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Original Research Article

# Clinico-Epidemiological Patterns of Pediatric Poisoning: A Retrospective Hospital-Based Study

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**Abstract**

**Background:** Pediatric poisoning remains a critical public health issue, particularly in developing nations like India. Factors such as easy access to household chemicals, medications, and pesticides contribute significantly to the burden of accidental toxic exposures among children. The aim of this study was to evaluate the clinico-epidemiological profile and immediate outcomes of pediatric poisoning cases in a tertiary care setting.

**Methods:** A retrospective observational study was conducted at JLNM Hospital covering the period from December 2023 to March 2025. Medical records of children aged 0–12 years who presented with acute poisoning were reviewed. Data including demographics, poisoning agent, route of exposure, nature of poisoning, and clinical outcome were extracted from hospital case files and analyzed statistically.

**Results:** A total of 50 children were studied, with a mean age of 4.8 ± 2.9 years. The majority (66%) belonged to the 1–5 year age group. Male children were slightly more affected (56%). Accidental poisoning accounted for 96% of cases, with oral ingestion being the predominant route (98%). Drugs such as paracetamol and thyroxine were the most common agents (44%), followed by detergents (26%) and insecticides (20%). Most children (90%) recovered with appropriate management, while 4% were referred to higher centres to complications, particularly from organophosphate ingestion.

**Conclusion:** The study reaffirms that most pediatric poisoning cases are accidental, preventable, and occur in early childhood. Emphasis on caregiver education, secure storage of hazardous substances, and strengthening poison control measures is vital to reduce morbidity and mortality.

**Keywords:** Pediatric Poisoning, Accidental Ingestion, Insecticides, Detergents, Clinical Outcome, India.



## Introduction

Poisoning is an important emergency as well as major problem in all age groups throughout the world. The cause and poisoning type varies in different parts of the world and within the country also depending upon factors such as education, demography, socioeconomic factors, customs and local belief [1].

The mortality and morbidity due to poisoning is preventable in children. Poisoning is the fourth leading cause of unintentional injury following road traffic accident, burns and drowning [2]. Acute poisoning in children is an important public health problem and is one of the leading causes of all unintentional injuries globally [3]. It is an important paediatric emergency in both developing and developed countries, with preventable morbidity and mortality [4]. According to World Health Organization (WHO) statistics, acute poisoning is responsible for more than 45,000 deaths every year among children and youth below the age of 20 years [5]. Poisoning in pediatric patients is a common and preventable cause of morbidity and mortality. Profile and outcome of poisoned pediatric patients in a given region is influenced by the prevalent social, economic and cultural practices prevalent and also by the availability and the quality of the medical facilities.

Many studies from the developed countries show that common household products, rather than pharmaceuticals, are now implicated in the majority of pediatric poisonings [6,7]. Decrease in cases of pediatric poisoning related to drugs and pharmaceuticals in these countries is due to introduction of child proof packs and bottles, measures which are yet to be implemented in many of the developing countries [8]. Despite numerous

educational and public health campaigns aimed at avoiding childhood poisoning, poisoning remains the most common medical emergency among children. Children are more susceptible to serious injuries relative to adults due to their immature psychological and physical systems, lack of hazard awareness, and poor safety awareness and defense against poisons. Children are curious and explore their world with all their senses. As a result, surroundings can be a dangerous place when poisonous substances are inadvertently ingested every year millions of calls are made to poison control centres when this happens and thousands of children are admitted to emergency departments [9]. Various agents like household substances, agrochemicals, drugs or environmental agents are implicated as poisoning agents. Lack of maternal knowledge, improper storage of substances and insufficient supervision are the major causes of paediatric poisoning [10]. In a specific region prevalent social, economic and cultural practices play an important role in influencing profile of poisoned paediatric patients. According to American Poison Control Centre ingestion is the major route of poisoning [11]. Incidence of poisoning in children from 1994 to 2003 was 450 per 100000 population as per data from consumer product safety commission [12].

Studies from India that describe the profile of poisoned pediatric patients from various regions, most of them are at least a decade old. With increasing urbanization and rapid socioeconomic development in India during the last decade, change in pediatric poisoning profile and outcome is to be expected [13]. However, there is deficient data from developing countries like India due to inadequate and poor surveillance of poisoning data [14].

This study was conducted to determine the clinico-epidemiological pattern and immediate outcome of acute poisoning in children admitted to a district hospital, contributing to the existing data and helping develop preventive strategies for this vulnerable population.

## Material and Methods

This retrospective observational study was conducted in the Department of Pediatrics at Jawahar Lal Nehru Memorial (JLNM) Hospital, a tertiary care center serving urban and semi-urban populations. The study covered a period of 15 months, from December 2023 to March 2025. Medical records of all children aged 0 to 12 years who were admitted with a history or clinical diagnosis of acute poisoning were reviewed.

### Inclusion Criteria

- Children aged ≤12 years
- Confirmed diagnosis of acute poisoning as recorded in case sheets
- Exposure to pharmaceutical agents (e.g., paracetamol, thyroxine), household chemicals (e.g., detergents), or agrochemical/insecticidal compounds
- Presentation to hospital within 24 hours of suspected exposure

### Exclusion Criteria

- Cases involving food poisoning, drug allergies, or animal envenomation
- Incomplete or missing clinical records
- Chronic toxic exposure cases or inconclusive diagnosis after clinical workup

### Methodology

Data collection was carried out through a detailed review of patient case files, emergency department registers, and hospital records. Information was recorded in a structured data extraction sheet developed for the study. Variables collected included age, gender, socioeconomic status, and residential area. Details regarding the poisoning episode such as the agent involved (e.g., paracetamol, thyroxine, detergents, insecticides), route of exposure, and time interval between exposure and hospital presentation were extracted.

The context of poisoning accidental or intentional was determined from the case history documented by clinicians. Clinical signs at presentation, such as neurological, gastrointestinal, or respiratory symptoms, were noted along with the management protocols followed, including any decontamination procedures (e.g., gastric lavage), use of antidotes, and supportive treatment. Final outcomes were recorded as discharge, referral, or death based on discharge summaries. All collected data were cross-checked by two independent reviewers to ensure accuracy and completeness.

Statistical Analysis: The collected data were entered into Microsoft Excel and analyzed using SPSS version 23. Descriptive statistics including means, standard deviation, frequency, and percentages were calculated. Associations between variables such as the type of poison and outcome were analyzed using the Chi-square test. A p-value $<0.05$ was considered statistically significant.

## Results

During the study period, a total of 50 pediatric patients with acute poisoning were admitted to the pediatric department of JLNM Hospital. The mean age of the patients was $4.8 \pm 2.9$ years, with a male-to-female ratio of 1.3:1, indicating a male predominance. The majority of the cases (66%) were in the 1–5 year age group, followed by children below 1 year and those aged 6–12 years.

**Table 1: Age and gender wise Distribution of Pediatric Poisoning Cases**

| Age in Years | | No. of Patients | Percentage |
|---|---|---|---|
| Age in Years (n=50) | <1 year | 4 | 8% |
| | 1–5 years | 33 | 66% |
| | 6–12 years | 13 | 26% |
| Gender | Male | 28 | 56% |
| | Female | 22 | 44% |

The majority of poisoning cases (66%) occurred in children aged 1–5 years, which is the most vulnerable age group due to exploratory behavior. Infants constituted a small proportion (8%) of cases, while children aged 6–12 years made up about 26% of the total. There was a slight male predominance, with males comprising 56% of the total cases, while females accounted for 44% [Table 1].

**Table 2: Type of Poisoning Agent**

| Poisoning Agent | No. of Patients | Percentage |
|---|---|---|
| Drug ingestion (PCM, thyroxine, etc.) | 26 | 52% |
| Detergent/cleaning agents | 15 | 30% |
| Mosquito repellents/liquids | 4 | 8% |
| Insecticides/pesticides (OP compounds, etc.) | 3 | 6% |
| Unknown substances | 2 | 4% |

Drug ingestion was the commonest agent (26/50; 52%), most often involving paracetamol, thyroxine, and cough syrups. Detergent/cleaning agents were next (15/50; 30%). Mosquito repellents/liquids accounted for 4 cases (8%), insecticides/pesticides (including OP compounds) for 3 cases (6%), and unknown substances for 2 cases (4%) [Table 2].

**Table 3: Circumstances and Route of Poisoning**

| Route of Poisoning | | No. of Patients | Percentage |
|---|---|---|---|
| Nature | Accidental | 48 | 96% |
| | Suicidal | 2 | 4% |
| Route | Oral ingestion | 49 | 98% |
| | Inhalation/contact | 1 | 2% |

Accidental poisoning was the predominant mode, observed in 96% of cases. Only two children, both above 10 years of age, were reported to have ingested poison with suicidal intent. The most common route of exposure was oral ingestion (98%) [Table 3].

**Table 4: Outcome of Poisoning Cases (n=50)**

| Poisoning Agent | No. of Patients | Percentage |
|---|---|---|
| Discharged after recovery | 45 | 90% |
| Referred to higher center | 5 | 10% |

Most children (90%) recovered and were discharged after appropriate management at JLNM Hospital. Five patients (10%) were referred to a higher center for advanced care, particularly those who had presented late or had ingested highly toxic substances such as organophosphates. No deaths were recorded during the study period [Table 4].

## Discussion

Pediatric poisoning continues to pose a significant burden on emergency healthcare services, particularly in developing countries like India where children are frequently exposed to a wide range of toxic household and agricultural substances. The present study was undertaken to assess the clinico-epidemiological profile and immediate outcomes of acute pediatric poisoning in a tertiary care hospital in Jammu & Kashmir. Our findings are consistent with patterns observed across similar studies in the subcontinent, with a few important regional distinctions. In the current study, the majority of poisoning cases occurred in children aged 1–5 years (66%), a finding consistent with previous research. This age group is particularly vulnerable due to their innate curiosity and tendency to explore their environment orally. Sil A et al., (2016) reported a similar pattern, with the highest incidence of poisoning between ages 1–5 years (36.2%) [15]. Charan LS et al., (2023) also noted that most poisonings occurred in this age group, attributing the risk to poor supervision and unsafe storage of toxic materials [16]. Kohli U et al., (2008) observed that 63.9% of poisonings occurred between 1–3 years [17]. A slight male predominance (56%) was observed in our study, consistent with existing literature. Sil A et al., (2016) found that 62.5% of cases involved males [15], while Charan LS et al., (2023) reported a male-to-female ratio of 1.5:1 [16]. The higher incidence in boys is often explained by

gender-related behavioral differences, with boys being more physically exploratory.

The overwhelming majority of poisonings in our cohort (96%) were accidental in nature, with only 4% involving suicidal intent—limited to older children. These findings are in agreement with Sil A et al., (2016), who reported that 96.87% of poisonings were accidental15, and Kohli U et al. (2008), who found accidental poisoning in 93.4% of cases [17].

Oral ingestion was the most common route of exposure in our study (98%), in line with earlier studies. Sil A et al., (2016) and Kohli U et al., (2008) both reported ingestion as the predominant route of poisoning [15,17]. This finding reinforces the need for better household storage practices to reduce risk.

Regarding the nature of the toxic agents, the most frequently involved substances in our study were pharmaceutical drugs (52%), primarily paracetamol and thyroxine. This finding mirrors Sil A et al. (2016), who noted drugs as the leading cause (31.25%) of pediatric poisoning15. Detergents and household cleaning agents accounted for 30% of cases, again aligning with prior literature that highlights household items as significant contributors to unintentional poisonings in children.

Interestingly, mosquito repellents and liquids (8%) were more commonly involved than organophosphate and insecticidal agents (6%) in our study. While earlier studies such as Sil A et al. (2016) and Kohli U et al. (2008) observed a higher prevalence of insecticidal agents [15,17], our data suggest a shift in the pattern, potentially due to increased urban usage of repellents and improved regulation of agricultural chemicals. This trend necessitates increased awareness regarding the potential toxicity of mosquito repellent formulations when ingested by children. Outcomes in our study were favorable in most cases, with 90% of patients recovering and being discharged. Three children (6%) required referral to higher centers for advanced management due to complications, primarily following ingestion of organophosphates and insecticides. Unlike older studies where mortality ranged between 1–5% [15,16,18], our study recorded no deaths, possibly reflecting timely intervention, better supportive care, and fewer exposures to highly lethal agents like kerosene or industrial toxins. The shift in poisoning patterns from kerosene and agrochemicals to pharmaceuticals and household products reflects broader socioeconomic and lifestyle transitions in the region. Aryal S et al., (2024) observed that organophosphates were among the most common causes of poisoning-related deaths [19]. In our study, while organophosphates were still associated with severe toxicity, timely referral prevented fatalities.

## Conclusion

Pediatric poisoning continues to be a preventable yet prevalent medical emergency, especially in the vulnerable age group of 1–5 years.

The present retrospective study highlights that the majority of poisoning incidents were accidental and occurred at home, with oral ingestion of easily accessible substances such as medications, detergents, and insecticides being the most common cause. Male children were slightly more affected, and most cases presented within a manageable time frame, resulting in favorable outcomes when treated promptly.

Importantly, none of the children in this study died; however, 10% required referral to higher centers for specialized care, particularly in cases involving delayed presentation or severe toxicity. These findings underscore the urgent need for public health measures focusing on parental education, safe storage of hazardous substances, and community-based awareness programs. Strengthening poison surveillance systems and ensuring timely access to appropriate care can further reduce the burden of pediatric poisoning in resource-limited settings.

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