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Sociodemographic and Clinical Profile of Poisoning Cases Presenting to the Emergency Department: A Hospital-Based Descriptive Cross-Sectional Study

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Abstract

Background:

Acute poisoning is a common emergency presentation and remains an important preventable cause of morbidity and mortality in India. Regional data are essential for identifying vulnerable groups, common toxic agents, treatment needs, and outcome patterns.

Objectives:

To assess the sociodemographic profile, poisoning-related characteristics, clinical presentation, management, and outcomes of poisoning cases presenting to the emergency department.

Methods:

This hospital-based descriptive cross-sectional study was conducted in the emergency department of Government Medical College, Quthbullapur, Medchal-Malkajgiri, Telangana, India, from 1 August 2024 to 31 January 2026 (18 months). Using consecutive sampling, 100 eligible acute-poisoning cases were enrolled. Sociodemographic characteristics, toxic agent, mode and route of exposure, time to hospital arrival, clinical manifestations, severity, management, hospital stay, and outcome were summarized using descriptive statistics.

Results:

The mean age was 32.8 ± 14.6 years; 32 (32.0%) patients were aged 21–30 years. Males accounted for 56 (56.0%) cases, rural residents for 62 (62.0%), and married individuals for 61 (61.0%). Pesticides/organophosphorus compounds were the leading agents [38 (38.0%)], followed by drug overdose [18 (18.0%)] and household chemicals [14 (14.0%)]. Suicidal poisoning occurred in 68 (68.0%) cases, and oral ingestion was reported in 92 (92.0%). Nausea/vomiting was the most frequent manifestation [68 (68.0%)]. Intensive care admission and ventilatory support were required in 24 (24.0%) and 14 (14.0%) patients, respectively. Overall, 89 (89.0%) recovered and were discharged, while 6 (6.0%) died.

Conclusion:

Poisoning predominantly affected young adults, males, rural residents, and agriculture-related groups. Pesticide poisoning and suicidal exposure were the major patterns, underscoring the need for preventive and emergency care strengthening.

Recommendations:

Community-level poison prevention, safe pesticide storage, mental health screening, rapid referral, and emergency preparedness should be strengthened in rural and semi-urban settings.

Keywords: *Acute poisoning; Emergency department; Organophosphorus compounds; Pesticide poisoning; Suicidal poisoning; Descriptive cross-sectional study.*

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Introduction

Acute poisoning is a common medical emergency in low- and middle-income countries and contributes to emergency attendance, hospitalisation, intensive care use, and preventable mortality. The clinical spectrum includes exposure to pesticides, pharmaceutical agents, household chemicals, corrosives, rodenticides, plant toxins, and mixed or unidentified substances. Outcome is influenced by the toxic agent and dose, route and intent of exposure, delay before treatment, prehospital measures, early decontamination, antidote availability, and access to cardiorespiratory support [1–3].

Poisoning patterns differ across regions because agricultural practices, occupational risks, household storage, access to medicines, socioeconomic conditions, and psychosocial stressors are not uniform. Indian hospital-based studies frequently report a substantial burden among young adults and males, although women, students, homemakers, agricultural workers, and children also contribute to the caseload. Pesticides and organophosphorus compounds remain prominent in many agricultural settings, while drug overdose, corrosives, rodenticides, and household chemicals are increasingly recognised [1–5].

Self-poisoning with pesticides is especially relevant in South Asia because highly toxic products may be accessible within homes and farms. Organophosphorus exposure can produce cholinergic manifestations, altered sensorium, respiratory failure, and haemodynamic instability, requiring rapid resuscitation, atropine therapy, oximes in selected patients, and ventilatory support [5–10]. Local epidemiological data are therefore necessary for antidote procurement, emergency staffing, referral planning, critical-care preparedness, and targeted prevention.

The objective of this study was to describe the sociodemographic characteristics, poisoning-related profile, clinical manifestations, severity, management requirements, hospital stay, and outcomes of acute-poisoning cases presenting to the emergency department of Government Medical College, Quthbullapur, Telangana, India.

Methodology

Study design and setting

A hospital-based descriptive cross-sectional study was conducted in the emergency department of Government Medical College and its attached Government General Hospital, Quthbullapur, Medchal-Malkajgiri district, Telangana, India, from 1 August 2024 to 31 January 2026, covering 18 months. The institution is a government teaching centre serving Quthbullapur, other parts of Medchal-Malkajgiri district, and adjoining northern Hyderabad. The attached hospital has an approximately 500-bed service capacity and provides 24-hour emergency care, outpatient and inpatient services, general medicine, general surgery, obstetrics and gynaecology, paediatrics, orthopaedics, dermatology, ophthalmology, otorhinolaryngology, anaesthesia, radiology, laboratory diagnostics, and critical-care referral. Its catchment includes urban, semi-urban, industrial, and nearby rural communities, including patients referred from peripheral government facilities.

Study population and eligibility criteria

All patients presenting to the emergency department with a history or clinical diagnosis of acute poisoning during the study period were screened. Patients were included when poisoning was due to oral, inhalational, or dermal exposure to pesticides, drugs, household chemicals, rodenticides, corrosives, plant toxins, or unknown/mixed agents. Patients brought dead to the hospital, cases with chronic occupational toxicity without acute exposure, food-borne gastroenteritis without toxicological exposure, and records with insufficient core clinical data were excluded.

Sample size and sampling technique

The sample size was calculated using the single-population proportion formula: $n = Z^2p(1-p)/d^2$. At a 95% confidence level, $Z = 1.96$. Because a reliable recent local estimate was unavailable, p was taken as 0.50 to obtain the maximum sample size, and the absolute precision (d) was set at 0.10. Thus, $n = (1.96^2 \times 0.50 \times 0.50)/(0.10^2) = 96.04$. The minimum sample was rounded to 97 and increased to 100 to allow for incomplete information. Consecutive sampling was used, and every eligible patient presenting during the study period was approached until 100 complete records were obtained.

Data collection procedure

Data were collected using a structured proforma after initial stabilization. Information was obtained from the patient, attendant, referral note, poison container, prescription strips, and hospital record, wherever available. Variables included sociodemographic details, poison characteristics, time to arrival, presenting features, severity, key interventions, ICU admission, ventilatory support, hospital stay, and final outcome.

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Bias

Potential selection bias was reduced through consecutive enrolment of all eligible cases. Information bias was limited by using a pretested structured proforma, uniform operational definitions, and multiple sources of exposure history, including the patient, attendant, referral note, poison container or medicine strip, and hospital record. Severity was assessed using the same predefined clinical criteria for all participants. Data entries were checked against source records before analysis, and no enrolled participant was selectively removed on the basis of poison type, severity, or outcome. Recall bias could not be eliminated completely and is acknowledged as a limitation.

Clinical definitions and severity assessment

The mode of poisoning was categorized as suicidal, accidental, homicidal, or undetermined using history and medico-legal documentation. Severity at admission was classified as mild, moderate, or severe using sensorium, hemodynamic status, respiratory involvement, neurological manifestations, and organ-support requirement, consistent with standardized poisoning severity assessment [11].

Management protocol

All cases received emergency assessment of airway, breathing, circulation, disability, and exposure. Decontamination, gastric lavage, activated charcoal, oxygen, intravenous fluids, vasopressor support, seizure control, and antidotes were provided according to poison type, time since exposure, clinical condition, and physician judgment. Organophosphorus poisoning was managed with atropine-based resuscitation, supportive care, and oxime therapy where indicated [10].

Statistical analysis

Data were entered into a spreadsheet and analysed descriptively. Continuous variables were expressed as mean with standard deviation. Categorical variables were summarized as frequency and percentage. As the study was primarily descriptive, no inferential comparison was planned. Tables were prepared to present the sociodemographic profile, poisoning-related characteristics, clinical manifestations, severity, management, and outcomes.

Ethical considerations

The study was conducted after approval from the Institutional Ethics Committee, GMC Quthbullapur, Medchal, Telangana, India. Written informed consent was obtained from patients or legally acceptable representatives, as appropriate.

Results

Participant flow

A total of 100 consecutive eligible patients with acute poisoning were enrolled, and complete data were available for all 100 participants included in the final analysis. The source records used for this manuscript did not contain a screening log showing the total number of poisoning presentations assessed before enrolment or the number excluded under each prespecified criterion. Consequently, these pre-enrolment counts are reported as not documented rather than estimated. No participant was excluded after enrolment (Figure 1).

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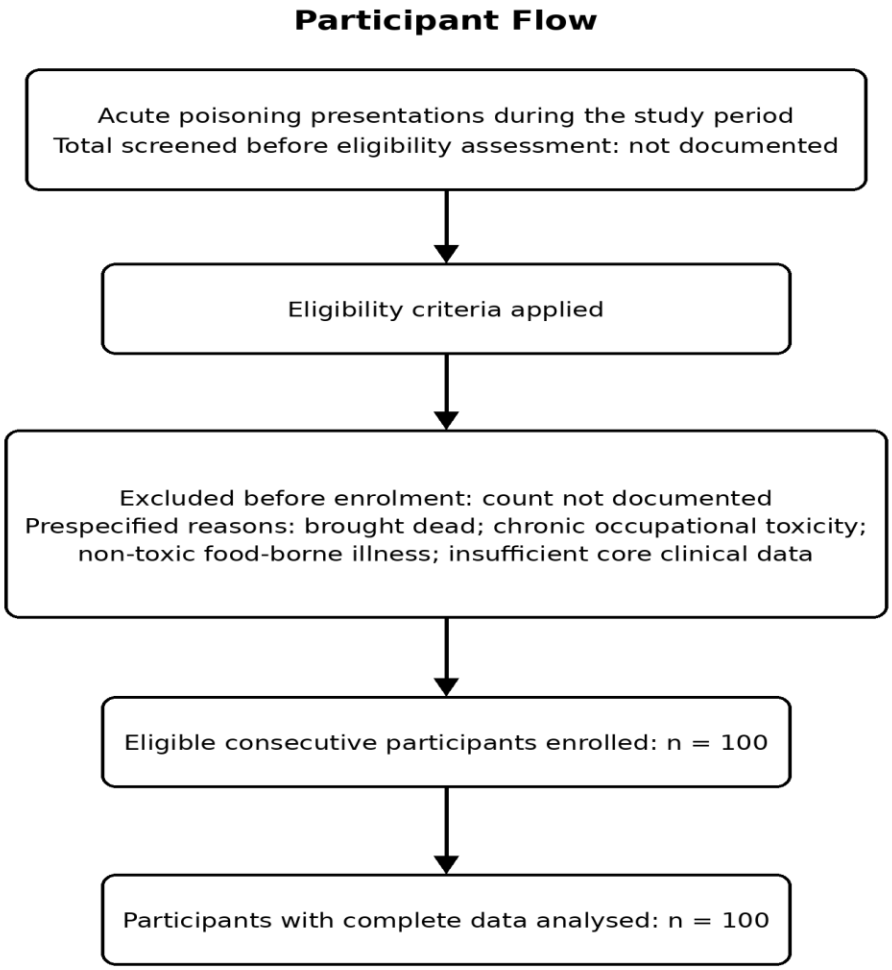

Figure 1. Flow of participants through the study.

Among the 100 analysed patients, the mean age was 32.8 ± 14.6 years. The 21–30-year group contained 32 (32.0%) cases, followed by 24 (24.0%) in the 31–40-year group. There were 56 (56.0%) males and 44 (44.0%) females. Rural residents accounted for 62 (62.0%), and 61 (61.0%) patients were married. Agricultural workers [30 (30.0%)] and homemakers [24 (24.0%)] were the largest occupational groups (Table 1).

Table 1 *Sociodemographic Profile of Poisoning Cases (N = 100)*

Variable	Category	Number	Percentage
Age group	≤10 years	6	6.0
	11–20 years	14	14.0
	21–30 years	32	32.0
	31–40 years	24	24.0

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Variable	Category	Number	Percentage
	41–50 years	14	14.0
	>50 years	10	10.0
Sex	Male	56	56.0
	Female	44	44.0
Residence	Rural	62	62.0
	Urban	38	38.0
Marital status	Married	61	61.0
	Unmarried	39	39.0
Occupation	Agricultural worker	30	30.0
	Homemaker	24	24.0
	Labourer	16	16.0
	Student	12	12.0
	Private/government employee	10	10.0
	Unemployed/others	8	8.0

Pesticides/organophosphorus compounds were identified in 38 (38.0%) cases, followed by drug overdose in 18 (18.0%), household chemicals in 14 (14.0%), and rodenticides in 10 (10.0%). Poisoning was suicidal in 68 (68.0%) patients, accidental in 27 (27.0%), and homicidal or undetermined in 5 (5.0%). Eighty-two (82.0%) patients reached the emergency department within 6 hours, including 18 (18.0%) within 1 hour, 36 (36.0%) within 1–3 hours, and 28 (28.0%) within 3–6 hours. Oral ingestion was the route in 92 (92.0%) cases (Table 2).

Table 2 *Poisoning-Related Characteristics (N = 100)*

Variable	Category	Number	Percentage
Type of poison	Pesticides/organophosphorus compounds	38	38.0
	Drug overdose	18	18.0
	Household chemicals	14	14.0
	Rodenticide	10	10.0
	Corrosive agents	7	7.0
	Plant/other toxin	5	5.0
	Unknown/mixed poison	8	8.0
Mode of poisoning	Suicidal	68	68.0
	Accidental	27	27.0
	Homicidal/undetermined	5	5.0
Time to hospital arrival	≤1 hour	18	18.0
	1–3 hours	36	36.0
	3–6 hours	28	28.0
	>6 hours	18	18.0

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Variable	Category	Number	Percentage
Route of exposure	Oral ingestion	92	92.0
	Inhalational/dermal exposure	8	8.0

Nausea/vomiting was reported in 68 (68.0%) patients, altered sensorium in 32 (32.0%), excessive salivation or sweating in 28 (28.0%), abdominal pain in 24 (24.0%), and respiratory distress in 18 (18.0%). Hypotension and seizures occurred in 12 (12.0%) and 7 (7.0%) patients, respectively. Poisoning severity was mild in 43 (43.0%), moderate in 37 (37.0%), and severe in 20 (20.0%) cases (Table 3).

Table 3 *Clinical Presentation and Severity of Poisoning (N = 100)*

Clinical variable	Category	Number	Percentage
Presenting symptoms/signs*	Nausea/vomiting	68	68.0
	Altered sensorium	32	32.0
	Excessive salivation/sweating	28	28.0
	Abdominal pain	24	24.0
	Respiratory distress	18	18.0
	Hypotension	12	12.0
	Seizures	7	7.0
Severity at admission	Mild	43	43.0
	Moderate	37	37.0
	Severe	20	20.0

Note. Multiple responses were possible for presenting symptoms and signs.

Gastric lavage was performed in 52 (52.0%) patients, activated charcoal was given to 40 (40.0%), and a specific antidote was administered to 35 (35.0%). Intensive care admission was required for 24 (24.0%) patients, while 14 (14.0%) received ventilatory support. Forty-two (42.0%) patients stayed for ≤3 days and 40 (40.0%) for 4–7 days. Recovery and discharge occurred in 89 (89.0%), 5 (5.0%) were discharged against medical advice or referred, and 6 (6.0%) died (Table 4).

Table 4 *Management and Clinical Outcomes (N = 100)*

Variable	Category	Number	Percentage
Gastric lavage	Yes	52	52.0
	No	48	48.0
Activated charcoal	Yes	40	40.0
	No	60	60.0
Specific antidote given	Yes	35	35.0
	No	65	65.0
ICU admission	Required	24	24.0
	Not required	76	76.0
Ventilatory support	Required	14	14.0
	Not required	86	86.0
Duration of hospital stay	≤3 days	42	42.0

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Variable	Category	Number	Percentage
	4–7 days	40	40.0
	>7 days	18	18.0
Final outcome	Recovered and discharged	89	89.0
	Discharged against medical advice/referred	5	5.0
	Death	6	6.0

Overall, the profile was characterised by young adults aged 21–30 years [32 (32.0%)], males [56 (56.0%)], rural residents [62 (62.0%)], agricultural workers [30 (30.0%)], pesticide/organophosphorus exposure [38 (38.0%)], and suicidal intent [68 (68.0%)]. Although 89 (89.0%) patients recovered, severe poisoning occurred in 20 (20.0%), ICU admission in 24 (24.0%), ventilatory support in 14 (14.0%), and death in 6 (6.0%).

Discussion

This descriptive cross-sectional study included 100 acute-poisoning cases. The largest age group was 21–30 years [32 (32.0%)]; 56 (56.0%) patients were male, 62 (62.0%) lived in rural areas, and 30 (30.0%) were agricultural workers. Pesticides/organophosphorus compounds were the principal agents [38 (38.0%)], suicidal exposure accounted for 68 (68.0%), and oral ingestion for 92 (92.0%). Nausea/vomiting occurred in 68 (68.0%), while 20 (20.0%) had severe poisoning. ICU admission was required in 24 (24.0%), ventilatory support in 14 (14.0%), and mortality was 6 (6.0%). These findings indicate that poisoning in this setting is concentrated among economically active adults and is strongly linked to deliberate ingestion of readily available toxic substances.

Young adults may be disproportionately represented because this life stage combines occupational pressure, family conflict, financial stress, impulsive behaviour, and greater access to medicines or agricultural chemicals. The male proportion in the present study (56.0%) was lower than the 75.4% reported by Ramesha et al. in Karnataka but was close to the 59.5% reported by Aggarwal et al. in North India [1,3]. In contrast, Suganthi et al. observed a modest female predominance, illustrating how local social roles and referral patterns can change the sex distribution [2]. Rural residence in 62.0% and agricultural work in 30.0% further suggest that occupational and household availability of toxic products shaped the observed profile.

Pesticides/organophosphorus compounds accounted for 38.0%, which closely resembles the 36.0% organophosphorus contribution reported by Ramesha et al. but is lower than the pesticide-dominant proportions reported in some agricultural cohorts [1,5,14]. Drug overdose constituted 18.0%, demonstrating that pharmaceutical access is also clinically important. The predominance of suicidal intent (68.0%) is consistent with Indian studies in which deliberate self-poisoning forms the majority of acute cases, although Suganthi et al. reported a higher proportion of 86.8% [2]. Easy access, storage within homes or farms, acute psychosocial crises, and the lethality of selected pesticides may explain this pattern. Regulatory control of highly hazardous pesticides, locked storage, smaller pack sizes, and timely mental-health intervention are therefore relevant preventive measures [6–9].

The clinical manifestations reflected the mixed exposure pattern. Nausea/vomiting (68.0%), altered sensorium (32.0%), salivation or sweating (28.0%), and respiratory distress (18.0%) are compatible with gastrointestinal irritation, central nervous system depression, and cholinergic toxicity. One fifth of patients had severe poisoning, explaining the clinically important requirements for ICU care (24.0%) and ventilatory support (14.0%). Ramesha et al. reported respiratory support in 23.2% of organophosphorus/carbamate cases and an overall mortality of 15.4%, whereas the present mortality was 6.0% [1]. Published intensive-care cohorts have similarly shown that respiratory failure, delayed presentation, shock, and organ dysfunction are associated with adverse outcomes [12,13]. The comparatively lower mortality in the present study may be partly related to the finding that 82.0% reached the hospital within 6 hours and only 20.0% were classified as severe; however, this interpretation is cautious because the study did not perform adjusted outcome modelling.

The recovery rate of 89.0% supports the value of early stabilisation, poison-specific assessment, antidote availability, and escalation to intensive care when needed. Nevertheless, a 6.0% mortality and the need for organ support show that acute poisoning remains a substantial preventable emergency. The results are most applicable to government teaching hospitals serving urban, semi-urban, industrial, and rural populations in Telangana. Differences in poison availability, referral pathways, prehospital care,

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and ICU access limit direct extrapolation to the wider community. Prospective multicentre surveillance with verified compound identification, detailed exposure dose, psychiatric assessment, and longer follow-up would provide stronger regional evidence.

Conclusion

This hospital-based descriptive cross-sectional study found that poisoning cases presenting to the emergency department were predominantly young adults, males, rural residents, married individuals, agricultural workers, and homemakers. Pesticides, including organophosphorus compounds, were the leading toxic agents, and suicidal exposure was the most frequent mode. Oral ingestion was the principal route, and most patients reached the hospital within 6 hours. Nausea and vomiting, altered sensorium, cholinergic symptoms, abdominal pain, and respiratory distress were common clinical features. Although most patients recovered and were discharged, ICU admission, ventilatory support, and mortality occurred in a notable proportion. Strengthening early emergency care, safe pesticide practices, mental health support, and structured poison surveillance is essential in this setting.

Limitations

This study was conducted at a single hospital with 100 cases, limiting wider regional representation. The quantity of poison consumed, exact compound identity, prehospital treatment details, and psychiatric assessment were not uniformly available. Long-term follow-up after discharge was not included. Recall bias from attendants in emergency histories was also possible. Laboratory toxicology confirmation was unavailable for several cases, so classification relied on history, container evidence, and clinical judgment.

Recommendations

Hospitals serving rural populations should maintain poison management protocols, antidote stocks, activated charcoal, and referral pathways for severe cases. Emergency staff should receive periodic training in airway stabilization, organophosphorus poisoning management, and early identification of patients needing intensive care. Community education should focus on safe pesticide storage, restricted access to highly toxic compounds, use of labelled containers, and avoidance of household storage near food items. Screening for suicidal intent, counselling, psychiatric referral, and family-based support should become routine before discharge. Display of emergency algorithms in casualty areas is also useful. Local poison surveillance should be strengthened for preventive planning.

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Abbreviations

ED: Emergency Department;
ICU: Intensive Care Unit;
OP: Organophosphorus;
PSS: Poisoning Severity Score
SD: Standard Deviation.

Conflict of Interest

The authors declare no conflict of interest.

Source of funding

The study had no funding.

Author contributions: KSS (K. Sudhakar Suresh) conceptualised and designed the study, interpreted the findings, reviewed the literature, and critically revised the manuscript. MG (Mahender Gaddam) contributed to study design, data interpretation, literature review, preparation of the initial draft, and manuscript revision. AGJ (Archana Ganapuram Jagadishwar) contributed to the literature review, data interpretation, preparation of the initial draft, and critical revision. All authors approved the final manuscript and accept accountability for the work.

Data availability

Data available on request

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