

# A review of acute poisoning cases admitted in the MICU of a tertiary care hospital

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## Abstract

**Aims:** To study the age, sex, seasonal distribution and the clinical profile of different types of acute poisoning cases admitted to the ICU, and to determine outcome in the form of duration of stay and mortality and factors affecting it. **Methods:** This was a cross sectional observational study conducted in the MICU of a tertiary care hospital over a period of 12 months. Acute poisoning cases were studied. Outcome was measured in the form of duration of ICU stay and mortality. **Results:** There were a total of 714 admissions over 12 months, of which 149 were acute poisoning cases (20.8%). Among poisoning patients, males were 98/149 (65.7%). Age distribution: 12-19 yrs - 16.7%, 20-34 yrs - 44.9%, 35-49yrs - 26.1%, 50-69 yrs -10.7%, 70 yrs and above - 1.3%. Suicidal intent was the most common cause of poisoning (135/149, 90.6%). Pesticide is the most commonly used poison, majority being organophosphorus compounds (OPC) (95/149 patients). Most common clinical features were vomiting, anxiety/ restlessness and cholinergic crisis. Most common ECG finding was bradycardia. Twenty two of 149 patients had a SOFA score of >11 (14.7%), 31 had score between 9 and 11 (20.8%) and 96 had score < 9 (64.4%). Most common complications seen were delirium due to atropinisation, electrolyte disturbance and intermediate syndrome. There were 22/ 149 deaths (Mortality of 14.7%), which was significantly less compared to mortality among non-poisoning group of patients (192/714,26.9%, p value < 0.01). Higher SOFA score significantly increased the risk of mortality among poisoning patients. (p- 0.01). **Conclusion:** Pesticides are the most common agents seen among the acute poisoning admissions in the MICU and young adult male population constitute majority. Mortality among the poisoning patients was significantly lower compared to the non-poisoning patients, and was mainly due to OPC. Higher SOFA score was associated with adverse outcome among the poisoning patients.

**Key Words:** Acute poisoning, ICU, organophosphorus compounds, SOFA score.

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## INTRODUCTION

Acute poisoning cases contribute to significant proportion of indoor admissions in public hospitals and a much greater proportion of intensive care unit (ICU) admissions. There is a wide variation in the most common agent used for poisoning in different parts of the

country, leave alone different parts of the world. Organophosphorus compounds are the most commonly used poisons in 9<sup>th</sup> country. Aluminium phosphide is a very common poison used in the northern states, whereas it is rarely seen in other parts of the country<sup>1,2</sup>. There is also discrepancy in the type of poisonings in rural and urban areas, with studies from different urban areas reporting a significant number of benzodiazepine overdoses cases getting admitted to the ICU<sup>3,4</sup>. A different pattern is seen in Western countries, with benzodiazepine/ acetaminophen overdose constituting a majority of poisoning admissions in ICU<sup>5,6</sup>. The profile of patients with acute poisoning and their choice of agents depend upon the socioeconomic, religious and cultural status. Young adults constitute majority of the cases and a suicidal intent is most commonly seen. However many studies also show a predominance of accidental consumption, especially in children<sup>7</sup>. The determinants of

outcome include agent, the dose, pre-existing co-morbidities, the time from exposure to presentation to a healthcare facility and the experience of care provider. Male labourers and farmers are found to constitute most of the cases<sup>8</sup>. Most of the cases can be salvaged with appropriate timely therapy. There is scarcity of data from the Indian subcontinent especially from those patients admitted to ICU.

### MATERIALS AND METHODS

This is a cross sectional observational study conducted in the MICU of a tertiary care hospital. All admissions in MICU in the year 2015 were screened. All the patients with any form of acute poisoning were included in the study. Data regarding the type of poisoning, demographic details, clinical features, vital and laboratory parameters, complications, duration of stay and mortality were collected. Outcome was measured in the form of duration of ICU stay and mortality.

**Operational definition:** In this study, acute poisoning has been defined as exposure to any substance/ drug, leading to manifestation of its adverse effects in < 24 hrs.

**Statistical Analysis:** All statistical analysis was performed by using 10.0 version of statistical Software SPSS.

**Descriptive Analysis:** Continuous variables were summarized by using summary statistics (number of observations, mean and standard deviation). Categorical values were summarized by using frequencies and percentages.

**Tests of Significance:** Association between outcome with different parameters were estimated by using Chi Square test and Student's t test as per relevance.

### RESULTS

There were a total of 714 admissions in the MICU in the year 2015 of which 149 were acute poisoning cases (20.8%). Among poisoning patients, males were 98 (65.7%), and females were 51 (34.2%). Age distribution was- 12- 19 yrs - 16.7%, 20-34 yrs - 44.9%, 35-49yrs - 26.1%, 50-69 yrs -10.7%, 70 yrs and above - 1.3%. Suicidal intent was the most common cause of poisoning (135/149, 90.6%). The remaining 14 cases were of accidental poisoning. No case of homicidal poisoning was seen in this duration of study. Most of the patients belonged to the lower socio economic group (97.3%).Pesticide was the most commonly used poison, majority being organophosphorus compounds(OPC) (95 patients). Carbamates and pyrethroids(17and 10 patients respectively) constituted the remaining pesticide poisonings. Among the carbamates, propoxur, with the brand of 'Jallad' was the most commonly seen in this centre. Total number of admissions during the period was

714; of these, there were 149 acute poisoning cases (20.8% of total), of which there were 122 Pesticide poisoning, 10 snakebite and 18 other poisoning cases (figure 1). Among the pesticides, there were 95 OPC, 17carbamate and 10 pyrethroid poisoning cases.

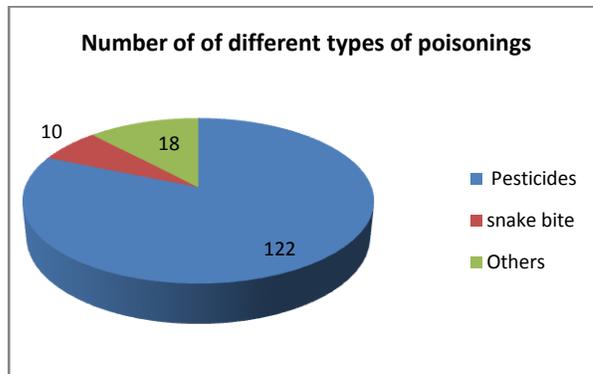


Figure 1: Proportion of different poisoning cases

The other 18 poisoning cases were - scorpion bite – 1, paraquat – 1, sedative – 3, amytryptaline – 1, corrosive – 1, chloral hydrate – 1, olanzepine – 1, morphine – 1, aluminium phosphide – 1, waterproofing cement add – 1, inj. phenyl + insulin – 1, ratkill paste – 1, methanol – 2, diesel – 1 and unknown substance- 1. Maximum cases were seen in the summer months (71 patients) during mid-march to mid June. There were 51 poisoning cases during monsoon (June to October), and 27 cases during winter (November to March) (figure 2).

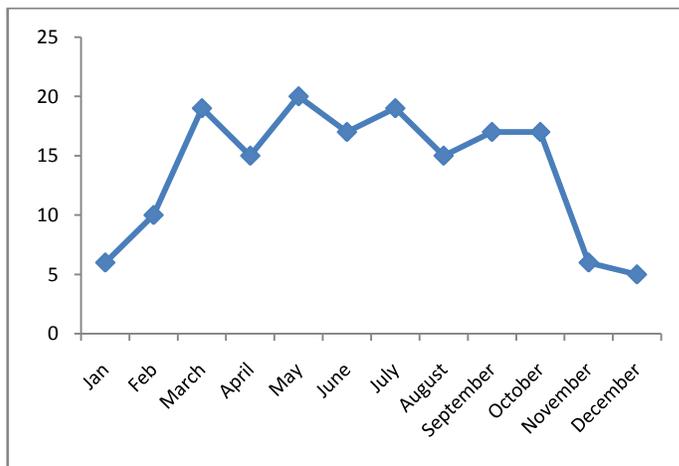


Figure 2: Seasonal trends of poisoning cases.

**Clinical features:** Of the 122 patients with pesticide poisoning, presenting symptoms noted were vomiting – 101 (83.4%), anxiety and restlessness -93 (76.8%), cholinergic crisis – 51 (42.1%), confusion -41 (33.6%), delirium – 38 (31.1%), loss of consciousness -8, coma -3, convulsions -2 and asymptomatic - 14. Of the 10 patients with snake bite, 3 presented with quadriparesis, of which one also had respiratory failure. In one patient,

quadriplegia was due to cholinergic crisis as a result of prior neostigmine administration. One presented with ptosis. Six patients had local swelling and bleed at site of bite, of which 3 had oliguria, and one had breathlessness. Clinical signs of patients with pesticide poisoning included fasciculations (94/122), miosis (91), bradycardia (88), neck lag (56), hypotension (44), respiratory muscle weakness (39), hypertension (28), ataxia (18) and ophthalmoplegia (3). Of the 149 patients with poisoning, 42 (28.1%) had underlying co-morbidities - 11 had Diabetes mellitus, 19 had hypertension, 8 were alcoholics, and 4 had pre existing thyroid dysfunction.

**Investigations:** Sr. Cholinesterase - Of 122 such patients, 96 had low cholinesterase levels (<5, 500 U/L) with 59 patients having levels < 200 U/L. Serum cholinesterase ranged from <200 U/L to 8, 200 U/L. Mean cholinesterase level was 2224 U/L. Thirteen patients had elevated amylase and lipase, and 4 patients had elevated NT pro BNP. Thyroid function tests were found to be deranged in 14 patients (9.3%), with 2 being hyperthyroid, 5 being hypothyroid and 7 having subclinical hypothyroidism. Of the 10 patients of snake bite, 5 had WBC counts > 11,000, 6 had INR > 1.5 and 3 had creatinine > 1.5 mg/dL. Urine tox screen positively helped in the diagnosis of 3 patients with sedative overdose and one patient with morphine overdose, of the 32 patients screened. Most common ECG change was bradycardia, which was seen in 88 patients of OP/ carbamate poisoning, and one patient with Aluminium phosphide poisoning. In one patient with aluminium phosphide poisoning, bedside tests (silver nitrate test and the confirmatory ammonium molybdate test) were carried out to confirm the poison. Also, sodium dithionite test was performed on the urine sample of a patient for diagnosis of paraquat poisoning. Of the 149 poisoning patients, 22 patients had a SOFA score of >11 (14.7%), 31 patients had score between 9 and 11 (20.8%) and 96 patients had score < 9 (64.4%).

**Treatment: Supportive treatment:** Except for one patient with corrosive poisoning, and one patient with IV phenyl injection, all patients received gastric lavage. Thirty four patients required ventilatory support. Three patients required hemodialysis.

**Specific antidote:** Atropine was the mainstay of treatment in case of OPC and carbamate poisonings. Average initial atropine infusion rate - 4 ml/hr. Maximum was 12 ml/hr. Two patients could not given atropine due to resting tachycardia, and tendency to develop ventricular tachyarrhythmias. Pralidoxime was given in 95 patients with OPC poisoning, and was avoided in 27 patients with carbamate poisoning. Fifty two patients of OPC poisoning required sedation with benzodiazepines (Inj. Midazolam) i/v/o delirium and agitated behaviour

due to atropinisation. Pyrethroid poisonings were treated supportively with 8 of 10 requiring IV sedation (Inj. Midazolam). All patients with snake bite received Anti-snake venom. Six of them required FFP transfusion. Two required hemodialysis. Three patients with sedative overdose were treated with Inj. Flumazenil. One patient with morphine overdose was treated with Inj. Naloxone. Complications seen among the poisoning patients were Delirium secondary to atropinisation -88, Electrolyte disturbance -42 patients during the course of ICU stay, Intermediate syndrome- 25, Type 2 paralysis characterised by proximal muscle weakness -24, Pancreatitis - 13, Ventilator associated pneumonia-12, Tracheostomy due to prolonged intubation -9, Ventricular tachycardia after Inj. Atropine -2, Prolonged tracheostomisation due to laryngomalacia -2, Distal muscle weakness during prolonged ICU stay -2 and ICU psychosis -1. There were 22 deaths (Mortality of 14.7%), which was significantly less compared to mortality among non poisoning group of patients (26.9%, chi square 5.26, p value < 0.01). Almost all deaths were due to OPC poisoning (10/22), and one each due to diesel and aluminium phosphide consumption (figure 3). Autopsy was performed in all cases and the causes of death were shock (10), cerebral edema (8), Acute respiratory distress syndrome (3), disseminated intravascular coagulation (1). No mortality was seen among snake bite cases.

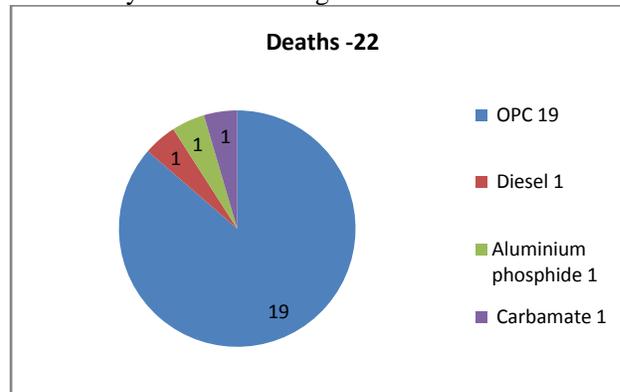


Figure 3: Distribution of deaths among different poisoning patients.

Time of presentation had a significant influence on the survival, with all patients presenting within 4 hours being saved (0 deaths out of 64), 8 deaths among 65 patients presented between 4 to 24 hours, and 14 deaths among 20 patients who presented after 24 hours of consumption. Of 28 patients with SOFA score >10, 18 did not survive, whereas, of 121 patients with SOFA score ≤10, only 4 patients expired. Higher SOFA score significantly increased the risk of mortality among poisoning patients. (Chi square - 0.45, p- 0.01). Of 96 patients with low Cholinesterase levels (<5, 500u/L), 56/96 survived,

whereas 10/26 survived among patients with normal Cholinesterase levels. ( $p = 0.09$ - not significant). Duration of ICU stay varied from 2 to 29 days. Average duration of stay was longer among the poisoning patients (8 days) compared to non poisoning patients (6 days) but was not statistically significant. No significant association was found between higher SOFA score and duration of ICU stay (Score > 10, stay > 5 days-19/28, Score  $\leq$  10, stay >5 days -64/121,  $p = 0.07$ ). No significant association was found between cholinesterase levels and duration of ICU stay (Cholinesterase <5, 500- duration of stay >5 days-56/96, Cholinesterase  $\geq$ 5, 500 –duration of stay > 5 days-12/26,  $p = 0.2$ ).

## DISCUSSION

There is a preponderance of male patients among the acute poisoning cases admitted to the MICU (65.7%). Young adults (20 – 34 yrs) constitute maximum of the cases (44.9%). Maximum cases are during the summer months. Most of the cases are suicidal, and belong to the lower socioeconomic group. Pesticides are the most common poison used. This data is similar to studies done in different parts of the country<sup>1</sup>. However, sedative overdose has been consistently the commonest type of poisoning in developed countries<sup>5</sup>. Snake bite is the second most common type of poisoning in our centre, with maximum incidence during monsoon. An interesting seasonal pattern, with maximum cases during summer months, and a dip in cases during winter months has been noted. A similar pattern is also described in a study conducted in Tamil Nadu. Though in this study, the reason for predominance in summer months has been attributed to water scarcity leading to crop failure in summer, and increased availability of grain preservatives, this reason is not applicable in our centre which is situated in an urban area. Higher incidence of depression in summer months due to increased heat and humidity is a likely cause, however further studies will be needed to look into this factor<sup>8</sup>. Most common presenting complaints were vomiting, anxiety and restlessness, followed by cholinergic crisis. Most common clinical signs were fasciculations, miosis and bradycardia. Most common presenting features of snake bites were local swelling and bleed (vasculotoxic), and quadriparesis (neurotoxic). It is important to rule out cholinergic crisis due to prior neostigmine administration in cases of apparent neurotoxic snake bites. Of all poisoning admissions, thyroid function tests were deranged in 9.3% of the cases, implicating it as an important contributory factor as a cause of depression leading to suicidal poisoning. Gastric lavage and atropine were the most commonly instituted treatment. Fifty two percent required ventilatory support. Most common complications seen

include delirium secondary to atropinisation, followed by electrolyte disturbances and intermediate syndrome. These findings are similar to other studies conducted worldwide<sup>9</sup>. Mortality among the poisoning patients was 14.7% which was significantly lesser than the mortality among the non poisoning patients (26%). Most of the deaths were due to OPC consumption (19/22). Delay in presentation is associated with increased mortality with maximum mortality among those presenting after 24 hours of consumption, and no mortality among those presenting within 4 hours. There was no association found between cholinesterase levels and mortality. No mortality was observed among the snake bite cases, thereby showing that timely management can prevent death in this case. Duration of ICU stay was comparable between poisoning and non poisoning groups. Higher SOFA score was associated with an adverse outcome. This is comparable to another study conducted in Korea<sup>10</sup>.

## CONCLUSION

Pesticides, with OPC constituting majority, are the most common agents seen among the acute poisoning admissions in the MICU in our centre. Young adult males constitute majority. Summer months saw more poisoning cases, though most of the snake bites were in monsoon. Vomiting and restlessness were the most common presenting symptoms, followed by symptoms of cholinergic crisis. Mortality among the poisoning patients was significantly lower compared to the non-poisoning patients, and was mainly due to OPC compounds, and is significantly increased with delay in time of presentation. Higher SOFA score was associated with adverse outcome among the poisoning patients. In summary, Poisoning cases constitute a significant proportion of patients among the MICU admissions. Most of the poisoning cases can be saved with timely intervention. It is important to periodically review the clinical profile and outcome of such cases, due to changing trends in the socioeconomic status/ availability/ accessibility of different types of poisons. A high index of suspicion is required for early diagnosis and optimal management of these patients. Primary causes precipitating suicide have to be identified and tackled on priority.

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