

Evaluation of clinical patterns of adult patients presenting with acute poisoning in the emergency at Birat Medical College Teaching Hospital

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ABSTRACT

Introduction: Poisoning is one of the major public health concerns worldwide that requires prompt emergency care, owing to its high morbidity and mortality rates. It is also one of the leading causes of visits to the emergency room. This study focused on identifying clinical presentation and outcomes (discharge, mortality, site of treatment, and duration of hospital stay) in adult patients presenting with acute poisoning due to various etiologies at Birat Medical College Teaching Hospital (BMC-TH) in Nepal.

Methods: This was a descriptive cross-sectional hospital-based study conducted among patients attending the emergency room of Birat Medical College Teaching Hospital from August 2024 to January 2025. The study was started after ethical approval from the Institutional Review Committee (Reference No: IRC-PA-404/2024). The inclusion criteria consisted of adult patients aged 18 years or above who were diagnosed with acute poisoning based on history, examination, and laboratory parameters. Collected data was performed using structured questionnaires and analysis was performed by using Microsoft Excel. Convenience sampling method was used.

Results: A total of 85 cases of acute poisoning were included. The majority of sufferers were younger adults (18–40 years). Males comprised 53%, and females accounted for 47%. Organophosphate (OP) pesticides accounted for the foremost poisoning factor (35.29%), followed by pharmaceutical overdoses (20%) and rodenticides (15.2%). Common symptoms of poisoning had been nausea and vomiting (62%), dizziness (45%), and altered mental status (40%). A common cause for poison intake was suicide (44.2%) and the most common place of intake was home (48.45%). The average period of hospitalization was four days, and in-hospital mortality was 5%, especially due to severe phosphide poisoning (0.85%) and organophosphate poisoning (2.55%). Timely interventions, along with gastric lavage, antidote, and supportive care, were related to better outcomes.

Conclusion: Poisoning predominantly affects the young adult population, and among the various etiologies, most common pesticides are organophosphate. This indicates the need to increase awareness amongst the general community, regulate poisonous substances, and construct healthcare resources to lessen the burden of morbidity and mortality because of poisoning in Nepal.

Keywords: Acute poisoning, Clinical patterns, Emergency, Organophosphates, Outcomes, Suicide.

INTRODUCTION

Poisoning is a global health issue, as evidenced by WHO data showing 0.3 million deaths annually.¹ In low and middle-income nations, poisoning

remains a pressing medical and socioeconomic problem mainly due to a lack of education, safe handling of chemicals, timely pre-hospital and emergency care.² The root etiological factors of acute poisoning vary significantly between regions. Common factors are socioeconomic (income, lifestyle, alcoholism), environmental, and healthcare (poison call center, availability

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of antidote). For instance, psychoactive drugs dominate toxic visits to Spanish emergency (income, lifestyle, alcoholism), environmental, and healthcare (poison call center, availability of antidote). For instance, psychoactive drugs dominate toxic visits to Spanish emergency rooms.³ Meanwhile, eastern Iran studies show pesticides and medications as top agents, highlighting the need for locally-tailored strategies.⁴

Research from Tabriz also found intentional poisoning on the rise, underscoring unaddressed social and mental health issues requiring prompt attention. Agriculture's importance to Turkey's economy likewise accounts for many farmer exposures to organophosphates and chemicals. Suicides and accidental exposures in farming often involve pesticides, a chief killer, especially in rural communities.⁵⁻⁷ Rural Asia sees 500,000 deaths yearly from suicide attempts, with organophosphates linked to 200,000.⁸ This reality looms large in Nepal, where investigations at tertiary centers consistently find pesticides like organophosphates and rodenticides predominating exposures. A substantial proportion aims to end life, tied to mental health struggles and social stresses impacting young adults.⁹ Yemen faces similar trouble due to weak policies and a lack of dedicated poison facilities whereas research from two Nepali regions moreover reveals divergent case fatality rates.¹⁰⁻¹² For example, 2015 Chitwan study reported an incidence of 62.67 per 100,000 and case fatality of 3.8%, noting insecticide and rodenticide as common agents in suicidal, low socioeconomic female youth.¹³ However, most national work bears some limitations like having a small sample size and not highlighting common specific chemical poisons like paracetamol overdose, marijuana inhalation, tramadol, and pregabalin overdose.¹⁴ This underscores the need for ongoing geographical investigations to better track poisoning patterns and outcomes.

Limited information is available on the poisoning situation in Nepal as it is not included in the national routine Health Management and Information System (HMIS); thus Nepal needs specific epidemiological surveillance in different geographical areas to determine the extent and pattern of the problem. Newer chemical and pharmaceutical industry developments, and easy

cross-border area access to substances, have drawn attention to more poisoning research. There are many local challenges faced by medical doctors while managing cases of poisoning. Being in low and middle-income countries we don't have adequate antidotes or poison call centers, and low literacy rates among the population delayed the arrival of patients at hospitals that makes the management difficult. The objective of study was to identify clinical pattern of acute poisoning and its outcome.

METHODS

This single-center study was conducted in the Emergency room at BMC-TH, one of the major referral centers in eastern Nepal, catering to both urban and rural populations. The study population comprised adult patients aged 18 years and above who were diagnosed with acute poisoning during the six months of the study period, from August 2024 to January 2025. Ninety-three patients met the criteria for acute poisoning, though complete data were available for analysis on eighty-five cases (N=85). The inclusion criteria were all the patients presenting with overt signs and symptoms of poisoning, while cases of snakebite, idiosyncratic drug reactions, patient who did not provide consent and patients below 18 years were excluded. Informed consent was obtained from willing participants. A non-probability convenience sampling method was used, allowing the inclusion of all eligible cases that presented themselves within the stated timeframe. Data were collected using a structured questionnaire that included demographic characteristics, types of poisons ingested known based on history provided by patient/visitor, clinical presentation, poison labeled container/package, smell of poison, site of intake, modes of poisoning-intentional or accidental, management interventions, and outcomes. Clinical records and laboratory investigations were reviewed to supplement the patient interviews. The questionnaire was pretested to minimize errors and discrepancies that were resolved through consultations with subject matter experts. Data entries were performed using Microsoft Excel.

RESULTS

A total of 85 cases of acute poisoning were

recorded. Demographic and clinical details are presented below.

Table 1. Demographics of Acute Poisoning Cases

Parameter	Frequency (N=85)	Percentage (%)
Gender		
Male	45	53%
Female	40	47%
Age Group		
18-30 years	30	35%
31-40 years	25	29%
41-50 years	18	21%
51-60 years	7	8%
>60 years	5	6%

The majority of patients were male 53% and 47% were female. The age distribution showed that the most affected group was between 18 and 40 years old, accounting for 64% of the total cases. The youngest group (18-30 years) comprised 35% of the cases, followed by the 31-40 years age group (29%).

Table 2. Types of Poisoning Cases

Type of poisoning (n)	Agents	Frequency (N=85)	Percent (%)
Organophosphates (OP) (30)	Chlorpyrifos & cypermethrin	21	35.29%
	Parathion	4	
	Diazinon	2	
	Malathion	3	
Pharmaceutical Overdose (17)	Paracetamol	9	20%
	Amitriptyline	3	
	Clonazepam	2	
	Cough syrup	2	
	Povidone iodine	1	
Rodenticide (13)	Zinc phosphide	13	15.2%
Insecticide (10)	Phosphide (Aluminum)	10	11.7 %
Alcohol (7)	Ethanol	7	8.23%
Others (8)	Carbon monoxide	3	9.4%
	Marijuana inhale	2	
	Spirit	1	
	Turpentine	2	

Table 3. Symptoms Presenting in Patients

Symptom	Frequency (N = 85)
Nausea/Vomiting	53 (62%)
Abdominal Pain	30 (35%)
Dizziness	38 (45%)
Altered Mental Status	34 (40%)
Excessive Salivation	25 (29%)
Asymptomatic Cases	13 (11.05%)

Table 4. Reason of taking poison:

Variables	Frequency (N = 85)
Suicidal (Intensional)	55 (64.7%)
Accidental	11 (12.9%)
Recreational drug misuse	9 (10.5%)
Threat	4 (4.7%)
Psychiatric illness (Depression)	6 (7.05%)

Table 5. Site of admission of patient inside hospital.

Site of Admission	Frequency (N=85)
ICU	72 (61.2%)
Ward	13 (11.05%)

Table 6. Outcomes of Acute Poisoning Cases

Outcome	Frequency (N=85)
Recovered & Discharged	64 (75%)
Moderate-Severe Complications	17 (20%)
Mortality	4 (5%)

Organophosphate poisonings were the leading cause of acute intoxication, impacting roughly 25.5% of individuals who were brought in, trailed by overmedication on pharmaceuticals at 14.43% and rat poisons at 11.05%. Additional factors behind poisonings included insecticides which made up 8.5% of cases, alcohol consumption accounted for 5.95%, and chemicals or family unit things caused 10% of occurrences.

The most common clinical symptoms reported were nausea and vomiting (62%), dizziness (45%), and abdominal pain (35%). A significant proportion of patients exhibited altered mental status (40%). Specific symptoms, such as excessive salivation and bradycardia, are observed predominantly in patients with organophosphate

poisoning.

Table four shows the reason of intake of poison in frequency and percentage. Highest Intension of taking poison was Suicidal ($n = 52$, 64.7%) followed by accidental ($n = 11$, 12.9%).

Figure one shows the place of intake of poison in frequency and percentage. Common place of intake of poison was home ($n=57$, 48.45%)

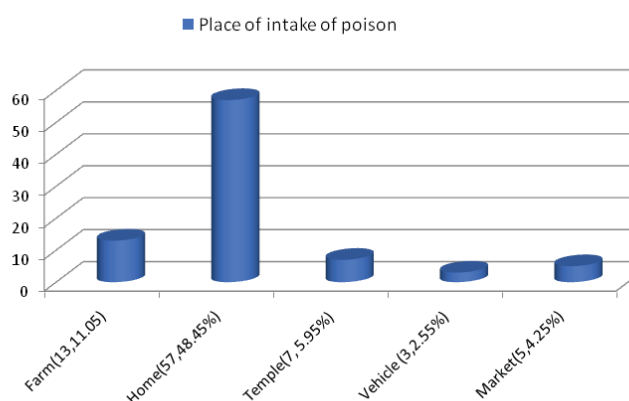


Figure 1. Place of intake of poison

In terms of patient outcomes, 75% of the patients (64 cases) recovered fully and were discharged, with an average hospital stay of 4 days. Unfortunately, 5% of the patients (four cases) expired primarily due to complications from organophosphate poisoning (3) and phosphate (Aluminum) (1). The remaining 20 % (17 cases) suffered moderate to severe complications, including respiratory distress, proximal muscle weakness and reversible kidney failure, requiring extended hospitalization and intensive care.

Total Intensive care unit (ICU) admitted cases were 72 (61.2%), ward admission for asymptomatic cases were 13 (11.05%) which needs 24 hour close observation.

DISCUSSION

The present study on diverse clinical profile of acute poisoning highlights its persistent challenges in Nepal, a country with limited healthcare resources along with a high burden of preventable poisoning cases. The findings are supported by multiple studies from similar settings and suggest for targeted interventions.

Trends in Demographics and Public Implications:

Results of demographics from this study indicates acute poisoning most frequently affects adults aged 18 to 40 years (64%), though gender representation was roughly equal with a slight male predominance (53%). Comparable studies across the area likewise pinpoint youthful adults as a heavily impacted group, as example research among Iranians and Nepalese on assorted factors like mental distress over financial difficulties, failed relationships, social stressors like unemployment, and easy access to toxic materials.^{5,9} The predominance of the 18-40 cohorts emphasizes further need for age-specific prevention like programs supporting adolescent mental health and boosted awareness of risks from pharmaceuticals and pesticides.

The gender distribution in this study revealed a nearly even split, though prior research in other locales has highlighted elevated poisoning rates for males specifically about occupational exposure and substance abuse.⁵ However, these discrepancies may simply mirror societal norms where the risk of accidental poisoning, drug overdose, and chemical misuse is equally probable for all. Moreover, all adult patients with poisoning who were admitted to the hospital were only included in the study population, the actual gender ratio might differ when all the patients who are admitted to emergency care are included. This calls for holistic prevention strategies that are not only inclusive but also responsive to both men's and women's needs.

Causes and Risk Factors of Poisoning:

Chiefly, the findings of this study revealed that organophosphate poisoning (35.29%) was the leading cause of acute poisoning, followed by pharmaceutical overdose (20%) and rodenticide poisoning (15.2%). These conclusions align with other investigations of rural and farming regions, where pesticides - notably organophosphates - are commonly applied yet pose great risks to health.^{6,7} The high prevalence of pesticide poisoning highlights the need for adopting strong policies on pesticide use, enhanced safety practices like personal protective equipment usage, and expanded training for agricultural laborers and the general public on proper handling and disposal. The role of pharmaceutical overdoses

in this study further highlights the growing issue regarding medication misuse (over the counter drug supply) and, a worldwide pattern, especially in middle-income nations.³ This demands strict controls on medication sales and distribution, public education on safe drug practices, and the promotion of safe storage and disposal of unused drugs.

Clinical Symptoms and Treatment Outcomes:

Common presentations included nausea, vomiting, dizziness, abdominal pain, and mental status changes, consistent with acute effects elsewhere.⁴ Organophosphate poisoning symptoms involved excessive salivation, irregular heartbeats (bradycardia) and proximal muscle weakness in many patients reporting under this category. This symptom highlights the need of early recognition and care, especially for organophosphate poisoning where quick treatment and support significantly improves survival.

A recovery rate of 75% the mortality rate of 5% was quite similar to other studies.^{11,15} This similarity may be due to common emergency and ICU treatment protocols of both tertiary care hospitals. Death was mainly due to complications such as respiratory muscle paralysis, chemical pneumonitis, recurrent seizure in the Intensive care unit (ICU) of organophosphate poisoning, indicating that serious poisoning cases are difficult to handle. This reinforces the need for intensive care units and advanced interventions, particularly in resource-restricted areas. Furthermore, 20% experienced moderate or serious issues, necessitating long follow-ups and rehabilitation for survivors of acute episodes due to possible lifelong impacts including neurological damage, or emotional trauma

Reasons and Places of Poison Intake:

Reasons and Places of Poison intake varied greatly across contexts. Majority of suicide (intentional) (55, 64.7%) by toxic substances was a common here, which is similar to the study conducted in Bir Hospital (97,98.0%), Dhulikhel hospital (42, 79.24%), Nepal Medical College (41, 53.9%) for suicidal attempt.^{9,15,16} Similar to study conducted in other tertiary hospitals of Nepal, the majority cause for suicide can be due to excess to toxic substance, common psychological stressor of

urban city.

Accidental exposure (12.9%) being second cause of poisoning in our study was relatively similar to the study finding of Dhulikhel hospital (22.23%).¹⁶ The similarity may be due to common agriculture practice and common chemical supply chain. The cases were predominately found in industrial settings where employees might handle hazardous materials without precautions.

Policy and Public Health Recommendations

The findings of this study provide key public health recommendations. Firstly, stricter management of toxic substance application in agricultural and rural zones, Educational campaigns communicating secure dealing and exposure prevention, as well as eco-friendly pest administration techniques can considerably diminish poisonings. This necessitates better pharmaceutical policy, prohibiting risky medicine sales, and initiatives raising cognizance of safe usage.

Second, the establishment of poison control centers is crucial in attempting to enhance outcomes in cases of poisoning. This would immediately advise the management of poisoning and help avoid unnecessary hospital admissions, thus helping healthcare providers provide optimal care. In developing nations like Nepal, with generally meager medical infrastructure, establishing such an asset would signify a significant step towards comprehensive poisoning case administration. Ultimately, public wellness strategies must address the extensive prevalence of intentional poisoning among young adults by integrating mental health support. Also, counseling and community-based programs may be among the areas that can reduce the incidence of suicide and self-harm that often manifest as poisoning cases.

Limitations: Being a single-center study may limit the generalizability of the findings, while relying on convenience sampling could introduce selection bias.

CONCLUSION

In this study suicidal poisoning was the most prevalent among adult male, indicating significant psychosocial stressors among the affected population. Organo phosphorus compounds were

the most commonly used poisons, reflecting their widespread availability, especially in agricultural settings. Gastrointestinal symptoms were common emergency presentation and in hospital recovery rate was better which may be due to effective hospital care, including prompt diagnosis and appropriate management. Improving regulatory measures (drug acts); antidote availability, toxicological screening labs, education campaigns, and mental health support by involving psychologists can reduce poisoning incidents and enhance health outcomes. However, more widespread awareness of toxic risks and better access to treatment are also vital to lessen poisoning cases. Additional research, especially in prevention (establishing community clinics and follow-up at home or hospital) continues to be necessary to adequately confront this challenge.

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Conflict of Interest: None.

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