ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25may1867

Epidemiological and Clinical Characteristics of Poisoning Patients at a Tertiary Healthcare Setting: A Cross-Sectional Study

Poisoning Cases at a Tertiary Setting: An Epidemiological study

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Publication Date: 2025/06/06

Abstract: The study aimed to assess the epidemiological and clinical characteristics of poisoning cases and explore how time to hospitalization and toxicity severity affect patient outcomes.

- ***Objective:***

To assess the epidemiological trends and clinical characteristics of patients presenting with poisoning at a tertiary healthcare setting.

- ***Method:***

This cross-sectional study was conducted over six months (September 2024 to February 2025) at a tertiary healthcare setting in Belagavi. a total of 60 patients admitted with poisoning were included after informed consent. Data was collected using a structured, pre-validated electronic questionnaire and analyzed using IBM SPSS version 29. Statistical methods included descriptive statistics, chi-square tests, and correlation analyses, with $p<0.05$ considered significant.

- ***Results:***

Most poisoning cases involved males (63.3%) and individuals aged 18–40 years (63.3%). Intentional poisoning accounted for 65% of incidents. The workplace was the most common site of exposure (65%). Patients admitted within 30 minutes had a 100% recovery rate, whereas those admitted after more than 12 hours showed increased mortality (up to 42.9%). Severe toxicity was linked with symptoms like unconsciousness, irregular heart rate, and multi-organ involvement. Dermatological, cardiovascular, and gastrointestinal issues were more frequent in severe cases.

- ***Conclusion:***

Poisoning predominantly affects young adults and is often intentional. Early medical intervention significantly improves survival, while delays lead to worse outcomes. Timely care and preventive strategies are critical to reducing the impact of poisoning.

Keywords: *Poisoning, Clinical features, Toxicity, Public Health.*

How to Cite: Ifraa M Warimani; Dr. Geetanjali S Salimath; Harshavardhan Patil (2025) Epidemiological and Clinical Characteristics of Poisoning Patients at a Tertiary Healthcare Setting: A Cross-Sectional Study. *International Journal of Innovative Science and Research Technology*, 10(5), 3559-3563. https://doi.org/10.38124/ijisrt/25may1867

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I. INTRODUCTION

The World Health Organization (WHO) estimates that nearly 300,000 people die from poisoning each year, with the vast majority of these deaths occurring in low- and middle-income countries [1]. In developed nations, the fatality rate from poisoning is relatively low, ranging between 1% and 2% [2]. However, in India, this rate can rise significantly, reaching between 20% and 30%. Poisoning is also recognized as the fourth most common cause of death in the country [3]. According to data from the National Poison Data System (NPDS), compiled by the American Association of Poison Control Centers, acute poisoning is a major public health issue in the United States, affecting over 2.2 million people annually [4].

- In Colombia, 33,165 cases of acute poisoning were documented in 2020, mainly caused by medications, psychoactive substances, and pesticides. However, due to substantial underreporting and a lack of comprehensive epidemiological data, continuous monitoring is necessary to manage the high burden of illness, death, and related costs [5]. Household poisoning, caused by exposure to everyday products like cosmetics, pesticides, cleaning agents, sanitizers, and detergents, poses another serious concern. Since many of these substances are undetectable by sight, smell, or taste, awareness and proactive prevention are essential [6].
- Evidence shows that most hospital admissions and deaths are the result of intentional self-poisoning rather than accidental or occupational exposure. In China, the government has established ongoing surveillance systems for pesticide use and poisoning, including the creation of the Occupational Diseases and Occupational Health Information Monitoring System (ODSRS) in Jiangsu Province in 2006. This online platform tracks various occupational hazards and poisoning incidents [7].
- In India, the National Poison Information Centre (NPIC), under the National Institute of Occupational Health (NIOH) and Indian Council of Medical Research (ICMR), offers crucial information on poisoning cases, including symptoms, causes, and treatment. However, the system still lacks access to real-time data on poisoning incidents across the country [8]. The study aims to assess the demographic profile, clinical characteristics, and outcomes of patients admitted with poisoning in a tertiary healthcare center and to evaluate the correlation between time to hospitalization, toxicity level, and clinical parameters.

II. METHODS

This cross-sectional study was carried out over a six-month period, from September 2024 to February 2025, at a tertiary healthcare center in Belagavi. Ethical approval was obtained from the Institutional Ethics Committee (Ref No: KLECOPBGMEC/D012-2024), and written informed consent and assent form was secured from all participants prior to enrollment.

A total of 60 patients who experienced poisoning and were admitted during the study period were included based on predefined eligibility criteria. Data collection was performed using a structured and pre-validated questionnaire designed to capture both epidemiological and clinical information. The tool was administered electronically through Google Forms to ensure uniformity and ease of response tracking.

Collected data were compiled and analyzed using IBM SPSS Statistics Version 29. Descriptive statistics, including mean and standard deviation, were used for continuous variables. Categorical variables were examined using the chi-square test. Correlation analyses between clinical and demographic variables were conducted using Pearson's correlation coefficients, depending on data distribution.

III. RESULTS

This study analyzed the demographic and clinical characteristics of 60 poisoning patients admitted to a tertiary healthcare setting.

As shown in **Table 1**, the majority of patients (63.3%) were aged between 18–40 years, followed by 26.7% aged 41–60 years. Only 8.3% were under 18, and 1.7% were over 60 years. Males constituted a higher proportion of cases (63.3%) compared to females (36.7%). Regarding relationship status, 71.7% of the patients were married, and 28.3% were single. In terms of employment, the largest group was housewives (30%), followed by those categorized as 'other' (26.7%), farmers (18.3%), students (13.3%), and unemployed individuals (11.7%). The reason for poisoning was intentional in the majority of cases (65%), while 35% were accidental. The location of poisoning incidents was primarily the workplace (65%), followed by the home (20%) and other locations (15%).

Table 2 presents the relationship between time to hospitalization and toxicity level with various clinical parameters. Vomiting, headache, and nausea were the most reported symptoms, affecting 50% of patients arriving within 15–30 minutes and 43.5% of those arriving within 1–4 hours. Pain, swelling, redness, and dizziness were also common (40–46.1%) in early-presenting patients. In contrast, severe symptoms like irregular heart rate (25–28.6%) and unconsciousness (28.6%) were more frequent among those admitted after >12 hours.

When correlated with toxicity level, shows that these common symptoms were fairly consistent across mild (50%), moderate (40–45%), and severe cases (44.7%). However, irregular heart rate and unconsciousness were notably higher in patients with severe toxicity (10.5% and 5.3%, respectively). A clear trend is evident in linking time to hospitalization with clinical outcomes. All patients (100%) who were admitted within 15–30 minutes recovered, while mortality increased with delayed admission—25% in the >12 hrs group and 42.9% in the >24 hrs group. With respect to toxicity level, mortality was 0% in mild cases, 5% in moderate cases, and 13.2% in severe cases.

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As detailed, none of the patients had known comorbidities. Pregnancy or lactation was noted in a small subset of patients, particularly in those arriving 1–4 hours (7.7%) and >24 hours (14.3%) post-poisoning. Prior medication use was generally low, reported only in 7.9% of severe toxicity cases. The clinical effects of poisoning varied notably. Dermatological abnormalities were the most frequent manifestation in severe cases (21.1%), followed by cardiovascular (15.8%) and gastrointestinal issues (13.2%). Nephrotoxicity and multi-organ involvement (e.g., cardiovascular + neurological) were more common among late-presenting and severely toxic patients. Mild cases often had no significant effects or only dermatological symptoms.

IV. DISCUSSION

This study highlights the demographic and clinical profile of poisoning cases in a tertiary care setting, showing patterns consistent with previous research in South Asia. The majority of patients were young adults (18–40 years), similar to findings by Rajbanshi *et al.* [9], with a male predominance (63.3%), reflecting trends seen in other Indian studies. Intentional poisoning (65%) was the most common cause, consistent with the observations of Mittal *et al.* [11] and Hempstead [10], who emphasized the rising burden of self-poisoning, particularly among younger populations.

Early hospitalization was clearly linked to better outcomes, with 100% recovery among those admitted within 30 minutes, while mortality increased significantly with delays—up to 42.9% after 24 hours. This mirrors the importance of timely care highlighted by Rajbanshi *et al.* [9]. Clinically, common symptoms such as vomiting and dizziness were more frequent in early presenters, whereas severe signs like unconsciousness and irregular heart rate were seen in delayed or severely toxic cases. Similar symptom severity patterns associated with toxicity and delayed treatment were noted by Mittal *et al.* [11].

Though our study found no comorbidities among patients, unlike Hempstead's [10] findings in a Western context, the trend of worsening outcomes with delayed care parallels other public health concerns like snakebite, as discussed by Menon *et al.* [12]. Overall, these findings reinforce the need for early intervention, awareness, and targeted mental health support to reduce poisoning-related morbidity and mortality.

Table 1 Demographic Characteristic of Poisoning Patients

DEMOGRAPHIC CHARACTERISTICS (n=60)		
AGE	**FREQUENCY**	**PERCENTAGE**
<18 Years	5	8.3%
18-40 Years	38	**63.3%**
41-60 Years	16	26.7%
>60 Years	1	1.7%
GENDER		
Male	38	**63.3%**
Female	22	36.7%
MARITAL STATUS		
Single	17	28.3%
Married	43	**71.7%**
EMPLOYMENT STATUS		
Unemployed	7	11.7%
Farmer	11	18.3%
House wife	18	**30.0%**
Student	8	13.3%
Other	16	26.7%
Reason for Poisoning		
Accidental	21	35%
Intentional	39	**65%**
Designation of Poisoning		
Home	12	20%
Work place	39	**65%**
Other	9	15%

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Table 2 Correlation of Time to Hospitalization and Toxicity Level with Clinical Parameters in Poisoning Patients (n = 60)

CLINICAL PARAMETER	Time duration between poisoning and hospitalization				Toxicity level		
	15–30 mins (n=10)	1–4 Hrs (n=39)	>12 Hrs (n=4)	>24 Hrs (n=7)	Mild (n=2)	Moderate (n=20)	Severe (n=38)
Symptoms of Poisoning							
Pain, Swelling, Redness, Dizziness	40%	**46.10%**	25%	14.30%	**50%**	45%	44.70%
Vomiting, Headache, Nausea	**50%**	43.50%	50%	28.60%	**50%**	40%	44.70%
Irregular Heart Rate	10%	5.10%	25%	**28.60%**	0%	5%	**10.50%**
Unconsciousness	0%	5.10%	0%	**28.60%**	0%	0%	**5.30%**
Clinical Outcomes							
Recovered	**100%**	94.90%	75%	57.10%	**100%**	95%	86.80%
Died	0%	5.10%	25%	**42.90%**	0%	5%	**13.20%**
Past Medical History							
Comorbidities	0%	0%	0%	0%	0%	0%	0%
Pregnancy and Lactation	0%	7.70%	0%	**14.30%**	0%	5%	**7.90%**
None	**100%**	92.30%	100%	85.70%	**100%**	95%	92.10%
Past Medication History							
Yes	0%	5.10%	**25%**	0%	0%	0%	7.90%
No	**100%**	94.90%	75%	100%	**100%**	**100%**	92.10%
Characteristics of Poisoning							
No effect	**10%**	7.70%	0%	0%	**50%**	10%	5.30%
Gastro intestinal + Neurological Abnormalities	0%	5.10%	0%	0%	0%	**10%**	2.60%
Gastrointestinal Abnormalities	10%	**15.40%**	0%	14.30%	0%	**20%**	13.20%
Nephrotoxicity	10%	10.30%	**25%**	14.30%	0%	**15%**	13.20%
Cardiovascular + Gastro intestinal + Neurological Abnormalities	0%	**2.60%**	0%	0%	0%	0%	**5.30%**
Cardiovascular Abnormalities	10%	7.70%	**25%**	14.30%	0%	5%	**15.80%**
Dermatological + Nephrotoxicity	**10%**	0%	0%	0%	0%	0%	**5.30%**
Dermatological Abnormalities	20%	20.50%	**25%**	14.30%	**50%**	20%	21.10%
Respiratory Abnormalities	10%	5.10%	0%	**14.30%**	0%	5%	7.90%
Metabolic Abnormalities	0%	2.60%	0%	**14.30%**	0%	0%	**5.30%**

Note: Mins= Minutes, Hrs= Hours,

V. CONCLUSION

This study highlights that poisoning predominantly affects the young adult population, with a higher incidence in males and intentional poisoning as the leading cause. Early hospitalization within 30 minutes is associated with better recovery rates and lower mortality, whereas delays beyond 12 hours significantly increase the risk of death. Clinical manifestations vary with the severity of toxicity and time to hospital presentation, with dermatological, cardiovascular, and gastrointestinal abnormalities being most common in severe cases. These findings underscore the importance of prompt medical intervention and targeted preventive strategies to reduce the burden of poisoning-related morbidity and mortality.

ACKNOWLEDGMENT

The authors would like to express their sincere gratitude to Dr. Sunil S. Jalalpure, Principal, for his constant support and encouragement throughout the course of this study. We are also deeply thankful to Prof. M. S. Ganachari, Head of the Department of Pharmacy Practice, for his valuable guidance and oversight. Our heartfelt appreciation goes to Ms. Maheen Kazi and Ms. Harini Desai, Pharm.D interns, for their dedicated assistance in recruiting patients and collecting data, which was instrumental to the successful completion of this study

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25may1867

Financial support and sponsorship: Nil.

Conflicts of interest:

The corresponding author, declares a conflict of interest as a member of the Ethics Committee. The author had no role in the decision-making process related to this manuscript to maintain impartiality and uphold ethical standards.

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