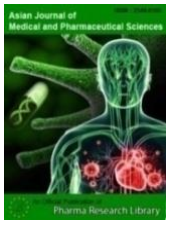

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Epidemiological and Clinical profies of Poisoning Cases with a Retrospective Analysis

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A B S T R A C T
Acute poisoning is a prevalent primary symptom that results in hospitalizations and ED visits in underdeveloped nations like Iran. All the acute poisoning cases admitted in the ICU were studied for epidemiological profiles, poisoning characteristics, and various clinical factors affecting the outcome of the patients. Eighty-five patients with acute poisoning were included in the study. Suicidal attempt leading to acute poisoning was seen in majority of the young population. The epidemiology of various poisonings, the features of clinical presentations, and the outcome predictions are not well documented. Such information can be used to create more effective management and prevention plans to lower the morbidity and death rates associated with these poisonings. This paper details the prevalence of acute poisoning in patients who were admitted to intensive care unit (ICU) (3)
Keywords: hospitalizations, ICU, epidemiology, acute poisoning

A R T I C L E I N F O

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C o n t e n t s

1. Introduction

Poison is a xenobiotic that, in sufficient quantities, can kill or damage an organism. A common and resource-intensive primary complaint that results in thousands of hospital admissions worldwide is poisoning. Acute toxicity can take many different forms, depending on the xenobiotic in question. Symptoms of poisoning include CNS depression, respiratory depression, hypotension, hypothermia, miosis, psychosis, dysrhythmias, and multisystem organ failure. Poisoning comes in two flavors: intentional and accidental. Intentional poisoning is prevalent and associated with high rates of illness and mortality in lower-income countries with limited resources.[1,2]

The World Health Organization (WHO) estimates that each year, approximately 0.3 million people die from acute poisoning, with organophosphorus poisoning accounting for 200000 of those deaths. Developing and resource-constrained nations have a far greater incidence. Because they are easily accessible, agricultural pesticides like organophosphorus, organochloride, zinc, and aluminum phosphide are frequently used for purposeful or unintentional poisoning in Asian countries, whereas industrial and developed nations are more likely to abuse medications like paracetamol, opioids, benzodiazepines, and tranquilizers.

Poisoning kills 700 people every day and affects thousands more worldwide. The yearly prevalence of poisoning (homicidal, accidental, and suicidal) varies between 0.2 and 9.3 cases per 1,000 people in affluent nations, and it is

steadily increasing worldwide. Children aged 3 to 44 had the highest mortality rate, with 0.5 deaths per 1,000,000 children among those under 15.[2,7]

Materials and Methods: The study is a retrospective analysis focused on patients presenting with a history of poisoning. Its key objectives are:

- To determine the epidemiological profile of poisoning cases.
- To identify the types of poisons consumed.
- To evaluate the duration of stay and mortality rates related to poisoning.

Study Setting: Conducted in a tertiary care university teaching hospital and a Level I trauma center.

Study Period: Duration: One year.

Study Population:

All consecutive patients registered in the emergency department with a history of poisoning were included in the analysis. This design allows for understanding poisoning trends, management outcomes, and associated factors in a high-acuity setting. This excerpt appears to describe the inclusion and exclusion criteria for a study focusing on patients.

Inclusion Criteria:

- All patients, regardless of age or sex.
- Patients registered in the ED with complaints related to the consumption of:
- Medicines.
- Alcohol.
- Chemicals used in:
- Households, Agriculture, Industries etc

Exclusion Criteria:

- Patient charts with incomplete data.
- Patients diagnosed with food poisoning.
- Pregnant women.
- Patients with: Snake bites, Scorpion stings, Other insect bites etc[4,8,15]

2. Methodology

Definition and Initial Evaluation:

Poisoning is defined as exposure to substances resulting in an ED visit. Patients are clinically evaluated and resuscitated by the attending physician upon arrival.

All poisoning cases are registered as medico-legal cases.

Identification of Poison:

Identification is based on patient/witness statements, the smell of the substance, brought specimens, or clinical features characteristic of specific poisons.

Decontamination and Treatment:

Decontamination: Includes gastric lavage, administration of activated charcoal, and antidotes based on the type of poison. Contents from gastric lavage are sent to the laboratory for confirmation of the poison. Pesticide poisoning cases receive additional decontamination (clothing removal and thorough washing) in a dedicated decontamination room.

Emergency Management:

Ensuring airway patency, oxygenation, and ventilation. Stabilizing circulation and managing seizures if present. Inserting central lines as needed based on the clinical presentation. This systematic approach ensures rapid and effective treatment for patients while addressing legal and safety considerations.[4,5]

Data Collection

Using the ICD-10-CM diagnosis codes categories T36–T65 in the search categories from the computerized medical records, the medical charts of every patient who was discharged with a diagnosis of poisoning throughout the study period, which ran from October 2013 to September 2014, were located. The preformatted questionnaire was used to gather information from the medical records. Patients' age, sex, marital status, years of marriage, occupation, the poisoning substance consumed, the date and time of consumption, the poison's availability, the reason for ingestion, the intent, whether gastric lavage was performed, the antidote administered, the patient's disposition, and the patient's outcome were among the information gathered.[6,9,11]

3. Results and Discussion

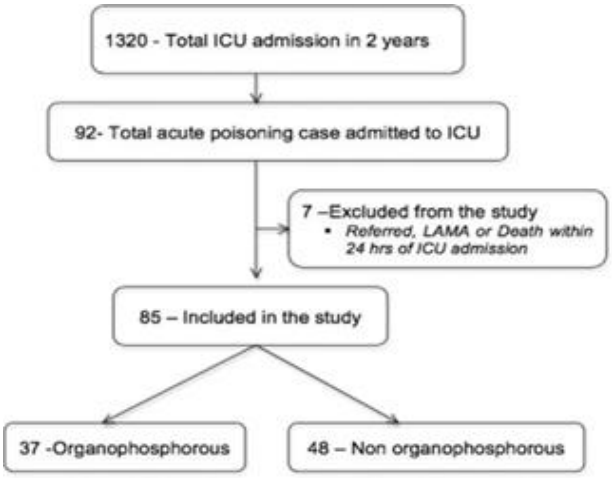

Fig.1

The demographic profile and patient characteristics were illustrated in Table 1. The incidence of poisoning was common in young adolescent age group (56.4%) with female having a higher proportion of poisoning. Depression and chronic debilitating diseases such as end-stage renal failure, hepatic failure, malignancy, and HIV infection were observed to be associated with the poisoning.

Table 1 displayed the patient's demographic profile and attributes. Poisoning was prevalent in the young adolescent age range (56.4%), with a larger percentage of poisoning occurring in females

Variables		N%	Mean
Age	<5 years	6	28.15
	5-30 Years	48	
	30-50 Years	20	
	>50 Years	11	
Sex	Male	32	1.65:1
	Female	53	

Education	Illiterate	9	
	Primary	26	
	Secondary	32	
	Higher secondary	18	
Premorbid Condition	Psychiatric	7	
	Chronic	12	

The poisoning characteristics including mean time for exposure to the hospital, route of poisoning, and intention of poisoning are demonstrated in Table 2. In majority of the cases, the poisoning was ingested orally with the suicidal intention due to the suicidal attempt. Based on the availability of the toxicology screening kit, only 20 patients were subjected for urine toxicology screening where only 8 patients showed positive result for benzodiazepam and opioids.

Table.2

Variables	Values
Time for first exposure to hospital (mean±SD, h)	3.62±1.41
Intention, *n* (%)	
Suicidal	81 (95.2)
Accidental	3 (3.5)
Homicidal	1 (1.1)
Route, *n* (%)	
Oral	78 (91.7)
Intravenous	3 (3.5)
Skin	4 (4.7)
Urine toxicology (*n*=20)	Positive=8

SD: Standard deviation

The various types of compounds used for acute poisoning are shown in Figure 2. Majority of acute poisoning was due to the organ phosphorous compounds (43.5%). The various drugs used for poisoning were acetaminophen (paracetamol), acetyl salicylate (aspirin), benzodiazepams (diazepam), opioids (morphine), amitriptyline. Similarly, the chemicals used for poisoning accidentally or intentionally were kerosene and acid used for the battery. In 5.8% of patients, the type of poison could not be recognized.

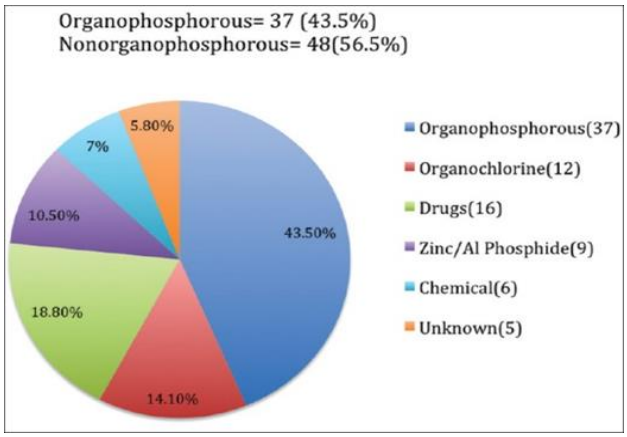

Fig.2

As demonstrated in Table 3, the clinical and outcome variables were compared between the organophosphorous and non organophosphorous poisoning. The patients with non organophosphorous poisoning showed 1.6 times (odds ratio with 95% confidence interval [CI]: 0.522–5.437) higher ICU mortality. Similarly, the patients with organophosphorous poisoning had a significantly longer duration of ICU stay (P = 0.020).

Table.3

Variables	OP (%)	Non-OP (%)	*P*
GCS	9.5±3.6	10.5±3.5	0.220
SOFA	4.3±2.5	4.4±3.0	0.778
Hospital presentation time	3.2±1.9	3.1±2.1	0.725
Duration MV	1.5±2.7	1.2±2.0	0.841
Duration ICU stay	5.3±2.2	4.2±1.9	0.020
Mortality	5 (5.9)	10 (11.8)	0.380 (OR 1.6)

OP: Organophosphorous; Non-OP: Nonorganophosphorous; GCS: Glasgow Coma Scale; SOFA: Sequential Organ Failure Assessment; MV: Mechanical ventilation; OR: Odds ratio; ICU: Intensive care unit

Comparison of clinical and outcome variables between organophosphorous and non organophosphorous poisoning

The observed mortality in the study population was 17.6% [Table 4]. The various clinical factors contributing mortality were studied and compared between survivors and non survivors [Table 4]. Among the various factors studied, age, GCS, SOFA scoring, duration of ICU stay, duration for hospital presentation, need for mechanical ventilation, deranged coagulation profile, hepatic failure, and need for vasoactive drugs had a statistically significant impact on ICU mortality of the patients (P < 0.05). Out of all these significant variables, deranged coagulation profile and hepatic failure had a strong association for mortality (P < 0.001) with the significant odds ratio 3.80 (95%CI: 0.59–11.45) and 4.24 (95%CI: 0.74–10.61), respectively.

Table.4

Variables	Survivor (*n*=70, 82.4%), *n* (%)	Nonsurvivor (*n*=15, 17.6%), *n* (%)	OR	95% CI		*P*
				L	U	
Age	28.5±13.1	38.4±15.1				0.012
GCS	10.6±3.4	7.7±3.5				0.005
SOFA	3.9±2.4	6.3±3.3				0.003
Duration of MV	1.1±2.1	2.4±3.0				0.069
Duration of ICU stay	4.5±1.9	5.8±2.7				0.041
Duration of presentation	2.5±1.6	6.0±1.5				<0.001
Mechanical ventilation	18 (21.2)	8 (9.4)	3.30	1.048	10.39	0.035
VAP	6 (7.1)	3 (3.5)	2.66	0.58	12.15	0.192
ARF	14 (16.5)	4 (4.7)	1.45	0.40	5.26	0.566
Coagulation	4 (4.7)	6 (7.1)	3.80	0.59	11.45	<0.001
Hepatic failure	6 (7.1)	8 (9.4)	4.24	0.74	10.61	<0.001
Vasoactive drugs	18 (21.2)	10 (11.8)	5.77	1.74	19.18	0.002
OP	32 (37.65)	5 (5.9)	1.68	0.522	5.437	0.380
Non-OP	38 (44.7)	10 (11.8)				

GCS: Glasgow Coma Scale; SOFA: Sequential Organ Failure Assessment; VAP: Ventilator associated pneumonia; ARF: Acute renal failure; MV: Mechanical ventilation; OP: Organophosphorous; Non-OP: Nonorganophosphorous; OR: Odds ratio; ICU: Intensive care unit; L: Lower; U: Upper

Multiple logistic regression, a backward logistic model, was used to assess the adjusted effect of all the statistically significant variables contributing ICU mortality [Table 5]. The model demonstrated that the most important factors contributing mortality were need of mechanical ventilation (P = 0.037), presence of hepatic failure (P = 0.019), duration of hospital presentation (P = 0.004), and age (P = 0.028).

Table.5

Variables	*B*	SE	*P*
Mechanical ventilation	2.5	1.2	0.037
Hepatic failure	2.6	1.1	0.019
Duration of presentation	5.1	1.0	0.004
Age	2.57	1.17	0.028

SE: Standard error

DISCUSSION

Acute poisoning is a major health-care problem with a significant morbidity and mortality. It is a common medical emergency in the East Asian subcontinent where pesticides and insecticides are in easy access to the population. The prompt diagnosis and appropriate management is necessary for better outcome. However, the diagnosis and management can be challenged and complicated by the wide variation in the pattern of poisoning which depends on the various factors such as geographical area, socioeconomic status, literacy rate, age, and presence of various comorbid conditions.[6,10]

The mean age of presentation in the present study was comparable to the studies done by Zaheer et al., Gannur et al., and Nigam et al. where majority of the patients with acute poisoning presented within the age group of 16–30 years.[11,12,13] The young age presentation could be due to the fact that this age group was the most active age with a lot of personal and social responsibilities related with the personal career issues, studies, love affairs, and parental expectations. Female predominance for poisoning in our study can be explained by the fact that females are easily emotionally and mentally affected by the issues such as household violence and love affair failures.[13,14]

The duration of presentation to the hospital is an important factor to determine the clinical course and outcome. The patients presenting to the first health-care service within 2 h of acute poisoning have least morbidity and mortality.[15] The delayed presentation of the patients in our study might be due to the various reasons such as delayed recognition of the victim after ingestion of the poison, difficult assess to the transport facility, or difficult access to the health-care centers. Delayed presentation after 4 h was also found by the work done by Ahuja et al. where they had mentioned that delayed initiation of resuscitative measures could be the possible contributing factor for the high mortality in their subjects.[7]

The finding that the oral route being the most common route of poisoning and suicidal intention being the most common mode of poisoning was also observed by Ahuja et al., Das, and Padmanabha et al.[7,16,17] Urine toxicology screening can be helpful for the identification of the toxins in limited cases. However, the negative result does not rule out the presence of toxins and as such does not have a significant impact on the management protocol.[6] The test was done in 20 cases on the basis of clinical suspicion and availability of the kit at the time of presentation of the patient. Only eight patients had a positive result for diazepam and morphine.

As agriculture is the main occupation in the eastern part of Nepal, the organophosphorous compounds were easily available and were misused for self-intention harm. Many studies have demonstrated that the organophosphorous compound was the major toxin used in the cases presented with acute poisoning.[6,7,14]

The duration of ICU stay was significantly longer in patients with organophosphorous poisoning. The longer duration of mechanical ventilation in organophosphorous poisoning as observed in the study (though statistically nonsignificant) and the intermediate syndrome in this group of the patients might have contributed longer duration of ICU stay. Pulmonary complications such as increased secretion, pneumonia, and acute respiratory distress syndrome are frequently seen in patients with organophosphorous poisoning which leads to longer duration of stay in ICU.[18]

The mortality with acute poisoning in a well-established center with advanced life support is 1%–2%.[19] The mortality has been seen higher in the center with limited critical care resources and with the delayed initiation of specific management.[19] The mortality in our study was 17.6%, which was comparable to the mortality observed in the study by Ahuja et al. (18%) and Joshi and Patel (15.8%).[7,20] Aluminum phosphide and paracetamol poisoning along with the development of multi-organ failure might have contributed higher mortality in our study. Singh et al. had observed very low mortality in acute poisoning, i.e., 2.8%, and this was due to the aluminum phosphide poisoning only.[6] The better outcome in this study was due to the well-equipped center with advanced life and organ support.[6]

Nonorganophosphorous poisoning patients had higher multi-organ failure and thus higher mortality (11.8%). A study done by Mathai and Bhanu had demonstrated that factors responsible for poor prognosis were delayed presentation, early evidence of organ failure, acidosis, and need for vasoactive drugs for hemodynamically unstable patients.[21] Ahuja et al had demonstrated higher mortality of the patients with high APACHEII score and high SOFA score.[7] In the same study, the higher mortality was also observed in patients requiring mechanical ventilation and vasoactive support.[7]

Louriz et al. had found that need of vasoactive drugs for refractory shock was the independent factor for determining mortality.[22] In the present study, all the statistically significant variables contributing poor prognosis were analyzed using multiple logistic regression to determine the independent predictors of mortality. Elderly age, need for mechanical ventilation, hepatic failure, and delayed presentation to the health-care center were the independent clinical predictors for contributing for higher mortality ($P < 0.05$). Initial resuscitative measures were delayed for the patients presenting late to the health-care center leading to early development of multi-organ failure and higher mortality.

Limitation:

This is a single center-based study that makes data unreliable to represent the whole eastern part of Nepal. The epidemiological data do not include socioeconomic status, cultural and religious data, and occupational data that could have provided additional information regarding clinical

spectrum of poisoning. Majority of the cases in the study were referred from other center where facility for advanced life support was not available. Minimizing the delay in initiating in advanced life support could have reduced the observed mortality in the study.

4. Conclusion

Organophosphorous is the leading cause of acute poisoning requiring admission to the ICU in the eastern part of Nepal. Mortality is determined by the age of the patients, delayed presentation to the hospital, evidence of organ failure, need for mechanical ventilation, prolong duration of ICU stay, need for vasoactive drugs, and hepatic failure with coagulopathy. Hence, the study showed that initiation of early resuscitative measure and organ support can help to reduce the mortality of the poisoning patients.

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