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Research Article

PATTERN OF POISONING CASES AND THEIR CLINICAL OUTCOMES IN A TERTIARY CARE HOSPITAL: A PROSPECTIVE OBSERVATIONAL STUDY

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ABSTRACT

Background: Acute poisoning constitutes an important medical emergency and contributes substantially to preventable morbidity and mortality, particularly in developing countries. The pattern of poisoning varies according to geographical region, occupation, socioeconomic conditions, accessibility of toxic substances, and intent of exposure.

Materials and Methods: This prospective observational study was conducted in a tertiary care teaching hospital over a period of six months. A total of 60 consecutive patients presenting with acute poisoning and fulfilling the eligibility criteria were included. Demographic characteristics, type and route of poison, intention of exposure, presenting manifestations, time interval between exposure and hospitalization, treatment, requirement for intensive care and mechanical ventilation, duration of hospitalization, and final outcome were recorded using a structured proforma. Data were analyzed using descriptive statistics.

Results: Of the 60 patients, 38 (63.3%) were males and 22 (36.7%) were females. The largest age group was 21–30 years (35.0%). Intentional self-poisoning accounted for 46 (76.7%) cases. Pesticides were the most frequently implicated group (41.7%), with organophosphorus compounds accounting for 16 (26.7%) of all cases. Gastrointestinal symptoms were the commonest presenting manifestations. Intensive care was required in 21 (35.0%) patients and mechanical ventilation in 9 (15.0%). Overall, 52 (86.7%) patients recovered and were discharged, 3 (5.0%) left against medical advice and 5 (8.3%) died.

Conclusion: Acute poisoning predominantly affected young adults, with males constituting nearly two-thirds of cases. Intentional ingestion was the commonest mode, and agricultural pesticides, particularly organophosphorus compounds, represented the major toxic agents. Early hospitalization, rapid identification of the poison, appropriate supportive care, availability of antidotes, and intensive care facilities are important for improving clinical outcomes.

KEYWORDS: Acute Poisoning, Organophosphorus Poisoning, Pesticide Poisoning.

Introduction

Acute poisoning is an important cause of emergency hospital admission and represents a significant but largely preventable public health problem. Poisoning may occur following intentional self-harm, accidental exposure, occupational contact, medication errors, or substance misuse. Its epidemiological pattern varies considerably according to geographical location, agricultural practices, socioeconomic status, availability of toxic substances, and local prescribing and storage practices. In low- and middle-income countries, agricultural pesticides remain particularly important because of their widespread availability and potentially high toxicity. The World Health Organization recognizes pesticide self-poisoning as an important contributor to suicide mortality worldwide[1,2].

In India, organophosphorus compounds, other agricultural pesticides, household chemicals, corrosives, and pharmaceutical preparations constitute important causes of acute poisoning[3,4]. Young adults are frequently affected, and intentional oral ingestion is commonly reported in hospital-based studies[5]. Outcome depends on the toxicity and quantity of the substance, route of exposure, delay in receiving medical care, clinical severity at presentation, availability of specific antidotes, and access to intensive care and ventilatory support[6].

Continuous surveillance of poisoning patterns is therefore essential for planning emergency services and preventive interventions. The present prospective observational study was undertaken to evaluate the pattern, clinical characteristics, management requirements, and outcomes of acute poisoning cases presenting to a tertiary care hospital.

Aim

To study the pattern of acute poisoning cases and their clinical outcomes among patients admitted to a tertiary care hospital.

Materials and Methods

A hospital-based prospective observational study was conducted among patients admitted with acute poisoning.

Study Setting

The study was carried out in the Emergency Department, Department of Medicine, and Intensive Care Unit of a tertiary care teaching hospital. The hospital caters to both rural and urban populations and receives poisoning cases directly as well as referrals from peripheral healthcare facilities.

Study Duration

The study was conducted over a period of six months.

Sample Size

A total of 60 consecutive patients diagnosed with acute poisoning and satisfying the predefined selection criteria were enrolled during the study period.

Sampling Method

Consecutive sampling was employed. All eligible acute poisoning patients presenting during the study period were considered for inclusion until the required sample size of 60 was achieved.

Inclusion Criteria

Patients of either sex presenting with a definite or strongly suspected history of acute poisoning were included. Diagnosis was based on history provided by the patient or accompanying relatives, available poison container or label, characteristic clinical features, referral documentation, and relevant investigations wherever indicated. Patients or legally acceptable representatives providing informed consent were included.

Exclusion Criteria

Patients with chronic occupational exposure without acute poisoning, isolated food-borne infections without evidence of a toxic exposure, adverse drug reactions occurring at normal therapeutic doses, snakebite or other venomous animal bites, and patients for whom adequate clinical information could not be obtained were excluded. Ethics committee approval was obtained for our study with number 2026/429.

Data Collection

After initial stabilization, information was collected using a predesigned structured case-record form. Variables included age, sex, residence, occupation, nature and type of poison, intention of poisoning, route of exposure, approximate time of poisoning, time elapsed before hospital presentation, presenting symptoms and signs, vital parameters, relevant laboratory findings, treatment administered, use of specific antidotes, requirement for intensive care, requirement and duration of mechanical ventilation, complications, length of hospital stay, and final clinical outcome.

The poisoning agent was identified from the history, poison container when available, clinical toxidrome, referral records, and laboratory evidence where applicable.

Intent was classified as intentional/self-harm, accidental, or occupational. Final outcomes were categorized as recovery and discharge, discharge against medical advice (DAMA), or death.

Treatment

Management was performed according to the clinical condition and nature of poisoning. Initial care included assessment and stabilization of airway, breathing and circulation, intravenous access, appropriate investigations, and supportive therapy. Gastrointestinal decontamination was considered only when clinically appropriate.

Specific antidotes such as atropine and oxime therapy for organophosphorus poisoning or N-acetylcysteine for significant paracetamol exposure were administered when indicated. Patients with severe poisoning, respiratory failure, hemodynamic instability, altered sensorium, or other major complications were transferred to the intensive care unit.

Data were entered into Microsoft Excel and analyzed using appropriate statistical software. Categorical variables were summarized as frequencies and percentages. Continuous variables were expressed as mean ± standard deviation or median, as appropriate. Associations between categorical variables and clinical outcomes could be assessed using the Chi-square test or Fisher's exact test. A p-value <0.05 was considered statistically significant.

Results

A total of 60 patients with acute poisoning were included during the six-month study period. The age of patients ranged from 16 to 68 years. Young adults constituted the major proportion of the study population.

Table 1: Demographic and Circumstantial Characteristics of Poisoning Cases (n=60)

Characteristic	Number	Percentage (%)
Age group (years)		
≤20	8	13.3
21–30	21	35.0
31–40	14	23.3
41–50	9	15.0
>50	8	13.3
Sex		
Male	38	63.3
Female	22	36.7
Residence		
Rural	39	65.0
Urban	21	35.0
Intent of poisoning		
Intentional/self-harm	46	76.7
Accidental	11	18.3
Occupational	3	5.0
Route of exposure		
Oral	54	90.0
Inhalational	4	6.7
Dermal/other	2	3.3

The highest proportion of patients belonged to the 21–30-year age group (35.0%), followed by 31–40 years (23.3%). Overall, 35 (58.3%) patients were aged between 21 and 40 years. Males constituted 63.3% of the study population, producing a male-to-female ratio of approximately 1.7:1.

Thirty-nine (65.0%) patients were from rural areas. Intentional self-poisoning was observed in 46 (76.7%) patients, whereas 11 (18.3%) exposures were accidental and 3 (5.0%) were occupational. Oral ingestion was overwhelmingly the commonest route, accounting for 54 (90.0%) cases.

Table 2: Distribution According to Type of Poison and Major Clinical Manifestations

Poison/Clinical characteristic	Number	Percentage (%)
Type of poison		
Organophosphorus pesticides	16	26.7
Other pesticides/insecticides	9	15.0
Pharmaceutical drugs	10	16.7
Household chemicals	7	11.7
Corrosives	6	10.0
Rodenticides	5	8.3
Alcohol/other toxic substances	4	6.7
Unknown agent	3	5.0
Major manifestations*		
Nausea/vomiting/abdominal symptoms	35	58.3
Altered sensorium	18	30.0
Excessive salivation/secretions	15	25.0
Respiratory distress	13	21.7
Miosis	12	20.0
Hypotension	9	15.0
Fasciculations	8	13.3
Seizures	4	6.7

*Multiple clinical manifestations could occur in the same patient.

Agricultural pesticides collectively accounted for 25 (41.7%) cases, making them the predominant category of poisoning. Organophosphorus compounds alone accounted for 16 (26.7%) cases and represented the single most frequently identified poison. Pharmaceutical drug overdose was observed in 10 (16.7%) patients, followed by household chemicals in 7 (11.7%), corrosives in 6 (10.0%), and rodenticides in 5 (8.3%).

Gastrointestinal manifestations such as nausea, vomiting, and abdominal discomfort were present in 35 (58.3%) patients. Altered sensorium occurred in 18 (30.0%), while excessive secretions were documented in 15 (25.0%). Respiratory distress was observed in 13 (21.7%) patients. Features consistent with cholinergic toxicity, including miosis, salivation, and fasciculations, were predominantly observed among organophosphorus poisoning cases.

Most patients stayed in hospital for four to seven days (45.0%). Fifty-two (86.7%) patients recovered and were discharged in satisfactory condition. Three (5.0%) left against medical advice. Five patients died, producing an overall case-fatality rate of 8.3%. Severe respiratory compromise, hemodynamic instability, altered sensorium,

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delayed presentation, and need for mechanical ventilation were prominent characteristics among patients with adverse outcomes.

Table 3: Treatment Requirements, Hospital Course and Clinical Outcomes (n=60)

Variable	Number	Percentage (%)
Specific antidote required	24	40.0
ICU admission required	21	35.0
Mechanical ventilation required	9	15.0
Vasopressor support required	7	11.7
Hospital stay ≤3 days	23	38.3
Hospital stay 4–7 days	27	45.0
Hospital stay >7 days	10	16.7
Final outcome		
Recovered and discharged	52	86.7
DAMA	3	5.0
Death	5	8.3
Total	60	100.0

Twenty-four (40.0%) patients required a specific antidote. Twenty-one (35.0%) required ICU admission and 9 (15.0%) required mechanical ventilation. Vasopressor support was required in 7 (11.7%) patients.

Discussion

The present prospective observational study evaluated the epidemiological pattern, clinical manifestations, treatment requirements, and outcomes of 60 patients admitted with acute poisoning during a six-month period. The findings demonstrate that poisoning remains particularly important among economically productive young adults and that intentional ingestion of agricultural chemicals continues to constitute a substantial component of acute toxicological emergencies.

In the present study, the largest proportion of cases occurred among patients aged 21–30 years (35.0%), while 58.3% were between 21 and 40 years. This predominance among younger adults is comparable with observations from several Indian hospital-based studies[3-6]. Prashar et al. reported a mean age of approximately 32 years among pesticide-poisoning patients, with organophosphorus compounds being the most commonly implicated pesticides[5]. Young adulthood represents a period characterized by occupational, financial, family, and interpersonal stress, which may partly contribute to the high frequency of intentional poisoning in this population.

Males accounted for 63.3% of cases, with a male-to-female ratio of approximately 1.7:1. A similar male predominance has been documented in Indian poisoning studies. An observational study from a poison information centre in Ahmedabad reported a male-to-female ratio of 1.89:1[7]. Greater occupational exposure to agricultural chemicals, social and financial pressures, and differences in healthcare-seeking patterns may contribute to this observation.

Approximately two-thirds (65.0%) of patients in the present study were from rural areas. The higher representation of rural patients may be associated with the widespread availability of pesticides and agricultural chemicals. Pesticides are frequently stored in households or farms and can therefore become readily accessible during impulsive acts of self-harm. Restricting access to highly hazardous pesticides and improving safe storage practices have consequently been proposed as important suicide-prevention strategies[1,2].

Intentional self-poisoning accounted for 76.7% of all cases, considerably exceeding accidental and occupational poisoning. The predominance of intentional exposure has been repeatedly reported from South Asian healthcare settings. The WHO recognizes pesticide self-poisoning as an important contributor to global suicide mortality[1]. Although the proportion has changed over time and varies substantially between countries, pesticide poisoning remains particularly relevant in agricultural communities[8].

The oral route was involved in 90.0% of patients. This finding is expected considering that intentional ingestion constituted the majority of cases. An Indian Poison Information Centre study similarly reported oral exposure in more than 90% of investigated poisoning cases[7].

Pesticides represented the largest group of toxic agents, accounting for 41.7% of cases, with organophosphorus compounds alone responsible for 26.7%. Previous Indian studies have also demonstrated the importance of organophosphorus and other pesticide poisoning[3,5,7]. A prospective tertiary-care study by Prashar et al. found organophosphorus compounds to be the most frequently implicated pesticide category[5].

The predominance of organophosphorus poisoning has important clinical implications. Organophosphorus compounds inhibit acetylcholinesterase, resulting in accumulation of acetylcholine at muscarinic, nicotinic, and central nervous system synapses. Clinical manifestations can therefore include miosis, bronchorrhea, excessive salivation, vomiting, diarrhea, sweating, bradycardia, fasciculations, muscle weakness, altered consciousness, seizures, and respiratory failure[9,10]. Rapid recognition of the cholinergic toxidrome and timely atropinization, together with supportive respiratory management and oxime therapy where indicated, are important components of management.

Gastrointestinal symptoms were the commonest manifestations in the present study, occurring in 58.3% of patients. Altered sensorium occurred in 30.0%, excessive secretions in 25.0%, and respiratory distress in 21.7%. Studies focusing specifically on organophosphorus poisoning have similarly reported vomiting and excessive secretions as common clinical manifestations[9].

Pharmaceutical agents accounted for 16.7% of cases and represented the second important category after pesticides. Drug poisoning patterns are influenced by availability of over-the-counter medicines, prescription practices, psychiatric illness, and access to household medication. Identification of the specific drug, dose, time since ingestion, concomitant substances, and patient comorbidities is essential because clinical severity may vary substantially.

A major strength of studying hospital poisoning patterns is the ability to evaluate resource utilization. More than one-third (35.0%) of patients in the present study required ICU admission, while 15.0% required mechanical ventilation. These observations emphasize that even with a relatively high overall recovery rate, acute poisoning can impose substantial demands on emergency and critical-care services.

Respiratory failure is particularly important in severe organophosphorus poisoning because of bronchial secretions, bronchospasm, central respiratory depression, respiratory muscle weakness, aspiration, and complications such as intermediate syndrome. Requirement for ventilatory support is therefore frequently associated with severe poisoning and increased risk of poor outcome[9-11].

The overall recovery rate in the present study was 86.7%, whereas mortality was 8.3%. Prashar et al. reported recovery in approximately 80% and mortality of 6.4% in their pesticide-poisoning cohort[5]. Differences in mortality across studies may be related to the type and quantity of poison, referral patterns, severity at admission, delay in treatment, and availability of intensive care facilities.

Time between toxic exposure and definitive treatment is an important potentially modifiable determinant of outcome. A prospective observational study by Singh et al. demonstrated that a shorter lag time in reaching hospital was associated with reduced duration of hospitalization[6]. Early resuscitation, appropriate decontamination in selected patients, rapid administration of antidotes, airway protection, and timely ICU referral may therefore substantially influence prognosis.

Five deaths occurred in the present series. Clinically, adverse outcomes tended to occur among patients presenting with altered sensorium, respiratory failure, hypotension, or requirement for ventilatory and vasopressor support. These findings reinforce the importance of early severity assessment. In organophosphorus poisoning, structured tools such as the Peradeniya Organophosphorus Poisoning (POP) scale have been investigated for predicting complications, ventilatory requirement, and outcome[9,11].

The findings have broader preventive implications. Restriction and safer regulation of highly hazardous pesticides, secure storage, improved product labeling, farmer education, appropriate personal protective equipment, establishment of poison information services, and improved access to emergency medical care may reduce poisoning-related morbidity and mortality. Mental-health assessment is equally important following intentional poisoning. Survivors of deliberate self-poisoning should receive psychosocial evaluation, identification of precipitating stressors, suicide-risk assessment, appropriate counselling, and referral for psychiatric care where necessary.

Conclusion

Acute poisoning remains an important emergency medical problem in tertiary healthcare practice. In the present study, young adults aged 21–40 years constituted the majority of patients, males were more frequently affected, and nearly two-thirds of patients came from rural areas. Intentional self-poisoning was the predominant circumstance of exposure, and oral ingestion was the commonest route.

Agricultural pesticides constituted the largest category of poisoning, with organophosphorus compounds being the single most frequently identified agent. Although the majority of patients recovered, more than one-third required intensive care and 15% required mechanical ventilation. The overall mortality rate was 8.3%.

The study emphasizes the need for early recognition and treatment, rapid transfer of severely poisoned patients, adequate availability of antidotes and critical-care facilities, and systematic poison surveillance. At the community level, safe pesticide storage, regulation of highly hazardous pesticides, public education, improved poison information services, and mental-health interventions for individuals at risk of self-harm are important components of a comprehensive poisoning-prevention strategy.

Limitations of Study

Our present study was a single-centre hospital-based study with a relatively small sample size, which may limit the generalizability of the findings. Additionally, long-term complications and outcomes after hospital discharge were not evaluated. Larger multicentric studies with extended follow-up are recommended to validate the findings.

Conflicts of Interest

None

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