

Profile of acute childhood poisoning at a tertiary care teaching hospital in North India

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ABSTRACT

Objective: The objective of the study was to determine the profile and outcome of children under the age of 12 years admitted with acute poisoning at a tertiary care teaching hospital in Delhi. **Materials and Methods:** We retrospectively reviewed case files of all patients <12 years of age admitted with poisoning at pediatric emergency from January 2016 to December 2016. All cases with definite history of poisoning were included in the study. Exclusion criteria included chronic poisonings such as lead poisoning, food poisoning, foreign body ingestion, and homeopathic drug ingestion. Baseline characteristics of patients, type of poison, signs and symptoms of poisoning, investigations, treatment, and outcome were recorded from the case files and analyzed. **Results:** A total of 91 patients were presented with poisoning during the study period. Almost all cases (n=89, 97.8%) were accidental, only 2.2% (n=2) cases were suicidal, and none was homicidal. The mean age of presentation of these patients was 4.08±3.11 years with males outnumbering females (M: F=1.6:1). Corrosives (n=20, 21.9%), kerosene (n=17, 18.7%), prallethrin (n=11, 12.1%), and drugs (n=7, 7.7%) were the most frequently implicated agents. 11 patients (12.1%) were completely asymptomatic, while 30.7% (n=28) patients developed serious symptoms such as breathing difficulty, altered sensorium, seizures, abnormal speech, hematemesis, nasal bleeding, and hypotonia. Gastric lavage was done in 15 cases, three patients received activated charcoal, and three patients required intubation, and one patient required an emergency tracheostomy. One patient expired and rest all survived. **Conclusion:** The trends of pediatric poisoning noted in our center were different from those observed in other hospital based studies. Corrosives (particularly acids) being the most common agents. Prallethrin, kerosene, and drugs were other common agents.

Key words: Corrosive, Poisoning, Prallethrin

As per Centers for Disease Control, “a poison is any substance, including medications, that is, harmful to your body if too much is eaten, inhaled, injected, or absorbed through the skin” [1]. An unintentional poisoning occurred when a person taking or giving too much of a substance did not mean to cause harm. Poisoning in pediatric patients is a preventable cause of morbidity and mortality.

In 2016, a total of 2,159,032 cases of poisoning were encountered in the USA, out of which more than half of the cases (52.47%) were noted in children <12 years age group [2]. Although there are no authentic data from India, children <12 years surely constitute major bulk of total poisoning cases at any time in a hospital. As per one study from India, poisoning accounts for 0.33%–7.6% of total admissions in pediatric wards at any time in various hospitals in India, with mortality that ranges from 0.6% to 11.6% [3]. A retrospective study of poisoning calls received at the National Poisons Information Centre, All India Institute of Medical Sciences (AIIMS), India, showed that poisoning in children was reported in 33.6% of all calls [4].

The changes in the pattern of poisoning are very dynamic and vary from place to place and change over a period of time depending on

the demography, education, socioeconomic status, legislation, local beliefs, and customs. Understanding about the prevalent pattern and severity of poisoning is crucial for effective management and for developing appropriate strategies for its prevention at the regional and national level. The present study was done at an urban center in Delhi to describe the profile and outcome of patients presenting with acute poisoning in a pediatric emergency.

MATERIALS AND METHODS

This retrospective observational study was conducted by reviewing case files of all pediatric patients from January 2016 to December 2016 admitted with a definite history of poisoning. Permission for conducting the study was taken from the Institutional Ethical Committee. All poisoning cases are registered as medicolegal cases in our hospital, and their records are scrupulously maintained. All patients <12 years of age with a definite history of acute poisoning were included in the study. Exclusion criteria included chronic poisoning such as lead poisoning, food poisoning, foreign body ingestion, and homeopathic drug ingestion.

Details of the included patients were noted in a predesigned pro forma which included details such as age, sex, season, poison type, quantity, manner of poisoning (ingestion, inhalation, and skin contact), interval between exposure and presentation, first-aid at home, clinical features, investigations, therapeutic intervention, and outcome. Collected data were transferred to Microsoft Excel spreadsheet and were analyzed statistically using IBM SPSS statistics.

RESULTS

A total of 91 children (56 males and 35 females) were enrolled and studied, constituting 1.27 % of all admissions (7120 admissions). Mean age of patients was 4.08 ± 3.11 years and the youngest and oldest patients were 10 months and 12 years of age, respectively. Majority of patients were in 1–5 years age group ($n=65$, 71.4%) followed by 6–12 years ($n=23$, 25.2%) and <1 year ($n=3$, 3.2%) age groups. A most common mode of poisoning was by ingestion ($n=82$, 90.1%) followed by skin exposure ($n=9$ cases, 9.9%). Table 1 shows the agents implicated in poisoning in the present study. Corrosives were the most frequently implicated substances ($n=20$, 21.9%) out of which 16 were acids and four were alkali. Commonly ingested acids were hydrochloric acid (used in toilet cleaner and drain cleaner), sulfuric acid (used in battery water), oxalic acid (stain remover), and nitric acid (metal cleaner). Commonly used alkalis were calcium oxide (quicklime), sodium hydrochloride (bleaching powder – 5%), and sodium hydroxide (caustic soda).

Corrosives were closely followed by kerosene ($n=17$, 18.7 %), prallethrin ($n=11$, 12.1 %), and drugs ($n=7$, 7.7 %). Common drugs were antipsychotics, thyroxine, and antiepileptics. Other hydrocarbons (apart from kerosene) were lacquer ($n=4$), turpentine

oil ($n=3$), and diesel ($n=2$). There were 5 cases (5.5%) of rodenticide and 4 cases (4.4 %) of pesticide ingestion. Miscellaneous substances included: 1 case each of soap water, marble, battery, and Datura ingestion. Seven cases were of unknown substances, in which the exact nature of poison could not be ascertained. Envenomation was seen almost equally in males ($n=4$) and females ($n=5$), which included snake bite ($n=5$), scorpion sting ($n=3$), and 1 case of a bite from an unknown insect.

Almost all cases were accidental in nature. Only 2 cases were suicidal: A 12-year-old boy consumed alprazolam tablets after arguments with father and an 11-year-old boy consumed the whole bottle of liquid mosquito repellent due to depression/psychiatric illness. None of our cases was homicidal.

The median time of presentation in a pediatric emergency was 1.5 h (range 0.25–168 h). Although most of our patients were from nearby urban areas (mainly from unauthorized colonies to resettlement areas), few patients were first taken to private hospitals from where they were referred to our center. Hence, the time of presentation was unusually higher in these cases.

About 11 patients (12.1%) were completely asymptomatic. Vomiting was the predominant symptom in 29 (31.8%) patients followed by cough ($n=16$, 17.5%) and pain abdomen in 15 (16.4%) patients. 28 (30.7%) patients developed symptoms related to toxin ingestion. Some of them developed serious symptoms such as breathlessness ($n=7$, 7.6%), altered sensorium ($n=66.5\%$), seizures ($n=22.2\%$), abnormal speech, hypotonia, nasal bleed, hematemesis, lip swelling, and flushing of skin were seen in 1 case each (1.1%). Many patients had overlapping symptoms such as vomiting, cough, and breathlessness.

A chest radiograph was advised for 27 (29.6%) patients, serum electrolytes in 15 (15.9%) cases, and electrocardiogram in 4 cases (3 cases of antipsychotics and 1 case of levothyroxine ingestion). Gastric lavage was done in 15 cases (16.4%). No patient with corrosive ingestion or any other inappropriate indication received gastric lavage. Three patients received activated charcoal (levothyroxine, zolpidem, and amitriptyline).

One patient required emergency tracheostomy (acid ingestion), three patients required intubation and mechanical ventilation (kerosene, snake bite, and foreign body aspiration). Inotropic support was required in four patients (snake bite – 2, foreign body aspiration – 1, and carbamazepine ingestion – 1). The specific antidote was given to seven patients (snake bite – 4, organophosphorus poisoning – 2, and Datura poisoning – 1). Six cases of corrosive ingestion were advised UGI endoscopy after 4 weeks of discharge at the appropriate center (as this facility was not available at our center).

Eleven (12.1%) patients were discharged just after few hours of observation, 45 (49.4%) required supportive symptomatic treatment such as antiemetic, antacids, and intravenous fluids and were subsequently discharged after 24 h of admission. The maximum duration of stay was 11 days for a patient with mosquito repellent ingestion with chemical pneumonitis. Other 2 cases requiring prolonged stay (>7 days) were 1 case each of kerosene ingestion and snake bite. One patient went leaving against medical advice, two patients absconded, and 1 case of

Table 1: Agents implicated in pediatric poisoning (n=91)

Poison	No. of patients (%)	Sex distribution (M/F)
Corrosives	20 (21.9)	14/6
Kerosene	17 (18.7)	11/6
Prallethrin (liquid mosquito repellent)	11 (12.1)	6/5
Drugs [#]	7 (7.7)	4/3
Unknown	7 (7.7)	4/3
Rodenticide/insecticide	5 (5.5)	3/2
Snake bite	5 (5.5)	3/2
Pesticide	4 (4.4)	1/3
Lacquer (thinner)	4 (4.4)	4/0
Scorpion sting	3 (3.3)	0/3
Turpentine oil	3 (3.3)	2/1
Diesel	2 (2.2)	2/0
Unknown insect bite	1 (1.1)	1/0
Marble	1 (1.1)	1/0
Datura	1 (1.1)	0/1

[#]Drugs included were antipsychotics-3, thyroxine-1, antiepileptic-1, ear drop-1, potassium permagnate-1, M/F: Male/Female

acid ingestion requiring emergency tracheostomy expired, and the rest all 87 cases (95.6 %) were successfully discharged.

DISCUSSION

The present study described the pattern of acute poisoning at a tertiary care hospital. Acute poisoning in children is one of the most important preventable causes of morbidity and mortality in our country and worldwide. It constitutes 0.33–7.6% of total admissions in the pediatric ward at various hospitals across India [3]. In the studies conducted in Government General Hospital, Kakinada, South India, and a medical college in Lucknow, North India, the prevalence of childhood poisoning was found to be 2.86 % and 2.1% respectively [5,6]. In our study, the prevalence was 1.3%, which is well within the expected range.

Previous studies from India and abroad have shown that childhood poisoning is more common in males [4,7-10]. We had a similar finding with skewed sex ratio in favor of males (Male:female=1.6:1). In a study conducted in Mangalore, South India, male predominance was evident in the <5 years age group, while a female predominance in the age group between 10 and 15 years [11]. Male predominance could be due to more aggressive nature, relatively more freedom and possibly due to referral bias toward boys for hospitalization in comparison to girls. Majority of our patients were in 1–5 year age group consistent with other studies [2-4,9,12]. Mean age of our patients was 4.08±3.11 (standard deviation [SD]) years. The mean age of the study sample was 6.8 years in Mangalore study [11] while it was 3.12±2.04 years (SD) in AIIMS study [9]. Ongoing neurological development leading to curious, exploratory nature, close position to floor, and mouthing tendency could be the reason for frequent involvement of children in this age group. Most of the cases of poisoning in children <12 years age have turned out to be accidental in previous studies [2,4,9,10,12,13]. This fact was reaffirmed in our study in which only 2 cases were suicidal and none was homicidal.

Although most of our patients were from urban areas in nearby vicinity, some of them preferred to visit private hospitals first which resulted in an unusual delay in presentation in our emergency. The average time interval between poisoning and presentation to emergency was 1.5 h in the present study which is comparable to other studies from urban centers [9].

Corrosives were the most common agents implicated in our study. This finding is different from most previous studies, which found Kerosene to be the most common agent [3,9,12,6]. Although similar trend was noticed by Ghosh *et al.* [12] in which they found concentrated hydrochloric acid to be the second most common agent implicated in childhood poisoning. Medicines were found to be the most common agent in Safdarjung study [14], agrochemicals and hydrocarbons in Mangalore study [11]. Other common poisons found in different studies were – organochlorines, mosquito repellents, turpentine oil, corrosives, camphor, naphthalene, and heavy metals [5,8]. One study from Northern India reported kerosene to be the most commonly ingested poison in <12 year age group while organophosphorus in >12 year age group [15].

In our knowledge, none of the previous studies have found corrosives at the top of the list. Easy over the counter availability of acids, lack of legislation in manufacturing and selling, ignorance about safe storage and its hazardous implications and illiteracy could be the attributing factors. Among corrosives, acids were the most commonly involved agents. Acids are used for various household purposes such as toilet cleaner, drain cleaner, rust remover, stain remover, and paint remover [16]. Acids were followed by alkalis (quicklime and bleaching powder) and caustic soda. This finding is consistent with previous studies related to corrosive ingestion in which acids were found to be most commonly ingested corrosives in developing countries whereas alkalis were most commonly implicated in developed countries [17,18].

Kerosene was the second most common agent in our study as it is still being used as cooking fuel by many low-income families and is frequently stored indiscriminately in empty soft drink bottles within easy reach of children. No seasonal variation was found in our study as previously observed in some studies [19,20].

Toxicity due to prallethrin, a synthetic analog related to pyrethroids used in liquid mosquito repellent was the third most common agent in our study. However, none of these cases was fatal, and most of them required only observation for a few hours. Its widespread use in every household with economic prosperity and easy accessibility to children (close to floor switchboards) might be the reason.

Drug toxicity is fairly common in both developing and developed countries [2,3,9]. In our country, it is mainly due to the lack of child-proof containers and packaging compounded by careless storage by adults. In a previous study from an urban center in India by Roy *et al.* Delhi, drugs were found to be the most common agent in pediatric poisoning [14]. Most common medicines implicated in poisoning were – thyroxine, phenytoin, benzodiazepines, paracetamol, cyproheptadine, zandu balm, telmisartan, and carbamazepine [5]. Vast variety of drugs was reported in AIIMS study [9]. Antipsychotics were the most common drug identified at our center.

Approximately two-thirds of our patients were either asymptomatic or had mild non-specific symptoms such as vomiting, cough, and pain. Rest one-third developed serious symptoms and signs, while one of the patients expired in our study. Other studies from India have also shown similar mortality in the range of 0.64–11.6% [3,12]. Envenomation was the major cause of death in a previous study from Delhi [12]; however, in our study, the only death that occurred was because of acid ingestion. Although most of the pediatric poisoning is accidental with very small amount ingested requiring only conservative care, corrosive ingestion can be relatively more fatal with several short- and long-term complications depending on the amount and concentration of corrosive ingested [17]. Prevention of poisoning requires a two-pronged approach: First, community-based education enhancing people's awareness regarding safe storage and using child-proof containers. The second approach is by strict

legislation and its enforcement such as mandatory childproof packaging, restricting the concentration of various household corrosives (at manufacturer level) which may reduce the severity of unintentional ingestion [21].

CONCLUSION

The profile of pediatric poisoning noted at our center differed from previous studies in terms of agents commonly involved; corrosives being the most common and kerosene, prallethrin, and drugs being the other common agents.

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