International Journal of Contemporary Pediatrics
Ravikumar SA et al. Int J Contemp Pediatr. 2025 Jul;12(7):1101-1105
http://www.ijpediatrics.com
pISSN 2349-3283 | eISSN 2349-3291

DOI: https://dx.doi.org/10.18203/2349-3291.ijcp20251860

Original Research Article

Profile of poisoning in children and adolescents at a tertiary care centre

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Received: 24 April 2025
Revised: 16 May 2025
Accepted: 22 May 2025

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ABSTRACT

Background: This study examines exogenous poisoning-related hospitalizations among children and adolescents at Chengalpattu medical college hospital. It aims to identify risk factors for unintentional poisoning in individuals aged 1-18 and assess clinical outcomes. Additionally, it seeks to characterize the types and outcomes of poisonings in this demographic.
Methods: A retrospective analysis was conducted using medical records of all admissions with confirmed poisoning diagnoses from January 1, 2022, to December 31, 2022, at Chengalpattu medical college hospital. Patients aged 1 to 18 years were included. Cases involving food poisoning, adverse drug reactions, and animal-related envenomation were excluded. Data collected included demographic details, type of poisoning, time to hospitalization, treatment given, and outcomes.
Results: Out of 2,123 total poisoning cases, 389 (18.3%) involved patients under 18 years. A majority were female (58.4%), with a mean age of 11.61 years. Most cases (64%) originated from rural areas. The leading agents were corrosives (52.5%), organophosphorus compounds (14.1%), and oleander (13.6%). Corrosive poisoning was predominant among children under five, indicating accidental ingestion. The median time to hospital admission was 3.29 hours, and the Glasgow coma scale score was 12.83. Medical management was successful in 98.9% of cases, while the overall mortality rate was 1%, with organophosphorus poisoning being the most fatal.
Conclusions: Preventive strategies and public education are essential, especially in rural areas, to reduce poisoning incidents. The study also highlights the growing concern of intentional poisonings and underlines the importance of mental health support for adolescents, particularly girls.

Keywords: Poisoning, Children, Adolescents, Treatment

INTRODUCTION

Accidental poisoning is a significant global health issue affecting children and teenagers, resulting in approximately 45,000 deaths annually and an incidence rate of 1.8 per 100,000 people. In 2014, it ranked as the tenth most common cause of death worldwide among individuals aged 15 to 19.[1]

Economically disadvantaged metropolitan areas often relay on pesticides to manage household pests during periods of high infestation. Various factors, including the length of time, frequency, and amount of exposure, as well as the inherent level of toxicity of the pesticide, influence the likelihood of human poisoning by pesticides. Human exposure frequently occurs in occupational or residential settings, either deliberately or

inadvertently through various channels, such as contaminated food, soil, air, water, or direct contact with a specific product.

According to a recent estimation, the global incidence of accidental acute pesticide poisonings is approximately 385 million instances per year, resulting in about 11,000 accidental deaths annually.[2] The number of deaths from pesticide suicides varies across estimates, ranging from 300,000 in earlier studies to more cautious, recent figures of 110,000 deaths annually. This accounts for approximately 13.7% of all global suicides.[3]

Young children, particularly those of pre-school age, spend most of their time at home, where they are at increased risk of accessing toxic substances and medications. The prevalence of unintentional poisoning in kids can be attributed to several factors, including caregivers limited understanding of substances toxicity, failure to recognize potential risks and inadequate supervision. Furthermore, the inadequate storage of cleaning products and medications amplifies the potential hazards for youngsters within the household.[4,5]

The occurrence of poisoning among adolescents is another significant concern. Adolescents have the potential to use substances, either intentionally or unintentionally, that adversely impact their life. Poisoning can be due to a diverse array of substances, encompassing pharmaceuticals, alcoholic beverages, home chemicals, and even naturally occurring toxins.

The incidence of accidental poisoning leading to mortality in children and adolescents is comparatively lower when compared to intentional poisoning. In 2012, a total of 392 deaths were recorded, out of which 40 were classified as accidental or non-intentional. Among these deaths, only 12 deaths occurred in individuals aged of 0-19 years, as indicated by sources.[6,7]

The objective of this study was to explore the characteristics of children and adolescents who were victims of either intentional or unintentional exogenous poisoning, specifically, it focuses on analysing the frequency and mortality rates of patients admitted to hospitals due to poisoning incidents. The investigation was conducted at Chengalpattu Medical College Hospital.

METHODS

We conducted a retrospective analysis using a purposive sampling technique of medical records for all adolescents admitted to the pediatric wards between January 1st, 2022, and December 31st, 2022, at Chengalpattu medical college hospital. Institutional ethical committee (IEC) approval was obtained for the study (No. IEC-CMC/Approval/19/2022). All individuals under the age of 18 with a confirmed diagnosis of poisoning were included. Cases involving food poisoning, toxic or idiosyncratic reactions to prescribed medications, snake bites, and scorpion stings were excluded.

Data were collected using a pre-designed form that recorded details such as age, gender, substance time of ingestion time, method of ingestion, time of symptom onset, time of hospital presentation, symptoms and signs, diagnostic tests, treatment measures, and outcomes. The collected information was entered into a Microsoft Excel spreadsheet for organization and analysis. Statistical analysis was performed using SPSS version 10.

RESULTS

During the study period, a total of 2,123 poisoning cases were examined and admitted. Of these, 18.3% (389 cases) involved individuals aged 1 to 18 years. The mean age of the patients was 11.61±6.753 years, indicating a predominantly young patient population. The study particularly showed the discrepancy in poisoning cases across gender, with females comprising 58.4% and males comprising 41.6% (Figure 1). Approximately 64% of the cases originated from rural areas, suggesting that rural settings may be more vulnerable to poisoning incidents, possibly due to factors such as less access to healthcare or awareness of hazardous substances.

The average duration from poison intake to hospital admission was approximately 3.29±2.28 hours, highlighting variability in the time taken for patients to receive medical attention. The average Glasgow coma scale (GCS) score at admission was 14.82 (±0.903), indicating that most of patients were in a stable state of consciousness upon hospital arrival. The mean hospitalization periods were 2.46±2.505 days, with wide range reflecting varying levels of poisoning severity.

The most prevalent type of poisoning was caused by corrosive substances, affecting 52.5% of the study population, followed by organophosphorus compound (OPC) poisoning at 14.1% and oleander poisoning at 13.6%. Among the youngest demographic, those below 5 years old, corrosive poisoning was particularly common, accounting for 59.7% of the cases, indicating a specific risk factor for this age group likely related to accidental ingestion. In contrast, poisoning among adolescents (11-18 years old), especially females, poisoning was often intentional or associated with suicidal motives, highlighting a critical role of the need for targeted mental health intervention (Table 1) (Figure 2).

The treatment outcomes were generally positive, with 98.9% of the 389 cases in the 1 to 18-year-old age group successfully treated and discharged. However, OPC poisoning was the leading cause of death among poisoning types, underscoring its lethality. The overall case fatality rate was 1%, indicating that while patients recovered, poisoning still carries a small but significant risk of mortality (Table 2).

Table 1: Factors associated with type of poisoning.

Variables		Rat killer	Tablet poison	OPC and other pesticides	Corrosives	Oleander and other plants	Unknown compound	Chi square value and p value
Age group (in years)	Under 5 (n=124)	1 (3.1%)	11 (23.9%)	4 (7.3%)	74 (59.7%)	0 (0.0%)	34 (8.7%)	113.928, 0.000
	6 to 10 (n=17)	3 (9.4%)	0 (0.0%)	5 (9.1%)	5 (4%)	1 (1.9%)	3 (0.7%)	
	Adolescent 11 to 18 (n=284)	28 (87.5%)	35 (76.1%)	46 (83.6%)	124 (36.3%)	52 (98.1%)	42 (10.7%)	
Sex	Male	15 (46.9%)	7 (15.2%)	19 (34.5%)	59 (47.6%)	27 (50.9%)	34 (8.7%)	18.641, 0.005
	Female	17 (53.1%)	39 (84.8%)	36 (65.5%)	65 (52.4%)	26 (49.1%)	79 (20.3%)	

Table 2: Binary logistic regression.

Variables		Discharged (385)	Expired (4)	Chi square value	P value	Binary logistic regression p value (CI)
Age (in years)	Less than 10	141 (36.6%)	0 (0.0%)	2.29	0.13	0.871 (0.548-1.664)
	More than 10	244 (63.3%)	4 (100%)			
Sex	Male	161 (41.8%)	1 (25%)	0.45	0.49	0.396 (0.001-19.794)
	Female	224 (58.1%)	3 (75%)			
GCS	Mild	384 (99.7%)	0 (0.0%)	309.5	0.00	0.008 (0.107-0.718)
	Severe	1 (0.25%)	4 (100%)			

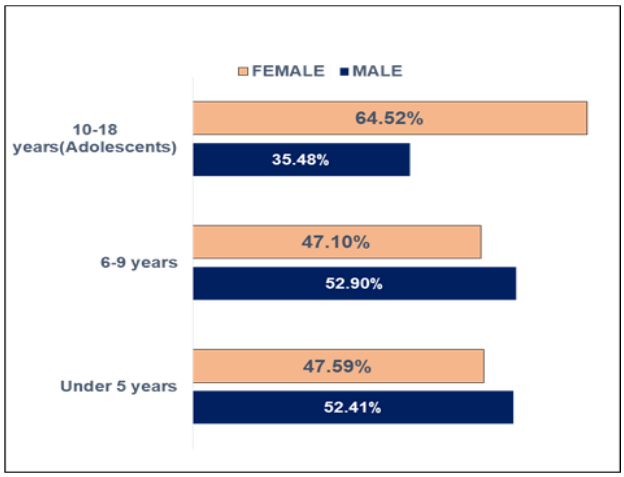

Figure 1: Age and sex distribution of study population.

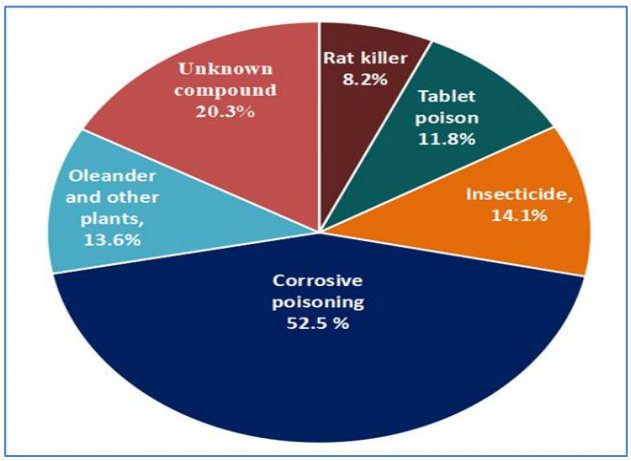

Figure 2: Pattern of poisoning in the study population.

DISCUSSION

Childhood poisoning is a significant cause of morbidity and mortality in paediatric patients in India. It is responsible for 0.33% to 7.6% of total admissions in paediatric wards at various hospitals across country.[8,9] However, our study reported a higher prevalence, with poisoning accounting for 18.3% of total admissions. Various studies from India and abroad show that childhood poisoning is more common in males but the present study did not support this finding, instead indicating a higher prevalence in females (58.4%) compared to males (41.6%).[9-12]

In the present study, the average time from intake to hospital admission was recorded as 3.29±2.28 hours. This relatively brief interval suggests that symptoms of poisoning manifest quickly, prompting victims or caregivers to seek immediate medical attention. However, the variation indicates that for some individuals, the delay could be significantly longer, potentially worsening the prognosis. Swift admission after poisoning is crucial for effective intervention, emphasizing the need for public education on the importance of rapid response to poisoning incidents.[13]

According to the present study, the GCS score upon admission was relatively high at 12.83±0.903, indicating that the majority of patients had a mild level of impaired consciousness upon arrival. Higher GCS scores, as observed in this study, are associated with better outcomes in poisoning cases, likely due to limited acute neurological damage.[14] These statistics emphasize the potential advantages of prompt medical intervention, which is likely a contributing factor in maintaining better GCS scores.

The current investigation revealed that the mean length of hospitalization was 2.46±2.505 days, indicating a significant variation in the severity and treatment requirements for poisoning incidents. Previous studies conducted in India and neighbouring areas have indicated that corrosive poisoning especially due to kerosene is the primary cause of the majority of childhood poisoning, accounting for 25-50% of cases.[9,15-17] Kerosene is often used as cooking fuel in low-income households and is commonly stored in soft drink bottles, making it easily accessible to children.

According to our findings, corrosives (52.5%), organophosphate compounds (OPCs) (14.1%), and oleander (13.6%) were the most frequently consumed substances. Recent research suggests that these compounds are often stored or labelled incorrectly, leading to accidental consumption, especially by children.[18] This is in line with the high number of corrosive poisonings. This necessitates more stringent laws and enhanced public awareness initiatives to avert such occurrences

The majority of poisoning incidents in children under the age of 6 were accidental, while in teenagers intentional self-poisoning, often associated with suicidal motives, was more prevalent.[9,19-21] Our data confirms that caustic poisoning is the most common type in children less than 5 years, accounting for 59.7% of occurrences. The finding is especially concerning due to the severe tissue damage and enduring difficulties linked to caustic substances, such as household cleaning products and acids. These drugs are frequently stored inadequately, rendering them easily accessible to youngsters.[22] There is an urgent requirement for parental consciousness and more stringent rules regarding the packaging of these potentially dangerous substances.

Our data indicates a concerning pattern among adolescents aged 11 to 18 years, where the act of ingesting poison is often intentional. There is a notable difference between gender, with a higher occurrence in females. This pattern may indicate underlying mental health conditions, such as depression or anxiety, which are known to have a greater impact on adolescent females compared to other groups.[23] These findings indicate the significance of incorporating mental health services into educational systems to offer timely intervention and assistance for this susceptible population.

The treatment outcomes reported in our study are promising, as 98.9% of the 389 instances analyzed resulted in effective treatment and discharge. This high recovery rate highlights the effectiveness of contemporary medical interventions and the advantages of prompt and efficient healthcare services in managing poisoning cases.[24]

However, despite these positive outcomes, the high fatality rate of OPC poisoning continues to be a significant concern. The presence of OPCs, which are frequently employed as pesticides, poses a significant risk to neurological health due to their severe neurotoxic properties. Previous study suggested that the availability of OPCs in agricultural environments may be a contributing factor to the elevated mortality resulting from poisoning. This highlights the immediate necessity for more stringent regulatory measures, enhanced dissemination of knowledge on proper management of pesticides, and potentially creation of safer substitutes.[25]

The overall case fatality rate (CFR) of 1% in our study, though relatively low, still represents a significant public health concern. Each poisoning-related death is preventable, and this statistic should prompt further analysis into specific factors that contribute to fatal outcomes. Additionally, it calls for enhanced community and professional awareness programs aimed at both prevention and improved management of poisoning cases.

Limitations

The lack of assessment of psychosocial factors, such as family context and mental health status, limits understanding of the root causes of intentional poisoning. Moreover, study was limited to 1-year period and did not capture seasonal or long-term trends in poisoning cases.

CONCLUSION

These findings emphasize the need for preventive measures and educational programs, particularly targeted at high-risk groups such as young children and adolescents. Efforts should prioritize improving safety in rural areas, where the prevalence of poisoning is higher, and increasing public awareness of the dangers of specific toxic substances. Moreover, the link between intentional poisoning and mental health in adolescents, especially among females, calls for enhanced support systems and accessible mental health services to address these issues proactively.

ACKNOWLEDGEMENTS

The authors would like to thank to former Dean, Dr. Narayanasamy Krishnasamy, Dr. Lokesh, a postgraduate student, and all the staff of the multidisciplinary research unit at Chengalpattu medical college for their constant support in completing this project.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Ravikumar SA, Arivoli K, Parameshwari P, Dhakshayani RV, Jayanthi R, Sara S, et al. Profile of poisoning in children and adolescents at a tertiary care centre. Int J Contemp Pediatr 2025;12:1101-5.