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Original Research Article

# Clinical Profile, Treatment Approaches, and Outcomes of Acute Poisoning Cases: A Retrospective Analysis from a Tertiary Care Center

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**Abstract:** ***Background:*** Acute poisoning is a significant public health issue, particularly in low- and middle-income countries (LMICs), where access to toxic substances is widespread, and regulatory oversight is limited. This study aimed to examine the clinical profile, treatment modalities, and outcomes of acute poisoning cases in a tertiary care setting in Bangladesh. ***Methods*****:** A retrospective observational study was conducted at Satkhira Medical College Hospital from January 2023 to January 2025. All patients admitted with confirmed acute poisoning were included, excluding those with chronic poisoning or incomplete records. Data were extracted from hospital records and included sociodemographic information, poisoning specifics, clinical parameters, treatment approaches, and outcomes. Descriptive statistics and logistic regression analyses were performed using STATA version 17. ***Results*****:** Among 169 patients, the mean age was 22 years (IQR: 18–33), with the majority aged 18–40 years (57.6%). Females comprised 55.6% of the cohort. Suicidal intent accounted for 96.5% of cases. The most frequently involved agents were organophosphates (24.4%), corrosives (22.0%), and sedatives (17.3%), with oral ingestion being the dominant route (95.2%). Nephrotoxicity (26.7%), hepatotoxicity (20.4%), and neurotoxicity (13.4%) were commonly observed. All cases were managed conservatively. Complete recovery was achieved in 86.8% of patients, with an in-hospital mortality rate of 11.5%. Multivariate analysis identified older age (AOR: 1.05; $p = 0.034$), male sex (AOR: 4.29; $p = 0.029$), delayed hospital presentation (AOR: 1.54; $p = 0.014$), and organ dysfunction (AOR: 36.07; $p < 0.001$) as significant predictors of poor outcomes. ***Conclusion*****:** Young adults, particularly females, represent the majority of poisoning cases, with organophosphates and corrosives being the most common agents. Despite high rates of intentional poisoning, conservative treatment yielded favorable outcomes in most cases.

**Keywords:** Acute Poisoning, Clinical Outcomes, Organophosphate Toxicity, Supportive Treatment, Tertiary Care Hospital.

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## Introduction

Acute poisoning represents a substantial threat to public health globally, accounting for a significant number of emergency room visits, hospitalizations, and deaths each year. According to the World Health Organization (WHO), an estimated 106,683 people die annually due to unintentional poisoning, while hundreds of thousands more experience non-fatal outcomes that result in long-term disability and healthcare utilization.[1] This burden is particularly pronounced in low- and middle-income countries

(LMICs), where toxic substances such as pesticides, pharmaceuticals, and household chemicals are widely accessible, often without appropriate regulatory controls or public awareness.[2] In recent years, pesticide self-poisoning has emerged as one of the most common methods of suicide worldwide, contributing to an estimated 15 – 20% of global suicides.[3] The South Asian region, including countries like Bangladesh, India, Nepal, and Sri Lanka, bears a disproportionately high burden due to agrarian economies, poor mental health support systems, and unrestricted access to agrochemicals.[4] Unintentional poisoning, on the other hand, is frequently associated with occupational exposure, accidental ingestion by children, or improper storage and labeling of hazardous substances.[5] Emergency departments and intensive care units frequently serve as the frontline settings for managing acute poisoning. Patients may present with diverse clinical symptoms ranging from gastrointestinal disturbances and altered sensorium to cardiorespiratory compromise and multi-organ failure.[6] The variability in clinical presentation depends largely on the type of toxic agent, dose ingested, route of exposure, time elapsed since ingestion, and pre-existing comorbidities.[7] The availability of specific antidotes, rapid diagnosis, and timely intervention play crucial roles in determining patient outcomes. Sociodemographic variables such as age, gender, rural versus urban residence, educational status, and socioeconomic background have been found to influence both the intention (accidental vs. intentional) and outcome of poisoning events.[8, 9] Several studies report that adolescents and young adults—particularly females—are more vulnerable to intentional self-poisoning due to psychological stressors, interpersonal conflicts, or academic pressures.[10] Meanwhile, occupational poisoning remains a significant concern among male agricultural workers in rural areas, reflecting broader occupational health disparities.[11] Despite the high incidence and mortality associated with acute poisoning, there remains a critical gap in the literature—particularly in LMICs—regarding the clinical profiles, management strategies, and predictors of outcomes. Most published studies are limited by small sample sizes, single-centre experiences, or a narrow focus on specific toxic agents. Comprehensive retrospective analyses that examine a broad spectrum of poisoning cases across different age groups, etiologies, and treatment pathways are urgently needed to inform clinical protocols and public health interventions. Understanding the characteristics of poisoning cases, including the clinical signs at presentation, types of agents involved, mode of poisoning, time to admission, and treatment approaches, can aid in the formulation of evidence-based strategies for prevention, early diagnosis, and timely treatment. In addition, outcome analysis—both in terms of recovery and mortality—can provide valuable insight into potential predictors of prognosis and guide resource allocation in emergency settings.

**Objective:**

This study aims to examine the clinical characteristics, management approaches, and treatment outcomes of acute poisoning cases admitted to a tertiary care center in Bangladesh. Through a retrospective analysis, we aim to provide region-specific evidence that can support improved decision-making in both clinical and public health domains.

## Methods

### Study Design and Setting

This retrospective observational study was conducted at Satkhira Medical College Hospital (SMC), one of the largest tertiary care teaching hospitals in Bangladesh. SMC serves a diverse population from both urban and rural regions and receives a high volume of emergency and inpatient admissions, making it an ideal setting for evaluating acute poisoning cases. The study covered two years, from January 2023 to January 2025, during which data on all admitted poisoning cases were reviewed and analyzed.

### Study Participants

This study included all patients admitted to the emergency or inpatient departments of Satkhira Medical College Hospital with a diagnosis of acute poisoning during the defined study period. Acute poisoning was operationally defined as exposure to a toxic agent—whether chemical, pharmaceutical, or biological—that produced clinical manifestations within 24 hours of ingestion, inhalation, dermal contact, or other routes of exposure. The diagnosis was confirmed based on the patient's self-reported history, corroboration by witnesses, or clinical judgment by the attending physician. Eligible participants encompassed individuals of all age groups and sexes who presented with acute poisoning confirmed through history or clinical evaluation.

However, patients with chronic poisoning—characterized by delayed or prolonged exposure with onset beyond 24 hours—were excluded from the study. Additionally, cases with incomplete or missing hospital records that lacked critical data points such as the type of poison, clinical features, treatment modalities, or outcomes were not considered. Patients who were declared dead on arrival without sufficient documentation for clinical assessment were also excluded to ensure analytical consistency and data integrity.

**Data Collection**

Data for this study were retrospectively extracted from official hospital case records, including emergency department registers, inpatient admission logs, treatment charts, and discharge summaries. A standardized data abstraction form was developed to ensure uniform and systematic collection of relevant information across all cases. The abstraction process was carried out by trained research personnel under close supervision to maintain consistency and reduce the risk of data omission or misclassification. The collected data encompassed several key domains. Sociodemographic information included the patient's age and sex, which are essential for analyzing population-level trends and demographic vulnerability to poisoning. Poisoning-specific variables captured the date and time of toxic exposure, the type of poison involved—categorized as pesticides, pharmaceuticals, household chemicals, or unknown agents—the route of exposure (oral, inhalational, dermal, or others), and the underlying intent, whether accidental, suicidal, or homicidal. Detailed clinical characteristics were recorded based on parameters noted at the presentation. These included vital signs such as pulse rate, systolic and diastolic blood pressure, respiratory rate, and temperature. Additional clinical markers involved oxygen saturation ($SpO_2$), pupil size (constricted, dilated, or normal), and the level of consciousness, assessed via the Glasgow Coma Scale (GCS), where available. Documentation also noted organ system involvement, particularly respiratory, neurological, cardiovascular, renal, and hepatic systems, based on the clinical diagnosis or laboratory/radiologic investigations. Information regarding treatment modalities was systematically captured, focusing on the administration of gastric lavage, use of specific antidotes, supportive care measures such as intravenous fluids, oxygen supplementation, mechanical ventilation, and psychiatric referrals in cases of intentional poisoning. The nature and timeliness of these interventions were also noted, given their potential influence on patient outcomes. Finally, treatment outcomes were documented as complete recovery, occurrence of complications, in-hospital mortality, or discharge against medical advice. The length of hospital stays, measured in days from admission to discharge, was recorded to assess healthcare utilization and recovery duration. To ensure data reliability, all entries were cross-verified independently by two trained researchers. Any inconsistencies or discrepancies were resolved through consensus, with re-examination of source documents where necessary. This quality assurance process was integral to preserving the validity and robustness of the dataset used for subsequent statistical analysis.

**Management Approach**

All patients in this study were managed exclusively with conservative treatment measures. Clinical care primarily involves close observation and monitoring of vital signs, neurological status, and organ functions. Supportive care, including oxygen therapy, intravenous fluids, correction of electrolyte imbalances, pain management, and temperature regulation, was provided as needed. Gastrointestinal decontamination with activated charcoal or gastric lavage was performed only when indicated and within the appropriate time frame after ingestion. Symptom-specific interventions such as antiemetics or antacids were used, particularly in corrosive poisoning cases. Seizures, agitation, and arrhythmias, when present, were managed with standard pharmacologic agents. For cases involving intentional poisoning, psychiatric evaluation and counseling were routinely provided.

**Statistical Analysis**

All data were entered, cleaned, and analyzed using STATA statistical software (version 17). Descriptive statistics were utilized to summarize the demographic characteristics, clinical features, poisoning details, treatment approaches, and outcomes of the study population. Continuous variables such as age, time since ingestion, and length of hospital stay were reported as means with standard deviations (SD) for normally distributed data, or medians with interquartile ranges (IQR) for skewed distributions. Categorical variables, including sex, type of poison,

intent of poisoning, route of exposure, and treatment outcomes, were expressed as frequencies and percentages. To identify factors independently associated with adverse outcomes, such as in-hospital complications or mortality, binary logistic regression analysis was conducted. Variables demonstrating significant associations in bivariate analysis ($p < 0.10$) or deemed clinically relevant were included in the multivariate model to adjust for potential confounders. Adjusted odds ratios (AORs) with 95% confidence intervals (CIs) were reported to quantify the strength of associations. A p-value of $< 0.05$ was considered statistically significant in all analyses. The statistical approach ensured robust evaluation of both descriptive trends and predictive relationships within the dataset. All procedures adhered to ethical research standards, and the study protocol received approval from the Institutional Review Board of Satkhira Medical College, ensuring compliance with the ethical principles outlined in the Declaration of Helsinki.

## Results

**Table 1: Baseline Characteristics of Patients with Acute Poisoning (N = 169)**

| Variable | Value / Frequency (%) |
|---|---|
| Mean Age (years) | 22 (18 – 33) |
| Age Group | |
| • Less than18 years | 41 (23.8) |
| • 18–40 years | 99 (57.6%) |
| • Over 40 years | 32 (18.6%) |
| Sex | |
| • Male | 75 (44.4%) |
| • Female | 94 (55.6%) |
| **Time from Ingestion to Hospital (hours)** | **6 (3 – 6)** |
| **Intent of Poisoning** | |
| • Suicidal | 163 (96.5%) |
| • Accidental | 6 (3.6%) |

### Baseline Characteristics of Patients with Acute Poisoning

The mean age of the patients was 22 years, with an interquartile range of 18 to 33 years. Most patients (57.6%) were aged between 18 and 40 years, while 23.8% were under 18 years, and 18.6% were over 40 years. In terms of sex distribution, 44.4% of the patients were male and 55.6% were female. The median time from ingestion to hospital presentation was 6 hours, with an interquartile range of 3 to 6 hours. Regarding the intent of poisoning, 96.5% of cases were suicidal, whereas 3.6% were accidental Table 1.

**Table 2: Poisoning Characteristics (n = 169)**

| Variable | Frequency (%) |
|---|---|
| **Type of Poison** | |
| • Organophosphate | 41 (24.4) |
| • Corrosive Poisoning | 37 (22.0) |
| • Sedative | 29 (17.3) |
| • Paraquat | 14 (8.3) |
| • Uknown | 23 (13.7) |
| • Others | 24 (14.3) |
| **Root of Poisoning** | |
| • Oral | 159 (95.2) |
| • Inhalation | 8 (4.8) |
| **Organ System Involvement** | |
| • Nephrotoxicity | 46 (26.7%) |
| • Neurotoxicity | 23 (13.4%) |
| • Hepatotoxicity | 35 (20.4%) |

### Poisoning Characteristics

Among the types of poison ingested, organophosphates were the most frequently reported, accounting for 24.4% of cases. Corrosive poisoning was observed in 22.0% of patients, followed by sedatives at 17.3%, paraquat at 8.3%, unknown substances at 13.7%, and other types of poison at 14.3%. The predominant route of poisoning was oral, reported in 95.2% of patients, while inhalation accounted for 4.8%. In terms of organ system involvement, nephrotoxicity was noted in 26.7% of cases, hepatotoxicity in 20.4%, and neurotoxicity in 13.4% Table 2.

**Table 3: Clinical Parameters on Admission (n = 169)**

| Parameter | Mean ± SD / Frequency (%) |
|---|---|
| Systolic Blood Pressure (mmHg) | 110 (105 – 120) |
| Diastolic Blood Pressure (mmHg) | 70 (70 – 80) |
| Pulse Rate (beats/min) | 89.8± 17.7 |
| Oxygen Saturation (%) | 98 (90 – 98) |
| **Pupil Condition** | |
| • Contractile | 5 (3.2) |
| • Dilated | 26 (16.6) |
| • Normal | 117 (74.5) |
| • Pinpoint | 9 (5.9) |

| **Lung Condition** | |
|---|---|
| • Clear | 130 (89.7) |
| • Congestion | 14 (9.7) |
| • Dilated | 1 (0.7) |
| **Abnormal Pupil Response** | **40 (25.5%)** |

**Clinical Parameters on Admission**

The median systolic blood pressure on admission was 110 mmHg (interquartile range: 105–120 mmHg), while the median diastolic blood pressure was 70 mmHg (IQR: 70–80 mmHg). The mean pulse rate was 89.8 ± 17.7 beats per minute. The median oxygen saturation was 98%, with an interquartile range of 90–98%. Regarding pupil condition, 74.5% of patients had normal pupils, 16.6% had dilated pupils, 5.9% had pinpoint pupils, and 3.2% had contractile pupils. Abnormal pupil response was observed in 25.5% of cases. Lung examination findings indicated that 89.7% of patients had clear lungs, 9.7% showed signs of congestion, and 0.7% had lung dilation Table 3.

**Table 4: Clinical Outcomes (n = 169)**

| **Outcome Variable** | **Value / Frequency (%)** |
|---|---|
| Complete Recovery | 144 (86.8%) |
| Developed Complications | 1 (1.8%) |
| In-hospital Mortality | 19 (11.5%) |
| Median Length of Hospital Stay (days) | 1 (2 – 3) |

**Treatment Interventions and Clinical Outcomes**

All patients were clinically managed without invasive procedures, typically through observation, fluids, and symptomatic care. Among the patients, 144 (86.8%) achieved complete recovery, while 19 (11.5%) experienced in-hospital mortality. Only 1 patient (1.8%) developed complications. The median length of hospital stay was 1 day, with an interquartile range of 2 to 3 days (Table 4).

**Table 5: Multivariate Logistic Regression Analysis of Factors Associated with Poor Outcomes in Acute Poisoning (n = 147)**

| **Predictor Variable** | **Adjusted Odds Ratio (95% CI)** | **p-value** |
|---|---|---|
| Age | 1.05 (1.00 – 1.09) | 0.034 |
| Male Sex (vs. Female) | 4.29 (1.16 – 15.87) | 0.029 |
| Time: Ingestion to hospital (hrs) | 1.54 (1.99 – 2.10) | 0.014 |
| Organophosphate Poisoning | 0.43 (0.08 – 2.38) | 0.332 |
| Corrosive Poisoning | 0.62 (0.13 – 2.88) | 0.540 |
| Organ Dysfunction Present | 36.07 (6.42 – 202.66) | <0.001 |

**Multivariate Logistic Regression Analysis of Factors Associated with Poor Outcomes in Acute Poisoning**

The multivariate logistic regression analysis identified several factors independently associated with poor outcomes in acute poisoning cases (N = 147). Older age was associated with higher odds of poor outcomes (AOR: 1.05; 95% CI: 1.00–1.09; $p = 0.034$). Male patients had significantly higher odds compared to females (AOR: 4.29; 95% CI: 1.16–15.87; $p = 0.029$). The time from ingestion to hospital arrival was also significantly associated with poor outcomes (AOR: 1.54; 95% CI: 1.99–2.10; $p = 0.014$). Organophosphate poisoning (AOR: 0.43; 95% CI: 0.08–2.38; $p = 0.332$) and corrosive poisoning (AOR: 0.62; 95% CI: 0.13–2.88; $p = 0.540$) were not significantly associated with poor outcomes. In contrast, the presence of organ dysfunction showed a strong association with poor outcomes (AOR: 36.07; 95% CI: 6.42–202.66; $p < 0.001$) (Table 5).

**Note:** Values are adjusted odds ratios (AORs) with 95% confidence intervals. "Poor outcome" includes death, unchanged, or referral

## Discussion

The findings indicate that acute poisoning predominantly affects young adults, with a mean age of 22 years and the majority (57.6%) aged between 18 and 40 years. This age distribution is consistent with previous studies, which have frequently identified young adults as the most vulnerable group due to psychosocial stressors, unemployment, and emotional instability. [12, 13] The notable proportion of patients under 18 years old (23.8%) may also reflect impulsivity and lack of coping mechanisms during adolescence, a trend observed in other regional data. The slightly higher proportion of female patients (55.6%) aligns with global patterns, where females, particularly in South Asia, are more likely to engage in self-poisoning, often linked to domestic conflict or relationship issues.[14, 15] However, while women

attempt suicide more frequently, men tend to use more lethal means and have higher mortality rates.[16] The median time from ingestion to hospital presentation was 6 hours, which is relatively prolonged and may impact prognosis, particularly for poisons requiring early intervention (e.g., organophosphates, paracetamol). This delay reflects systemic challenges in emergency response, transport, or awareness—factors commonly reported in resource-limited settings.[17] Strikingly, the overwhelming majority (96.5%) of poisonings were suicidal in intent, underscoring the urgent need for mental health support and suicide prevention strategies in this population. This aligns with regional trends in low- and middle-income countries (LMICs), where intentional self-poisoning represents a leading cause of hospital admissions for poisoning.[18] The predominance of organophosphate poisoning reflects its widespread availability and frequent use in deliberate self-harm, consistent with findings from other low- and middle-income countries.[19] Corrosive agents were also commonly involved, likely due to easy access to household cleaning products.[20] Sedative and paraquat poisonings indicate misuse of prescription drugs and the high lethality of certain agricultural chemicals.[21] The oral route was overwhelmingly the most common, typical of intentional ingestions, reflecting the existing literature.[22]

Nephrotoxicity emerged as the most frequent organ involvement, followed by hepatotoxicity and neurotoxicity, reflecting the systemic effects of commonly ingested toxins such as pesticides and sedatives.[23] The median systolic and diastolic blood pressures (110/70 mmHg) on admission were within the normal physiological range, suggesting that the majority of patients did not present with severe hemodynamic instability, which is often associated with poor outcomes in poisoning cases.[24] The mean pulse rate of 89.8 bpm reflects mild tachycardia, which can occur as a physiological response to stress, hypoxia, or certain toxic agents, including organophosphates and sedatives.[25, 26] Oxygen saturation levels were generally preserved, with a median of 98%, although some patients presented with hypoxia (IQR: 90–98%), indicating possible respiratory compromise or systemic toxicity, especially in cases of paraquat or corrosive ingestion.[27] The presence of abnormal pupil responses in 25.5% of patients—including dilated and pinpoint pupils—can reflect central nervous system involvement or specific toxic syndromes, such as cholinergic or anticholinergic toxidromes.[28] On lung auscultation, most patients (89.7%) had clear lung fields, while 9.7% exhibited congestion, which may be attributable to aspiration, pulmonary edema, or systemic toxicity. The rare finding of lung dilation (0.7%) might be incidental or related to underlying comorbidities.[29] The majority of patients with acute poisoning (86.8%) recovered completely with conservative management strategies, including observation, fluid resuscitation, and symptomatic care, without the need for invasive interventions. This aligns with current recommendations emphasizing supportive care as the cornerstone of poisoning management when no specific antidote is available.[28] A low complication rate (1.8%) further supports the effectiveness of early and appropriate supportive treatment in many poisoning scenarios.[27] However, an in-hospital mortality rate of 11.5% is notable and suggests the presence of high-risk cases or delayed presentation. Previous studies in similar settings have reported mortality rates ranging from 4.6% to 15.2%, depending on poison type, time to presentation, and availability of critical care resources. The relatively short median hospital stay of 1 day (IQR: 2–3) suggests that many patients stabilized quickly, consistent with findings from other regional studies where brief admissions were observed for non-lethal poisoning cases.[30] The multivariate logistic regression analysis revealed key predictors significantly associated with poor outcomes in acute poisoning. Advancing age increased the likelihood of adverse outcomes (AOR: 1.05; 95% CI: 1.00–1.09), aligning with previous research indicating that older individuals may have reduced physiological reserve and comorbidities that complicate recovery from toxic exposures.[31] Male patients were found to have over four times the odds of poor outcomes compared to females (AOR: 4.29; 95% CI: 1.16–15.87), a pattern also reported in earlier studies, potentially reflecting differences in the severity or intent of poisoning events.[32] Delayed presentation to the hospital was a significant determinant of poor prognosis (AOR: 1.54; 95% CI: 1.99–2.10), emphasizing the critical importance of timely medical intervention, which is consistent with findings from Kumar *et al*., where earlier treatment was associated with better outcomes.[33] Notably, specific poison types such as organophosphates and corrosives were not independently linked to worse outcomes in the adjusted model, suggesting that other

clinical factors may mediate their effects. The presence of organ dysfunction was the most powerful predictor of poor outcomes (AOR: 36.07; 95% CI: 6.42–202.66), highlighting the critical need for early identification and management of organ failure. This finding is consistent with the literature, which identifies multi-organ involvement as a major contributor to morbidity and mortality in poisoning cases.[28, 34]

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