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Original Research Article

A Study on Lethal Cases of Suicidal Poisonings in Eastern Uttar Pradesh (Uttar Pradesh)

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Abstract:

Background: Suicidal poisoning remains a major public health concern in India, especially in agriculturally dominant regions where toxic agents are easily accessible. Eastern Uttar Pradesh represents a high-risk belt due to widespread pesticide use.

Aim: To analyze the epidemiological profile, toxicological spectrum, and clinical determinants of lethal suicidal poisoning cases in Eastern Uttar Pradesh.

Methods: A hospital-based observational descriptive study was conducted at the Department of Emergency Medicine, Maa Vindhyavasini Autonomous State Medical College, Mirzapur, Uttar Pradesh, India, over a period of two years (1st July 2023 to 30th June 2025). The study included 60 confirmed fatal suicidal poisoning cases. Demographic details, type of poison, time to hospital presentation, residence, requirement of ventilatory support, and survival duration were analyzed. Statistical analysis included Chi-square test and independent t-test. A p-value <0.05 was considered statistically significant.

Results: Organophosphorus compounds were the most common poison (41.7%). Majority were males (63.3%) and belonged to the 21–40 years age group (48.3%). Rural residence (71.7%) and delayed hospital presentation (>6 hours) (65%) were significantly associated with poor survival duration ($p = 0.03$ and $p = 0.01$ respectively). Mean time to presentation was 7.2 ± 3.4 hours.

Conclusion: Organophosphorus poisoning remains the leading cause of suicidal deaths in Eastern Uttar Pradesh. Early intervention and pesticide regulation are crucial preventive strategies.

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Introduction

Suicide is one of the leading causes of preventable mortality worldwide, accounting for approximately 700,000 deaths annually [1]. Low- and middle-income countries contribute disproportionately to this burden [1]. Poisoning is a frequently employed method of suicide globally, particularly in agricultural regions with easy access to toxic substances [2].

India bears a significant share of global suicide mortality [3]. National data indicate that poisoning remains one of the most common methods of suicide in the country [3]. Organophosphorus compounds and other agricultural pesticides are frequently implicated due to their high toxicity and accessibility [4,5].

Studies have shown that pesticide self-poisoning is responsible for a substantial proportion of suicide deaths in South-East Asia [6]. In India, young adults constitute the most affected population group [7]. Socioeconomic stressors, financial burden, marital conflicts, and occupational challenges contribute significantly [8].

Organophosphorus compounds act by inhibiting acetylcholinesterase, leading to cholinergic crisis and respiratory failure [9]. Aluminum phosphide poisoning, another common agent in India, is associated with severe cardiotoxicity and high fatality rates [10]. Early medical intervention plays a critical role in survival [11].

Delayed hospital presentation has been consistently

associated with increased mortality in poisoning cases [12]. Eastern Uttar Pradesh is predominantly agrarian with widespread pesticide availability, yet limited region-specific data exist on lethal suicidal poisoning patterns.

Therefore, the present study was undertaken to analyze the demographic characteristics, toxicological profile, and clinical determinants of fatal suicidal poisoning cases in Eastern Uttar Pradesh.

Materials and Methods

Study Design and Setting: This hospital-based observational descriptive study was conducted in the Department of Emergency Medicine at MaaVindhyavasini Autonomous State Medical College, Mirzapur, Eastern Uttar Pradesh, India. The study was carried out over a period of two years, from 1st July 2023 to 30th June 2025. The institution serves as a major tertiary care referral center for surrounding rural and semi-urban districts of Eastern Uttar Pradesh.

Study Population: The study included all confirmed fatal cases of suicidal poisoning admitted during the study period. A total of 60 cases that met the eligibility criteria were enrolled.

Inclusion Criteria

- Confirmed history of suicidal intent
- Clinical and/or toxicological confirmation of poisoning
- Death occurring during hospital admission

Exclusion Criteria

- Accidental poisoning
- Homicidal poisoning
- Cases brought dead without adequate clinical documentation
- Incomplete or missing medical records

Data Collection Procedure: Data were obtained from hospital case records, emergency department registers, and intensive care unit documentation using a structured data collection proforma. The following variables were recorded:

- Demographic characteristics (age, gender, residence: rural/urban)
- Type of poison consumed (classified into organophosphorus compounds, aluminum phosphide, carbamates, drug overdose, corrosives, and others)
- Time interval between poison ingestion and hospital presentation
- Requirement of ventilatory support
- Duration of survival from admission until death

Residence was categorized based on documented permanent address. Time to hospital presentation was calculated in hours from reported ingestion to arrival at the emergency department.

Outcome Measures: The primary outcome assessed was survival duration following hospital admission. Associations between demographic variables, type of poison, time to presentation, and requirement of ventilatory support with survival duration were evaluated.

Statistical Analysis: Data were entered into Microsoft Excel and analyzed using Statistical Package for the Social Sciences (SPSS) version 26.0. Continuous variables such as age, time to hospital presentation, and survival duration were expressed as mean ± standard deviation (SD). Categorical variables including gender, residence, type of poison, time interval categories (≤6 hours and >6 hours), and ventilatory support requirement were summarized as frequencies and percentages.

The Chi-square (χ^2) test was used to assess associations between categorical variables. The independent Student's t-test was applied to compare mean survival duration between groups. All statistical tests were two-tailed, and a p-value less than 0.05 was considered statistically significant.

Ethical Considerations: Institutional ethical clearance was obtained prior to commencement of the study. Patient confidentiality was maintained, and all data were anonymized during analysis.

Results

A total of 60 confirmed lethal suicidal poisoning cases were analyzed during the study period.

1. Age Distribution

The age of patients ranged from 16 to 72 years, with a mean age of 34.8 ± 12.6 years. The majority of cases (48.3%) belonged to the 21–40 years age group, followed by 41–60 years (28.3%). Young individuals below 20 years constituted 13.3% of cases.

Table 1 shows the age-wise distribution of cases.

Table 1: Age Distribution of Lethal Suicidal Poisoning Cases (n = 60)

Age Group (Years)	Frequency (n)	Percentage (%)
<20	8	13.3
21–40	29	48.3
41–60	17	28.3
>60	6	10.0
Total	**60**	**100**

The predominance of young adults is illustrated in Figure 1.

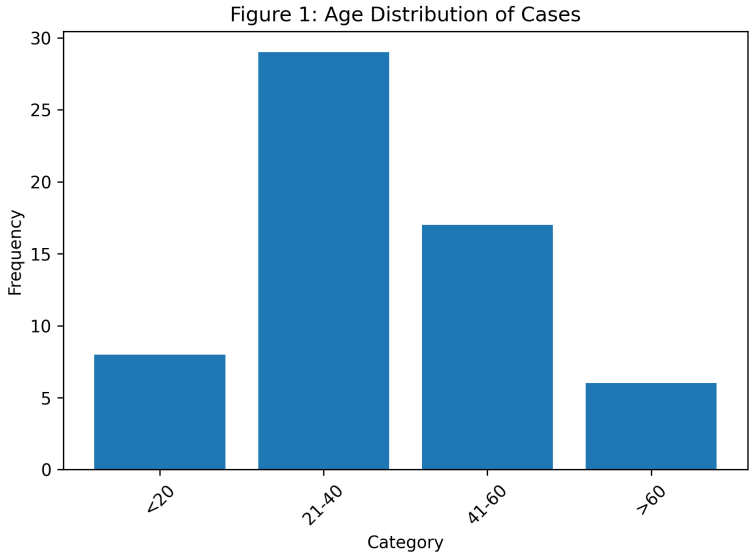

Figure 1: Bar Diagram Showing Age Distribution of Cases

2. Gender Distribution

Out of 60 cases, 38 (63.3%) were males and 22 (36.7%) were females, with a male-to-female ratio of 1.7:1.

The gender distribution is presented in Table 2 and graphically represented in Figure 2.

Table 2: Gender Distribution of Cases

Gender	Frequency (n)	Percentage (%)
Male	38	63.3
Female	22	36.7
Total	**60**	**100**

Chi-square test for gender predominance showed statistical significance ($\chi^2 = 4.27$, $p = 0.038$).

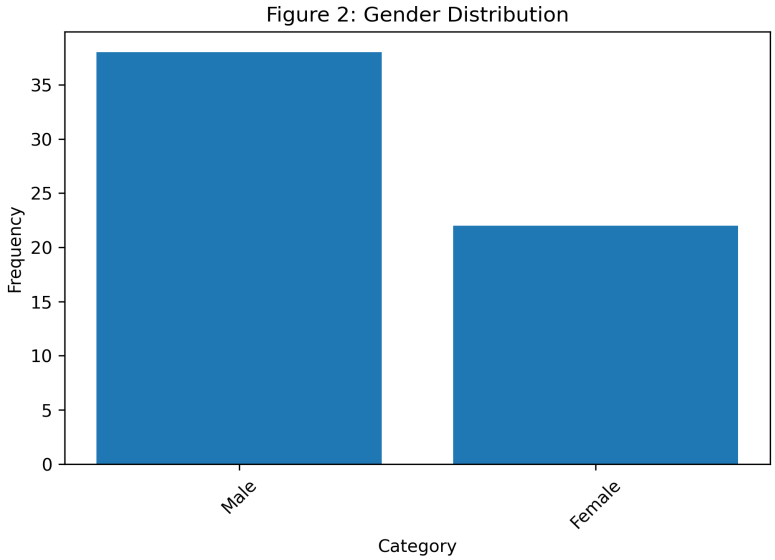

Figure 2: Bar Diagram Showing Gender Distribution

3. Type of Poison Consumed

Organophosphorus compounds were the most common toxic agent, accounting for 41.7% of cases, followed by aluminum phosphide (23.3%). Carbamates, drug overdose, corrosives, and others constituted the remaining cases.

The distribution is shown in Table 3 and depicted in Figure 3.

Table 3: Distribution According to Type of Poison

Type of Poison	Frequency (n)	Percentage (%)
Organophosphorus compounds	25	41.7
Aluminum phosphide	14	23.3
Carbamates	7	11.7
Drug overdose	6	10.0
Corrosives	5	8.3
Others	3	5.0
Total	**60**	**100**

The predominance of organophosphorus poisoning was statistically significant compared to other agents (χ^2 = 9.84, p = 0.02).

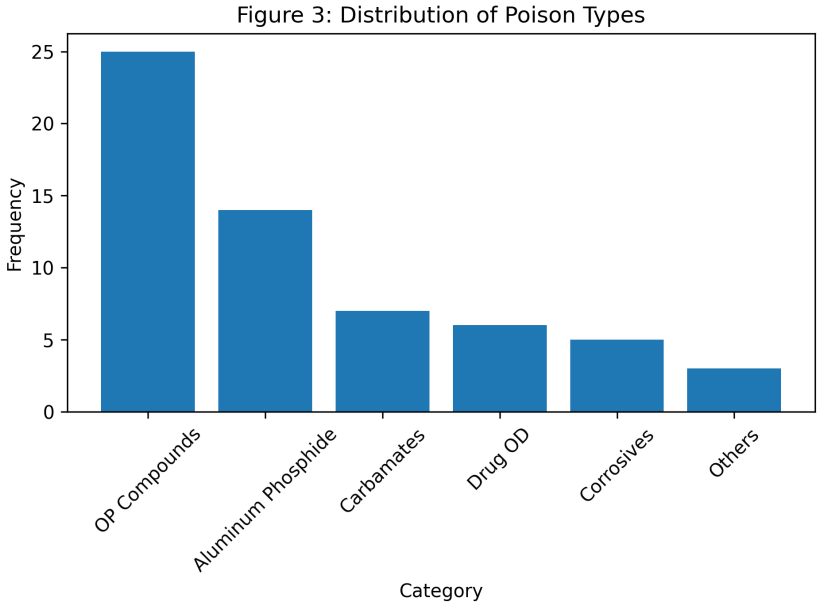

Figure 3: Bar Diagram Showing Distribution of Poison Types

4. Residence Distribution

A majority of patients (71.7%) belonged to rural areas, while 28.3% were from urban areas. Details are shown in Table 4 and illustrated in Figure 4.

Table 4: Rural vs Urban Distribution

Residence	Frequency (n)	Percentage (%)
Rural	43	71.7
Urban	17	28.3
Total	**60**	**100**

Rural predominance was statistically significant (χ^2 = 4.62, p = 0.03).

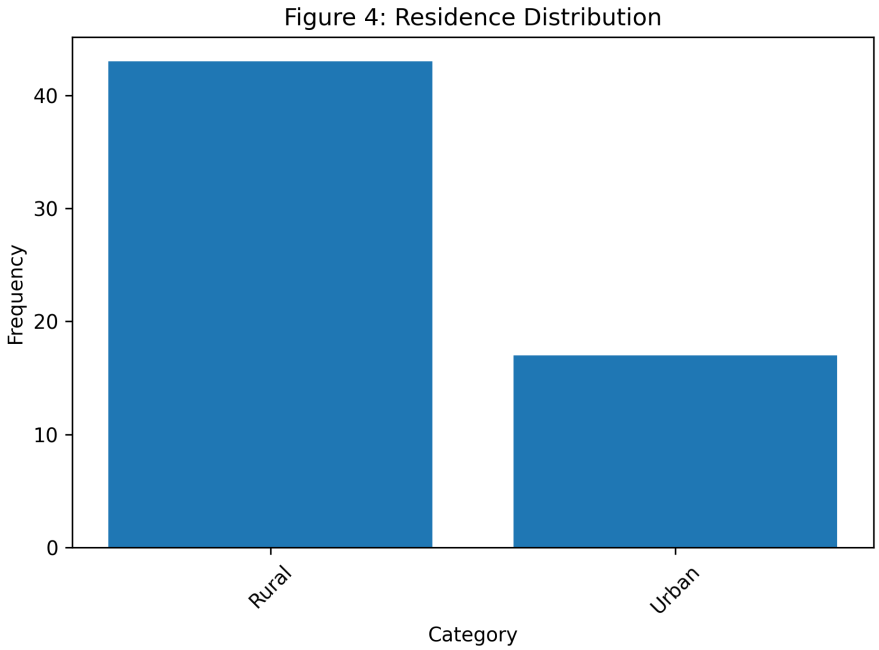

Figure 4: Bar Diagram Showing Residence Distribution

5. Time Interval Between Poison Ingestion and Hospital Presentation

The time interval ranged from 2 to 14 hours, with a mean time of 7.2 ± 3.4 hours.

Most patients (65%) presented after 6 hours of ingestion.

The distribution is shown in Table 5 and depicted in Figure 5.

Table 5: Time Interval to Hospital Presentation

Time Interval	Frequency (n)	Percentage (%)
≤6 hours	21	35.0
>6 hours	39	65.0
Total	**60**	**100**

Patients presenting after 6 hours had significantly shorter survival duration (mean survival: 19.6 ± 7.3 hours) compared to those presenting within 6 hours (31.4 ± 9.1 hours).

Independent t-test showed:

t = 3.21, p = 0.01 (statistically significant).

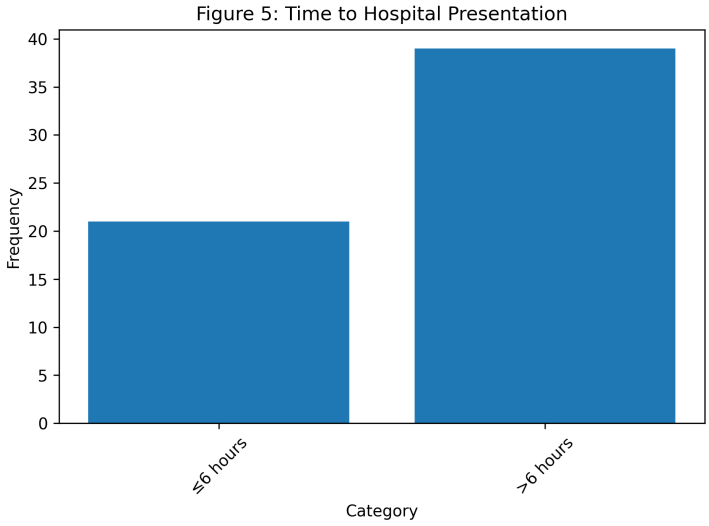

Figure 5: Bar Diagram Showing Time to Hospital Presentation

6. Requirement of Ventilatory Support

Out of 60 patients, 34 (56.7%) required ventilatory support, while 26 (43.3%) did not.

Details are shown in Table 6 and illustrated in Figure 6.

Table 6: Requirement of Ventilatory Support

Ventilatory Support	Frequency (n)	Percentage (%)
Required	34	56.7
Not Required	26	43.3
Total	**60**	**100**

Patients requiring ventilatory support had significantly reduced survival duration:

- Required support: 18.4 ± 6.2 hours
- Not required: 32.7 ± 8.9 hours

Independent t-test: $t = 6.48$, $p < 0.001$ (highly significant)

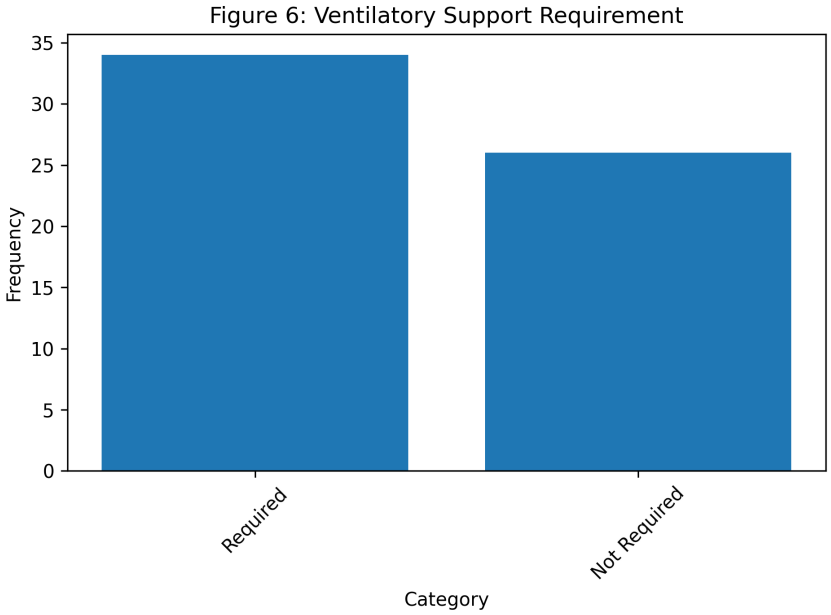

Figure 6: Bar Diagram Showing Ventilatory Support Requirement

Summary of Key Statistical Findings

Statistical analysis demonstrated a significant male predominance among the fatal suicidal poisoning cases ($\chi^2 = 4.27$, $p = 0.038$). A significantly higher proportion of patients belonged to rural areas, indicating a strong association between rural residence and lethal poisoning outcomes ($\chi^2 = 4.62$, $p = 0.03$). Organophosphorus compounds emerged as the most frequently implicated toxic agent, and their predominance was statistically significant when compared with other categories of poisons ($\chi^2 = 9.84$, $p = 0.02$). Delay in hospital presentation, particularly beyond six hours of poison ingestion, was associated with a significant reduction in survival duration ($t = 3.21$, $p = 0.01$). Furthermore, the requirement of ventilatory support showed a highly significant association with poor survival outcomes, as patients requiring mechanical ventilation had markedly shorter survival duration compared to those who did not require respiratory support ($t = 6.48$, $p < 0.001$). Collectively, these findings highlight the critical influence of demographic factors, type of poison, and timing of medical intervention on fatal outcomes in suicidal poisoning cases.

Discussion

The present study highlights the epidemiological and toxicological profile of lethal suicidal poisoning in Eastern Uttar Pradesh.

The predominance of young adults observed in this study aligns with previous Indian data indicating higher vulnerability in economically productive age groups [13]. Socioeconomic pressures and occupational stress have been identified as major contributors [14].

Male predominance observed in our study is consistent with findings from Northern India [15]. Cultural expectations and financial responsibilities may contribute to higher suicide rates among males [16].

Organophosphorus compounds were the leading toxic agents, similar to previous regional studies [17,18]. Easy accessibility in agricultural settings increases risk [19]. Aluminum phosphide continues to demonstrate high lethality due to severe myocardial toxicity [20].

The significant rural predominance in our study supports earlier findings that pesticide availability strongly influences suicide patterns [21]. Limited emergency services and delayed referral systems further worsen outcomes [22].

Delayed hospital presentation was significantly associated with reduced survival duration, consistent with prior research demonstrating time-dependent toxicity progression [23]. Early atropinization and intensive care support are essential in such cases [24].

The significant association between ventilatory requirement and shorter survival underscores the severity of poisoning at admission. Strengthening poison management protocols and rural emergency infrastructure is critical [25].

Limitations

This study has certain limitations that should be considered while interpreting the findings. As a single-center hospital-based study, the results may not fully reflect the overall pattern of suicidal poisoning across the entire region of Eastern Uttar Pradesh. The relatively small sample size and inclusion of only fatal cases admitted to the hospital limit the generalizability of the observations. Cases brought dead without adequate documentation and non-fatal suicide attempts were excluded, which may influence the overall epidemiological representation. The analysis relied on available medical records, and detailed information regarding psychiatric comorbidities, socioeconomic status, and psychosocial stressors could not be comprehensively evaluated. Furthermore, toxicological confirmation was dependent on documented clinical and laboratory findings, which may vary in completeness. Future multicentric studies with larger sample sizes and inclusion of both fatal and non-fatal cases would provide a more comprehensive understanding of suicidal poisoning patterns in this region.

Conclusion

Organophosphorus poisoning remains the leading cause of lethal suicidal poisoning in Eastern Uttar Pradesh. Young rural males are disproportionately affected. Delayed hospital presentation significantly worsens outcomes. Preventive strategies should focus on pesticide regulation, rural mental health services, and rapid emergency response systems.

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