on in two patients of corrosive poisoning for stricture.

Table 3: Treatment modalities, (n=110).

Treatment modalities	N	Percentage (%)
Antibiotics	51	46.3
Anticonvulsants	7	6.3
Specific antidote	13	11.8
O2 Support	33	30
Invasive ventilation	19	17.2
Non- invasive	14	12.7
Gastric lavage	22	20
Blood component therapy	10	9.1
Inotropes	11	10
No specific treatment kept under observation	24	21.8

Outcome in specific type of poisoning

The 8.1% patients who died of which 37.5% were >9 years of age (p=0.01). Animal bite and insecticidal poisoning patient had maximum mortality (25% each). Lowest mortality (2.3%) was seen in children who presented within six hours of the poisoning as compared to those who presented beyond the six hours (30.7%).

Table 4: Specific treatment in different types of poisoning.

Type of poisoning	Specific treatment	Total patients	Number of patients given the treatment
Snake bite	Anti-snake venom	12	10
Snake bite with neurological manifestation	Neostigmine and atropine	6	6
Scorpion bite	Tab prazosin	4	4
Organophosphorus poisoning	Atropine and pralidoxime	4	4
Tab isoniazid	Tab Pyridoxine	1	1
Corrosive ingestion	Gastrojejunostomy	5	2

Table 5: Outcome in different types of poisoning.

Type of poisoning	Outcome					
	Discharge, (n=98)		Expiry, (n=9)		Lama, (n=3)	
	N	%	N	%	N	%
Hydrocarbon, (n=30)	27	90	1	3.3	2	6.7
Corrosive, (n=6)	6	100	-	-	-	-
Insecticide, (n=12)	9	75	3	25	-	-
Animal, (n=16)	11	68.7	4	25	1	16.7
Irritants, (n=1)	1	100	-	-	-	-
Drugs, (n=14)	13	93	1	7	-	-
Plant, (n=5)	5	100	-	-	-	-
Agricultural, (n=1)	1	100	-	-	-	-
Household, (n=23)	23	100	-	-	-	-
Unknown, (n=2)	2	100	-	-	-	-

DISCUSSION

The relatively low proportion of poisoning cases (0.48%) in the present study could be due to the multiple referrals made to the tertiary care centre from the entire state and also from the nearby states, resulting in more annual admissions compared to other health facility. When compared to other studies proportion of poisoning cases was variable due to many factors like difference in sample size, duration of study period and total number of admissions, location of hospital where study period was done. The proportion was similar in Khushbu et al.[5] The incidence of poisoning ranges from 0.33% to 7.6%.[6,7]

The children in the age group of 3-6 years were the most common age group observed to be affected. The reason might be their curiosity to explore the surroundings and inability to differentiate between safe and danger things which lead them to put everything in the mouth making themselves prone to poisoning. Also, relatively large surface area compared to adult make them prone for rapid absorption of poisonous substance through muco-cutaneous route. In different studies also higher number of cases were seen in children less than 6 years.[8,9] Age group less than 6 years makes 80% of all poisoning cases.[10,11]

In the present study male to female ratio was 1.5:1. Male preponderance was also observed in other comparison studies.[12-14]

Majority of children belonged to low socioeconomic status (60.8%). Lack of awareness and education of the parents, overcrowding, poor storage facilities and lack of supervision due to work load could be the reasons for preponderance of this class. Comparative study with other authors also reported similar observation with majority children in lower class.[15,16,17] Also all these studies were done in government hospitals, which are more preferred by middle and lower socioeconomic class due to non- affordability for treatment can be reasons for lower class preponderance.

The children become symptomatic early due to relatively faster absorption and slow elimination of toxic substance from the body by different organs.

Accidental poisoning occurred in 98.1% cases. Similar observation was noted in the comparative studies done in other countries.[18,19,20] The young children lack the concise to differentiate between harmful and non-harmful might be the reason along with their spontaneity. No case of suicidal poisoning was seen in the present study while

some studies show intentional poisoning in the adolescent age group.[21,22]

In present study, kerosene poisoning, was most common (15.4%). Kerosene storage is common in many Indian households, especially in low socioeconomic group. It is routinely used as domestic fuel and for lighting purpose, commonly stored in drinking water bottles.

Incidence of animal bites, insecticide poisoning and poisoning due to plant and seeds were seen in study done at institutes situated in rural and hilly areas seen in study by Sharma et al at Indira Gandhi medical college, Shimla.

Whereas cases of hydrocarbons, corrosive and drug ingestion were more common poisoning observed in studies done at institutes situated in urban areas as seen in S Balamurugan et al at Chennai and Khushbu et al at Ahmedabad. Exposure to toxic household products as the most common poisoning was seen in international studies also, including kerosene as the most common agent in some studies.[23-26]

In other Indian studies, pesticides were found to be the most common agents.[17,27] Unregulated sale of pesticides and easy accessibility to children in rural household could be the reason to this.

Oral route was the commonest route of poisoning observed in infants and young children as they develop mouthing of objects and being more curious and innocent with an increased spontaneous activity. The 83.6% poisonings were contributed to ingestion of toxic substances. Inhalational route was the least common. Similar observation noted in the Indian as well as in the international studies, where pharmacologic as well as non-pharmacologic substances, accidentally/ intentionally were consumed orally leading to the emergency.[21,28-30]

Clinical feature/ presentation that was common in all studies was vomiting, followed by altered sensorium in our study, similar findings were present in J Sharma et al. Breathing difficulty was the next common in S Balamurugan et al while local manifestation (skin/mucous changes) were common in Khushbu et al. In one of the study done in Taiwan, neurological symptoms were the most common because the neurological pharmacologic agents were also the common agents consumed.[21] This also draws attention to the fact that the common presentation can be diverse in different studies, as the agents that caused poisoning frequently in the respective studies vary. In another Indian study, cough followed by vomiting (21%) was the most common presenting symptom and cardiorespiratory abnormalities were most common (49%) finding on clinical examination.[31] Mucosal injury, abdominal pain and other gastrointestinal symptoms were common in other similar studies.[2,32,] Altered sensorium, respiratory distress and seizures were common presentation in study by Kohli et al where the common agents were kerosene and pesticides.[33] Asymptomatic patients might have consumed either milder toxins or toxins in smaller amounts.[32]

The outcome depends on various factors like lethal dose, time of presentation, multi-system involvement, co-morbid conditions and timely intervention.

In present study, animal bites had highest case fatality 3.6%, followed by insecticide poisoning 2.7%.

Hydrocarbon and drug poisoning had similar fatality of 0.9%. In comparison studies, mortality following insecticide ranged from 1.82% to 5.5%. Similarly, death rate in animal bite varies from 0.6% to 3.6%.[32] Hydrocarbon poisoning showed death rate between 0.6 to 2.73%.

Table 6: Type of poisoning.

Type of poisoning	Present study	Balamurugan et al (%)	Khushbu et al (%)	Sharma et al (%)
Hydrocarbon	27.2	37.8	30	4.9
Animal bites/ sting	14.5	-	20	12.7
Insecticides	10.9	21.7	10	38.2
Plants	4	11.2	4.6	21.8
Corrosives	5.4	5.6	5.4	3
Drugs	12.7	7	10.9	11
Miscellaneous	24.5	-	19.1	4.2

Table 7: Comparison of case fatality with different studies.

Type of poisoning	Present study (n=110) (%)	Balamurugan et al (n=110) (%)	Khushbu et al (n=143) (%)	Sharma et al (n=165) (%)
Hydrocarbon	0.9	2.73	0.6	-
Animal	3.6	2.73	-	0.6
Insecticides	2.7	1.82	3.4	5.5
Plants	-	-	-	-
Corrosives	-	1.82	-	-
Drugs	0.9	-	-	-

Limitations

Those intensive care unit admissions where death occurred within a short duration after admission and couldn't be thoroughly investigated or where patients left against medical advice, may have contributed to lesser proportion of cases.

There is a fine line between those cases considered as idiosyncratic reactions or drug overdose (poisoning), as no measurable parameter (like drug concentration in blood) were used.

In cases of history of insect / animal bite, photograph of the animal or killed animal was brought along with the patient in most cases, clinical correlation was made and diagnosis of insect bite/animal bite was made. In few cases only a history of animal/insect bite was available, animal/insect remained unidentified. Such cases were also included. As death due to animal bite was the most common cause of mortality in this study, some cases couldn't be identified as definite cases of animal bite.

Cases with history of poisoning but remained asymptomatic during course of stay were also included.

CONCLUSION

Poisoning should also be suspected in an unexplained emergency. There lies a strong need for prompt diagnosis, prerequisite knowledge of the suspected poisonous agent, confirmation of the agent at the earliest, and early intervention so that mortality can be reduced. Well established facilities for carrying out required investigations in case of specific poisoning, availability of antidote, trained intensive unit team and a support team will help to reduce the mortality due to poisoning. Parents should be sensitised regarding the risk of poisoning and how they can rearrange the household to prevent accessibility of toddlers to the poisonous agents.

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