e-ISSN: 0976-822X, p-ISSN:2961-6042

Available online on http://www.ijcpr.com/

International Journal of Current Pharmaceutical Review and Research 2026; 18(4); 1039-1044

Original Research Article

A Retrospective Observational Study on Acute Poisoning cases and their outcome in a Tertiary care hospital

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Received: 16-02-2026 / Revised: 15-03-2026 / Accepted: 17-04-2026
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Conflict of interest: Nil

Abstract:

Background: Acute Poisoning is a major public health problem in India. It is one of the most common medical conditions which requires emergency management to prevent patient mortality. This study was aimed to generate the clinico - epidemiological profile of acute poisoning cases admitted in the emergency department of a tertiary care hospital.

Aim: To conduct a retrospective observational study on acute poisoning cases and their outcome in a tertiary care hospital.

Methods: A retrospective observational research study of all registered poisoning cases managed at the emergency department of Government General Hospital, Machilipatnam was conducted from January to June 2025. Collected data was analyzed using descriptive and inferential statistics. The obtained results were stated as frequency, percentage, and Chi-square analysis.

Results: Among 100 poisoned selected patients, 36% were organophosphate poisoning, belonging to the age group of 18–50 years. The most common route of poisoning seen is ingestion (94%). Suicidal poisoning was noted in majority of the patients (60%). The main reason for poisoning was marital disharmony 50.62% and 16.2% patients were put on ventilator life support during treatment. Recovered and discharged from the hospital was seen in 82% of patients and death witnessed in 8% of poisoned patients. The patient outcome was found to be significantly associated with type of poisoning ($P < 0.001$) and motive of poison consumption ($P < 0.001$).

Conclusion: This study has done to contribute added evidence concerning the clinico-epidemiological profile and consequences of acute poisoning patients admitted in Government General Hospital, Machilipatnam.

Keywords: Acute Poisoning, Emergency Department, Retrospective Observational Study and Organophosphate Poisoning.

DOI: 10.25258/ijcpr.18.4.166

Introduction

Acute poisoning is a common reason for visits to emergency department and hospitalizations worldwide, and it is a common cause of morbidity and mortality. Understanding the epidemiology of poisoning and its changes is important to both emergency physicians and public health practitioners. Poisoning may occur either intentionally or unintentionally. [1-3]

The incidence of poisoning cases is increasing due to changes in the lifestyle and social behaviour of humans. The prevalence and types of poisoning vary considerably across the world and depends on socioeconomic status and cultural practices, as well as on local industrial and agricultural activities. Household chemical agents and prescribed drugs are the most common poisoning agents in the developed world, agrochemicals are the most common poisoning agents in developing countries.[4]

Poisoning is very common in developing countries, and because of the weak regulations and poor health-care services, the consequences of poisoning are much worse than in the developed world. Pesticides are the most common chemicals used to inflict self-harm in developing countries.[5]

Management of acute poisoning consists of prevention of cross-contamination, identification of toxins through history or physical examination, supportive symptomatic care, decontamination, elimination, and antidote therapy.[6]

The nature of poison used varies in different parts of the world and may vary even in different parts of the same country depending on the socioeconomic factors and cultural diversity. It is important to know the nature and severity of poisoning in order to take prompt appropriate measures to save lives and reduce morbidity and mortality.[7]

As a result, this study was conducted to determine the pattern of acute poisoning cases and their management at the emergency department of Government General Hospital, Machilipatnam.

Methods and Materials

Study Site: The study was conducted at the emergency department of Government General Hospital, Machilipatnam from January 1st to June 30, 2025. The hospital provides specialized health services to the surrounding population. It has different departments such as, General medicine, General surgery, Obstetrics and Gynecology, Pediatrics and Neonatal care, Orthopedics, ENT, Opthalmology, Psychiatry, Skin & STD, Central lab , X-ray, CT, MRI and Pharmacy.

Study Design: A retrospective observational study design was used.

Source of Population: All patients who had visited the emergency department of Government General Hospital, Machilipatnam due to acute poisoning are the source population for this study.

Study Population: There were a total of 220 registered poisoning cases listed in the registry of the emergency department during the study period, of which 100 cases had complete data, and were included in the study.

Inclusion and Exclusion Criteria

Inclusion Criteria: All acutely poisoned patients aged between 18yrs – 50yrs, who had visited the emergency department of Government General Hospital, Machilipatnam listed in the medical registry during the study period.

Exclusion Criteria: Acute poisoning cases with incomplete information on the patient card and aged less than 18yrs, more than 50yrs.

Statistical Analysis: SPSS Version 20 Software was used for statistical analysis. Descriptive statistical tools were used to report percentage and frequency distribution tables. One-way analysis of variance (ANOVA) followed by Tukey's post hoc multiple comparison test was used to compare

the frequency of poisoning cases across seasons. P-values <0.05 were considered statistically significant.

Ethical Consideration: This study was approved by the ethical review committee of SPV Government Medical College, Machilipatnam, NTR University of Health Sciences. Permission to conduct the study was granted from Government General Hospital, Machilipatnam. Confidentiality of patient - specific data was maintained throughout the study.

Results

Table 1: Demographic Profile of Poisoning Cases (N = 100)

Parameter	Category	Number of Cases (n)	Percentage (%)
Age (Mean)	-	-	34 years
Age Range	-	-	18–50 years
Most Affected Age	21–30 years	40	40%
Gender	Male	58	58%
	Female	42	42%

The majority of poisoning cases occurred in the age group of 21–30 years, accounting for 40% of the total sample, indicating that young adults are mostly vulnerable. The mean age of the affected individuals was 34 years. Male patients comprised a slightly higher proportion (58%) compared to females (42%), suggesting a gender difference in either exposure to or intent behind poisoning incidents.

Table 2: Distribution by Type of Poison Ingested

Type of Poison	Number of Cases (n)	Percentage (%)
Organophosphorus	36	36%
Drug Overdose	22	22%
Household Chemicals	15	15%
Alcohol	12	12%
Unknown Substances	10	10%
Carbon Monoxide	5	5%

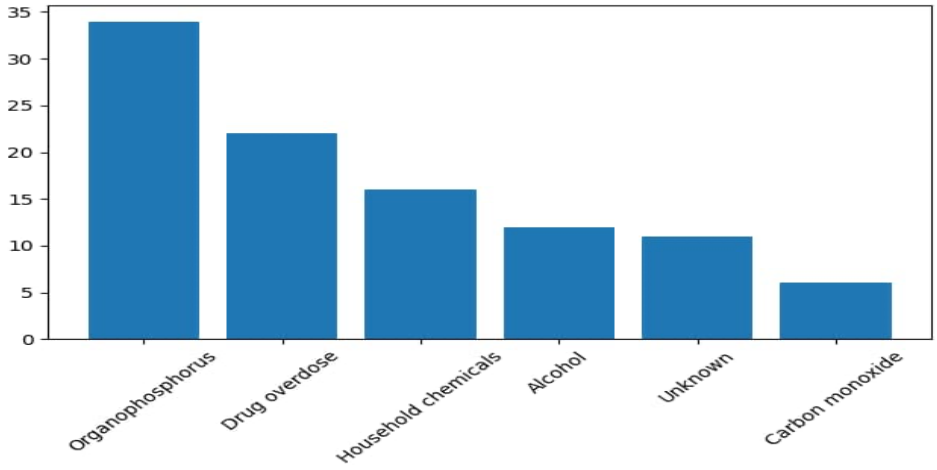

Figure 1: Distribution by Type of Poison Ingested

Organophosphorus compounds were the most common type of poison, seen in 36% of cases, indicating a significant agricultural or rural exposure pattern. Drug overdoses followed at 22%, reflecting possibly rising trends in self-medication or psychiatric illness. Household chemicals (15%) and alcohol (12%) also represented notable portions, often linked with accidental ingestion. Unknown substances and CO were involved in 10% and 5% of cases, pointing to the need for better identification and toxicology reporting.

Table 3: Mode of Poisoning

Mode	Number of Cases (n)	Percentage (%)
Suicidal	65	65%
Accidental	30	30%
Homicidal	5	5%

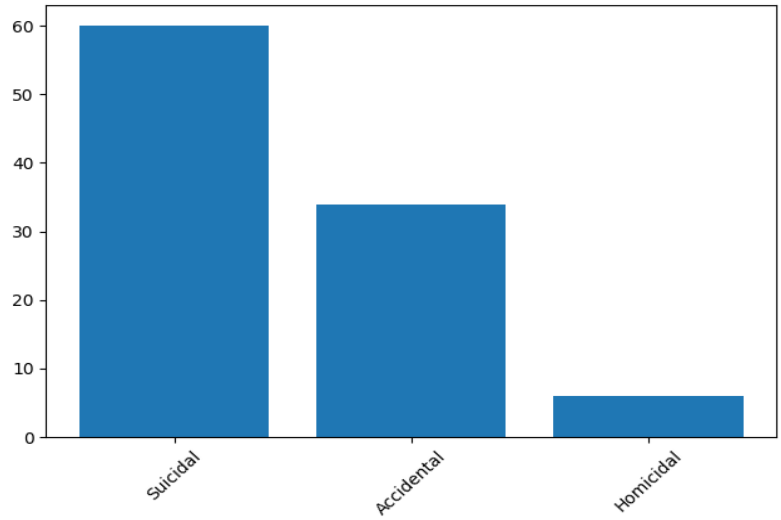

Figure 2: Mode of Poisoning

Suicidal poisoning was predominant mode accounting for 65%, highlighting the psychiatric and emotional factors contributing to poisoning incidents. Accidental cases were also significant (30%), especially among children and due to domestic exposure. Homicidal cases were rare (5%), but still indicate intentional harm in certain contexts. This distribution underscores the urgent need for mental health intervention and poison control education.

Table 4: Time Interval between Poisoning and Hospital Arrival

Time to Arrival	Number of Cases (n)	Percentage (%)
Within 1 hour	22	22%
1–4 hours	48	48%
After 4 hours	30	30%

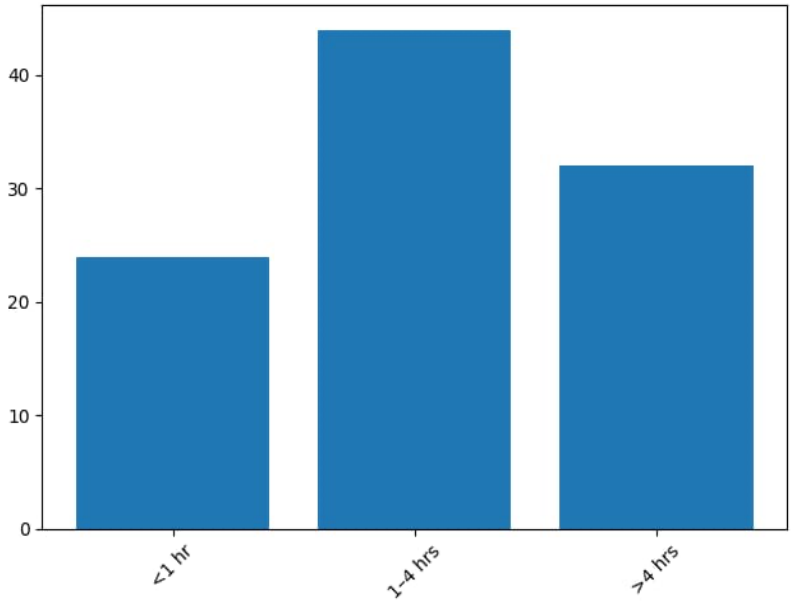

Figure 3: Time Interval between Poisoning and Hospital Arrival

Nearly half the patients (48%) arrived at the hospital within 1 to 4 hours of poisoning, while 22% presented within the first hour, suggesting moderate responsiveness. However, 30% arrived after more than 4 hours, which may negatively influence treatment outcomes. Delays in reaching medical care could be attributed to lack of awareness, transport issues, or rural settings.

Table 5: Treatment Outcome of Poisoning Cases

Outcome	Number of Cases (n)	Percentage (%)
Recovered	82	82%
Referred	10	10%
Death	8	8%

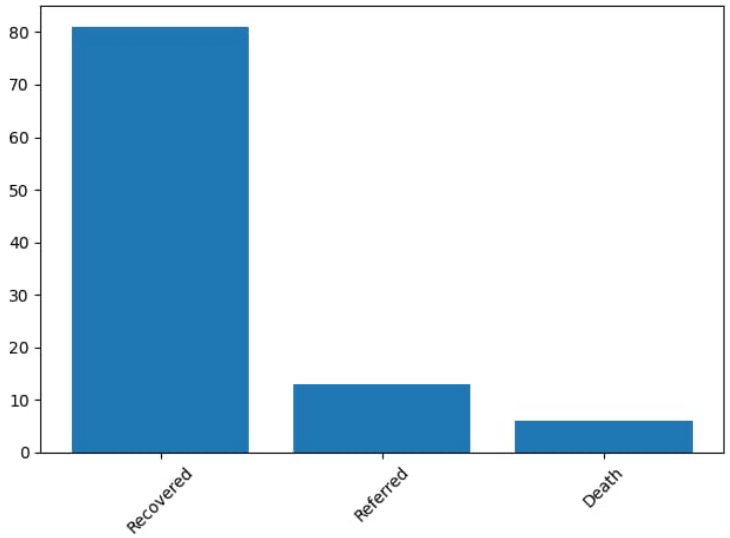

Figure 4: Treatment Outcome of Poisoning Cases

The majority of patients (82%) recovered, indicating effective treatment protocols and early interventions. However, a mortality rate of 8% is clinically significant and emphasizes the need for further preventive and management strategies. Additionally, 10% were referred to higher centers, possibly due to complications or lack of advanced care facilities on site.

Discussion

Comparison of Findings with Other Studies: The present study provides valuable insights into the pattern, demographics, and clinical outcomes of poisoning cases in a tertiary care hospital (GGH, Machilipatnam) over a period of six months. The most affected age group was 21–30 years, comprising 40% of the total cases, which aligns with the findings of studies by among young adults. This age group is often under significant personal and professional stress, possibly contributing to higher rates of intentional poisoning. The male-to female ratio in this study was 1.38:1, showing male predominance, which is consistent with prior studies and who attributed this trend to increased occupational exposure and risk-taking behaviour in males. Organophosphorus poisoning emerged as the most prevalent type (36%), consistent with other Indian studies where agricultural pesticides are easily accessible due to unregulated distribution. [8] For example, a study conducted in rural Maharashtra reported organophosphates in over 40% of poisoning cases, reinforcing the role of environmental and occupational factors.[9] Drug overdose (22%) and household chemicals (15%) were the next most common, in line with the global increase in self-medication and access to over-the counter drugs.[10] Suicidal intent was the most common mode of poisoning (65%), a finding echoed in numerous national and international reports.[11] For instance, research by found a similar proportion (around 60%) of intentional poisoning. The high rate of suicide - related poisonings underscores the urgent need for mental health screening, community counselling and suicide prevention programs.[12]

Interpretation of Significant Associations: The time to hospital arrival significantly influenced treatment outcomes. Patients who arrived within the first hour had better recovery rates, while those presenting after 4 hours were more likely to experience complications or poor outcomes. This is consistent with the findings of Sharma et al., who demonstrated that delayed medical intervention increases mortality risk in acute poisoning cases.[13] The study also found that organophosphorus and carbon monoxide poisoning were associated with more severe symptoms, often requiring intensive care. The mortality rate of 8% in this study, though lower than some studies e.g., Jain et al [14] reported 12%, still represents a substantial burden. Most deaths occurred in patients who either consumed highly toxic substances or presented late to the hospital. Notably, referred cases (10%) were often due to complications beyond the scope of the emergency department, such as multiorgan failure or need for ventilatory support.[15]

Implications: The findings of this study have multiple implications for clinical practice, hospital administration, and public health policy. Clinically, early recognition of poisoning symptoms, combined with the timely use of antidotes and supportive care, plays a critical role in improving survival rates. The prevalence of pesticide - related poisoning calls for strict regulation on sale and use of such substances. Moreover, there is a need to promote poison information centers and awareness campaigns to educate the public about the dangers of common toxic substances found in homes and workplaces. From a public health perspective, addressing high rate of suicidal poisoning requires targeted mental health initiatives, especially for vulnerable populations like young adults. Integration of mental health services into primary care, as well as crisis helplines and community outreach programs, could significantly reduce the incidence of deliberate self-harm.

Strengths of the Study: One of the strengths of this study is its retrospective design, allowing for a comprehensive analysis of trends and outcomes over time. The sample size, though moderate, was adequate to highlight key patterns and associations. Additionally, data were collected using a standardized abstraction form, ensuring consistency in information capture. The study also benefits from being conducted in a tertiary care setting, which typically receives a wide variety of poisoning cases, providing a broader perspective than primary or secondary care centers. The use of electronic health records further improved data accuracy and reduced the chance of information loss.

Conclusion

This retrospective analysis of poisoning cases over a six month period in a tertiary care hospital highlights alarming prevalence and severity of poisoning, particularly among young adults aged 21 to 30 years. This study reveals that organophosphates were most commonly implicated toxic agents, primarily due to their widespread use in agriculture and easy accessibility, especially in rural settings. The predominance of suicidal intent in 65% of cases underscores the pressing need for mental health awareness, early psychological intervention, and integration of mental health services into primary healthcare systems. Furthermore, association between delayed hospital presentation and poorer clinical outcomes

emphasizes critical importance of timely medical intervention in reducing morbidity and mortality associated with poisoning. The study also brings attention to role of socio-economic and occupational factors in influencing both type and intent of poisoning. The presence of drug overdoses and household chemical exposure highlights a growing concern about lack of regulation and safe storage practices at home. A coordinated approach involving public health education, regulation of hazardous substances, and improved poison surveillance systems is crucial. Strengthening poison control centers, providing training to healthcare workers in toxicology management, and initiating community-based outreach programs can serve as key strategies in addressing this challenge. Additionally, future healthcare policies should focus on establishing and enhancing rapid response systems, especially in rural and semi-urban areas where access to emergency care remains limited. Emergency transport services, better referral linkages, and awareness campaigns at grassroots level can collectively reduce delays in treatment and prevent avoidable deaths. Overall, findings of this study underscore the urgent need for a multifaceted approach combining healthcare, policy, education, and community engagement to effectively manage and prevent poisoning cases.

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