

Original Article**Clinical Patterns and Outcome of Acute Poisoning Cases at a Tertiary Care Hospital in Eastern Nepal**Madan Krishna Mandal ^{1*}, Namita Kumari Mandal ², Rohit Kumar Shah¹¹Department of Emergency Medicine, Nobel Medical College Teaching Hospital, Biratnagar, Nepal,²Department of Clinical Pharmacology and Therapeutics, BP Koirala Institute of Health Sciences, Dharan, NepalArticle Received: 15th April, 2025; Accepted: 16th May, 2025; Published: 31st July, 2025DOI: <https://doi.org/10.3126/jonmc.v14i1.83299>**Abstract****Background**

Acute Poisoning is a major health problem with significant morbidity and mortality affecting people of all age groups. The objective of the present study was to find out the clinical features, epidemiological profile, pre-hospital treatment practice and the role of triage variables as severity and outcome indicators.

Materials and Methods

All emergency patients with acute oral poisoning were included. Data on triage, demographics, clinical features, poison characteristics, and pre-hospital treatment were recorded using a semi-standardized Proforma. Primary outcomes were mortality and survival; secondary outcomes included admission details and complications.


Results

Adult poisoning comprised 3.3% of Emergency admissions, mainly affecting young adults (21–30 years, 33.4%) with a female predominance (62.9%). Most were married (67.6%), educated up to secondary level (62.4%), and were housewives (42.5%) or students (30.3%) from nearby districts. Intentional suicides (92.2%), primarily with organophosphates (30.3%) and rat killers (20.1%), predominated. Over 59.7% arrived within 4 hours, mostly at night (69.6%). Gastrointestinal symptoms (81.1%) were common, with Glasgow Coma Scale of 13–15 in 80.8%. Antidotes were given in 31.6%, intubation in 9%, and complications in 17.5%. Mortality was 6.3%, while 78.4% survived; fatalities had lower Blood Pressure, oxygen saturation, and consciousness.

Conclusion

Poisoning is common with agricultural products with housewives and students forming the majority. Young age is commonly involved. Suicidal act at home presenting with gastro-intestinal symptoms visiting at night is common.

Keywords: *Poisoning, Organophosphates, Antidotes, Triage, Emergency Service*

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Introduction

Acute poisoning is a major public health problem, causing significant morbidity and mortality across all age groups. A poison is any substance capable of harming a living organism through contact or ingestion and may be used intentionally to cause injury [1]. According to the World Health Organization (WHO), about 300,000 people die annually from acute poisoning, with organophosphorus compounds alone accounting for nearly 200,000 deaths.[2,3] Toxicology, the study of chemical effects on biological systems, is crucial in understanding and managing poisoning, while forensic toxicology aids medico-legal investigations.

Globally, suicidal poisoning is common, but its patterns vary with geography, socio-economic status, and cultural influences. [4] In many Asian countries, agricultural pesticides such as organophosphates, Organochlorine, and phosphides are frequently involved due to easy accessibility. In contrast, developed nations report higher rates of pharmaceutical-related poisoning, including paracetamol, opioids, and benzodiazepines.[5,6] Poisoning is a medical emergency requiring prompt intervention; however, evidence-based guidelines for managing organophosphate poisoning remain limited. Scarcity of local epidemiological data highlights the need for regional studies to guide effective prevention and management. [7]

This study aims to analyze the clinic epidemiological profile, poisoning patterns, management practices, and outcomes of poisoning cases in a tertiary care hospital in Eastern Nepal to improve care and optimize resource allocation.

Materials and Methods

This single-center, prospective cross-sectional observational study was conducted on acute poisoning cases presenting to the Emergency Ward of Nobel Medical College Teaching Hospital (NMCTH), Biratnagar, a tertiary care center in Eastern Nepal. The study was carried out over one year, from January 1, 2019, to December 31, 2019. For the purpose of this study, acute poisoning was defined as exposure to drugs or environmental substances resulting in an emergency visit, even if the patient was asymptomatic. Acute exposure was considered as a single exposure,

continuous exposure lasting less than eight hours, or repeated exposures within one week.[8]

Ethical clearance was obtained from the Institutional Review Committee of NMCTH (IRC No: 235/2018), and informed consent was taken from patients or their relatives prior to inclusion. Patients aged above 14 years with a history of acute oral poisoning were included, while those who refused consent, had chronic poisoning (e.g., metallic poisoning), food poisoning (except plant toxins), or snake and insect bites were excluded.

The sample size was calculated based on a prevalence of 3.89% reported in a previous study at BPKIHS, Dharan [9], yielding an estimated minimum of 380 cases using the formula $n = Z^2pq/l^2$. However, all consecutive eligible patients during the study period were enrolled, resulting in a total of 1003 cases. Data were collected using a semi-standardized proforma that included demographics, poisoning details, prior treatment, presenting symptoms, and outcomes such as mortality, survival, or other discharge status. Complications related to poisoning were also recorded. Data were entered in Microsoft Excel 2010 and analyzed using SPSS version 30, with descriptive statistics such as percentages, proportions, means, and standard deviations, and presented in tabular and graphical form as appropriate.

Results

Adult poisoning cases accounted for 3.31% of total ER admission. Majority of the cases belonged to age group 20-30 years (33.4%) with mean age of 30.2 years (SD=14.02 years), there was a Female preponderance with female: male ratio 1.7:1. Majority of cases were married (67.6%) and most of them had education up to secondary level. In our study, by occupation 42.5% cases were housewife followed by students which comprised 30.3%. Most of the cases were from Sunsari district (31.4%) followed by Morang (22.5%) then Jhapa (18.6%) which are nearby districts. The majority of patients (about 81%) belonged to Hindu communities (Brahmin, Chhetri, Madhesi, Janjati), followed by Muslims (5.4%) and Dalit communities.



Table 1: Demographic Characteristics of Poisoning cases

Variables	Parameters	Frequency n(%)
Gender	Male	372 (37.1)
	Female	631(62.9)
Age group (Years)	≤20	301(30)
	21-30	335(33.4)
	31-40	168(16.8)
	41-50	96(9.6)
	51-60	60(6)
Marital Status	≥60	42(4.2)
	Unmarried	325(32.4)
	Married	678(67.6)
Educational Status	Illiterate	26(2.6)
	Informally literate	66(6.6)
	Secondary level	626(62.4)
	Post-Secondary level	285(28.4)
Occupation	Housewife	426(42.5)
	Students	304(30.3)
	Manual Workers	166(16.5)
	Farmers	41(4.1)
	Others	66(6.6)
Districts	Sunsari	315(31.4)
	Morang	225(22.4)
	Jhapa	187(18.6)
	Others	276(27.6)

Most poisoning cases were intentional suicides (92.2%), with organophosphates (30.3%) and rat killers (20.1%) were being the most common agents. Over half (59.7%) reached the hospital within 4 hours, and 57% presented directly while 43% were referred. Among referred cases, 64% had received gastric lavage. The majority of presentations occurred at night (69.6%).

Table 2: Patterns of Poisoning

Intention	Suicide	925(92.2)
	Accidental	72(7.2)
	Homicidal	1(0.1)
	Recreational	3(0.3)
	Medicinal	2(0.2)
Compounds Ingested	Organophosphates	304(30.3)
	Organochlorine	168(16.7)
	Rat Killers	202(20.1)
	Mushroom	56(5.6)
	Drugs	63(6.3)
	Household Compounds	70(7)
Delay in arrival (Hours)	Unknown	140(14)
	≤4	599(59.7)
	4-8	313(31.2)
	8-12	74(7.4)
	≥12	17(1.7)
Type of Visit	Direct	572 (57)
	Referred	431(43)
Gastric Lavage among referred cases	Yes	276(64)
	No	155(36)
Timing of Presentation	Day	305(30.4)
	Night	698(69.6)

The average values of the triage vital signs in the survival and fatality groups are shown in the table below:

Table 3: Vital Sign Differences in Survivors vs. Fatalities

VITAL SIGNS	SURVIVORS (n= 786) Mean ± SD	FATALITIES (n=63) Mean ± SD
Pulse (bpm)	89.1 ± 16.3	94.7 ± 29.95
Respiratory Rate (/min)	21.7 ± 2.83	25.2 ± 8.19
Temperature(°F)	98.0 ± 0.59	97.2 ± 1.03
Systolic BP (mmHg)	116.1 ± 20.05	86.35 ± 21.94
Diastolic BP (mmHg)	72.80 ± 13.29	49.36 ± 17.94
AVPU (Alert, Response to Verbal, Painful stimulus, Unresponsive)	A=753 & V/P/U= 33	A=25 & V/P/U= 38
Oxygen Saturation (SpO2 (%))	96.47 ± 6.59	74.39 ± 22.08

Most patients had a GCS of 13–15 (80.8%), with gastrointestinal symptoms being the predominant clinical feature (81.1%). Antidotes were administered in 31.6% of cases, while only 9% required intubation. Complications occurred in 17.5% of patients. The majority survived (78.4%), with 6.3% mortality and 15.3% leaving against medical advice (LAMA), Discharged on request (DOR) or being referred.

Table 4: Distribution of Clinical Parameters and Outcomes among Poisoning Cases

Variables	Parameters	Frequency n(%)
Glasgow Coma Scale (GCS)	<9	52(5.2)
	9-12	140(14)
	13-15	811(80.8)
Clinical Features	Gastro-intestinal	814(81.1)
	Neurological	118(11.8)
	Respiratory	10(1)
	None	61(6.1)
Antidotes	Yes	317(31.6)
	No	686(68.4)
Intubation	Yes	90(9)
	No	913(91)
Complications	Yes	176(17.5)
	No	827(82.5)
Outcomes	Survival	786(78.4)
	Mortality	63(6.3)
	Others (Absconded, LAMA, DOR, Refer)	154(15.3)

Discussion

Studies from various parts of Nepal have reported lower poisoning incidences compared to our study, which recorded 1,003 adult cases (3.31%) in one year. For instance, Karki et al., Baral et al., and Deepak Sigdel et al. each reported fewer than 300 cases annually [10, 11,



12]. However, Bhandari et al. documented 1,437 cases in one year at BPKIHS, Dharan [9]. The higher incidence at our center and BPKIHS likely reflects their status as referral centers for eastern Nepal, as well as cross-border patient referrals from India.

Our study found a higher incidence of poisoning in females than males, with a ratio of 1.7:1, consistent with findings by Bhandari et al., Karki et al., Baral et al., Deepak Sigdel et al., and Kishore et al. [9–13]. In contrast, studies by Thapa et al. and Patil et al. reported male predominance [14, 15]. The female preponderance may be attributed to greater susceptibility to stress; however, further research is needed to confirm this observation more broadly.

The majority of cases were in the 20–30 years age group, followed by those under 20 years. Similar findings were reported by Bhandari et al., Karki et al., Baral et al., Deepak Sigdel et al., Kishore et al., Patil et al., and Aroor et al. [9–13, 15, 16], while Paudyal et al. identified the 15–24 years group as most affected [17]. This trend suggests that the productive age group is predominantly involved, possibly due to high stress levels related to studies, work, and personal relationships.

Poisoning was most common among housewives (42.5%) and students (30.3%), aligning with the findings of Baral et al., Thapa et al., and Khadka et al. [11, 14, 18]. Conversely, Karki et al. reported the highest rates among the unemployed (42.4%) and farmers (29.2%), while Marahatta et al. found farmers (47.5%) to be the most affected group, followed by housewives (31.49%) [10, 19]. Shakya et al. also noted students as the predominant group. [20]

We found that 90.8% of poisoning cases were literate, with education at class 10 level or above. Similar results were reported by Aroor et al., Marahatta et al., and Shakya et al. [16, 19, 20]. This higher incidence among the educated population may reflect the stresses and challenges faced in today's demanding environment. We observed a higher incidence of poisoning among married individuals (67.6%) compared to unmarried ones (32.4%), consistent with findings by Karki et al., Baral et al., Aroor et al., and Pokhrel et al. [10, 11, 16, 21]. This may be attributed to marital discord. Additionally, the increasing trend of Nepalese going abroad for work often leaves housewives alone or in joint families with limited psychological and emotional support, which could contribute to these results.

The majority of patients (about 81%) belonged to Hindu communities (Brahmin, Chhetri, Madhesi,

Janjati), followed by Muslims (5.4%) and Dalit communities. Similar findings were reported by Patil et al. [15]. These demographic patterns warrant consideration, with further analysis needed on lifestyle factors and daily needs. Government policies should focus on equitable resource distribution and improving living standards for these groups.

In our study, 60% of cases presented to the emergency room within 4 hours, and over 91% within 8 hours of poisoning, consistent with findings by Bhandari et al., Paudyal et al., and Rajbanshi et al. [9, 17, 22]. Other studies, such as those by Baral et al., Kishore et al., and Singh et al., reported most cases arriving within 2 hours [11, 13, 23], while Deepak Sigdel et al., Sarkar et al., and Karki et al. noted presentations mostly after 1 hour [12, 24, 25]. Early arrival enables timely and effective treatment; however, delayed presentations at centers like ours often preclude initial gastric lavage, shifting focus to supportive care. This delay is largely due to patients traveling from hilly regions with limited transportation facilities.

We found that 93.5% of poisoning cases involved ingestion at home, with the remainder occurring outside, such as at workplaces or hotels, consistent with Marahatta et al.'s finding of 66.6% [19]. This suggests that deliberate self-harm (DSH) could be reduced through proper family monitoring of high-risk individuals and public education focused on prevention.

We found that 57% cases had direct visit to our ER while 43% cases were referred from outside after primary management. A study by Kishore et al. found that 50% cases came after treatment from outside and Karki et al. found 25.5% cases were referred from outside. [13, 25] As a tertiary care center, we receive numerous critical cases referred to us after initial management at peripheral centers. This underscores the crucial role these centers play in the timely and effective management of acute poisoning cases. Therefore, enhancing the skills and training of personnel at primary health care centers and district hospitals as well as promoting first aid education at the individual level can significantly improve the management of such cases.

In our study, all poisoning cases involved oral ingestion. Studies by Bhandari et al., Baral et al., Kishore et al., Patil et al., Aroor et al., and Khadka et al., also identified oral route as the commonest route of poisoning. [9, 11, 13, 15, 16, 18] This highlights the importance of timely implementation of standard gastrointestinal decontamination procedures. Notably, the mode of poisoning in



our region differs from that commonly seen in Western countries.

We found that 64.5% referred cases underwent gastric lavage before referral to our center which was similar to finding in study by Karki et al. [10] This indicates that gastric lavage is still commonly practiced in resource-limited settings within our country. The observed low mortality rate further underscores its potential benefit when patients present early and the toxic compound is promptly identified. However, the methods of performing gastric lavage varied across centers. In some facilities, gastric emesis is still practiced, while others insert a nasogastric tube for lavage prior to referral.

A total of 69.6% of cases presented during nighttime hours, with the remaining arriving during the day. This distribution is consistent with the findings of Patil et al., Pokhrel et al., Karki et al., and Kushwaha et al. [15, 21, 25, 26]. The higher number of nighttime presentations may reflect a shortage of healthcare manpower during those hours.

In our study, 92.2% of cases involved suicidal intent, 7.2% were due to accidental ingestion, and a small number were related to recreational, medicinal, or homicidal exposures. These findings are consistent with studies from other centers in Nepal. [11, 13, 14, 16, 19-22, 25]

In our study, pesticides including organophosphates accounted for the majority of cases (47.1%). Similar trends have been reported in studies from various centers [9-12, 14, 17, 19, 21-23, 25]. Kishore et al. [13], however, identified rodenticides as the most commonly involved agents, likely due to their easy availability in that region; these accounted for 20% of cases in our study. Drug overdoses comprised 6.3% of cases, with paracetamol (2%), benzodiazepines (2.2%), and antipsychotics/thyroxine (2%) being the most frequent. This is lower compared to findings from Karki et al. (8.7%), Kishore et al. (22.7%), Aroor et al. (49.1%), Paudyal et al. (25%), Rajbanshi et al. (10.5%), and Kushwaha et al. (15%) [10,13,16,17,22,26]. In 10% of cases, the toxic agent could not be identified due to insufficient information. Accurate identification of the poisoning agent is critical for effective management, particularly when the use of specific antidotes is required.

In our study, 31.2% of patients received specific antidotes, primarily for organophosphate and paracetamol poisoning, while the remaining cases were managed symptomatically. In comparison, Karki et al. reported antidote use in 51.1% of cases, whereas Patil et al. observed

14.9% receiving specific antidotes [10, 15]. Similarly, Kishore et al. found that 83.67% of cases were managed with symptomatic treatment alone. [13]

The clinical features at presentation are very important in determining the initial symptomatic management of poisoning in most of the cases. Most common clinical features were nausea and vomiting (50.4%) followed by burning sensation of abdomen with nausea/vomiting (21%). Study by Baral et al., Kishore et al., and Aroor et al. also found similar results with higher incidence of gastrointestinal symptoms. [11, 13, 16] About 12% cases presented with neurological symptoms in our study compared to 26.5% in study by Kishore et al. and 64.8% in study by Patil et al. [13, 15]

Secondary complications were observed in approximately 17% of cases, including aspiration pneumonitis, deranged liver and renal function tests, and coagulopathy. Kishore et al. reported secondary complications in 28.5% of cases, while Paudyal noted a rate of 25% [13, 17]. The occurrence of such complications is of particular concern in patients who received initial treatment involving induced emesis and gastric lavage. In our study intubation was required in 9% cases compared to 6.3% cases in study by Bhandari et al. [9]

In our study the survival percentage was 78.3%, fatalities was 6.3% and result was not known in remaining 13.4% as those cases were referred, absconded, discharged on patients request (DOPR) and left against medical advice (LAMA). Studies done at various centers have found mortality ranges from 0% to 18.3% [9-13, 15-17, 19, 23, 27] The mortality was very high as compared to western countries. [28] Pesticides were a major contributor (44.5%). There are other explanations for the relatively large number of pesticide poisonings in eastern Nepal. Nepal's status as an agricultural country makes pesticides widely accessible, and the use of appropriate storage containers is generally lacking. Additionally, there is limited public awareness about the toxic effects of these chemicals. Although authorities have taken steps such as banning highly toxic pesticides (e.g., endosulfan and parathion) and encouraging reduced pesticide use, further efforts are needed to decrease deaths from pesticide poisoning. In our region, these challenges are compounded by the cross-border sale of pesticides from India, which influences the availability and use of these substances.



Conclusion

Acute poisoning remains a significant public health challenge in Eastern Nepal, predominantly affecting young adults, especially females in their productive age groups. The majority of cases were linked to deliberate self-harm, with pesticides particularly organophosphates being the most commonly used agents due to their easy availability in agricultural settings. Although most patients recovered with timely symptomatic management and antidote administration, secondary complications and a significant mortality rate highlight the need for improved prevention and early intervention strategies. Regional epidemiological data, such as this study, are essential to inform policies, allocate resources effectively, and develop standardized treatment guidelines tailored to local needs.

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