



Pattern of Acute Poisoning Admissions in the Medical Intensive Care Unit of a Tertiary Care Hospital

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ABSTRACT

Poisonings comprise an important health issue and leading cause of hospital admission and mortalities in developing countries. This study aims to evaluate the incidence, drug utilization pattern and cost of intensive care associated with poisonings in a tertiary care center. Participants comprised of acute poisoning admissions to the Medical Intensive Care unit of A J Hospital & Research Center, Mangalore during 6 months period. Data regarding pattern of poisoning, basic demographics and drug utilisation were collected by retrospective review of patient records. Prevalence of poisoning was 35.49 cases per 1,000 hospitalizations. Majority of poisoning cases were observed in the age group between 25-44 years (85%). Intentional self-poisoning to Organophosphorous compounds and drug over dosage by sedatives were the most common patterns of poisoning observed. Parameters related to drug utilization exhibited slight variations with the agent consumed. Mortality rate was less probably due to timely medical management. Prevailing treatment protocols require updating on proper guidelines for better management of poisoning. There is need for stringent pesticide regulation laws and counselling and training programs to reduce incidence of poisonings.

Keywords: Poisonings, drug utilisation, pesticide, medical intensive care unit, drug over dosage.

INTRODUCTION

Poisoning or intoxication is defined as the occurrence of harmful effects resulting from exposure to a foreign chemical or a xenobiotic, ^[1] it can occur by means of ingestion, inhalation or contact; unintentionally or intentionally. Poisonings comprise an important health issue in developing countries resulting in health threats and hospitalization leading to huge financial burden on victims and an immense strain on hospital services. The WHO statistics estimate around 346,000 people worldwide die from unintentional poisoning, more than 90% of these occur in developing countries. ^[2] Pesticides particularly Organophosphorous poisoning (OPP) from occupational, accidental and intentional exposure is common in the low to middle socioeconomic countries which is usually attributed to the hazardous occupational usage and unsafe storage of pesticides. ^[3] According to a community study, the high number of pesticide self-poisonings was an impulsive response to economically or psychosocially stressful events facilitated by easy access to pesticides. ^[4] Knowledge about demographics and management of

poisoning cases is essential as it helps in framing appropriate policies like introducing new guidelines and updating prevailing treatment protocols, counselling and sensitizing the society on hazards of poisoning and proper usage and storage of chemicals and pesticides. However, there is paucity of evidence evaluating poisoning management from India. The cost to government health-care services of treating poisoned patients is probably substantial. It is essential to understand the general and specific interventions and management for poisoning as these studies can inform health policy decision making and guide the investment and management at different levels of the health-care system to optimize the use of resources. ^[5] Hence, this study was carried out with the objective to evaluate the demographics and drug utilization pattern of poisoning admissions in the medical intensive care unit of a tertiary care hospital.

MATERIALS AND METHODS

The study was an observational retrospective study conducted at the 20 bedded medical intensive care unit of our tertiary care hospital. The data over 6 month period was collected for the study. The primary data sources included the medical records department and the hospital billing databases.

The study population comprised of all adult patients above the age of 18 years who met the diagnostic criteria for

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poisoning and who were admitted to the medical ICU from the emergency room. Patients who were discharged or who expired within 24 hours of admission were excluded from the study.

Data regarding demographic profile, diagnosis, clinical assessment, treatment data, comorbid conditions, other investigational details, treatment outcome and ICU cost related parameters data were recorded.

Statistical Analysis was carried out following data entry. Descriptive statistics were used for demographic details. Categorical data of the determinants were analysed using the chi square test. P value <0.05 was considered to be significant. IBM SPSSv22 was used for the statistical analysis.

Table 1: Demographic Details

Patient Characteristics	Percentage %
Males	57.44
Females	42.55
Age (Mean $\pm$ SD)	29.36 $\pm$ 12.21
Background URBAN	68.08 ***
Rural	31.91
Married	63.82
Single	36.17
Direct Admission	72.34
Referred	27.65

*** $p < 0.001$

Table 2: Duration of hospital stay in patients

Duration	Patients (%)
<1 week	81
1 to 2 weeks	12.5 **
>2 weeks	4.1

** p value <0.01

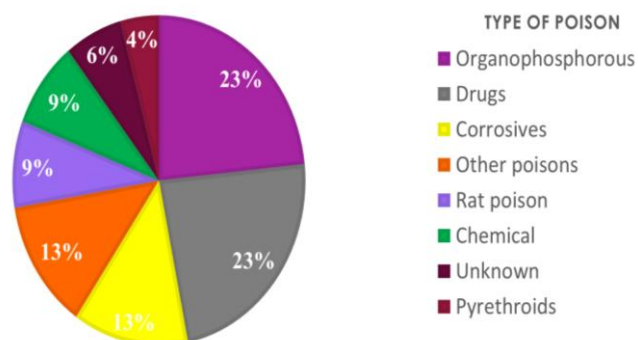


Fig. 1: Pattern of Poisoning

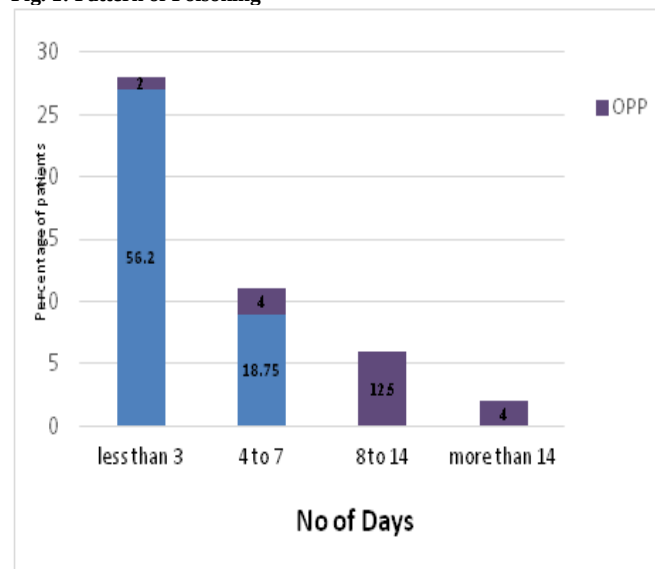


Fig. 2: Duration of Hospitalisation

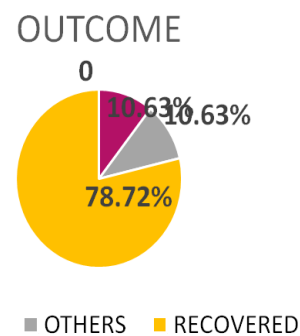


Fig. 3: Patient Outcome

RESULTS

A total of 1324 patients were admitted in the medical ICU during the study period. 47 patients were admitted with the diagnosis of acute poisoning. Prevalence of poisoning was 35.49 cases per 1,000 hospitalizations. 23% of the cases included Drug over dosage. 64% were intentional poisoning, remaining were accidental. Table 1 describes the demographic profile of patients in the study. We observed more number of males 57% than females. Majority of them were direct admissions. Approximately 28% of the patients were referred from primary and secondary care hospitals. Incidence was more in married individuals and those who were from urban background. Majority of poisoning cases were observed in the age group between 25-44 years (85%). A medicolegal case (MLC) can be defined as a case of injury or ailment, etc., in which investigations by the law-enforcing agencies are essential to fix the responsibility regarding the causation of the said injury or ailment. [6] Poisoning admissions are usually categorized under MLC. In the present study MLC was registered for 53% of the cases. The Glasgow Coma Scale or GCS is a neurological scale that provides a reliable, objective way of recording the conscious state of a person for initial as well as subsequent assessment. [7] A patient is assessed against the criteria of the scale, and the resulting points give a patient score between 3 (indicating deep unconsciousness) and either 14 (normal orientation). The Glasgow coma scale (GCS) of the patients in our study on admission to the ICU ranged from 10 to 15 in majority (60%) which indicates that the patients were conscious at the time of admission.

Figure 1 shows the pattern of poisoning in this study. The most common type of poisoning observed was Organophosphorous poisoning (OPP) and drug over dosages (23% each) followed by poisonings due to ingestion of corrosives (13%), other poisons, rat poisons (9%), pyrethroids (6%) etc. The most common mode of poisoning is by ingestion. Sedatives group of drugs were the most common class of drug over dosage observed in the present study.

Table 2 describes the duration of hospitalization per patient. Majority of patients in the study had a shorter stay in the hospital. 60% of the patients were shifted or discharged from the ICU within 72 hours of admission due to improvement in condition. However there is a significance between prolonged duration of stay in the ICU and mortality (X^2 test, $p < 0.05$). Among those who had prolonged stay in the ICU, a significant number were Organophosphorous poisoning cases (p value <0.01) (Figure 2).

Figure 3 illustrates outcome of the patients. 78% of the patients admitted to the ICU recovered and were discharged. However, Mortality rate was 10.6% and was significant in

OP poisoning cases compared to other poisonings (X^2 test p value <0.01). 34 % received specific antidotes and this group included treatment organophosphorous poisoning using specific antidotes like oximes whereas majority of the cases were on supportive and symptomatic therapy.

Prescription audits were done, almost 60 % of the prescriptions comprised of generic drugs. Average no. of prescriptions per patient= 5.44 ± 2.73 (Mean $\pm$ SD). There was a highly significant increase in the number of prescriptions among organophosphorous patients (X^2 test, $p < 0.001$)

The dosage form administered predominantly were parenteral preparations like injectable and infusions followed by oral dosage forms like tablets followed by syrups (Figure 4). Major therapeutic classes of drugs used are enlisted in Table 3. Gastro protective drugs constituted the maximum prescribed drug, among them proton pump inhibitors were preferred over Histamine 2 receptor blockers Ranitidine and congeners. Among antibiotics second and third generation cephalosporins were widely used. Among specific antidotes atropine and pralidoxime followed by N acetyl cysteine were preferred. Inotropes used were Dopamine and Noradrenaline. Antidepressants, anxiolytics and antiepileptics were used the common Drugs acting on central nervous system being used

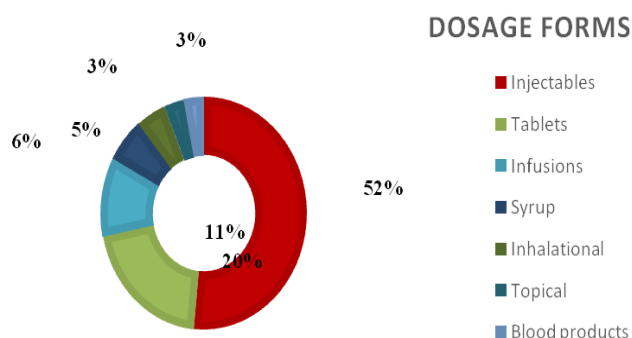


Fig. 4: Dosage forms prescribed

Table 3: Therapeutic Drugs Administered

Category	Drugs
Antiulcer	Pantoprazole, Omeprazole, Ranitidine, Sucralfate
Antibiotics	Cefoperazone, Cefotaxim, Ceftriaxone, Levofloxacin
Antidotes	Atropine, Pralidoxime, N-acetyl cysteine
	Antidepressants- Sertraline, Escitalopram
CNS drugs	Anxiolytics-Lonezepam
	Antiepileptic- Oxcarbazepine
CVS drugs	Dopamine, Noradrenalin, Vasopressin

DISCUSSION

Agriculture, Pesticides and Poisonings are closely interrelated, the incidence of poisonings increased substantially with the intensification of agriculture accompanied with the widespread use of pesticides. The problem of over the counter drugs, unrestricted access to drugs and poisons is compounded by lack of knowledge and awareness among the users on the dangers of these chemicals. Poisoning cases most often require intensive care management after the initial emergency treatment measures, where the major brunt of multiple medical therapy and interventions await the patient. Till date there is no clear cut evidence regarding the burden of poisoning admission in the intensive care setup of our country. Hence this study was done with an aim to collect relevant data regarding pattern of poisoning as well as the drug utilization parameters on poisoning cases in the medical intensive care unit of a tertiary care private hospital in an urban area.

In the present study men outnumbered women by 15%, and 85 % of them were in the productive age group of 25-45 years. These findings correlate with studies conducted nationally [8-9] and internationally [10], and may be attributed to the fact that pesticides are more accessible to men, as is found in the literature. The pattern of distribution of patients was predominantly from urban areas in contrast to other studies where there was rural predominance. [11] OP compounds (23%) and Drug over dosage were the most common poisonings that required critical care management, the most commonly consumed drugs being Sedatives (Barbiturates and benzodiazepines) and Paracetamol which is again a common pattern similar to the Indian study by Dash *et al.* [12] Contrastingly, the incidence of Aluminum Phosphide was 9%, and this is significantly lower compared with the incidence in North India. [13]

Duration of hospital stay, type of poison and co morbid complications are some of the major determinants of mortality in patients with poisoning. The present study showed significance between prolonged duration of stay in the ICU and mortality which implies that prolonged length of stay is an indicator for mortality especially in organophosphorous poisonings.

Treatment predominantly comprised of supportive and symptomatic therapy (66%) which indicates lack of clear-cut treatment guidelines and protocols for majority of the cases. The symptomatic treatment was given included drugs to reduce gastric acid secretion, antiemetics, antibiotics, IV fluids etc. Increase in the number of prescriptions was found among Organophosphorous poisoning cases which contributed to increased morbidity and polypharmacy as well. Majority (60 %) of the prescriptions were of generic drugs which is a good indicator of prescribing practices.

Literature shows that in UK, the self-poisoning CFR is less than 0.5%, in Sri Lanka it is 7% and in India it is 30%. This big difference is most likely due to differences in pesticide legislation laws. [14] The low mortality rate (10.6%) in our study could be attributed to the infrastructure and treatment facility available at a tertiary care center. 10% of the patients got discharged against medical advice owing to financial and other reasons. Patient Outcome was similar to a study done in Tanzania by Kale *et al* where about 90.2% of the patients who were reported to have been poisoned, recovered and 5.6% lost their lives. [15]

The incidence of pesticide and chemical related poisonings could be regulated if the government adopts stringent Poison prevention strategies which can be implemented at various levels like strict regulations in manufacture, distribution, usage and storage of pesticides, Establishing poisoning information center at regional levels to provide timely information and measures of emergency management for poisonings, Counselling and training of agriculturists on proper techniques of usage and storage of chemicals and fertilizers and educate them on the harmful effects of pesticides, Formulating protocols and guidelines for better management at Institutional levels, Research to bring about safer chemicals for farming, Proper counselling and treatment of patients who are at risk of suicidal tendencies etc Limitations of the present study include small sample size which is inadequate to project the results to a larger population. The sample size could be justified because of the highly selective inclusion criteria, (the cases included were only adults admitted to the intensive care unit for more than

24 hours). The poisoning cases entering the emergency or admitted to other wards were not included. The study is retrospective hence results may vary with present trends. High costs of treatment and intensive care burden makes poisoning an extremely important area for pharmacoeconomic evaluation which is lacking in the present evaluation and requires further research.

We can conclude by stating that poisoning is one of the leading causes of hospital admissions and mortalities. Organophosphorous poisonings and Drug over dosage by sedatives are the most common poisoning admissions that require intensive care admission and management. Majority of the patients recovered which indicates good emergency and intensive care management. Prevailing treatment protocols require updation on proper guidelines, cost assessment, counselling and training programs.

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