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Research Article

EPIDEMIOLOGICAL STATUS AND CLINICAL PROFILE OF ACCIDENTAL CHILDHOOD POISONING CASES ADMITTED IN A TERTIARY CARE HOSPITAL OF EASTERN INDIA WITH SPECIAL REFERENCE TO AWARENESS OF PARENTS

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ABSTRACT

Objectives: Accidental poisoning is one of the major medical emergencies in paediatric population, specially among under five children. However, there is still lack of clinicodemographic data mostly due to under-reporting of events. In this study, we analyzed the clinicoepidemiological profile as well as awareness of parents in respect to childhood poisoning cases admitted in our institute.

Methods: Children aged up to 12 years admitted in our hospital with accidental poisoning between January 2020 to June 2021 were included in this study. We collected their demographic, epidemiological and clinical data, analyzed, and compared these with data from other parts of India as well as world.

Results: About 87% of children were under 5 years of age with a male dominance (male: female was 1.3:1). Majority of children (65%) were from lower socioeconomic class and 66% of parents had no knowledge or ignorant about the poisonous substance. Hydrocarbons like-kerosene oil (44.5%) followed by drugs were the most common substance related to poisoning. Cough (23.7%) followed by vomiting (21%) was the most common presenting symptom and cardiorespiratory abnormalities were most common (49%) finding on clinical examination. About 5% of children died due to poisoning or its related effects.

Conclusion: It can be said that negligence and ignorance from the side of caregivers play the most important role in such calamities. Community-based childhood poisoning prevention program and simple preventive measures like education to the parents, proper storage of household items, and proper placement of drugs could be helpful in preventing mortality and morbidity in children with poisoning.

Keywords: Childhood poisoning, Epidemiology, Awareness of parents, Eastern India, Tertiary health-care center.

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INTRODUCTION

Accidental poisoning represents one of the most common medical emergencies for pediatric population and the resultant under five morbidity and mortality is a challenging public health problem worldwide [1,2]. The reported incidence of childhood poisoning in India varies from 0.3% to 7.6% [3]. Poisoning accounts for 0.03% of mortality in infant, 0.16% in the 1–4 years of age and 0.37% in 5–14 years of age group as per the statistics published by Government of India [4]. Peak incidence of accidental poisoning is in the 2nd year of life and 85% of accidental poisoning affect children under 5 years of age [5,6]. Children under the age of 5 years are poisoned accidentally mainly due to their innovative and exploratory nature and mouthing tendencies [7,8]. Furthermore, the introduction of a whole range of new and complex chemicals in the form of pesticides, household cleaners, medicines, etc. has widened the spectrum of toxic products to which children may get exposed [9].

Household products, rather than pharmaceuticals, are now implicated in the majority of pediatric poisonings [10]. With increasing urbanization and rapid socioeconomic development in India during the last several decades, change in pediatric poisoning profile is expected and it needs to be explored. The incidence is also higher among children from lower socioeconomic groups due to poor storage facilities of household products and greater accessibility of children to those potentially harmful things. Incidence is also higher in rural population due to use of pesticides in agricultural purpose [11]. Moreover, occupational accidents are grossly underreported in India because the workforce though abundant, is not organized. Although the national policy aims to protect the health of workers and prohibits employment of children below 14 years of age, a major problem is poor enforcement of laws.

This study was aimed at finding out the clinicoepidemiological profile including common agents of poisoning, their clinical presentation, and outcome of treatment for patients admitted in our pediatric ward. This study also looked for the awareness and level of knowledge about accidental childhood poisoning among parents.

MATERIALS AND METHODS

It was a hospital-based, observational, and cross-sectional study among the children admitted in pediatric medicine ward of our institute for accidental poisoning between January 2020 and June 2021.

Inclusion criteria

Children aged between 1 and 12 years with confirmed consumption of hazardous substances within the past 7 days of admission were included in this study.

Exclusion criteria

Cases of poisoning due to insect bite, snake bite and homicidal/suicidal poisoning were excluded from the study.

Study technique

After getting the consent from the child's parents/guardians, we took a detailed history including clinical history (developmental milestones,

type of poison, place of poisoning, circumstances of poisoning, presenting symptoms, clinical findings, time of presentation to hospital, gastric lavage done or not, treatment received before hospital admission) as well as socio-economic history (education of mother, occupation of mother, housing, number of siblings, accessibility of poison, knowledge of poisoning, and nutritional status of child) followed by detailed clinical examination. All information were collected using a pre-tested and pre-designed proforma.

Institutional ethics committee approval was taken before the initiation of the study.

Statistical analysis

Data were analyzed and compared according to appropriate statistical tests using SPSSv.20 software and Microsoft word-excel. For numerical variables data were summarized as mean and standard deviation and as count and percentages for categorical variables. All tests were analyzed with a 95% confidence interval.

RESULTS

Total 101 patients were analyzed in this study. About 87% of children were of under 5 years of age,among them majority (34.6%) were in the age group of 3–4 years. Mean age (±SD) of the study population was found to be 3.295±1.50604 years. Majority of children were male (57.4%), male: female ratio was 1.3:1, and most of them were from rural areas (66.3%) (Table 1).

Socioeconomic parameters

On analysis of socioeconomic parameters of the study population, it was seen that 60% of mothers were homemakers and only 12 (11.8%) were in non-agricultural services including four school teachers, three anganwadi workers, two bankers and two private firm employees.

Nearly one-fifth of the mothers were illiterate and 25% had educational background of secondary school level or above. According to Modified Kuppuswamy scale, most of the study participants were from lower middle class (27%) and upper lower class(38%).

As far as the knowledge of mothers regarding poisoning was concerned, majority of the mothers (66%) were either ignorant or had wrong idea about the poison to which the child was exposed. Only 34% of mothers had some information regarding it (Table 2).

Parameters related to poisoning

Majority of the cases presented with exposure to hydrocarbons (kerosene, turpentine oil and diesel oil) amounting to 44.5%. This was followed by ingestion of drugs (21%) which included pharmaceutical agents like- Paracetamol (5%), sedatives like- Alprazolam (2%) and Clonazepam (1%), iron formulations overdose (2%), antipsychotics like- Olanzepine (1%), Antihistaminics like- Cyproheptadine (4%), cough syrup formulations overdose (4%), Antihypertensive Losartan (1%), and Oral Contraceptive Pills (1%). Among household articles (13%) the most common was sanitizer ingestion (10%) followed naphthalene balls (2%) and toilet cleaner (1%). In insecticide poisons (17%), the majority cases were mosquito repellent oil (9%) followed by Organophosphorus group (5%), Bifenthrin exposure (1%), and Dithocarbamates (2%). Among plant poisons (4%), mothers could not identify the seed in 2% of cases whereas 1% ofcase was due to Dhatura seeds and 1% of case was with Ratti seed (Abrus Precatorius).

In 92% of cases, poisonous substance was easily accessible to victim. While in 7% the poisonous substance was not accessible, where poisonous substance was mistakenly administered to child by relatives, these substances were medicines (5%) and kerosene oil (2%) (Table 3).

Clinical parameters

Most of the patients (46.5%) attended hospital after 3–4 h from exposure to poison. Only 26.7% of children were brought to hospital within 2 h of exposure to poison. Mean time (±SD) of presentation was 4.19±3.21 h.

Around 30.6% of patients were asymptomatic at presentation. Most common presenting symptom was cough (23.7%) followed by vomiting (21.7%). Pain abdomen was seen in 9% and 4.9% of patients were drowsy at first visit.

Table 1: Baseline characters of study population

Characteristics	Number of patients (n=101), n (%)
Age of patients (years)	
1–2	9 (8.9)
2–3	29 (28.7)
3–4	35 (34.6)
4–5	15 (14.85)
5–6	7 (6.9)
6–7	2 (1.9)
7–8	1 (0.9)
8–9	2 (1.8)
9–10	0
>10	1 (0.9)
Gender	
Female	43 (42.5)
Male	58 (57.4)
Residence	
Rural	67 (66.3)
Urban	34 (33.6)

Table 2: Distribution of socioeconomic parameters of study population

Characteristics	Number of patients (n=101), n (%)
Occupation of mothers	
Houme-makers	61 (60.3)
Agricultural work	28 (27.7)
Service	12 (11.8)
Education level of mothers	
Illiterate	20 (19.8)
Primary school	54 (53.4)
High school	19 (18.8)
Graduate and above	8 (7.9)
Socioeconomic status	
Upper	6 (5.9)
Upper middle	12 (11.8)
Lower middle	28 (27.7)
Upper lower	39 (38.6)
Lower	16 (15.8)
Knowledge about poisoning	
Sufficient	35 (33.6)
Insufficient	66 (65.3)

Table 3: Distribution of parameters related to poisoning

Characteristics	Number of patients (n=101), n (%)
Type of poison	
Drugs	21 (20.7)
Household substances	13 (12.8)
Hydrocarbons	45 (44.5)
Insectisides	17 (16.8)
Plants	4 (3.9)
Accessability to poisonous substances	
Yes	93 (92.07)
No	8 (7.9)
Place of poisoning	
Home	90 (89.1)
Outdoor	8 (7.9)
Workplace of mother	3 (2.9)

On examination, 27% had no abnormal signs. Most signs were related to cardiorespiratory system including wheezing (20%), tachycardia (14%), bradycardia (2%), hypotension (3%), and respiratory distress (10%) followed by abdominal tenderness (12%) (Table 4).

Treatment outcome and follow-up

After treatment completion, 95% of patients (96) have gotten cured and 5% (5) children succumbed to the poisoning or its complications.

On subsequent follow-up, more than 50% of patients did not turn up further whereas 43% of cases were found to be doing well on follow-up with some cases having a few complications which were dealt later (Table 5).

Table 4: Distribution of clinical parameters at presentation

Characteristics	Number of patients (n=101), n (%)
Interval between exposure of poison and hospitalization (h)	
≤2	27 (26.7)
3–4	47 (46.5)
5–6	25 (24.7)
7–8	6 (5.9)
≥8	5 (4.9)
Presenting symptoms	
Asymptomatic	31 (30.6)
Convulsion	4 (3.9)
Cough	24 (23.7)
Vomiting	22 (21.7)
Pain abdomen	8 (7.9)
Sedation	5 (4.9)
Weakness	3 (2.9)
Diarrhoea	3 (2.9)
Nasal discharge	1 (0.9)
Presenting signs	
No abnormality	28 (27.7)
Wheezing	21 (20.7)
Tachycardia	15 (14.8)
Bradycardia	2 (1.9)
Hypotension	3 (2.9)
Respiratory distress	10 (9.9)
Respiratory failure	3 (2.9)
Shock	4 (3.9)
Abdominal tenderness	12 (11.8)
Diarrhoea	2 (1.9)
Dehydration	1 (0.9)

Table 5: Distribution of treatment outcome

Characteristics	Number of patients (n=101), n (%)
Outcome of treatment	
Cure	96 (95.04)
Death	5 (4.9)
Follow-up after discharge	
Stable	44 (43.5)
Not reported	52 (51.1)
Not applicable (death)	5 (4.9)

DISCUSSION

Childhood poisoning is a significant cause of morbidity and mortality in pediatric patients in our country. It is responsible for 0.33–7.6% (3% in present study) of total admissions in pediatric wards at various hospitals across India [12]. It is very likely that this reporting is an underestimate of the actual magnitude of this problem as many cases go unreported.

The majority of patients (64%) belonged to the age group of 2–4 years with the mean age (±SD) being 3.295±1.5 years which was consistent with the studies done by Jayashree and Singhi [13] (3.3±3.1 SD years, that is, 61.3%) and Gupta *et al.* [14]. In the present study, most of the patients were male (57.4%) leaving a 42.5% share for female patients with the male: female ratio being 1.38:1.These results were comparable with studies by Sil *et al.* (1.29:1), Saikia *et al.* (1.92:1), and Mandal *et al.* (1.68:1) [15-17]. In our study, majority of the (66%) cases were from rural areas which was similar to studies by Mandal *et al.* (79%) and Bhat *et al.* (68.38%) [17,18] (Table 1).

On analysis of socioeconomic background, most of the child's family belongs to upper lower class group (39%) according to Modified Kuppuswamy scale 2021. In most of the cases, mothers were found to be studied up to primary school level (54%) and only 8% of mothers had a graduate level degree or above, which was comparable to the study done by Balamurugan *et al.* [19]. The higher incidences of poisoning in these cases probably due to less educational status, more number of family members, less storage spaces, and overcrowding in these families. A similar pattern was observed in studies done by Vasanthan *et al.*, Ahamed *et al.* and Kajala *et al.* [20-22]. Majority of the mothers (66%) were either ignorant or had wrong idea about the poison to which the child was exposed whereas 34% of mothers had at least some information regarding it (Table 2).

In the present study, majority of the cases presented with exposure to hydrocarbon (kerosene, turpentine oil, and diesel oil) amounting to around 45%. This was followed by ingestion of drugs amounting to 20.7%. Among drugs and pharmaceutical agents responsible the most important was Paracetamol overdose (5%).

Among household articles (13%), the most common was sanitizer ingestion (10%) followed naphthalene balls (2%) and toilet cleaner (1%). In insecticide poisons (17%), the majority cases were mosquito repellent oil (9%) followed by Organophosphorus group (5%). In 92% of cases, poisonous substance was easily accessible to victim. About 90% of poisoning cases occurred at home whereas 8% took place outdoors and 2% at workplace of mother. These findings are consistent with the study done by Saikia *et al.* [16]. Different studies showing distribution of different etiologic agents for childhood poisoning are summarized below (Table 6).

In our study, 24% had cough, 22% had vomiting, 7% had pain abdomen, 4% presented with convulsion, 3% had sedation and nasal discharge each, 2% had hemoglobinuria, and excessive salivation each, 1% had diarrhea, whereas 30% of children were found to be asymptomatic. About 28% of children were apparently normal on clinical examination whereas 21% children had wheeze on auscultation, 15% had tachycardia, 14% had abdominal tenderness, 9% had respiratory distress manifested by tachypnea and chest retractions, and 3% had respiratory failure, cyanosis and falling oxygen saturation. About 3% of children had shock with poor perfusion and low volume pulse, 2% had bradycardia. Comparison of symptomatic presentation and clinical findings among different studies is summarized (Table 7).

Majority of the cases (91%) attended the hospital directly following poisoning. Rest 9% received primary treatment, namely, nebulization (5%), anticonvulsants phenytoin (1%), antispasmodics (1%), and gastric lavage (2%) before attending our emergency department. On admission, 9% of children required gastric lavage as a part of treatment option where as 91% of children were not given lavage either due to contraindication of the same or due to late presentation. These findings were comparable with the study by Jayashree and Singhi [13] and Mandal *et al.* [17].

Most subjects presented to the ER at around 4 h of exposure to poisoning (range 1–24 h). Mean time (±SD) of presentation was 4.19±3.21 h. These were similar to Bhat *et al.* (3 h) and Kohli *et al.* (3.5 h) but inconsistent with Sil *et al.* (9.8 h) [15,18,23]. About 95% of the children were discharged successfully after receiving proper treatment whereas 5% (5 in number) children succumbed to the poisoning or its complications. Two patients expired due to respiratory complications following

Table 6: Comparative study of various etiological agents leading to childhood poisoining

Name of study	Hydrocarbon (%)	Insecticide (%)	Drugs (%)	Household agents (%)	Others (%)
Present study	45	17	21	13	4
Saikia *et al.* [16]	54.25	18.3	11	6.5	9.95
Sil *et al.* [15]	38.9	25.2	12.5	6.6	16.8
Bhat *et al.* [18]	18.8	37.61	25.64	X	17.95
Kohli *et al.* [23]	29.7	13.5	19.8	22.4	14.6
Gupta *et al.* [14]	17.03	9.14	21.8	7.93	14.1
Jayashree and Singhi [13]	14.1	20.9	26.7	X	11.8
Basavaraj [24]	24.1	20	40	X	16

Table 7: Comparative study of various clinical presentations following childhood poisoining

Study	Asymptomatic	Cardio-respiratory symptoms	CNS symptoms	GI symptoms	Others
Present study	30	24	7	35	4
Saikia *et al.* [16]	49	10.5	7.8	28.1	4.6
Sil *et al.* [15]	51.3	15.86	10.7	21.8	X
Kohli *et al.* [23]	30.4	18.9	20.6	29.7	1.1
Balamurgan Sundararajan [19]	7	25.9	18.9	46.9	1.3

CNS: Central nervous system, GI: Gastrointestinal

hydrocarbon poisoning, two due to organophosphorus poisoning and one due to shock and liver failure following acute iron overdose. Twelve cases received antidotes specific to the poison exposed whereas 88% of children were treated symptomatically. N-acetyl cysteine, atropine, pralidoxime, and desferrioxamine were used as antidotes. Majority of the cases (52%) did not come for their schedule follow-up at our OPD a week after their discharge whereas 42% of cases were found to be doing well on follow-up with some cases having a few complications which were dealt later (2%) (Table 5).

Limitations of the study

There were also certain limitations present in this study. First, the sample size was small, which when divided for individual poisoning reduced the sample size further. Furthermore, due to COVID-19 outbreak during to the study period, many patients wanted a quick discharge on risk benefit, so long-term outcome could not be studied in some cases.

CONCLUSION

Childhood poisoning is one of the important pediatric medical emergencies causing significant mortality and morbidity in our country. Negligence and ignorance from the side of caregivers play the most important role in such calamities. Community-based childhood poisoning prevention program and simple preventive measures like education to the parents, proper storage of household items, and proper placement of drugs could be helpful in preventing mortality and morbidity in children with poisoning. Moreover, there is serious need to have ample data regarding clinicoepidemiological profile of childhood poisoning; so that we can find out the pattern and possible causes of childhood poisoning and can take measures to prevent.

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AUTHORS' CONTRIBUTIONS

Shiladitya Misra – Concept and design of the study and data collection; Sampriti Puitandi – Statistical analysis, data interpretation, and reviewed the manuscript; Linkon Biswas – Review of literature, data analysis, and data interpretation; Koustav Biswas – Literature review and preparation of first manuscript, Tarapada Ghosh – Intelectual contribution, interpretation of results, and final editing of the manuscript.

CONFLICTING INTEREST

None to declare.

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REFERENCES

1. Litovitz TL, Klein-Schwartz W, Caravati EM, Youniss J, Crouch B, Lee S. 1998 Annual report of the American association of poison control centers toxic exposure surveillance system. Am J Emerg Med 1999;17:435-87. doi: 10.1016/s0735-6757(99)90254-1, PMID 10496515
2. Andiran N, Sarikayalar F. Pattern of acute poisonings in childhood in Ankara: What has changed in twenty years? Turk J Pediatr 2004;46:147-52. PMID 15214744
3. Singh S, Singhi S, Sood NK, Kumar L, Walia BN. Changing pattern of childhood poisoning (1970-1989): Experience of a large north Indian hospital. Indian Pediatr 1995;32:331-6. PMID 8613288
4. Khadgawat R, Garg P, Bansal P, Arya A, Choudhary B. Accidental poisoning. Indian Pediatr 1994;31:1555-7. PMID 7875822
5. Basu M, Kundu TK, Dasgupta MK, Das DK, Saha I. Poisoning, stings and bites in children--what is new? An experience from a tertiary care hospital in Kolkata. Indian J Public Health 2009;53:229-31. PMID 20469761
6. Sitaraman S, Sharma U, Saxena S. Accidental poisoning in children. Indian Pediatr 1985;22:757-60. PMID 3836205
7. Hoy JL, Day LM, Tibballs J, Ozanne-Smith J. Unintentional poisoning hospitalisations among young children in Victoria. Inj Prev 1999;5:31-5. doi: 10.1136/ip.5.1.31, PMID 10323567
8. Goto K, Endoh Y, Kuroki Y, Yoshioka T. Poisoning in children in Japan. Indian J Pediatr 1997;64:461-8. doi: 10.1007/BF02737750, PMID 10771875
9. McCaig LF, Burt CW. Poisoning-related visits to emergency departments in United States, 1993-96. J Toxicol Clin Toxicol 1999;37:817-26. doi: 10.1081/clt-100102460, PMID 10630264
10. Bhat NK, Dhar M, Ahmed S, Chandar V. Profile of poisoning in children and adolescents at a North Indian territory care centre. J Indian Acad Clin Med 2011;13:37-42.
11. Rathore S, Verma AK, Pandey A, Kumar S. Pediatric poisoning trend in Lucknow district, India. J Forensic Res 2013;4:179-80.
12. Dutta AK, Seth A, Goyal PK, Aggarwal V, Mittal SK, Sharma R, *et al.* Poisoning in children: Indian scenario. Indian J Pediatr 1998;65:365-70. doi: 10.1007/BF02761129, PMID 10771987
13. Jayashree M, Singhi S. Changing trends and predictors of outcome in patients with acute poisoning admitted to the intensive care. J Trop Pediatr 2011;57:340-6. doi: 10.1093/tropej/fmq099, PMID 20978013
14. Gupta SK, Peshin SS, Shrivastava A, Kaleekal T. A study of childhood poisoning at National Poisons Information Center, All India Institute of

Medical Sciences, New Delhi. J Occup Health 2003;45:191-6.
15. Sil A, Ghosh TN, Bhattacharya S, Konar MC, Soren B, Nayek K. Prevalence of wasting, a study on clinico-epidemiological profile of poisoning in children in a rural tertiary care hospital. J Nepal Paediatr Soc 2016;36:105-9.
16. Saikia D, Sharma RK, Janardhan KV. Clinical profile of poisoning due to various poisons in children of age 0-12 years. J Family Med Prim Care 2020;9:2291-6. doi: 10.4103/jfmpc.jfmpc_365_20, PMID 32754490
17. Mandal A, Pal AC, Das PK, Dutta AK. Clinico-epidemiological profile of poisoning in children in a rural based medical college and hospital. IOSR J Dent Med Sci 2016;15:50-5.
18. Bhat NK, Dhar M, Ahmad S, Chandar V. Profile of poisoning in children and adolescents at a North Indian tertiary care centre. J Indian Acad Clin Med 2012;13:37-42.
19. Balamurgan MS, Sundararajan TS. Clinical profile and outcome of children presenting with poisoning. J Toxicol 2003;2:16-20.
20. Vsanthan M, James S, Shuba S, Abhinayaa J. Clinical profile and outcome of poisoning in children admitted to a tertiary referral center in South India. Indian J Child Health 2015;2:187-91.
21. Ahmed B, Fatmi Z, Siddiqui AR, Sheikh AL. Predictors of unintentional poisoning among children under 5 years of age in Karachi: A matched case-control study. Inj Prev 2011;17:27-32. doi: 10.1136/ip.2010.027524, PMID 20923985
22. Kajala P, Jhavar L, Narsaria N, Dubey NK, Sankar J. Childhood posoining: Clinical profile and outcome. Indian J Emerg Pediatr 2011;3:19-22.
23. Kohli U, Kuttiat VS, Lodha R, Kabra SK. Profile of childhood poisoning at a tertiary care centre in North India. Indian J Pediatr 2008;75:791-4. doi: 10.1007/s12098-008-0105-7, PMID 18581069
24. Basavaraj PK. Clinical profile and outcome of acute pediatric poisoing in urban tertiary care hospital. J Evid Based Med Health Care 2015;2:459-63.