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RESEARCH ARTICLE

PATTERNS AND SOCIODEMOGRAPHIC PROFILE OF ACUTE POISONING PATIENTS: A STUDY FROM TERTIARY CARE HOSPITAL IN SOUTHERN RAJASTHAN

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ABSTRACT

Background: Poisoning remains a significant yet underrecognized public health problem in developing countries, particularly in rural regions. The pattern and prevalence of poisoning are influenced by various factors, including substance availability, socioeconomic status, occupation, and education. **Objective**: To analyze the demographic and socioeconomic profile of acute poisoning cases presenting to the District Hospital, Banswara, in southern Rajasthan. **Methods**: A prospective study was conducted on 100 acute poisoning cases. Data were collected on demographics, type of poisoning agent, occupation, education level, and socioeconomic status using the Modified Kuppuswamy Socioeconomic Scale (2025). **Results**: Males were more frequently affected than females (male-to-female ratio: 13:7). The highest incidence was observed in the 21–30 year age group, followed by the 14–20 year group. Most cases were from rural areas (96%), with agricultural pesticides being the most common agents. A majority of patients had education up to high school or were illiterate. Laborers constituted the largest occupational group (32%). Most belonged to the upper-lower (78%) and lower-middle (16%) socioeconomic classes. **Conclusion**: Agricultural pesticides were the most predominant poison in our study across different age groups and various occupations. Most of the patients belonged to the upper-lower class, as per the Modified Kuppuswamy Socioeconomic Scale (2025).

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INTRODUCTION

Poisoning, defined as exposure to toxic substances—whether intentional or unintentional—occurs through ingestion, inhalation, or dermal contact with agents such as pharmaceuticals, pesticides, household chemicals, industrial toxins, illicit drugs, and medications.[1] It remains a significant public health issue worldwide. According to some studies, acute poisoning has a case fatality rate (CFR) of up to 40%, particularly among the young and economically productive population.[2] Globally, poisoning contributes to nearly 200,000 deaths annually, with pesticides and medications being the most common agents involved.[3] Patterns of poisoning vary across regions. In high-income countries, self-poisoning commonly involves analgesics, antidepressants, or sedatives. In contrast, low- and middle-income countries have pesticides as the predominant cause of poisoning. A study estimated approximately 385 million cases of acute poisoning annually, with South Asia contributing the highest burden.[3]

In India, the situation is particularly alarming. According to the National Crime Records Bureau (NCRB, 2023), out of 1,64,033 reported suicides in 2021, 25.1% were due to poisoning.[4] Independent estimates suggest that around 230,000 suicides occur in India every year, with nearly 30% linked to pesticide consumption.[5] The widespread availability of pesticides in rural areas due to their agricultural use increases the risk of both accidental and intentional poisoning. Gender disparities are also observed. Women, especially in younger age groups, are more likely to attempt poisoning due to psycho-social stress, easy availability of toxic agents, untreated mental illness, and patriarchal social structures. Females have higher rates of suicide ideation and suicide attempts than males, while fatal suicide acts are typically higher for males than for females.[6,7,8,9,10] This trend poses significant economic and public health challenges for society. Management of poisoning depends on the type of substance and the severity of exposure. Some cases may require only observation and supportive care to ensure stability while others

need specific treatments such as antidote administration, gastric decontamination, close supervision and advanced care. Despite the significant burden, region-specific data on poisoning are scarce, especially in rural Rajasthan. Banswara, a tribal and agrarian district in southern Rajasthan, is one such area where data is lacking. This study aims to assess the epidemiology, patterns, clinical outcomes, socioeconomic status, and associated risk factors of poisoning cases presenting to a tertiary care hospital in Banswara. The findings will help inform region-specific preventive and treatment strategies.

MATERIALS AND METHODS

This prospective observational study was conducted in the Mahatma Gandhi Hospital, a tertiary care center located in Banswara, Rajasthan. The study aimed to assess the demographic and socioeconomic status of patients admitted with acute poisoning. The study was carried out from July 21, 2025, and included a total of 100 consecutive patients of acute poisoning.

Inclusion Criteria

- Age: age 14 years and older
- Diagnosis: Patients admitted with a confirmed history of acute poisoning

Exclusion Criteria

- Age: younger than 14 years
- Absconding or LAMA : Patients who abscond or leave against medical advice.
- Critical Illness : Patients suffering from critical illness

Data were collected after obtaining oral consent from the patients or their guardians. The information was gathered using a structured proforma that included the following parameters:

- Demographic details
- Type and mode of poisoning
- Socioeconomic status (assessed using the modified Kuppuswamy Socioeconomic Status Scale, 2025)[11] (Table 1)
- Final outcome (recovery, death,)

RESULTS

During the course of the research, out of 115 patients initially enrolled in the study with acute poisoning, 15 were excluded due to insufficient data. Consequently, 100 patients were included in the final analysis. The majority of the patients were male, accounting for 65% (n = 65), while females constituted 35% (n = 35). A significant proportion of the study population, 94% (n = 94), belonged to rural areas, indicating a higher prevalence of poisoning cases in rural settings.(Table 2) Most patients (78%, n = 78) were in the age group of 14 to 30 years. More specifically, 36% were between 14–20 years, 42% between 21–30 years, 13% between 31–40 years, 8% between 41–50 years, and only 1% were above 50 years of age (Figure 1) (Table 3).

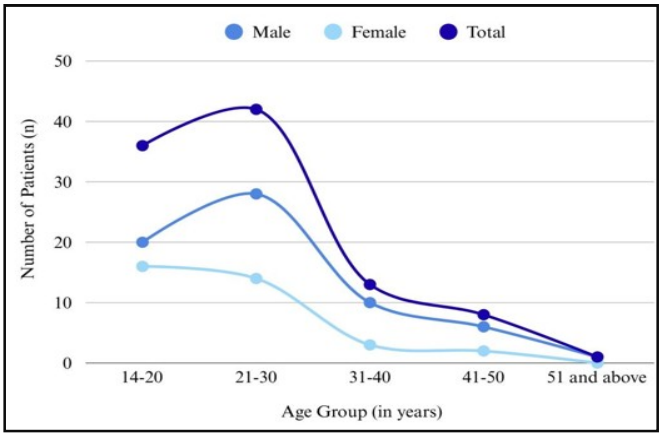

Figure 1. Age Group Distribution

In all cases (100%), the route of poisoning was through oral ingestion. Intentional ingestion was reported in 96% of the cases, whereas 4% were due to accidental ingestion. (Table 2) Agricultural pesticides were the most frequently used substances for poisoning (59%), followed by corrosive agents (10%), rat poison (5%), naphthalene balls (4%), Dhatura (2%), and urea (1%). In 19% of the cases, the exact substance was unknown (Figure 2).

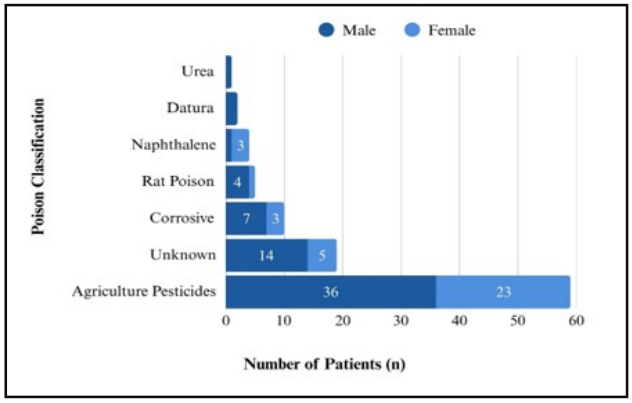

Figure 2. Gender Differences in Exposure to Poisoning Agents

Agricultural pesticides were the leading cause of poisoning across all age groups accounting for 59 cases, especially among 14-30 years old (44 cases).

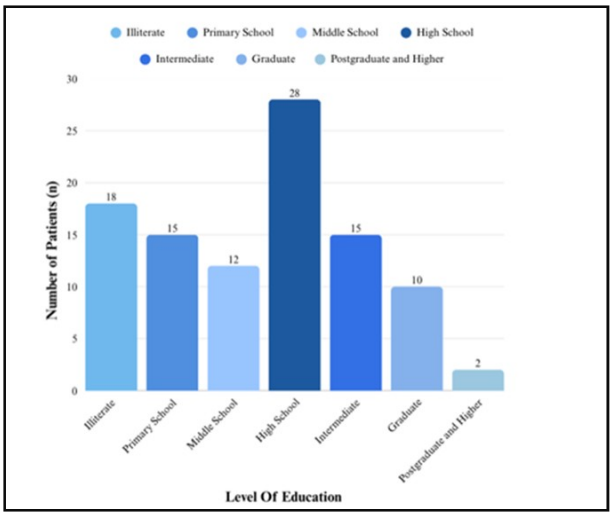

Figure 3. Educational Status

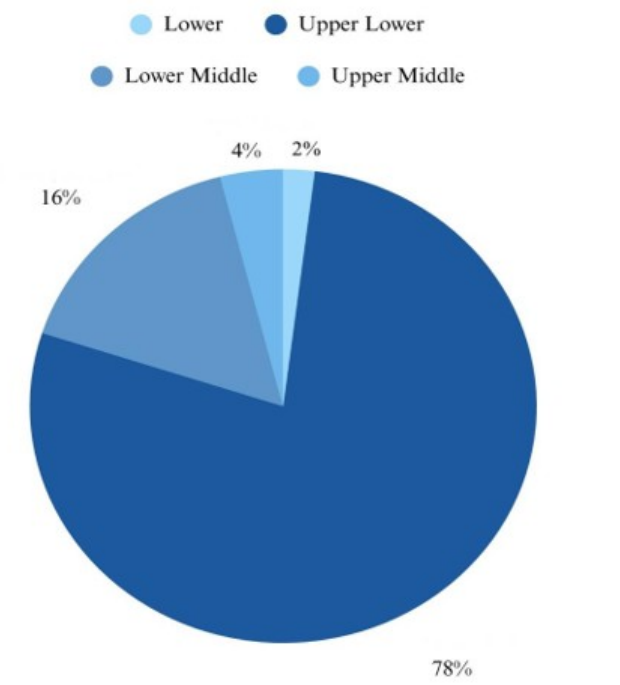

Figure 4. Socioeconomic Status

Corrosive substances were responsible for 10 cases, predominantly among the 14-20 years (5 cases) and 21- 30 years (3 cases) groups. Rat poison accounted for 5 cases, mostly in adolescents and young adults. Urea and naphthalene were less common causes, with 1 and 4 cases, respectively. Datura ingestion was confined to 2 cases both within the 41-50 years age group. A considerable number of cases (19 in total) involved unknown agents, most frequently in the 21- 30 years age group, suggesting either under-reporting or non-disclosure due to stigma (Table 4). With regard to educational status, 18% of patients were illiterate, 15% had completed primary education, 12% middle school, 28% high school, 15% intermediate level, 10% were graduates, and 2% had postgraduate or higher education (Figure 3)

In our study the occupational distribution revealed that the majority of participants were laborers (32%), followed by students (28%) and farmers (23%). Homemakers accounted for 7%, while clerks constituted only 1% of the sample. A smaller proportion were engaged in other occupations (5%) or were unemployed (4%) Table 2. The data indicates that agricultural pesticides are the predominant agents of poisoning across various occupations, with students (20%) and laborers (18%) being the most affected groups. Farmers also experienced notable poisoning incidents, particularly from pesticides (13%) and rat poison (3%). Corrosive substances were primarily reported among farmers (4%), followed by students, laborers, homemakers and clerks. Cases involving unknown poisons appeared in all occupational categories, especially among laborers (7%) and students (5%). Other toxic agents such as Datura, Urea, and Naphthalene were infrequently involved. Considering the major role of psycho-social and socioeconomic pressures in intentional poisoning(n=96), the leading predisposing factor was interpersonal conflicts (39.58%), followed by economic hardship (27.08%) and educational pressure (10.41%). Domestic conflicts were responsible for (20.82%) of cases, while only a small proportion (2.08%) was linked to psychological disorder Table 3. According to the Modified Kuppuswamy Socioeconomic Scale (2025), the majority of patients belonged to the upper lower class (78%), followed by the lower middle class (16%). Only 4% and 2% were from the upper middle and lower classes, respectively, and no patients were reported from the upper socioeconomic class (Figure 4) Table 2. The clinical outcome was favorable in most cases, with a survival rate of 97%. The overall mortality rate observed in the study was 3% Table 2.

Table 1. Modified Kuppuswamy Socioeconomic Status Scale, 2025

Serial no.	Education of the Head	Score
1	Profession or Honors	7
2	Graduate	6
3	Intermediate or Diploma	5
4	High School Certificate	4
5	Middle School Certificate	3
6	Primary School Certificate	2
7	Illiterate	1
Serial No.	**Occupation of the Head**	**Score**
1	Legislators, senior officials and managers	10
2	Professionals	9
3	Technicians and associate professionals	8
4	Clerks	7
5	Skilled workers, shop and market sales workers	6
6	Skilled agricultural and fishery workers	5
7	Craft and related trade workers	4
8	Plant and machine operators and assemblers	3
9	Elementary occupation	2
10	Unemployed	1
Serial No.	**Updated monthly family income in rupees (2025)**	**Score**
1	₹1,59,586 and above	12
2	₹ 79,756 - ₹1,59,585	10
3	₹59,795 - ₹79,755	6
4	₹39,830 - ₹59,794	4
5	₹23,870 - ₹39,829	3
6	₹7,989 - ₹23,869	2
7	< ₹7,988	1
Serial No.	**Total Score**	**Socioeconomic Class**
1	26-29	Upper (I)
2	16-25	Upper Middle (II)
3	11-15	Lower Middle (III)
4	5-10	Upper Lower (IV)
5	<5	Lower (V)

DISCUSSION

The present hospital-based study conducted at the District Hospital, Banswara (Southern Rajasthan), provides important insights into the epidemiological patterns of acute poisoning in southern Rajasthan. Our findings reaffirm the growing public health burden posed by poisoning, particularly among younger individuals. In our study, the majority of poisoning cases occurred in individuals aged 14–30 years, which is consistent with findings from previous Indian studies[12,13]. This age group, encompassing adolescents and young adults, is particularly vulnerable due to psychosocial stressors, academic pressures, interpersonal conflicts, and impulsive behavior. The transitional nature of this life stage likely contributes to increased susceptibility to self-harm and risk-taking behaviors. The primary predisposing factor was interpersonal relationship issues, observed across all age groups. Males were more frequently affected than females, with a male-to-female ratio of 13:7. This finding supports the results reported by Naman Agrawal et al[12] Ravikumar [14], kang et al.[15] In our study male predominance was mostly attributed to greater occupational exposure, outdoor activity, and psychosocial stress. However, contrasting data from previous study Gupta et al [16] indicate a higher incidence among females. Higher incidence in females can be explained by intentional self-harm or domestic violence, suggesting the influence of regional, cultural, and gender-based factors.

Table 2. Characteristics of Poisoning

Variable	Category	n(%)
Gender	Male	65(65%)
	Female	35(35%)
Residence	Rural	94(94%)
	Urban	6(6%)
Route of Administration	Ingestion	100(100%)
	Inhalation/Contact	0(0%)
Manner of Poisoning	Intentional	96(96%)
	Accidental	4(4%)
Psychiatric Illness	Yes	2(2%)
	No	98(98%)
Occupation	Student	28(28%)
	Farmer	23(23%)
	Laborer	32(32%)
	Homemaker	7(7%)
	Clerk	1(1%)
	Others	5(5%)
	Unemployed	4(4%)
State of Intoxication	Alcohol	25(25%)
Socioeconomic Class	Upper	0(0%)
	Upper Middle	4(4%)
	Lower Middle	16(16%)
	Upper Lower	78(78%)
	Lower	2(2%)
Outcome	Survival	97(97%)
	Death	3(3%)

Table 3. Characteristics of Poisoning cases by Gender

Variable	Subgroup	Total (n=100)	Male (n=65)	Female (n=35)	Death (n=3)
Age (years)	14-20	36	20	16	0
	21-30	42	28	14	1
	31-40	13	10	3	1
	41-50	8	6	2	1
	>51	1	1	0	0
Types of Poison	Urea	1	1	0	0
	Datura	2	2	0	0
	Naphthalene	4	1	3	0
	Rat Poison	5	4	1	0
	Corrosive	10	7	3	0
	Agriculture Pesticides	59	36	23	3
	Unknown	19	14	5	0
Education	Illiterate	18	13	5	0
	Primary School	15	10	5	0
	Middle School	12	8	4	2
	Intermediate School	28	19	9	1
	High School	15	8	7	0
	Graduate	10	5	5	0
	Post Graduate & Higher	2	1	1	0
Reason Of Poisoning	Economic Hardship	26	20	6	1
	Interpersonal Conflicts	38	22	16	2
	Psychological Disorder	2	2	0	0
	Domestic Conflicts	20	12	8	0
	Educational Pressure	10	7	3	0
	Accidental	4	2	2	0

Table 4. Distribution of Type of Poisoning Across Age Group

Poisoning Agents	Age Group (years)				
	14-20	21-30	31-40	41-50	>51
Urea	0	1	0	0	0
Datura	0	0	0	2	0
Naphthalene	1	2	1	0	0
Rat Poison	2	3	0	0	0
Corrosive	5	3	1	0	1
Unknown	5	12	1	1	0
Agricultural Pesticides	23	21	10	5	0

Agricultural pesticides were the most commonly consumed toxic agent in this study, followed by corrosives, phenyl, and naphthalene. The incidence of pesticide ingestion was higher in both males and females, while incidence of naphthalene poisoning was predominantly observed in females, potentially due to its common use in domestic settings, such as for mothball storage or as a home remedy. The predominance of agrochemical poisoning aligns with findings from other rural regions of India, where easy access to pesticides, due to widespread agricultural use, significantly increases the risk .

Although the absolute number of cases was higher among laborers, surprisingly, the highest proportion of pesticide consumption was observed among students (71.42%), followed by farmers (56.52%) and then laborers (52.25%). This higher percentage among students can be attributed to several factors, including the easy availability of pesticides, limited education, and a lack of awareness about the potential dangers posed by these pesticides. Corrosive ingestion and poisoning due to unknown substances were also noted across various occupational groups, while rat poison consumption was mainly reported among farmers and laborers. Cases of naphthalene, Datura, and urea poisoning were relatively few and scattered. Occupational analysis revealed that laborers formed the largest group (32%) among affected individuals, similar to findings by K.N. Ramesha et al[13]. This suggests that occupational exposure and lack of protective measures are critical factors in poisoning, particularly in agricultural and construction settings. Educational status was also a significant factor. Most patients had attained only primary or secondary education, while a substantial proportion were illiterate. Lower levels of education may result in poor knowledge of chemical toxicity, inadequate safety practices, and impaired coping mechanisms during psycho-social stress. Additionally, lower education often correlates with poor occupational choices, further increasing exposure to hazardous substances. A notable proportion of patients belonged to rural areas and were from the upper-lower (78%) and lower-middle (16%) socioeconomic classes, as assessed using the Modified Kuppuswamy Socioeconomic Scale (2025). This is consistent with other studies that identify poverty, limited education, and lack of awareness as major contributors to accidental and intentional poisoning [16,17].

Although agricultural pesticides were the predominant toxic agents, the overall mortality in our study was low. All fatal outcomes were specifically associated with ingestion of agrochemical agents. Lower case fatality could be due to early hospital presentation, timely referral, and improved intensive care facilities. These findings underscore the urgent need for regulatory control over hazardous agrochemicals, especially in rural and semi-urban areas. There is a clear necessity for community-level interventions, including health education campaigns on safe pesticide storage, usage, and handling. Strengthening mental health services and counseling infrastructure, particularly in resource-poor settings, is essential for preventing intentional self-poisoning.

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Conflict Of Interest: None declared

Key Points

- Acute poisoning is common in young people (14–30 years) in rural southern Rajasthan, especially in lower socioeconomic groups.
- Most cases (96%) are intentional and linked to interpersonal conflicts, financial stress, and low education.
- Agricultural pesticides are the most common cause, and the Kuppuswamy scale helps identify high-risk groups.
- Stronger pesticide control, better mental health services, increased awareness, and targeted prevention are needed.

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