Original Article

Profile of Poisoning Cases and Their Socio-Demographic Determinants in a Tertiary Care Hospital: A Hospital-Based Observational Study

Pusapati Prabhakar Varma[1], Manyam Srinivas[2], B. Vijaya[3]

[1]Associate Professor, Department of Community Medicine, Maharajah's Institute of Medical Sciences, Nellimarla, Vizianagaram, Andhra Pradesh, India

[2]Assistant Professor, Department of Microbiology, Maharajah's Institute of Medical Sciences, Nellimarla, Vizianagaram, Andhra Pradesh, India

[3]Assistant Professor, Department of Community Medicine, Maharajah's Institute of Medical Sciences, Nellimarla, Vizianagaram, Andhra Pradesh, India

Abstract

Background: Acute poisoning is a common poisoning emergency presentation in the Indian tertiary care hospital setting which is influenced by local toxic material availability, intent and social vulnerability characteristics. The objective is to present the clinical picture of poisoning cases and to determine the socio-demographic factors which predict intentional poisoning in patients admitted in a tertiary care hospital. **Material and Methods:** This observational study was carried out in a hospital in Nellimarla, Vizianagaram, Andhra Pradesh, India at the Maharajah's Institute of Medical Sciences, from March 2025 to August 2025. There were one hundred cases of poisoning admitted during the study period. Data from demographic variables, residence, marital status, education, occupation, socioeconomic status, poisoning agent, mode of poisoning, time to admission, management and outcome were analysed. Chi-square test was performed to assess the association of socio-demographic factors with intentional poisoning and $p<0.05$ was set as significant. **Results:** The mean age was 31.6 ± 12.4 years. The largest group was 20–29 years (36.0%), and males constituted 58.0%. Rural residents formed 64.0%. Household chemicals/corrosives (18.0%) and rodenticides (16.0%) were the second most frequent agents used, followed by organophosphorus compounds (34.0%). The percentages of suicidal poisoning, accidental exposure and occupational exposure were 68.0%, 24.0% and 8.0% respectively. Vomiting was the commonest symptom (62.0%). A total of 26.0% had to be admitted to ICU, 12.0% required mechanical ventilation and mortality was 5.0%. Age group, education and occupation and socioeconomic status were all significantly associated with intentional poisoning. **Conclusion:** The age group of young adults, males, rural residents, and lower/middle socioeconomic groups were mainly affected by poisoning. Organophosphorus compounds were the largest group of toxicants, with deliberate poisoning accounting for the bulk of the burden, highlighting the importance of prompt emergency treatment, safe handling of toxic substances and community measures in the prevention of poisoning.

Keywords: Poisoning, Organophosphorus, Intentional poisoning, Socio-demographic determinant, Tertiary care hospital, Observational study.

Received: 20 May 2026 **Revised: 05 June 2026** **Accepted: 29 June 2026** **Published: 10 July 2026**

Introduction

Acute poisoning is an immediately treatable and preventable form of morbidity and mortality. Contains deliberate and unintentional self-poisoning, accidental contact with toxic agents, occupational contact with toxic agents, and envenomation. Poisoning patterns vary by region, depending on the different chemicals that are found in homes, farms, workplaces, pharmacies and local markets. Agricultural chemicals, corrosives, household chemicals, rodenticides, and medicinal overdoses still are the most common forms of emergency presentations in low and middle income countries. Local hospital information is essential for triage planning, antidote stocking, critical care preparation and community prevention because of these differences.[1-4]

Pesticide self-poisoning has been the focus of special attention because of its significant role in deaths from unintentional suicides. Agrarian areas, particularly, where highly toxic products are kept in the home or field are a significant source of pesticide poisoning leading to death, whereas global reviews reveal pesticide ingestion is a major cause of fatal self-poisoning.[1,5,6] In addition, Indian data also reveal that poisoning is one of the main modes of suicide, where young adults have a high burden of suicide mortality.[5] Several agricultural compounds are also highly lethal and peripheral early decontamination is not available to rapidly respond to the culinary severity of these cases.[2,6]

Recurring patterns from Indian studies conducted in hospital settings have been reported that include poisoning among young adults, male, rural, married, farmers, students, and individuals who are exposed to household and agricultural stressors.[7-12] The incidence of organophosphorus compounds is regionally prominent in southern and rural India and drug overdose, corrosives, rodenticides, snake bite and aluminium phosphide

Address for correspondence: Dr. Pusapati Prabhakar Varma, Associate Professor, Department of Community Medicine, Maharajah's Institute of Medical Sciences, Nellimarla, Vizianagaram, Andhra Pradesh, India
E-mail: drprabhakarvarma@gmail.com

DOI:
10.21276/amit.2026.v13.i2.819

How to cite this article: Varma PP, Srinivas M, Vijaya B. Profile of Poisoning Cases and Their Socio-Demographic Determinants in a Tertiary Care Hospital: A Hospital-Based Observational Study. Acta Med Int. 2026;13(2):1040-1045.

are more prominent in specific regions.[7-14] The outcome is significantly influenced by the timing from the time of exposure to the time the patient arrives at the hospital, the type of poison, intent, the need for ventilation, and the availability of antidotes.[7,11,12,14] Thus, both toxicological and socio-demographic factors can be profiled to benefit clinicians and public health teams.

Tertiary hospitals have many cases of poisoning, but the factors involved in intentional poisoning are not consistent. Household composition, schooling, working status, living area and socio-economic status affect the ways people can be exposed to toxic agents. Poisoning also relates to seasonal farming and storage conditions of household chemicals in the rural and coastal areas, as well as to the referral distance from the hospital and differences in access to emergency care. A local profile helps clinicians to understand what agents are likely to be seen, plan the ICU resources required, stock and keep on hand antidote preparations, ensure good links with referrals, improve documentation of the events, and identify the need for periodic clinical audits to identify groups of patients who could benefit from being given preventive counselling in routine clinical practice. The present study aimed at describing the socio-demographic and clinical profile of poisoned cases admitted to a Tertiary Care Centre as well as to look at the socio-demographic determinants associated with intentional poisoning among the patients.

Materials and Methods

Study design and setting: This hospital-based observational study was conducted at Maharajah's Institute of Medical Sciences, Nellimarla, Vizianagaram, Andhra Pradesh, India. The institution functions as a tertiary care teaching hospital serving urban, semi-urban, and rural populations from Vizianagaram and adjoining districts. Patients with acute poisoning commonly present through the emergency department and are managed in medical wards, intensive care units, or specialty units according to clinical severity. The study period extended from March 2025 to August 2025.

Study population: All patients admitted with a history or clinical diagnosis of poisoning during the study period were screened. A total of 100 poisoning cases were included in the final analysis. Cases included intentional poisoning, accidental poisoning, and occupational toxic exposure. Patients with incomplete key records on poisoning agent, intent, or final outcome were excluded. Repeat admissions for the same poisoning episode were counted only once to avoid duplication.

Data collection: Data were collected using a structured case record proforma. Socio-demographic variables included age, sex, residence, marital status, educational status, occupation, and socioeconomic status. Poisoning-related variables included type of toxic agent, mode of poisoning, place of exposure, time interval from exposure to hospital arrival, presenting symptoms, gastric lavage, antidote therapy, ICU admission, mechanical ventilation, and final outcome. Clinical management was provided according to standard emergency and toxicology principles, including stabilization of airway, breathing, and circulation, decontamination where indicated, antidote therapy for relevant poisons, and respiratory support when required.[13,14]

Operational definitions: Intentional poisoning was defined as deliberate self-ingestion or self-exposure to a toxic substance. Non-intentional poisoning included accidental and occupational exposure. Time to presentation was grouped as <2 hours, 2-6 hours, and >6 hours. Socioeconomic status was recorded from the available clinical proforma and categorized as lower, middle, or upper. Mortality was defined as in-hospital death attributable to the poisoning episode or its complications.

Bias reduction: Selection bias was reduced by including consecutive eligible cases admitted during the defined study period. Information bias was minimized by using a uniform data extraction sheet and by cross-checking poisoning agent, intent, and outcome from admission notes, treatment records, and discharge summaries. Classification bias was reduced by using predefined categories for poisoning agent and mode of exposure.

Study size and statistical analysis: The study size of 100 cases was selected as a feasible consecutive sample from the defined six-month hospital admission period. Data were entered in a spreadsheet and analysed using descriptive statistics. Categorical variables were expressed as frequency and percentage. Continuous variables were expressed as mean and standard deviation. Associations between socio-demographic variables and intentional poisoning were assessed using the chi-square test. A p-value <0.05 was considered statistically significant.

Ethical considerations: Institutional Ethics Committee approval was obtained before initiation of the study.Patient confidentiality was maintained by anonymising records before analysis. The study followed standard ethical principles for observational clinical research.

Results

A total of 100 poisoning cases admitted to the tertiary care hospital were included in the final analysis. The mean age of the study participants was 31.6 ± 12.4 years. The highest proportion of cases belonged to the 20–29 years age group, followed by 30–39 years. Males constituted 58.0% of the study population, while females accounted for 42.0%. Most patients were from rural areas, and lower or middle socioeconomic strata formed the major proportion of the study population. Farmers and agricultural workers were the most common occupational group, followed by daily wage workers [Table 1].

Organophosphorus compounds were the most common poisoning agents, accounting for 34.0% of cases. Household chemicals and corrosives were observed in 18.0%, followed by rodenticides in 16.0% and drug overdose in 14.0%. Suicidal intent was the predominant mode of poisoning and was documented in 68.0% of cases. Accidental poisoning accounted for 24.0%, while occupational exposure was observed in 8.0% of patients. Most poisoning events occurred at home, and 42.0%

of patients reached the hospital within 2–6 hours of exposure [Table 2].

Table 1: Socio-demographic profile of poisoning cases (n=100)

Variable	Frequency	Percentage
Age group		
<20 years	14	14.0
20–29 years	36	36.0
30–39 years	24	24.0
40–49 years	16	16.0
≥50 years	10	10.0
Sex		
Male	58	58.0
Female	42	42.0
Residence		
Rural	64	64.0
Urban	36	36.0
Marital status		
Married	62	62.0
Unmarried	38	38.0
Educational status		
No formal education	12	12.0
Primary education	26	26.0
Secondary education	38	38.0
Higher education	24	24.0
Occupation		
Farmer/agricultural worker	32	32.0
Daily wage worker	24	24.0
Homemaker	18	18.0
Student	14	14.0
Employed/business	12	12.0
Socioeconomic status		
Lower	44	44.0
Middle	46	46.0
Upper	10	10.0

Table 2: Poisoning-related characteristics among study participants (n=100)

Variable	Frequency	Percentage
Type of poisoning agent		
Organophosphorus compounds	34	34.0
Household chemicals/corrosives	18	18.0
Rodenticides	16	16.0
Drug overdose	14	14.0
Plant/unknown toxins	8	8.0
Snake bite/other envenomation	6	6.0
Alcohol-related toxic exposure	4	4.0
Mode of poisoning		
Suicidal	68	68.0
Accidental	24	24.0
Occupational	8	8.0
Place of exposure		
Home	72	72.0
Workplace/agricultural field	18	18.0
Outdoor/unknown place	10	10.0
Time interval from exposure to hospital arrival		
<2 hours	34	34.0
2–6 hours	42	42.0
>6 hours	24	24.0

Vomiting was the most frequent presenting symptom, reported in 62.0% of cases, followed by excessive salivation or sweating in 38.0%, altered sensorium in 30.0%, and breathlessness in 24.0%. Gastric lavage was performed in 70.0% of patients where clinically indicated. Antidote therapy was required in 42.0% of patients. Intensive care admission was required in 26.0% of cases, and 12.0% required mechanical ventilation. Overall, 95.0% of patients recovered and were discharged, while mortality was observed in 5.0% of cases [Table 3].

Table 3: Clinical presentation, management, and outcome of poisoning cases (n=100)

Variable	Frequency	Percentage

Presenting symptoms*		
Vomiting	62	62.0
Excessive salivation/sweating	38	38.0
Altered sensorium	30	30.0
Breathlessness	24	24.0
Abdominal pain	22	22.0
Convulsions	8	8.0
Management and clinical course		
Gastric lavage performed	70	70.0
Antidote therapy required	42	42.0
ICU admission required	26	26.0
Mechanical ventilation required	12	12.0
Final outcome		
Recovered and discharged	95	95.0
Death	5	5.0

*Multiple responses were possible.

On analysing the socio-demographic determinants of intentional poisoning, age group, educational status, occupation, and socioeconomic status showed statistically significant associations. Intentional poisoning was more frequent among patients aged below 30 years, particularly those in the 20–29 years age group. A significant association was also observed with educational status, with higher proportions of intentional poisoning among patients educated up to secondary or higher level. Students, homemakers, and employed individuals showed a relatively higher proportion of intentional poisoning when compared with farmers and daily wage workers. Lower and middle socioeconomic groups together accounted for most intentional poisoning cases. However, sex, residence, and marital status did not show statistically significant associations with intentional poisoning in the present study [Table 4].

Table 4: Association of socio-demographic factors with intentional poisoning (n=100)

Variable	Intentional poisoning n (%)	Non-intentional poisoning n (%)	Chi-square value	p-value
Age group			10.93	0.027
<20 years	11 (78.6)	3 (21.4)		
20–29 years	30 (83.3)	6 (16.7)		
30–39 years	15 (62.5)	9 (37.5)		
40–49 years	8 (50.0)	8 (50.0)		
≥50 years	4 (40.0)	6 (60.0)		
Sex			2.93	0.087
Male	35 (60.3)	23 (39.7)		
Female	33 (78.6)	9 (21.4)		
Residence			3.22	0.073
Rural	39 (60.9)	25 (39.1)		
Urban	29 (80.6)	7 (19.4)		
Marital status			2.61	0.106
Married	38 (61.3)	24 (38.7)		
Unmarried	30 (78.9)	8 (21.1)		
Educational status			13.10	0.004
No formal education	5 (41.7)	7 (58.3)		
Primary education	13 (50.0)	13 (50.0)		
Secondary education	29 (76.3)	9 (23.7)		
Higher education	21 (87.5)	3 (12.5)		
Occupation			11.50	0.022
Farmer/agricultural worker	17 (53.1)	15 (46.9)		
Daily wage worker	14 (58.3)	10 (41.7)		
Homemaker	13 (72.2)	5 (27.8)		
Student	13 (92.9)	1 (7.1)		
Employed/business	11 (91.7)	1 (8.3)		
Socioeconomic status			7.27	0.026
Lower	24 (54.5)	20 (45.5)		
Middle	35 (76.1)	11 (23.9)		
Upper	9 (90.0)	1 (10.0)		

Overall, the study showed that poisoning cases were more common among young adults, males, rural residents, and individuals from lower and middle socioeconomic groups. Organophosphorus poisoning remained the leading toxic exposure, reflecting easy access to agricultural chemicals. Intentional poisoning formed the major burden, and significant socio-demographic determinants included younger age, educational status, occupational category, and socioeconomic status.

Discussion

Based on the present study it was found that the age group of

the young adult (20-29 years) accounted for the larger proportion of poisoning admissions. This profile is similar to several Indian hospital-based studies in which poisoning was prevalent in young and economically active people.[7-12] Youth are between the ages of 18 and 29, and navigating social, work, relationship, school, and financial changes. The combination of these and the ready availability of toxins make this group more susceptible to deliberate poisoning. The present study also has a male preponderance similar to the previous observations done at various tertiary care centres of Karnataka, Warangal, rural South India and North India.[7-9,11,12]

Almost two-thirds of the cases were residents of rural areas. The finding is of clinical relevance, since pesticides and other toxic substances may be more readily available to rural households and agricultural jobs. The largest group of cases in this study were caused by organophosphorus compounds (34.0%). Agricultural chemicals have been found to be significant causes of poisoning admissions and mortality in other regional studies, mainly in the southern and central parts of India.[4,7-9,13] Several reviews have highlighted that it is not the extent of pesticide use in an area that is most important, but the toxicity of the compound and the immediate availability of the substance.[1,4,6]

The intentional poisoning was the most common mode in the present study. This is similar to the observations made by researchers in Kancheepuram and North India in which suicidal poisoning had a significant proportion of admissions.[10-12] Since there are strong relationships between intentional poisoning and age, education, occupation and socioeconomic status, poisoning prevention cannot be limited to hospital treatment. There was a high proportion of intentional poisoning among students, homemakers, and employed students, and this was attributed to the factors of psychological distress, family conflict, occupational stress, and easy access to toxic substances. These have been beneficial to the integrated prevention that included counselling, family-level awareness, limited access to toxic substances and early referrals to mental health support.[4,5,10]

The most predominant clinical presentations were vomiting, cholinergic effects, altered sensorium, and breathlessness. Twenty-six percent required ICU care and 42.0% required antidote therapy, showing the clinical severity of poisoning in this setting. Mechanical ventilation was needed in 12.0%, consistent with the role of respiratory failure in poor outcome when using organophosphates in cases of preparedness.[13,14] Early stabilization, time to use antidote, protection of the airway and supportive intensive care continue to be pillars of survival. The mortality rate in the current series (5.0%) was lower than the rates of the other older series, but still could be prevented, particularly when further delay in presentation and/or high toxicity is added.[7,12,14]

The results are relevant to the practice of tertiary care hospitals and District Health systems. Agrarian area hospitals should have dedicated antidote supplies, ventilatory support equipment and standard poisoning protocols, and clear referral links, throughout the emergency department. On a community level, there is a need for education on occupational safety, crisis counselling, safe pesticide storage and the limitation of the sale of highly hazardous pesticides. Poison information centre/Toxicology registry in conjunction with Emergency services enhances surveillance and provides guidance for prevention.[8,12]

Limitations: Due to the limited number of cases in the study (n = 100) the results have to be interpreted in a regional context. Certain data were not available in every record, including psychiatric history and the precise toxic dose as well as long-term follow-up. Socioeconomic status did not depend on the person's actual socioeconomic position, but on hospital data that has the possibility of classification errors. No post-discharge psychiatric assessment and recurrence information were supplied.

Conclusion

Poisoning incidents were clustered in the young adult, male, rural, and lower/middle socioeconomic groups in this tertiary health care centre. Most exposures were secondary to organophosphorus compounds, and suicidal was the most common pattern of exposure. Among socio-demographic factors, younger age, educational status, occupation, and socioeconomic factors were significant factors associated with intentional poisoning. Emergency care resulted in the recovery of most patients in time, but the severity of the problem is indicated by the rate of admission to the intensive care unit and ventilatory assistance and moribundity rates. These findings are particularly relevant to localised poisoning prevention, safe storage of agricultural chemicals, early transport of persons poisoned, ensured availability of antidotes, and mental health counselling as part of emergency and routine health and medical services across high-risk communities and referral units on an ongoing basis.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Gunnell D, Eddleston M, Phillips MR, Konradsen F. The global distribution of fatal pesticide self-poisoning: systematic review. BMC Public Health. 2007;7:357. doi:10.1186/1471-2458-7-357.
2. Eddleston M, Phillips MR. Self poisoning with pesticides. BMJ. 2004;328(7430):42-44. doi:10.1136/bmj.328.7430.42.
3. Eddleston M. Patterns and problems of deliberate self-poisoning in the developing world. QJM. 2000;93(11):715-731. doi:10.1093/qjmed/93.11.715.
4. Bonvoisin T, Utyasheva L, Knipe D, Gunnell D, Eddleston M. Suicide by pesticide poisoning in India: a review of pesticide regulations and their impact on suicide trends. BMC Public Health. 2020;20(1):251. doi:10.1186/s12889-020-8339-z.
5. Patel V, Ramasundarahettige C, Vijayakumar L, Thakur JS, Gajalakshmi V, Gururaj G, et al. Suicide mortality in India: a nationally representative survey. Lancet. 2012;379(9834):2343-2351. doi:10.1016/S0140-6736(12)60606-0.

6. Mew EJ, Padmanathan P, Konradsen F, Eddleston M, Chang SS, Phillips MR, et al. The global burden of fatal self-poisoning with pesticides 2006-15: systematic review. J Affect Disord. 2017;219:93-104. doi:10.1016/j.jad.2017.05.002.
7. Ramesha KN, Rao KBH, Kumar GS. Pattern and outcome of acute poisoning cases in a tertiary care hospital in Karnataka, India. Indian J Crit Care Med. 2009;13(3):152-155. doi:10.4103/0972-5229.58541.
8. Kumar SV, Venkateswarlu B, Sasikala M, Kumar GV. A study on poisoning cases in a tertiary care hospital. J Nat Sci Biol Med. 2010;1(1):35-39. doi:10.4103/0976-9668.71671.
9. Jaiprakash H, Sarala N, Venkatarathnamma PN, Kumar TN. Analysis of different types of poisoning in a tertiary care hospital in rural South India. Food Chem Toxicol. 2011;49(1):248-250. doi:10.1016/j.fct.2010.10.026.
10. Suganthi S, Raja VP. Poisoning and its pattern among patients in a tertiary care center in Kancheepuram district, Tamil Nadu. J Educ Health Promot. 2019;8:194. doi:10.4103/jehp.jehp_62_19.
11. Mathew R, Jamshed N, Aggarwal P, Patel S, Pandey RM. Profile of acute poisoning cases and their outcome in a teaching hospital of North India. J Family Med Prim Care. 2019;8(12):3935-3939. doi:10.4103/jfmpc.jfmpc_832_19.
12. Aggarwal N, Sawlani KK, Chaudhary SC, Usman K, Dandu H, Atam V, et al. Study of pattern and outcome of acute poisoning cases at tertiary care hospital in North India. J Family Med Prim Care. 2023;12(9):2047-2052. doi:10.4103/jfmpc.jfmpc_592_23.
13. Banerjee I, Tripathi SK, Roy AS. Clinico-epidemiological characteristics of patients presenting with organophosphorus poisoning. N Am J Med Sci. 2012;4(3):147-150. doi:10.4103/1947-2714.93884.
14. Eddleston M, Buckley NA, Eyer P, Dawson AH. Management of acute organophosphorus pesticide poisoning. Lancet. 2008;371(9612):597-607. doi:10.1016/S0140-6736(07)61202-1.