



EVALUATION OF ACUTE POISONING PATIENTS IN EMERGENCY DEPARTMENT AT A TERTIARY CARE HOSPITAL IN NORTHERN INDIA

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ABSTRACT

Background: Acute poisoning is a common, serious emergency in Indian tertiary care hospitals, with a toxicological profile dominated by pesticides and aluminium phosphide rather than pharmaceutical overdose. **Objectives:** To evaluate the demographic profile, intent, mode of exposure, type of poison, clinical presentation, and outcome of patients with acute poisoning presenting to the emergency department (ED) of a tertiary care hospital in Northern India. **Methods:** This hospital-based observational study, conducted over 18 months in the Department of Emergency Medicine, Muzaffarnagar Medical College, enrolled 100 patients of all ages and both sexes with acute poisoning. **Results:** Most patients (62%) were aged 20–39 years, with male predominance (67%) and Ingestion accounted for 96% of exposures. Celphos (aluminium phosphide) and organophosphorus compounds each caused 33% of poisonings. Intentional poisoning occurred in 79% of cases, with no significant gender–intent association ($\chi^2 = 0.001$, $p = 0.97$). Outcomes were LAMA (46%), discharge (37%), death (14%), DOPR (2%) and referral (1%); poison type was significantly associated with outcome ($\chi^2 = 55.81$, $p = 0.0056$), with aluminium phosphide responsible for 13 of 14 deaths. Nearly half the patients (49%) were asymptomatic at presentation; vomiting (26%) was the commonest symptom. **Conclusion:** Acute poisoning predominantly affects young, economically active adults and is most often intentional. Aluminium phosphide and organophosphorus compounds remain the leading agents, and poison type significantly determines outcome. A multi-pronged approach combining emergency care, mental health support, pesticide regulation, and community prevention is needed.

KEYWORDS : Acute poisoning; Emergency department; Aluminium phosphide; Organophosphorus.

INTRODUCTION

Acute poisoning is a serious emergency-care challenge, with severe cases causing multi-organ dysfunction and high mortality, particularly in resource-limited settings.[1] A poison is any substance capable of harming the body when ingested, inhaled, injected or contacted with skin or mucosa, with severity depending on amount, route and duration of exposure.[2]

Poisoning epidemiology differs sharply between high-income and developing nations. Pharmaceutical overdose predominates in developed countries and carries lower fatality due to structured poison-control systems and antidotes. In India, pesticides, rodenticides, and industrial chemicals—often highly toxic and without specific antidotes—predominate, resulting in higher mortality. Aluminium phosphide releases phosphine gas causing profound hypoxia, metabolic acidosis, refractory shock, and multi-organ failure, with high mortality despite supportive care.[3]

Indian studies consistently show poisoning disproportionately affects young adults, reflecting psychosocial vulnerability and impulsivity during this productive life phase. [5,6] Male predominance is typical, especially in occupational and pesticide exposure, though intentional poisoning among females reflects domestic and sociocultural stressors. Rural populations bear a disproportionate burden linked to agrochemical access, lower literacy, and delayed presentation.[7]

Given the paucity of contemporary, region-specific ED data from Northern India and evolving poisoning trends, this study evaluated the demographic characteristics, intent, clinical features, and outcomes of acute poisoning patients at a tertiary care hospital in Northern India.

Aim and Objectives

Aim: To evaluate acute poisoning patients presenting to the emergency department of a tertiary care hospital in Northern India.

Objectives:

1. To study the cases of acute poisoning attending the emergency department.
2. To evaluate factors affecting poison intake and mortality among patients.
3. To identify the type of poisoning presenting in the emergency department.
4. To study the various clinical presentations at the emergency department.

MATERIALS AND METHODS

This hospital-based observational study was conducted on 100 patients with a clinical diagnosis of acute poisoning and a written informed consent; patients with chronic illnesses or major comorbidities were excluded. Sociodemographic

profile, poison type, exposure mode, intent, clinical presentation, examination findings, and outcome were recorded from patients, treating physicians and case records, and analysed using SPSS 26.0.

RESULTS

Of 100 patients evaluated, 62% were aged 20–39 years, 16% were 40–59 years and 14% were 60 years or older; 8% were under 20. Age and gender were not significantly associated ($\chi^2 = 2.58, p = 0.460$).

Male predominance was observed. (Table No.1)

Table 1: Gender Distribution (n = 100)

Gender	Number of patients
Male	67
Female	33

Intent was intentional in 79% and accidental in 21% of cases, with no significant gender association ($\chi^2 = 0.001, p = 0.97$) Celphos and organophosphorus compounds were the most often encountered poisons. (Table No.2)

Table 2: Type of Poison (n = 100)

Poison	Number of patients
Celphos	33
Organophosphorus	33
Amitraz	7
Paraquat	7
Rodenticide	6
Pyrethroid	5
Herbicide	5
Benzodiazepine	2
Phenol	2

Celphos accounted for 13 of the 14 deaths recorded in the study. The association between type of poison and clinical outcome was statistically significant. ($\chi^2 = 55.81, p = 0.0056$) Ingestion was the predominant route of exposure (96%), with inhalation exposure accounting for 4% of the cases.

Leaving against medical advice (LAMA, 46%) and discharge after recovery (37%) were the most frequent outcomes. (Table No.3)

Table 3: Clinical Outcome of Cases (n = 100)

Outcome	Number of patients
Discharged	37
LAMA	46
Death	14
DOPR	2
Referred	1

Clinically, 49% of patients were asymptomatic at presentation. Among symptomatic patients, vomiting was commonest (26%), followed by dyspnea (8%), altered sensorium (7%), hypotension (7%) and agonal breathing (3%).

DISCUSSION

Acute poisoning affected young adults aged 20–39 years, consistent with the economically active population's greater exposure to psychosocial stress, occupational pressure, and impulsive behavior. Similar age patterns have been reported by Samaria et al., Aggarwal et al. and George et al. [1,5,6] Male predominance, seen in about two-thirds of cases, likely reflects greater occupational and agricultural exposure and risk-taking behavior, consistent with prior Indian studies, [1,5,7] though poisoning among women remains clinically important, often linked to domestic and psychosocial stressors.

Oral ingestion dominated as the exposure route, mirroring other Indian hospital-based studies,[1,5,8] while uncommon inhalation exposure was largely accidental and

occupational, consistent with reports on volatile compound exposure.[9] Aluminium phosphide and OP compounds were the leading poisons, reflecting their wide availability and low cost, consistent with other North Indian data;[5,6,7] the presence of paraquat, herbicides, rodenticides and pyrethroids reflects a changing agrochemical landscape.[7,9] Intentional exposure predominated, highlighting self-harm as the principal driver of poisoning, consistent with Samaria et al. and Aggarwal et al. [1,5] Although more males presented with intentional poisoning in absolute terms, no statistically significant gender–intent association was found, suggesting intent is shaped more by psychosocial and situational factors than gender.

Outcomes varied considerably by agent: while many patients recovered, a sizable proportion left against medical advice, and death was concentrated among aluminium phosphide cases. The significant association between poison type and outcome underscores the central role of the specific toxic agent in prognosis. Mohammadpour et al., Anbalagan et al. and Chugh et al. similarly identified aluminium phosphide as among the most lethal poisons in India, attributing poor outcomes to rapid cardiovascular collapse, severe acidosis and absence of a specific antidote, [10,3,11] whereas pharmaceutical poisoning such as benzodiazepines carried comparatively favourable outcomes with timely supportive care.[12]

The considerable proportion of patients leaving against medical advice may reflect poor prognosis in severe cases, prolonged intensive-care needs and financial constraints, consistent with observations on the economic burden of poisoning-related hospitalisation by Salem et al. and Barnabas et al. [13,14]

Nearly half the patients were asymptomatic on arrival, consistent with earlier Indian data showing early presentation despite absence of overt symptoms.[1] Among symptomatic patients, gastrointestinal symptoms—particularly vomiting—were commonest, consistent with the irritant effects of commonly encountered poisons.[10] Respiratory involvement, though less frequent, indicated severe poisoning requiring urgent airway support, with similar associations between respiratory presentation and poor outcome reported by Mehta et al.[15]

This study's limitations include its single-centre design limiting generalisability. Future research should pursue multi-centric and population-based design. Strengthening regulation of highly toxic pesticides, improving public awareness and enhancing emergency services remain essential to reducing poisoning-related morbidity and mortality.

CONCLUSION

Acute poisoning remains a major public health issue and a frequent cause of ED visits in India. In this study, young, economically active adults—particularly males—were most affected, with intentional self-poisoning predominant and no significant gender association. Aluminium phosphide and organophosphorus compounds were the leading agents, and poison type significantly determined outcome, with aluminium phosphide responsible for most deaths. A comprehensive approach combining timely emergency management, mental health support, pesticide regulation and community-level prevention is essential to reduce poisoning incidence and improve outcomes.

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