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## Pattern of acute poisoning in children in rural areas: A retrospective observational study

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### Abstract

**Introduction:** Poisoning is a common emergency worldwide especially when occurring in pediatric age group. Routine surveillance and proper counselling of family members is required to avoid and prevent such situations. The study was designed to assess the spectrum of poisoning in rural areas of M.P.

**Methods and Materials:** This was a retrospective observational study. Paediatric patients under 13 years of age admitted with acute poisoning in PICU in last 1 year were studied for presenting complaints, clinical profile and outcome. Preventive measures were also discussed.

**Results:** 85 children were admitted in PICU with acute poisoning, incidence was more in male children, mainly at home or surroundings. It was apparently accidental and more common in children less than 5 years of age. Maximum cases of acute poisoning were of scorpion sting bite (as maximum patients were from rural areas of M.P.) followed by kerosene poisoning followed by rat poison. Death was reported in patients whereas maximum patients were discharged within 5 days without any serious complications.

**Conclusion:** Even though mortality reported due to acute poisoning is only, measures should be taken to avoid the hazard and parents should be counselled regarding taking safety measures at home.

**Keywords:** Pattern, poisoning, children, retrospective, observational

### Introduction

Pediatric poisoning occurs when substances are ingested, inhaled, injected, or absorbed through skin contact in quantities that are harmful to the body<sup>[1-3]</sup>. In most pediatric poisonings, the substances are minimally toxic, but some are severely toxic, requiring immediate medical intervention to prevent severe harm or death<sup>[2]</sup>. When evaluating patients, physician must be familiar with the management of common poisoning according to the most recent available information<sup>[4]</sup>. Demographics and pattern of poisoning may change time to time. Also the surroundings, living standard, education and occupation of the parents determine the kind of poison and its outcome<sup>[1, 4-6]</sup>. According to the World Health Organization (WHO), in 2012, 350,000 individuals, 45,000 of whom are under 20 years of age, lost their lives due to poisoning<sup>[7]</sup>. Regular surveillance is required to recognize trends of common poisoning in that particular area so that decontamination, enhanced elimination, antidotes, and supportive care can be provided timely. Pediatrician can effectively identify and manage poisoning according to age and time<sup>[6, 8]</sup>. When causes of poisoning in childhood are studied, chemicals such as drugs, household cleaning products, gas oil, rat poison are more prevalent and since the study was conducted in rural areas of M.P. scorpion and snake bite was also very commonly seen<sup>[9]</sup>. Every year, more than one million children lose their lives due to preventable accidents and poisoning is very common among these accidents. Therefore the study was done to investigate and update the characteristics and outcome of children admitted with acute poisoning in PICU.

### Aim

To study the clinical spectrum of acute accidental poisoning in paediatric patients admitted in PICU in rural areas of M.P.

### Inclusion criteria

All paediatric patients 13 years of age or below who presented with acute poisoning in PICU or emergency department from June 2020 to June 2021.

**Exclusion criteria**

1. Suspected case of homicidal or suicidal poisoning as per history or Medico legal report
2. All paediatric patients above 13 years of age
3. All patients below 1 month of age
4. Patients who absconded or left without medical advice (LAMA)

**Methods and Materials**

This is a retrospective observational study conducted from June 2020 to June 2021 at Atal Bihari Vajpayee Government Medical College Vidisha M.P. All patients 13 years of age or less who were admitted in PICU or came to emergency department with acute poisoning taken for the study. Children less than 1 month or older than 13 years of age were excluded. Patients who absconded or left without medical advice were excluded from the study. Data was collected from PICU and casualty room record. Personal details like age, gender, duration of stay of the patients were recorded along with type and nature of poisoning, clinical features and outcome. Scenario in which the accident occurred was also taken into account. Only apparent accidental poisoning were selected for the study and suspected suicidal or homicidal poisoning cases were excluded. Patient was followed up during stay at the hospital. Patient was initially admitted in PICU for observation, toxin was identified by either asking family members to get the substance or its packaging for the content of poison or in case of scorpion or snake or bee, by showing them the picture. Medicolegal case report was filed for police investigation. Patient was given appropriate and specific treatment and was investigated accordingly. Patient was shifted to ward after stabilizing. Patients who were critical continued their treatment in PICU. Outcome including mortality, referral to higher center or discharge was noted.

**Statistics**

Our specific data analysis depended on the types of information obtained and included descriptive statistics for most variables (i.e. demographics). Univariable summaries (means, medians, standard deviations) were provided for continuous variables (e.g., age, hours of ED stay) while frequency distributions summarized categorical variables (e.g., gender). Associations between variables were assessed with *t*-tests (for continuous variables) and chi-square tests (for categorical variables). The statistical software package SPSS Version 21 was used for all analyses, and a *p*-value of less than 0.05 was considered statistically significant.

**Results****Demographics**

Data was obtained from June 2020 to June 2021 and total 85 patients were taken who were admitted in PICU, ABVGMC Vidisha which represented 11.3% of total PICU admission during the study period (85/751). 15 patients were excluded from the study due to exclusion criteria. The study included 31 females, 36.4% and 54 males, 63.5%. All patients were initially admitted in PICU. Home was the common site of poisoning, 55% (47/85) and rest 45% occurred in nearby surroundings especially field. Most patients were between 0-3 years of age 64.7% (55/85).

**Time distribution and duration**

The proportion of emergency visit involving paediatric poisoning is around 10-12% annually. Out of 85 cases coming to emergency department, 11 cases came in

October, 12.9% followed by 9 patients in August, 10.5% and 8 patients in September, 9.4%.

**Route of poisoning and agents involved**

Causative agents and routes of poisoning are listed in table. Ingestion was collectively the most common route of poisoning 54% (46 cases) followed by venom 30.5% (26 cases). Other routes of poisoning like inhalation, spillage, absorption (skin or eye) and injection were hardly seen. Among the agents, scorpion bite was the most common accidental poisoning, 24 cases, 28%. Kerosene and turpentine oil the was second most common paediatric poisoning emergency noted, 20 cases (23.5%) followed by poisonous seed/ plant/ flower ingestion, 10 cases (11.7%). Other poisonous agents by ingestion included chemical/mosquito repellents, 8 cases (9.4%), rat poison 8 cases (9.4%) and pharmaceutical agents 6 cases (7.0%).

**Initial Presentation**

All the patients who presented with acute poisoning whether stable or critical were admitted in PICU. Their presenting symptoms and vitals were recorded which is recorded in table below. Hypothermia was noted in 23.5% cases, 20 cases whereas fever was present in only 2.3% (2 cases). Tachycardia was predominantly noted in 54% patients (46 cases) whereas bradycardia was noted in 10.5% (9 cases). Tachypnoea was noted in 45.8% (39 cases) whereas 6 patients had shallow breathing (7%). 35 patients had multiple unstable vitals at the time of presentation, 41% whereas 58.8% patients (50 patients) were stable and were kept under observation. GCS <8 was noted in 15.2%, 13 cases. Hypoxia (spo<sub>2</sub> <90%) was noted in 25 patients (29.4%) while others were maintaining spo<sub>2</sub> above 90%.

**Management, duration of stay and outcome**

All patients were admitted in PICU and symptomatic with supportive management was started in all patients. Gastric lavage was done in 34.1% cases (29). Activated charcoal and potassium permanganate was not available at our center so patients requiring were urgently referred to higher center, 12.9% (11 cases). ASV (anti snake venom) was given to 4 patients, 4.7%. Pralidoxime was started in 4 patients presenting with OP poisoning, 4.7%. Mechanical ventilation was required in 15.2%, 13 cases.

PICU stay was also recorded. 38 patients were shifted out of PICU to ward after 24 hours. 37.6% patients had PICU stay of less than 5 days whereas 17.6% patients had PICU stay of more than 5 days.

Death was reported in 10.5% cases which included venomous snake bite followed by OP poisoning. 11 patients were referred to higher center for further management. 65 patients were successfully treated and were discharged.

**Discussion**

Clinical spectrum was studied in this research which is similar to many studies done in India but none such study was done in the rural areas of M.P.

In this study, only accidental cases of acute poisoning was studied which is similar to study done by Lee *et al.* [10] in Feb 2019 where also acute poisoning was studied in paediatric population.

Acute poisoning shared a significant spectrum of total PICU admissions in 1 year in this study, 11.3% which is much more than the studies done by Seth *et al.* [11] and Lee *et al.*

[10], 2.2% and 0.27% respectively.

In this study maximum poisoning incidence occurred at home which is similar to the study done by Lee *et al.* [10] and Saikia *et al.* [12]. Acute poisoning was maximum reported in children less than 5 years of age, 51.7% which is similar to studies done by Lee *et al.* [10], Tobaigy *et al.* [13] and Martin *et al.* [14]. In less than 5 year old population, male population was predominantly affected in this study which is similar to study done by Lee *et al.* [10], Tobaigy *et al.* [13] and Martin *et al.* [14]

Maximum cases occurred at home, 55% followed by home surroundings which is similar to the study done by Lee *et al.* [10] and Saikia *et al.* [12]. Peak of paediatric poisoning was found in rainy season in our study as scorpion bite was the most common poisoning reported unlike in other studies where kerosene ingestion was the most common agent and peak of poisoning was reported in winter season. Maximum patients had stable vitals at the time of admission but 15.2% patients were critical and required mechanical ventilation, death was reported in 10.5% patients whereas 76.74% patients were successfully treated and discharged which is similar to the study done by Lee *et al.* and Mintegi *et al.* [15] where also maximum patients were successfully treated and discharged.

As only accidental poisoning was considered in this study, parental counselling was done in all cases. Parents were taught about safety measures at home and surroundings.

Pesticides, house cleaners and pharmaceutical drugs should not be kept within reach of children. Surroundings should be kept free of poisonous plants, stagnant water collection. Family members should keep a watch when children are playing outdoors. They should be also counselled about safety and first aid procedures to be done after snake and scorpion bite. It is similar to the study done by Gerard *et al.* [16] where also counselling done by paediatrician and family physician was studied.

**Table 1:** Demographic data of children with poisoning

Gender	n	%
Male	54	63.5%
Female	31	36.4%
<b>Age</b>		
1 month- 3 years	55	64.7%
4-8 years	20	23.5%
8-13 years	10	11.7%
<b>Site of poisoning</b>		
At home	47	55%
Home surroundings	38	45%

**Table 2:** Peak season of poisoning

Season/month	n	%
Autumn/ October	11	12.9%
Rainy season/ August	09	10.5%
Rainy season/ September	08	9.4%



**Picture 1:** Graphical representation of variation of incidence of poisoning over months in a year

**Table 3:** Route of Poisoning and Agents involved

Route of poisoning	n	%
Ingestion	46	56.4%
Inhalation	05	5.8%
Contact (skin/eye)	05	5.8%
Venom (snake/ scorpion/ bee)	24/02/01	28%/ 2.3%/ 1.1%
<b>Agent/ Poison</b>		
<b>Corrosives</b>		
Kerosene/ Turpentine oil	20	23.5%
<b>Pesticides</b>		
Organophosphates (OP poisoning)	04	4.7%
<b>Poisonous plant seed/ flower/ fruit</b>		

Ratanjot seeds/ flower	07	8.2%
Dhatura fruit	03	3.5%
<b>Insecticide/ rodenticide</b>		
Mosquito repellent	08	9.4%
Rat kill poison	08	9.4%
<b>Venom</b>		
Scorpion	24	28%
Snake	02	2.3%
Bee	01	1.1%
<b>Pharmaceutical drugs</b>		
Antipsychotic drugs	04	4.7%
Iron folic acid	01	1.1%
Paracetamol overdose	01	1.1%

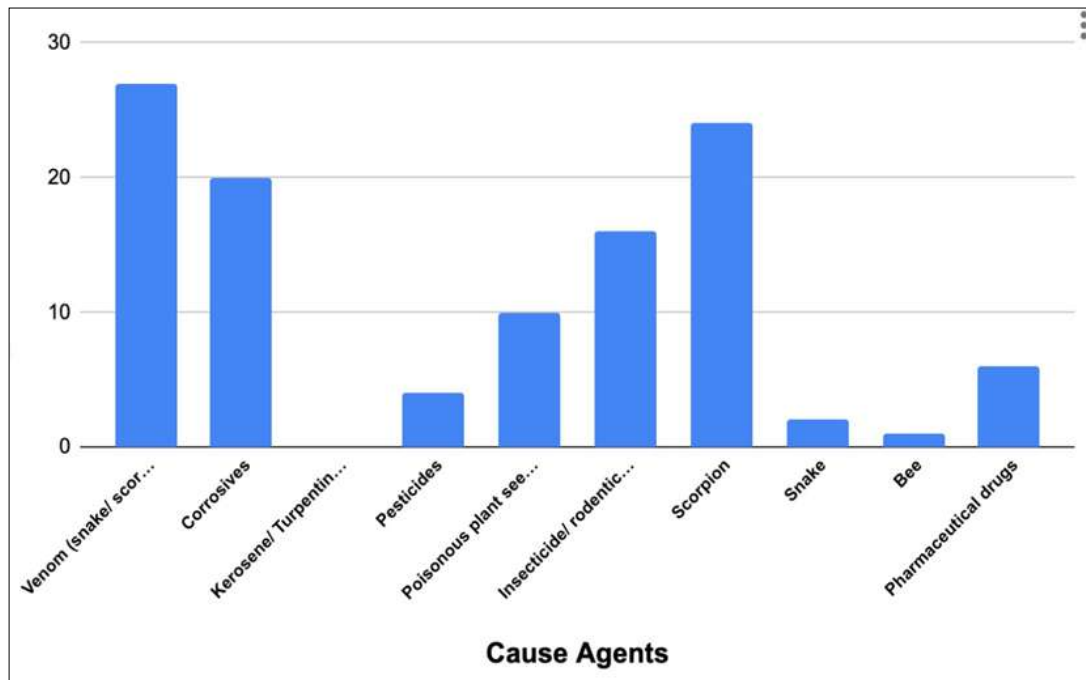


Figure 2: Bar graph presentation of common causative agents/poison resulting in accidental poisoning in rural areas of M.P.

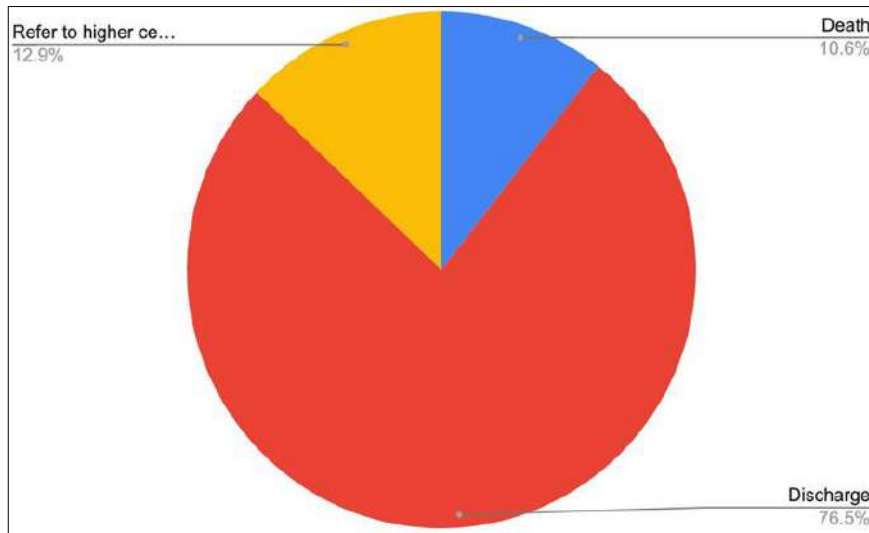
Table 4: Clinical presentation at the time of admission

	n	%
<b>Body temperature</b>		
Hypothermia	20	23.5%
Hyperthermia/fever	02	2.3%
<b>Heart rate</b>		
Tachycardia >100/min	46	54%
Bradycardia <60/min	09	10.5%
<b>Respiratory rate</b>		
Tachypnoea >40-60/min	39	45.8%
Shallow breathing <15/min	06	7%
<b>GCS score</b>		
<=8	13	15.2%
9-13	15	17.6%
14-15	57	67%
<b>spo2</b>		
<90%	25	29.4%
>90%	60	70.5%

Table 5: Management, hospital stay and outcome

Management	n	%
Gastric lavage	29	34.1%
ASV (anti snake venom)	04	4.7%
Mechanical ventilation	13	15.2%
<b>Duration of stay</b>		
<= 24 hours	38	44.7%
< 5 days	32	37.6%
>5 days	15	17.6%

Outcome		
Death	09	10.5%
Discharge	65	76.4%
Refer to higher center	11	12.9%



**Picture 3:** Pie chart representation of outcome of children admitted with acute accidental poisoning

**Conclusion**

1. Paediatric poisoning is still under reported, accounts for 11.3% in last year out of which scorpion bite was most commonly seen in the rural areas of M.P.
2. Due to advanced medical facilities even in the rural areas, death has reduced to 10.5% in 1 year.
3. Accidental poisoning can be avoided by proper parental counselling and safety measures at home and surroundings.

**Limitation to the study**

1. Only acute accidental cases were studied, chronic and intentional poisoning was not covered.
2. Due to admission policy of paediatric department, children up to 13 years could be included so adolescent poisoning could not be studied.
3. Due to COVID-19 pandemic last year, number of IPD patients reduced due to government lockdown guidelines.
4. Detailed toxicological analysis could not be done.

**Conflict of interest:** None

**Funding:** None

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