

## Original Research Article

# STUDY ON THE EPIDEMIOLOGY, CLINICAL PROFILE AND OUTCOME OF POISONING IN CHILDREN PRESENTING TO EMERGENCY SERVICE ROOM

Y Krishna<sup>1</sup>, J L Prakash Anand<sup>2</sup>, Lakshmi Narayana<sup>3</sup>, Kasipisi Naveen<sup>4</sup>

<sup>1-3</sup>Assistant Professor, Department of Paediatrics, Kurnool Medical College Kurnool, India.

<sup>4</sup>Post Graduate, Department of Paediatrics, Kurnool Medical College Kurnool, India.

Received : 10/06/2024  
Received in revised form : 22/07/2024  
Accepted : 06/08/2024

**Corresponding Author:**

**Dr. Y Krishna,**  
Assistant Professor, Department of  
Paediatrics, Kurnool Medical College  
Kurnool, India.  
Email: yadaralakrishna@gmail.com

DOI: 10.70034/ijmedph.2024.3.209

Source of Support: Nil,  
Conflict of Interest: None declared

Int J Med Pub Health  
2024; 14 (3); 1180-1184

**ABSTRACT**

**Background:** Childhood poisoning is one of the emergencies commonly encountered in Paediatric practice. This study was conducted to find out various clinical and epidemiological parameters of poisoning in children and correlate with outcome. To find out the incidence of poisoning among paediatrics admissions. To find out the leading cause of poisoning deaths among children less than 12 years of age.

**Materials and Methods:** All children less than 12 years of age admitted in PICU and paediatric wards with history of poisoning or intoxication during the period of January 2021 to December 2022 at Kurnool Medical College and Hospital. All children were examined, investigated and treated according to hospital policy. The outcome of poisoning was recorded.

**Results:** The incidence of poisoning in this study is found to be 3.7%. Maximum number of study subjects 59% was seen in 1-3 years age group followed by 19% in the age group of 6-12 years. The mean age of study participants was 3.7years. Oral ingestion is the most common route 96% followed by inhalation 3%, least common is skin contact 1%. Majority 56% of the children were discharged within 3-5 days and 44% of the children were discharged within 3 days. 95% study subjects were discharged where as 5% study subjects died.

**Conclusion:** Most of the accidental poisoning is seen in less than five years age group due to their innovative character, curiosity, mouthing tendencies and exploratory nature. Due to negligence and ignorance that could be prevented by giving more attention at home.

**Keywords:** Poisoning, Paediatric age group, Accidental poisoning, Outcome.

**INTRODUCTION**

All the things are poison, and nothing is without poison, only the dose permits something not to be poisonous”- Paracelsus.

Childhood poisoning is one of the emergencies commonly encountered in paediatric practice since the usage of chemicals have been increased in houses, acute poisoning cases also increased. Accidental poisoning is more common in childhood and most of the cases are preventable.<sup>[1]</sup> among hospital admissions, poisoning is the 12thmost common in children and contributes to high number of fatalities among the paediatric admissions.

Majority of these cases are the result of oral consumption of poisonous agents.<sup>[2]</sup>

Average incidence among various studies ranges from 0.3% to 7.6%,<sup>[3]</sup> which constitutes a significant number of admissions to paediatric wards. Poisoning is most commonly observed in children at 1-5 years of age and constitutes to 80% of cases. The mortality rate due to poisoning is 3.0% to 5.0%.<sup>[4]</sup>

Male children predominate the poisoning accidents accounted for by their greater degree of activity and the number of cases belong to poor socioeconomic status because of less space.<sup>[5]</sup> The causes and types of poisoning differ from place to place. These depend upon many factors such as education,

socioeconomic status, local beliefs and customs and also on the type of population, whether urban or rural.<sup>[6]</sup> The poisoning type and incidence of poisoning also differ from hospital to hospital and place to place and has a special bearing on the emergency care of that area.<sup>[7,8,9]</sup>

As our institution is tertiary care center, most of the poisoning cases are referred and admitted in our institution and most of the investigations are feasible in our institution. So far, the studies on poisoning have not undertaken in this hospital, and hence there is definite need for the study to know the definite detailed epidemiological evidence of poisoning.

Hence this study was undertaken to find out various epidemiological factors, clinical profile and outcome of children presenting with poisoning.

#### Aims and Objectives

To find out various clinical and epidemiological parameters of poisoning in children and correlate with outcome.

To find out the incidence of poisoning among paediatric admissions.

To find out the leading cause of poisoning deaths among children less than 12 years of age.

**Table 1: Common types of poisons in paediatric cases**

Poisoning	Gastrointestinal Symptoms	Other symptoms	Treatment
Kerosene oil	Nausea, vomiting, diarrhoea and abdominal pain	Headache, Dizziness, Drowsiness, Restlessness, Ataxia, Convulsions, Coma and occasionally Death.	Supportive care Gastric lavage Respiratory monitoring.
Camphor	Burning Sensation in Pharynx and Epigastrium, Vomiting,	Confusion, Restlessness, Delirium, Hallucinations, Muscle twitching, Myoclonus, Ataxia, Hyperreflexia, Fasciculation and Seizures	Gastric lavage and activated charcoal
Naphthalene	Vomiting, Diarrhea, Abdominal Pain, Anemia, jaundice, hemoglobinuria,	Headache, Fever and Altered Mental Status	Symptomatic treatment. Transfusion of Packed Red Blood Cells for anemia, Monitoring of fluid and electrolyte balance, Administration of alkalis in presence of hemoglobinuria to prevent its deposition in renal tubules, and renal replacement therapy.
Organophosphorus and carbamoyl	Nausea, Vomiting, Diarrhea, Increased Frequency of micturition. Excessive salivation and Lacrimation	Fasciculation, Cramps, Weakness, Paralysis, Anxiety, Tremors, Slurred Speech, Ataxia, Confusion, Seizures and Coma	Maintain the airway, breathing and circulation Gastric decontamination by stomach wash through activated charcoal Atropine Pralidoxime (PAM)
Acetaminophen	Gastrointestinal upset, Hypochondrial tenderness with Jaundice and Elevation of liver enzymes Hepatic Encephalopathy, Coagulopathy and MODS. Liver Failure or Death	Depression, Weakness, Hyperventilation	Maintaining airway, breathing, circulation and gastric lavage. Antidote: N-acetyl cysteine (NAC) should be given within 24hours of ingestion.
Anticonvulsants	Nausea, Vomiting, Diarrhoea	Nystagmus, ataxia, dystonia, lethargy, dyskinesia, Seizure and coma, fever, flushing, depression and delirium	Gastric lavage and activated charcoal. In severe cases hemodialysis may be required. Administration of antidotes when indicated.
Phenol (carbolic acid)	Excruciating pain, Dysentery,	Hypertension, Difficulty in Breathing, Coma, Seizures and Pulmonary Edema occurs after few days. Death is by respiratory or cardiac center depression	Intubation if necessary Renal failure corrected by peritoneal dialysis or hemodialysis. Castor oil application used for skin burns.

## MATERIAL AND METHODS

**Source of Data:** All children less than 12 years of age admitted in PICU and paediatric wards with history of poisoning or intoxication during the period of January 2021 to December 2022 at Kurnool Medical College and Hospital.

**Type of Study:** Prospective Cohort Study

**Duration:** January 2021 –December 2022(2years)

**Place of Study:** Department of Paediatrics, Kurnool Medical College and associated hospital, Kurnool.

**Inclusion Criteria:** All Children who were admitted with the history of any type of poisoning

(Accidental / Suicidal / homicidal). Even unknown poisoning is included in the study.

#### Exclusion Criteria

Snake bite, Scorpion sting and other poisonous bites. Other chronic diseases presenting with similar clinical features were excluded.

#### Sample Size

It is estimated based on the study done by MahvishQazi et al<sup>10</sup> titled “Clinical profile and outcome of children presenting with poisoning or intoxication: a hospital-based study.” They conducted study among 227 children admitted with poisoning or bite cases.

Based on, frequency of kerosene poisoning in above study = 12.36%

Using the variables,  
 Population size= 227  
 Hypothesized % frequency of a factor in population =12.36%  
 Confidence level – 95%  
 Designed effect for a random sample -1  
 Sample size  $n = [DEFF * Np(1-p)] / [(d2/Z21-\alpha/2*(N-1)+p*(1-p)]$   
 Required sample size is 97. So, a total of 100 study subjects are enrolled in study.

### Methodology

A written and informed consent from all the patients included in study

Institutional review board approval was obtained for this study.

All children who were admitted in ESR with acute poisoning who fit in inclusion criteria were taken.

Thorough history was taken and data regarding age, sex, place, socio-economic status (SES) was collected.

We studied the demographic profile and clinical presentation regarding type and quantity of the substance consumed, time of ingestion, nature of ingestion, time of presentation to hospital, symptoms and signs was taken.

Investigations, diagnostic and therapeutic interventions, and outcome were noted.

The entire data was recorded in individual patient's proforma.

The results were statistically analysed.

### Statistical Methods

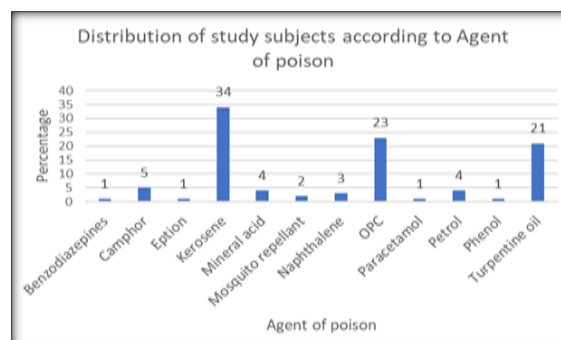
Statistical analysis will be performed by the SPSS program for Windows, version 17.0(SPSS, Chicago, Illinois). Continuous variables will be presented as mean  $\pm$  SD, and categorical variables will be presented as absolute numbers and percentage. Categorical variables will be analysed using either the chi square test or Fisher's exact test.  $P < 0.05$  was considered statistically significant.

## RESULTS

This is a prospective observational study done in a tertiary care centre among 100 study subjects.

There were 2700 admissions to PICU in total during this study period. Among them, 100 admissions

were due to poisoning. Hence the incidence of poisoning in this study is found to be 3.7%. [Table 1]



**Figure 1: Distribution of study subjects according to agent of poisoning**

Table no 2 show distribution of study subjects according to age. In this study maximum number of study subjects 59% was seen in 1-3 years age group followed by 19% in the age group of 6-12 years. The mean age of study participants was 3.7years with a minimum of 8 months and maximum of 12 years. Fig 1 show distribution of study subjects according to agent of poison.

In this study, it was observed that majority 34% study subjects consumed kerosene followed by 23% study subjects consumed OPC. Turpentine oil was consumed by 21% study subjects.

In this study, it is observed that 59% study subjects have consumed hydrocarbons type of poison followed by 23% study subjects who consumed pesticide type of poison. Oral ingestion is the most common route 96% followed by inhalation 3%, least common is skin contact 1%. it was found that most of the children 79% were symptomatic within 1-6 hours. About 10% study subjects were symptomatic within 6-24 hours and about 3% study subjects showed symptoms after 24 hours of poisoning. Majority 56% of the children were discharged within 3-5 days and 44% of the children were discharged within 3 days. 95% study subjects were discharged where as 5% study subjects died.

**Table 2: Distribution of study subjects according to age**

Age	Frequency	Percentage	Chi square	P value
<1yr	05	05.00		
1-3yrs	59	59.00		
3-6yrs	17	17.00	4.47	0.21
6-12yrs	19	19.00		
Total	100	100.00		

**Table 3: Distribution of study subjects according to type of poison consumed**

Type of poison	Corrosives	Frequency	Percentage	Chi square	P value
	Drugs	03	03.00		
	Household	11	11.00	14.64	0.005*
	Hydrocarbon	59	59.00		
	Pesticide	23	23.00		
Route of Absorption	Oral	96	96.00		

	Inhalational	03	03.00	0.21	0.89
	Skin contact	01	01.00		
Duration between poisoning and presentation	<1h	08	08.00		
	1-6h	79	79.00	60.26	<0.001*
	6-24h	10	10.00		
	>24h	03	03.00		
Duration of Hospital Stay	<3d	44	44.00		
	3-5d	56	56.00		
Outcome	Death	05	05.00		
	Discharge	95	95.00	51.10	<0.001*

**Table 4: Distribution of study subjects based on mode of presentation**

Mode of presentation	Frequency	Percentage
Abdominal pain	13	13.00
Altered sensorium	04	04.00
Asymptomatic	03	03.00
Cough	19	19.00
Fast breathing	13	13.00
Seizures	02	02.00
Vomiting	46	46.00
Total	100	100.00

## DISCUSSION

A total of 100 cases with poisoning were admitted during the study period. The age of these 100 cases ranged from 8 months to 12 years. In this study highest number of cases occur in 1-3 years age group (59.0%) followed by 6-12 years age group (17.0%).<sup>[5]</sup> cases were admitted with less than 1 year of age. Chukkanakal et al, J, Vasanthan et al study and Sridhar PV et al study showed 1-3 years as the predominant age group.<sup>[11,13,17]</sup> The higher incidence of poisoning in less than 5 years age is because of inherent inquisitiveness and higher oral exploratory activity aide by their newly acquired mobility and hand skills. In this study, it is observed that 59% study subjects have consumed hydrocarbons type of poison followed by 23% study subjects who consumed pesticide type of poison. Studies conducted by Nadig NG et al, Arpitha B et al, Kajala P et al, Chukkanakal et al., also revealed similar results where Hydrocarbon was observed to be the most common type of poison to occur in paediatric population accounting for 43%, 40%, 27.9% of cases respectively.<sup>[14,15,16,17]</sup> Among the Hydrocarbon, Kerosene is the most common agent of poisoning in present study accounting for 34% of cases. Similarly, studies done by Nadig NG, Chukkanakal et al, Sridhar PV et al also showed Kerosene as the commonest agent among hydrocarbons in the childhood poisoning, that is 43% and 35.18% respectively.<sup>[13,16,17]</sup> As Kerosene being the commonest household fuels used in lower middle class group families, since it is being kept in bottles on the floor in kitchen, children easily drink those bottles as water or playing due to curiosity. In this study, oral ingestion is the most common route of poisoning accounting for 96% (96) cases because the children have exploratory tendency for the substances by taking into mouth. Inhalation poisoning is seen in 3% of cases and by skin contact in 1% of cases. In this study most common mode of

presentation is vomiting (46%) followed by cough (19%). 13% of children presented with respiratory distress/fast breathing. Other common manifestations were abdominal pain and altered sensorium. In studies done by Vasanthan et al, Nadig NG et al, Kajala P et al, Chukkanakal et al and Sharma J et al also observed that vomiting was the most common symptom similar to this study accounting for 38.7%, 74%, 52.1% and 69.6% respectively.<sup>[11,15,16,17]</sup>

In the present study 79% of the cases presented within the first 6 hours. 8% of the cases presented in less than 1 hour in this study and these are from urban population, as duration is shorter in urban population compared to rural population. This could be explained by the longer distance that these rural patients travelled to reach hospital. This is similar to study done by Kohli et al.<sup>[12]</sup>

In the present study, mean duration of hospital stay is 3.6 days .This is similar to study done by Budhathoki et al,<sup>[17]</sup> in which mean duration of hospital stay was 3.8 days.6595% of the cases in the present study survived and discharged .This is similar to studies done by Vasanthan et al, Sridhar PV et al Chukkanakal et al and Nadig NG et al in which survival rate was 92%, 98.8%, and 95.98% respectively.<sup>[11,13,16,17]</sup>

Death occurred in 5% of cases and 4 cases are due to pesticide poisoning and 1 case is due to corrosive poisoning. Mortality was more in poisoning due to Pesticide followed by corrosive poisoning. There is no mortality in Hydrocarbon poisoning.

All the 5 expired cases are accidental and in all the 5 cases route of ingestion are oral. Out of 5 cases 3 cases presented >24 hours and most cases presented in altered sensorium and only supportive management was given at Pre referral centre. In most cases antidote administration was delayed and there is high mortality in these cases. Late presentation, delayed antidote administration, altered sensorium, and pesticide poisoning are the factors associated with high mortality.

## CONCLUSION

Childhood poisoning is one of the paediatric medical emergencies like other emergencies and causes significant mortality and morbidity in children.

Most of the accidental poisoning is seen in less than five years age group due to their innovative character, curiosity, mouthing tendencies and exploratory nature.

Majority of accidental poisoning are preventable by means of simple preventive measures and reduce the significant mortality among childhood poisoning.

Despite of rapid socioeconomic changes, still kerosene is the commonest agent involved in paediatric poisoning as it is being the most common fuel used in household followed by pesticides, due to location of our centre surrounded by many rural areas.

Main cause of paediatric poisoning is due to negligence and ignorance that could be prevented by giving more attention at home.

Currently lack of community-based childhood poisoning prevention program, simple preventive measures like education to parents, proper storage, child proof containers, and proper placement of drugs could be preventing mortality and morbidity in children with poisoning.

## REFERENCES

1. Kohli U, Kuttaiat VS, Lodha R, Kabra SK. Profile of childhood poisoning at a tertiary care center in North India, *Indian J Pediatr.* 2008;75(8):791-4.
2. Paudyal BP poisoning; pattern and profile of admitted cases in a hospital in Central Nepal. *JNMA J Nepal med.Assoc.*2005; 44 (159) :92-6.
3. Manzer N, Saad SM, Manzer B, Fatima SS. The study of etiological and demographic characteristics of acute household accidental poisoning in children. A consecutive case series study from Pakistan *BMC Pediatr.* 2010;10: 28.
4. Reddy KS, Kishor M, Manjunath VG. Poisoning in children- A study from tertiary care general hospital. *J Med. Sci Health* 2020; 6(3):14-18.
5. Buckley NA, Buckley N, Whyte IM, Oconnell DL, Dawson AH. Activated charcoal reduces the need for N-acetyl cysteine treatment after acetaminophen (Paracetamol) overdose. *J. Toxicol: Clin Toxicol.* 1999 Jan 1;37 (6): 753-7.
6. Surjit S, Narang A, Walia B, Mehta NS, Lata S. Accidental poisoning in children 10yrs experience. *Indian Pediatr.*1981, vol.18:163-166
7. Aqeel.M., Khan AM. Pattern and frequency of acute poisoning in children.pak.*J.Med.Sci.*2009; 25(3):51-4.
8. Meyers, Eddleston M, Bailey B, Desel H, Gottschling S, Gortner L. Unintentional household poisoning in children. *Klin pediatr.*2007;219(5); 254-70.
9. Subedi BK. A retrospective study of poisoning cases at Bir Hospital, Nepal, *J Inst.med.*1990;12: 296-302.
10. Qazim, SaqibN, Clinical profile and outcome of children presenting with poisoning or intoxication: a hospital based study. *Int J Contemp Pediatr* 2018; 5:1844-50
11. Vasanthan 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* 187, Vol2.Issue 4, Oct-Dec 2015.
12. Kohli U, Kuttaiat VS, Lodha R, Kabra SK. Profile of childhood poisoning at a tertiary care centre in North India *Journal of Pediatrics, Volume 75-August,2008.*
13. Sridhar PV, Sandeep M, Thammanna PS. Clinical profile and outcome of poisoning in pediatric age group at a tertiary care teaching hospital, Mandya, Karnataka, India.*Int J Contemp Pediatr* 2016;3:514-7.
14. Arpitha B, Rajanish KV, Adarsh E. Study of clinical profile of accidental poisoning in children. *Int J Contemp Pediatr* 2020; 7:1792-4.
15. Kajala P, Jhavar L, Narsaria N, Dubey NK, Sankar J.Childhood poisoning:Clinical profile and outcomes.India.*Journal of Emergency Pediatrics* Vol.3 NO:2 April-June 2011.
16. Sachin KR., et al. Epidemiology, clinical profile and immediate outcome of poisoning in children in Tertiary Care Hospital." *Acta Scientific Paediatrics* 4.1(2021):15-18.
17. Budhathoki S, Poudel P, Shan D, Bhatta NK, Dutta AK et al. Clinical profile and outcome of children presenting with poisoning or intoxication; a hospital based study, *Nepal Med Coll J* 2009;11(3)170-175
18. Chukkanakal, J. L., Kanakareddi, B., Kurnool, S., & Senapathi, P. (2022). A study of clinical profile and outcome of poisoning among pediatric population in a tertiary care hospital. *International Journal of Health Sciences*, 6(S2), 13230-13238.