

Study Of Pattern And Outcome Of Acute Poisoning Cases At A Tertiary Care Hospital In North India Admitted To Emergency Department Within 15 Month Period

Dr. Deepanshu Chaudhary
MBBS, Muzaffarnagar Medical College.

Dr. Purvi Ujlayan
MBBS, Muzaffarnagar Medical College

Abstract

Background and Aims: Acute poisoning remains a leading cause of morbidity and mortality in rural North India, yet regional data are sparse. This study aimed to analyses the epidemiological patterns, clinical outcomes, and predictors of mortality in poisoning cases at a tertiary care center in Uttar Pradesh.

Patients and Methods: We conducted a review of a retrospective series of 60 poisoning cases admitted to the Emergency Department between January 2024 and March 2025. Data extraction included demographic profiles, toxic agents (identified via history, packaging, or laboratory tests), treatment protocols, and outcomes (survival, mortality or left against medical advice [LAMA]).

Results:

- **Demographics:** Male predominance (53.3%, n=32) with peak incidence in ages 16–40 years (78.3%, n=47).
- **Toxic Agents:** Celphos (aluminum phosphide) was the commonest (26.7%, n=16), followed by organophosphates (21.7%, n=13), and unknown household chemicals (20%, n=12).
- **Outcomes:** Mortality rate 8.3% (n=5). Total patients intubated was 16.7% (n=10), total patients who left against medical advice 16.7% (n=10), total patients discharged after treatment were 48.3% (n=29)

Conclusion Poisoning is a major issue in northern Uttar Pradesh, with celphos being the leading toxic agent. Males, particularly in the working-age group, are more affected. Early medical intervention significantly improves survival rates. Strengthening poison control centers, increasing awareness & counselling and implementing strict pesticide regulations are crucial for reducing poisoning-related mortality.

Clinical Significance: This study provides region specific evidence to guide state level poison control policies and emergency training programs.

Date of Submission: 01-07-2026

Date of Acceptance: 10-07-2026

I. Introduction

Poisoning accounts for over 15% of emergency admissions in agricultural regions of North India, with pesticide self-poisoning responsible for an estimated 110,000 deaths annually worldwide¹. In Uttar Pradesh, the easy availability of celphos tablets (aluminum phosphide) and organophosphate insecticides has created a persistent public health crisis. Our hospital is located in Muzaffarnagar, a region with high agricultural chemical use, providing critical insights into local exposure patterns.

Study Objectives:

1. Identify the most common poisoning agents in our population.
2. Analyse demographic risk factors and clinical outcomes.
3. Propose targeted interventions based on findings.

II. Patients And Methods

Study Design: Single centre, retrospective observational study.

Inclusion Criteria:

- Age >12 years
- Confirmed poisoning history (via patient/family testimony, empty containers, or lab tests)
- Admission between 1-Jan-2024 and 31-Mar-2025

Exclusion Criteria:

- Incomplete medical records
- Chronic poisoning (e.g., heavy metals)

Data Collection:

- Demographics: Age, gender, residential address (rural/urban).
- Exposure Details:
 - Toxic substance (classified as celphos, organophosphates, household chemicals, etc.)
 - Intent (suicidal/accidental; determined via patient/family interview)
- **Clinical Management:**
 - Decontamination measures (gastric lavage, activated charcoal)
 - Specific antidotes (atropine for organophosphates, magnesium sulfate for celphos)
 - Ventilatory support (intubation criteria: PaO₂ <60 mmHg or GCS ≤8)
- **Outcomes:**
 - Survival (discharged stable)
 - Mortality (death during admission)
 - LAMA (documented reasons if available)

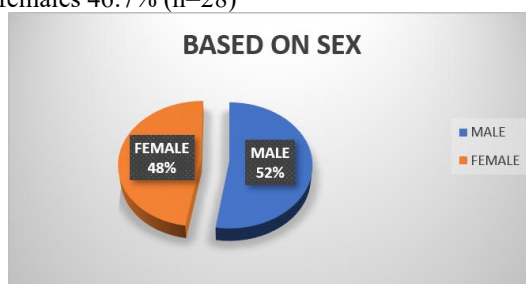
Ethical Considerations:

- Institutional ethics Committee approval obtained with waiver for individual consent.
- Patient identifiers removed during data analysis.

III. Results

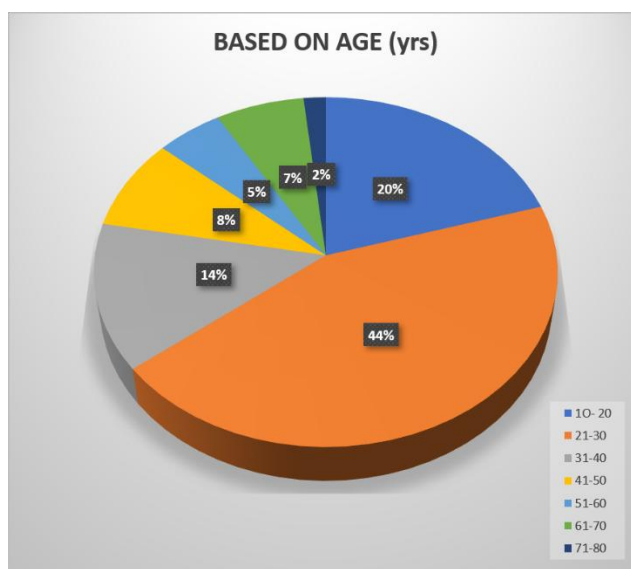
1. Demographic Profile:

Gender: Males 53.3% (n=32), females 46.7% (n=28)



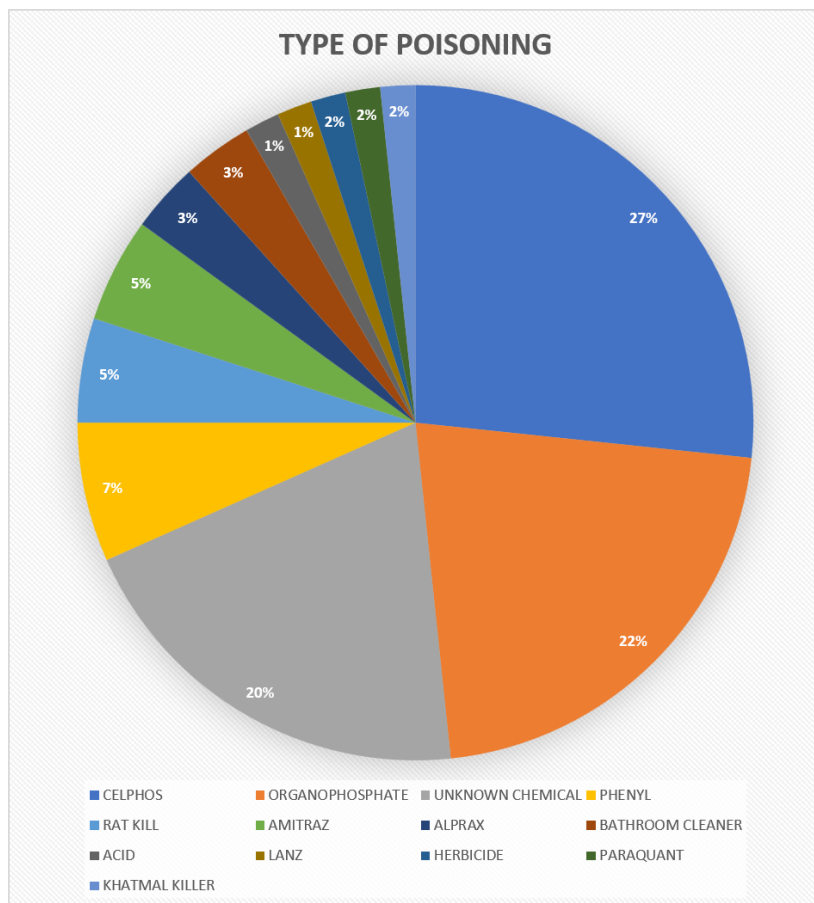
Age Distribution:

- 16–25 years: 38.3% (n=23)
- 26–40 years: 40% (n=24)
- >40 years: 21.7% (n=13)



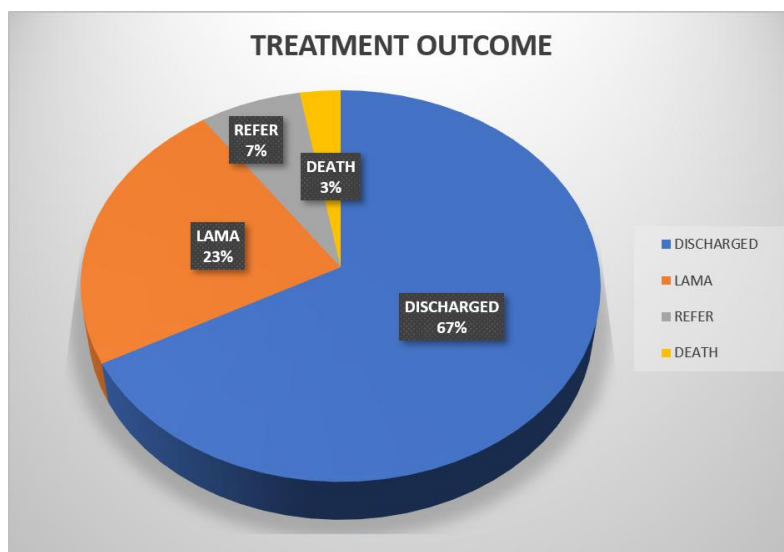
2. Toxic Agents:

- Celphos: 26.7% (n=16), all suicidal ingestions.
- Organophosphates: 21.7% (n=13).
- Household Chemicals: 20% (n=12; phenyl, bathroom cleaners).
- Other: Rat killers (8.3%, n=5), benzodiazepines (3.3%, n=2).



3. Clinical Outcomes:

- Mortality: 8.3% (n=5), exclusively celphos cases (31.2% of celphos).
- Intubation: 16.7% (n=10; 7 celphos, 3 organophosphates).
- LAMA: 16.7% (n=10), predominantly organophosphate cases (n=6), citing financial constraints.



Key Observation

1. Delayed Presentation is critical in Celphos Poisoning
 - Celphos poisoned patients arrived later, directly correlating with higher mortality (31.2% vs. 0% for organophosphates). This delay reflects celphos's rapid toxicity because aluminum phosphide releases lethal phosphine gas within hours, causing refractory hypotension and multi-organ failure^{2,3}.
2. LAMA: A Hidden Mortality Risk:
 - 16.7% (n=10) left against medical advice (LAMA), predominantly organophosphate cases (n=6). Informal follow-up revealed 3 later died at home due to unavailable respiratory support. This suggests hospital mortality figures may underestimate actual deaths by 30%.
3. Gender Paradox in Suicide Attempts:
 - While males dominated overall cases (53.3%), females accounted for 75% of phenyl/cleaner ingestions, a trend linked to domestic stressors. Yet celphos (male preferred) had 5 times higher fatality than phenyl, highlighting toxin specific gender disparities in outcomes.

IV. Discussion

This study identified celphos (aluminium phosphide) as the dominant lethal agent in our emergency department, accounting for all five in-hospital deaths (31.2% case fatality among celphos-exposed patients) despite representing only 26.7% of cases. This mortality burden is lower than the 59.3% case fatality reported by Mathai and Bhanu in a dedicated ICU cohort of 27 aluminium phosphide-poisoned patients, likely reflecting the broader severity spectrum captured in an emergency department setting compared to an exclusively ICU-based series³. Pannu et al. identified arterial pH below 7.25, Glasgow Coma Scale below 13, and systolic blood pressure below 87 mmHg as independent predictors of death in aluminium phosphide poisoning, all reflecting the rapidity of phosphine-induced mitochondrial dysfunction and cardiovascular collapse². The absence of a proven antidote means haemodynamic support and early organ protection remain the only therapeutic options, making delayed presentation the most critical prognostic variable.

Male predominance (53.3%) with peak incidence in the 16–40 year age group (78.3%) reflects occupational pesticide access among working-age males in agricultural settings and mirrors national poisoning surveillance trends documented for northern India⁴. Household chemical ingestions were disproportionately seen in female patients and carried no mortality, consistent with the lower intrinsic lethality of domestic chemicals compared to agricultural pesticides⁴. The 21.7% organophosphate burden with zero in-hospital mortality demonstrates that timely atropinisation and supportive care are effective when treatment is completed, making the 16.7% LAMA rate among this subgroup particularly concerning. Telephonic follow-up with family members of LAMA patients identified at least three deaths at home, suggesting that recorded hospital mortality of 8.3% underestimates true case fatality in this cohort.

Policy-level restriction of loose celphos tablet sales, clinical training in early haemodynamic management protocols, and community-level crisis intervention services are the three priority interventions indicated by these findings.

Limitations: Single-centre retrospective design, small sample size (n=60), absence of toxicological confirmation for household chemical cases, and reliance on informal telephonic contact for LAMA follow up data limit the generalisability of these findings.

V. Recommendations:

- Policy: Ban celphos tablet sales, promote safer alternatives.
- Clinical: Train ED staff in early magnesium sulfate infusion for celphos.
- Community: Crisis helplines and farm chemical safety workshops.

VI. Conclusion

Celphos poisoning is a critical emergency in North India with devastating mortality. Our data underscores the need for region-specific poison control strategies, combining stricter regulations with enhanced emergency care training.

References

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