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A PROSPECTIVE OBSERVATIONAL STUDY ON DIFFERENT POISONING CASES AND TREATMENT OUTCOME IN A TERTIARY CARE HOSPITAL IN DAKSHINA KANNADA

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ABSTRACT

The definition of poison is "any solid, liquid, or gas that, if introduced into the living body or come into contact with any part of it, will cause ill health, death by its constitutional and local effects, or both". The poisoning cases that were admitted to Srinivas Hospital in Mukka, Dakshina Kannada, over the course of the six-month study period were examined using a prospective observational study. A specially designed data collection form was used to collect patient details focusing on demographics, types of poisoning, treatment outcomes, and associated factors among 99 patients enrolled into the hospital during the period of study. Demographic analysis reveals a male predominance (62.6%) with a peak incidence among adults aged 19-60 years. Intentional poisoning, notably by agricultural pesticides (48.5%) and household products (32.3%), predominates, highlighting significant public health concerns. Treatment outcomes underscore the critical impact of consciousness levels on mortality rates, with delayed hospital admission linked to poorer outcomes. Supportive care, including antimicrobials, gastroprotective agents, and antidotes, forms the cornerstone of management. Assessment tools like the Glasgow Coma Scale and Poisoning Severity Score aid in severity stratification, guiding intensive care interventions. This study underscores the need for prompt medical intervention, comprehensive supportive treatments, and targeted public health strategies to mitigate poisoning risks and improve patient outcomes.

KEYWORDS: *poison, demographics, patient, treatment, outcomes.*

INTRODUCTION

Poison may be defined as any agent that can injure, kill or impair normal physiological function in humans producing general or local damage or dysfunction in the body by its chemical activity. Poisoning is the fourth most common cause of death in India and it has been estimated that, five to six persons per lakh of population die due to acute poisoning every year.[1] In day-to-day life, knowingly or unknowingly, millions of people are exposed to dangerous poisonous agents due to their unsafe storage and accessibility. The occurrence of intentional or accidental poisoning with toxic substances (*e.g.*, organophosphates, insecticides, venomous animal exposures, heavy metals, rodenticides, recreational substances and drug overdose) has been a major concern worldwide. Deliberate self-poisoning is a major health problem worldwide and is a common reason for young adults to be admitted to hospital.[2]

The commonest cause of poisoning in India and other developing countries is pesticides, the reason being agriculture-based economy.[3] Pesticides are routinely used for advanced farming and are readily available over the counter for agriculture purposes. To add to this problem poverty, illiteracy, ignorance, unsafe use of pesticides, and easy availability of highly toxic pesticides contribute to high rate of poisoning cases.[4] The necessity for treatment is contingent upon the seriousness of a particular intoxication. Consequently, laboratory chemical biomarkers may assist in determining whether, when, and how to manage patients with severe intoxication in the intensive care unit.[5] Unfortunately, hospital laboratory methods are not consistently accessible. Hence, various descriptive and prognostic evaluation scales (scoring systems) are being used to predict the severity and mortality rates in poisoning. This study employs scales like Glasgow Coma Scale (GCS), Acute Physiology and Chronic Health Evaluation II (APACHE II) Scoring System and Poisoning Severity Scale (PSS) to determine the severity of the poisoning incidents and compared the predicted results with the actual outcome promoting the usefulness of severity scoring systems are of major importance, not only for providing intense monitoring, treatment and treatment policy of these patients in emergency centers, but also for providing satisfactory public assistance on this matter.[5]

The cornerstone of treatment consists of supportive care, prompt gastrointestinal (GI) decontamination, methods for the extracorporeal removal of toxins, and the administration of

antidotes. The outcome of a poisoning incident is influenced by how quickly the patient arrives at the hospital, the understanding of the poison's toxicity level, and the preparedness of the medical care provided. Delays in reaching the hospital are primarily caused by transportation time and referrals from other medical facilities. Awareness of poisoning epidemiology and the typical patterns of poisoning in specific areas can aid in the swift diagnosis and treatment of cases, thereby reducing mortality and morbidity rates. Consequently, regional epidemiological data on poisoning is invaluable for effectively planning resource allocation for prevention and treatment strategies and for focusing research efforts. As a result, research of this kind will continue to serve as a valuable resource for the planning and management of critically ill cases of acute poisoning. It also aids in developing relevant policies, such as implementing new guidelines and revising existing treatment protocols, as well as raising awareness and educating the community about the dangers of poisoning and the proper handling and storage of chemicals. This study was conducted to evaluate the patterns and factors associated with poisoning in the Emergency Care unit, as well as to examine the severity and outcomes related to poisoning.[7]

RESULT

1.1 Determinants of poisoning

A total of 99 cases of poisoning admissions were recorded during the study period. The male population comprised a larger percentage at 62.6% compared to females at 37.4%. The majority of individuals affected fell within the age range of 19 to 60 years. Intentional poisoning was found in 94.9% of cases, while accidental poisoning accounted for 4.1%. Within the study group, 49.5% were married, and 50.5% were unmarried, with 94.5% maintaining a conscious state and 5.1% being unconscious. Among the poisoning incidents, exposure to pesticides was noted in 48.5% of the cases, followed by household products at 32.3%, medications at 13.1%, snake bites at 1.0%, and various other causes at 5%. The primary route of exposure was oral in 99% of cases, with snake bites making up the remaining 1%. Treatment outcome has association between length of hospital stay and level of consciousness with $\chi 2 = 12.728$, p value=0.0036; $\chi 2 = 17.22$, p value=0.0003.

Table 1: Demographics of Subjects.

Characteristics		Frequency (%)	Treatment outcome		P-value
			Survivors	Non-survivors	
Sex	Female	37(37.4%)	31(83.8%)	6(16.2%)	0.819
	Male	62(62.6%)	53(85.5%)	9(14.5%)	

Age (years)	≤18	9(9.1%)	8(88.9%)	1(11.1%)	0.936
	19-60	84(84.8%)	71(84.5%)	13(15.5%)	
	>60	6(6.1%)	5(83.3%)	1(16.7%)	
Current residence	Urban	16(16.2%)	16(100%)	-	---
	Rural	83(83.8%)	68(82%)	15(18%)	
Mode of poisoning	Unintentional	5(5.1%)	5(100%)	-	---
	Intentional	94(94.9%)	79(84%)	15(16%)	
Manner of Intentional poisoning	Suicidal	85(90.4%)	70(82%)	15(18%)	---
	Abuse	9(9.6%)	9(100%)	-	
Manner of Unintentional poisoning	Knowledge deficit	4(80%)	4(100%)	-	---
	Environmental	1(20%)	1(100%)	-	
Marital status	Married	49(49.5%)	40(81.6%)	9(18.4%)	0.785
	Unmarried	50(50.5%)	44(88%)	6(12%)	
Level of consciousness	Conscious	94(94.5%)	83(88.3%)	11(11.3%)	**0.0003***
	Unconscious	5(5.1%)	1(20%)	4(80%)	
Length of hospital stay	≤3 days	33(33.3%)	22(66.7%)	11(33.3%)	**0.0036****
	>3 days	66(66.7%)	62(94%)	4(6.0%)	
Route of exposure	Oral	98(99%)	83(83.4%)	15(16.6)	---
	Bite/Sting	1(1%)	1(1%)	-	

The p value was calculated by using the Pearson chi-square test, *there is an association status at admission and treatment outcome, ** there is an association between length of stay and treatment outcome, --- not fulfilled chi-square test assumption.

1.2 Types of poisoning

Among the poisoning cases pesticide exposures was observed in 48.5% followed by household products 32.3%, medicine 13.1%, snake bite 1.0% and miscellaneous were 5%.

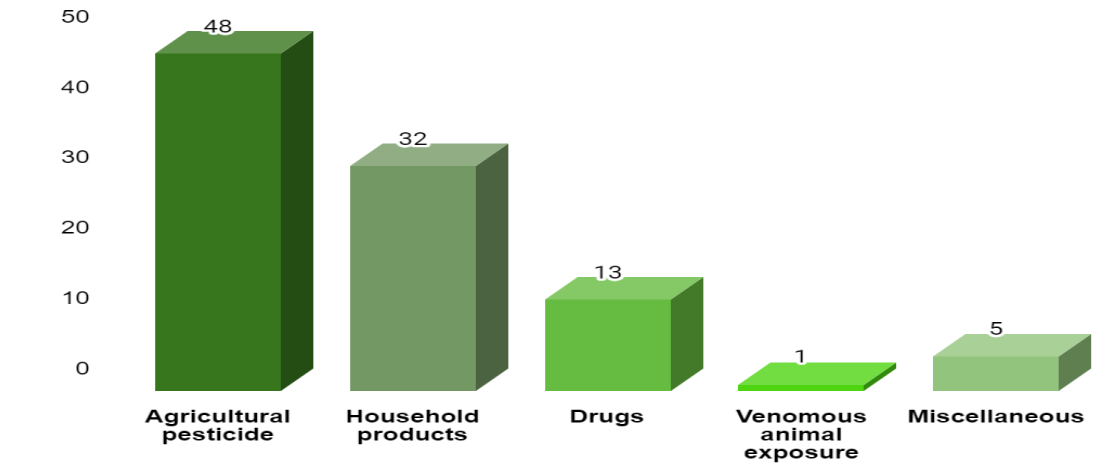

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Figure 1: Types of Poisoning agents.

1.3 Categories of pesticide poisoning

Organophosphate is the most frequently reported pesticide, accounting for 54.1% of cases, while Monocrotophos and Chlorpyriphos are found in 15.3% and 38.4% of cases, respectively. Tremephos, Glyphosate, and Aluminum phosphide each appear in 3.8% of cases. Profenophos is reported in 11.5% of cases, and Malathoin also has a frequency of 3.8%. Pyrethroid accounts for 16.7% of the cases, with Cypermethrin being the most prevalent among them at 87.5%, and Lambda cyhalothrin at 12.5%. Paraquat is observed in 22.9% of cases, while Amitraz is reported in 6.3% of the cases.

Table 2: Categories of pesticide poisoning.

Type of pesticide agents	Frequency (%)
Organophosphate	**26 (54.1%)**
Monocrotophos	4 (15.3%)
Chlorpyriphos	10 (38.4%)
Tremephos	1 (3.8%)
Glyphosate	6 (23.1%)
Aluminum phosphide	1 (3.8%)
Profenophos	3 (11.5%)
Malathoin	1 (3.8%)
Pyrethroid	**8 (16.7%)**
Cypermethrin	7 (87.5%)
Lambda cyhalothrin	1 (12.5%)
Paraquat	**11 (22.9%)**
Amitraz	**3 (6.3%)**

1.4 Household product used for poisoning

Among household products Rodenticide is the most commonly reported product, accounting for 71.8% of cases. Hydrocarbons are reported in 15.6% of cases, while Corrosives are found in 12.5% of cases. This distribution highlights Rodenticide as the predominant household product used in poisoning cases.

Table 3: Categories of household product used for poisoning.

Type of household product	Frequency (%)
Rodenticide	23 (71.8%)
Hydrocarbons	5 (15.6%)
Corrosives	4 (12.5%)

1.5 Categories of drugs used for poisoning

Among drugs used for poisoning Analgesics are the most frequently reported, representing 30.8% of cases. Antidepressants and Anticonvulsants are each found in 23.1% of cases, while

Antipsychotics account for 15.3%. Antidiabetic medications are the least reported, comprising 7.7% of cases.

Table 4: Categories of drugs used for poisoning

Type of household product	Frequency (%)
Antipsychotics	2 (15.3%)
Analgesics	4 (30.8%)
Antidiabetic	1 (7.7%)
Anticonvulsant	3 (23.1%)
Antidepressant	3 (23.1%)

1.6 Type of poisoning and mortality

Table 5 shows result comparing different types of poisoning with their associated mortality rates reveals significant variations. Organophosphate poisoning is the most frequent, accounting for 26.3% of cases, with a mortality rate of 24%. Paraquat poisoning, while less frequent at 11.1%, has the highest mortality rate at 46.7%. Rodenticide poisoning accounts for 23.2% of cases, with a mortality rate of 8.7%. Poisonings involving Amitraz, Pyrethroid, Hydrocarbons, Corrosives, Drugs, snake bites, and miscellaneous causes show no mortality, despite varying frequencies, with Amitraz poisoning accounting for 9.1%, Hydrocarbons for 5%, Corrosives for 4%, and Drugs for 13.1% of cases. Pyrethroid and miscellaneous causes each account for 3% and 5% of cases, respectively, while snake bites are rare, representing only 1% of cases.

Table 5: Comparison of type of poisoning with mortality rate.

Type of poisoning	Frequency	Morality rate (%)
Organophosphate	25 (26.3%)	6 (24%)
Paraquat	11 (11.1%)	7 (46.7%)
Rodenticide	23(23.2%)	2 (8.7%)
Amitraz	9 (9.1%)	0 (0%)
Pyrethroid	3 (3%)	0 (0%)
Hydrocarbons	5 (5%)	0 (0%)
Corrosives	4 (4%)	0 (0%)
Drugs	13(13.1%)	0 (0%)
Snake bite	1 (1%)	0 (0%)
Miscellaneous	5(5%)	0 (0%)

1.7 History of psychiatric illness

The figure illustrates the frequency of three mental health disorders: Depressive Disorder, Adjustment Disorder, and anxiety disorder. Depressive Disorder is the most prevalent, with 4 recorded cases, followed by anxiety disorder, which accounts for 3 cases. Adjustment Disorder is the least frequent, with only 1 reported case. The data indicates that Depressive

Disorder is the most commonly observed condition, while adjustment disorder is the least represented among the three disorders.

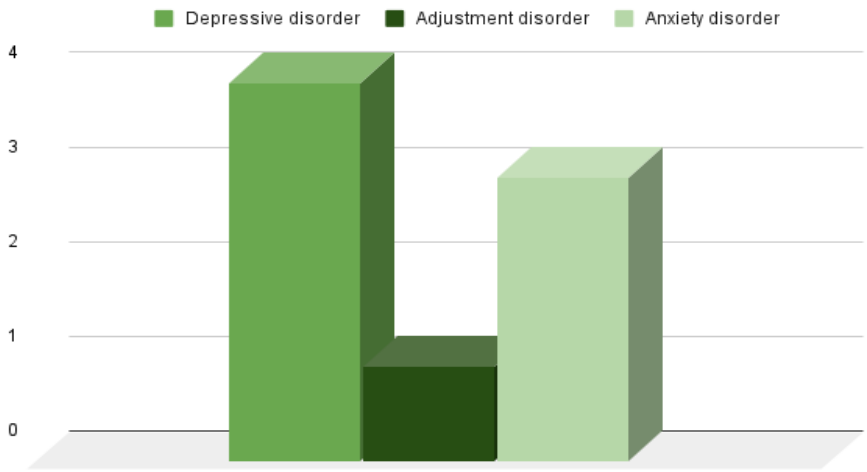

Figure 2: History of psychiatric illness.

1.8 Referral status and prior treatment given

According to the data, 54.5% of individuals were referred, while 45.5% were not. This indicates a slightly higher prevalence of referrals within the sample, with more than half of the individuals receiving a referral.

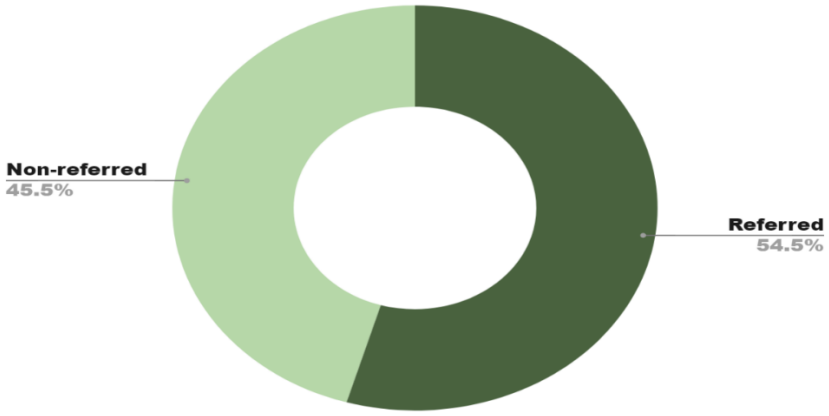

Figure 2: History of psychiatric illness

1.9 Prior treatment received by the patients

Table 6 shows data on prior treatment received in referral cases, distinguishing between survivors and non-survivors. Among the survivors, 33 individuals received gastric lavage, 1 received Anti-Snake Venom (ASV), 5 were treated with atropine, and 2 received pralidoxime. Hemodialysis was not administered to any of the survivors. In contrast, among

the non-survivors, 7 individuals received gastric lavage, while 2 underwent hemodialysis. No non-survivors received ASV, atropine, or pralidoxime. This data highlights the variation in treatment approaches between survivors and non-survivors.

Table 6: Prior treatment received by the patients.

Prior treatment received in referral cases	Gastric lavage	ASV	Atropine	Pralidoxime	Hemodialysis
Survivors	33	1	5	2	-
Non- Survivors	7	-	-	-	2

1.10: Association between Referral status and treatment outcome

Table 7 shows the patients in the non-referral group had significantly higher survival rate compared to referral group, indicating a better chance of survival for those not referred. Treatment outcome has association between referral status of the patient admitted to the hospital with $\chi 2 = 4.62$, p value=0.0316.

Table 7: Association between Referral status and treatment outcome.

	Survivors	Non-survivors	Total	p-value
Referral group	42	12	54	0.0316*
Non-referral group	42	3	45	
Total	84	15	99	

The p value was calculated by using the Pearson chi-square test, *there is an association between referral status of the patient admitted to the hospital.

5.11 Supportive treatment

Table 8 outlines the symptomatic treatments administered to patients, detailing their frequency and indications. Antimicrobials were the most frequently administered treatment, provided in 100% of cases to address infections. Proton Pump Inhibitors (PPIs) followed closely, used in 97.97% of cases for gastroprotective purposes. Antiemetics and intravenous fluids were also commonly utilized, administered in 84.84% and 79.7% of cases, respectively, to manage vomiting and ensure volume replacement. Other treatments included bronchodilators for breathlessness (30.30%), corticosteroids for airway inflammation (28.28%), and hepatoprotectives for liver damage (29.29%). Analgesics were provided in 15.15% of cases for pain management, while intravenous thiamine was used in 40.40% of cases, primarily for alcohol-related issues. Less frequently administered treatments included inotropic support (13.13%) for refractory hypotension and anticonvulsants (7.07%) for seizures. Additionally, interventions such as vitamin K injections and antioxidants were used

in 31.31% and 27.27% of cases, respectively, to counteract coagulopathy and manage oxidative stress. Other treatments, including statins and antiplatelets, were provided in 3.03% of cases each for ischemic heart disease, with minimal use of tetanus toxoid and antipyretics. This distribution reflects the diverse symptomatic management strategies employed to address various clinical conditions in the patient population.

Table 8: Symptomatic treatment provided.

TRATMENT	CASES	PERCENTAGE	INDICATION
Antimicrobials	99	100.%	Infection
PPI	97	97.97 %	Gastroprotective
Antiemetics	84	84.84%	Vomiting
Bronchodilator	30	30.30%	Breathlessness
Corticosteroids	28	28.28%	Airway inflammation
Analgesics	15	15.15%	Pain
Hepatoprotectives	29	29.29%	Liver damage
IV fluids	79	79.7%	Volume replacement
Antacid	15	15.15%	Ulceration
IV Thiamine	40	40.40%	Alcohol
Inotropic support	13	13.13%	Refractory hypotension
Anticonvulsant	7	7.07%	Seizure
Inj.Vit K	31	31.31%	Counteract coagulopathy
Antioxidant	27	27.27%	Metabolic or oxidative stress
Oxygen inhalation	17	17.1%	Respiratory depression
Statins	3	3.03%	k/c/o IHD
Antiplatelets	3	3.03%	k/c/o IHD
Tetanus toxoid	1	1.01%	Infection
Antipyretic	3	3.03%	Fever

1.12: Antimicrobials prescribed for acute poisoning

In cases of poisoning, antibiotic usage is often carefully selected based on the specific needs of the patient. The figure illustrates the distribution of antibiotics used in such scenarios, with Penicillin being the most commonly administered at 49.5%, followed by Cephalosporins at 33.3%, and Meropenem at 17.2%.

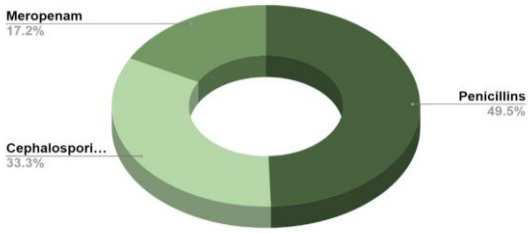

Figure 4: Antimicrobials prescribed for acute poisoning.

1.13 Antidote usage

The result on antidote usage in poisoning cases reveals that a significant majority of cases, 72.7%, did not require the administration of any antidote. Among the cases where antidotes were used, the combination of Atropine and Pralidoxime was the most common, accounting for 18.2% of the cases.

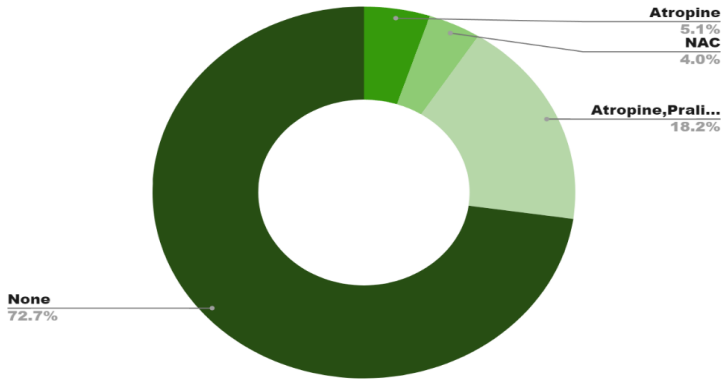

Figure 5: Frequency of antidote usage.

5.14 Enhancement elimination method used

The findings regarding enhancement elimination techniques in poisoning situations indicate that most patients, 73.73%, did not receive any particular enhancement elimination treatment. Gastric lavage was the most frequently utilized technique, implemented in 23.23% of instances, highlighting its significance in addressing specific varieties of poisoning. Hemodialysis was used in 2.02% of instances, probably reserved for more critical situations or particular toxic agents. Activated charcoal, recognized for its capability to absorb toxins in the digestive system, was utilized in only 1.01% of instances.

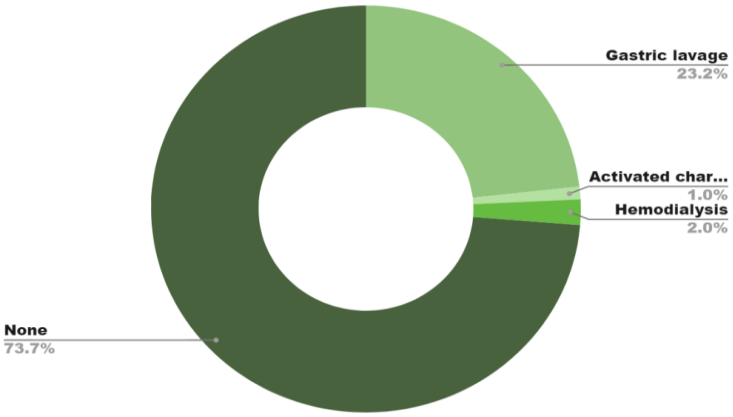

Figure 6: Enhancement elimination methods used.

5.15 Incidence of signs and symptoms

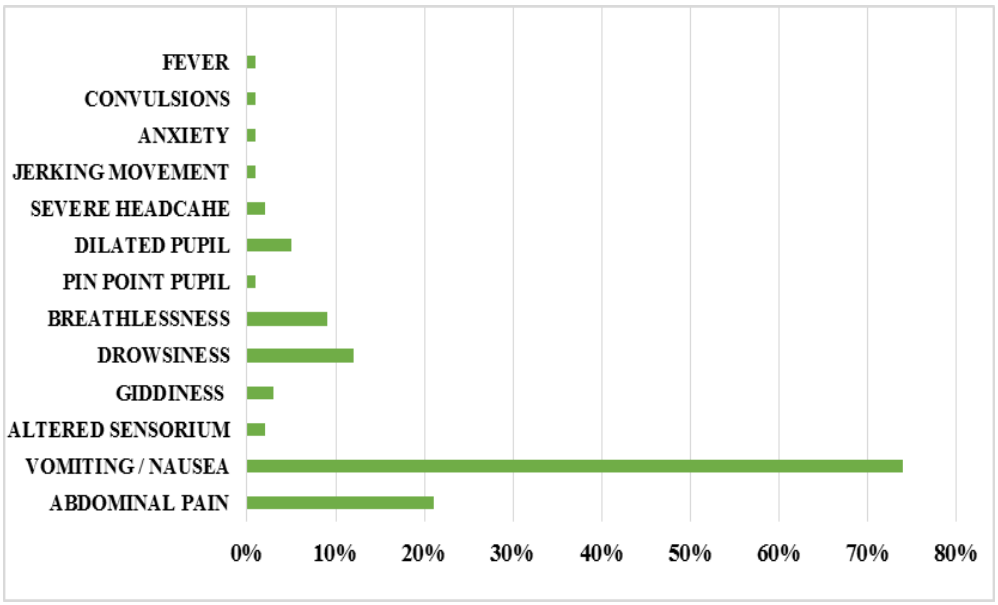

Figure 7: Incidence of Signs and Symptoms.

In this study the commonest symptom noted was nausea/ vomiting which occurred in 73 (74%) out of 99 patients of poisoning. This was followed by abdominal pain which was seen in 21 (21%) patients. The least occurring symptom noted was jerking movement, anxiety, convulsion and fever (1%) respectively.

5.16 Complications developed with time of admission

The data presented in Table illustrates the incidence of various complications in poisoning cases based on the time of admission. Complications such as acute kidney injury, acute liver damage, aspiration pneumonia, hepatic failure, and cardiac complications were assessed across patients with early admission, moderate delay admission, and severe delay admission.

Table 9: complications developed with time of admission.

Complications	All Patients	Early Admission (0-6hrs)	Moderate Delay Admission (7-10hrs)	Severe Delay Admission (>10hrs)
ACUTE KIDNEY INJURY	20	03	05	11
ACUTE LIVER DAMAGE	20	03	07	10
ASPIRATION PNEUMONIA	08	01	02	05
HEPATIC FAILURE	05	01	01	03
CARDIAC COMPLICATION	04	01	02	01

5.17 Comparing mortality in early v/s delayed admissions

The examination of admission timing in poisoning incidents shows a significant relationship between the duration until hospital admission and patient results. Among patients admitted during the initial 0-6 hours, 97.9% were alive, resulting in a mortality rate of just 2.1%. For individuals experiencing a moderate delay in admission (6-10 hours), the survival rate decreased to 81.0%, resulting in a mortality rate of 19.0%. The greatest effect was observed in instances with a severe delay in admission (over 10 hours), where the survival rate dropped to 67.7%, and the mortality rate rose to 32.3%. The P value of 0.001168 (chi2 =13.5056) signifies a statistically significant connection between the timing of admission and survival outcomes, underscoring the essential requirement for prompt medical intervention in poisoning incidents.

Table 10: Comparison of mortality in early v/s delayed admissions.

Time of admission	All patients	Survivors	Non-survivors	P value
Early admission (0-6hrs)	47	46	01	**0.001168***
Moderate delay admission (6-10hrs)	21	17	04	
Severe delay Admission (>10hrs)	31	21	10	

The p value was calculated by using the Pearson chi-square test,* there is association between incidence mortality in poisoning cases based on the time of admission.

1.18 Severity poisoning

1.18a Glasgow coma scale

The results indicate that among the 99 patients assessed, those with a Glasgow Coma Scale score of mild severity (≥13) had the highest number of recoveries (42), while those with moderate severity (9-12) had a lower recovery rate (31) and a notable incidence of death (3). Severe cases (≤8) had minimal recoveries (2) and a significant mortality rate (12).

Table 11: Severity of Poisoning based on Glasgow Coma Scale.

Severity scale		Outcome group			
		Recovered	DAMA	Recommended to higher hospital	Death
Glasgow coma Scale (n = 99 patients)	Mild ≥ 13	42	3	-	-
	Moderate 9 - 12	31	7	-	3
	Severe ≤ 8	2	-	1	12

1.18 Poison Severity Scale

Patients with minor severity had the highest recovery rate (37), while those with moderate severity had fewer recoveries (35) and a notable mortality rate (3). Patients classified as severe had minimal recoveries (1) and a high mortality rate (12). Overall, the severity of both Glasgow Coma Scale and Poison Severity Scale scores correlates with the likelihood of recovery and mortality.

Table 12: Severity of Poisoning based on Poison Severity Scale.

Severity scale		Outcome group			
		Recovered	DAMA	Recommended to higher hospital	Death
Poison Severity Scale (n = 99 patients)	Minor	37	1	-	-
	Moderate	35	5	-	3
	Severe	1	-	1	12

5.18c APACHE II Scale

The provided data consists of the ages, genders, and APACHE II scores of 15 patients. These patients, predominantly male, have APACHE II scores ranging from 20 to 29, with a mean score of approximately 23.4. This suggests that, on average, the severity of illness among these patients falls within the moderate to moderately severe range.

Table 13: Severity of Poisoning based on APACHE II.

Age (in years)	Gender	APACHE II score (n=15)
53	Male	28
41	Male	26
19	Female	21
23	Male	22
55	Female	27
41	Male	21
25	Male	29
79	Male	26
25	Male	21
56	Male	26
61	Male	22
31	Female	20
49	Male	20
57	Female	21
34	Male	21

5.18 d: Correlation between severity scoring and treatment outcome

The severity of illness (score/grade/level) was determined and categorized as per the indicators of GCS, PSS and APACHE 2 scoring systems (Table 13). There was a significant

(p<0.00001) association between the clinical outcome and scores of GCS, PSS and APACHE 2.

The unpaired t-test coefficient between GCS Score and clinical outcome was determined to be 8.90 with p-value < 00001.This indicates positive correlation between GCS score and clinical outcome i.e., higher score had positive clinical outcome while lower score had poor clinical outcome.

The unpaired t-test coefficient between PSS Score and clinical outcome was determined to be -8.44 with p-value <.00001. This indicates positive correlation between PSS score and clinical outcome i.e., higher score had poor clinical outcome.

The unpaired t-test coefficient between APACHE 2 score and clinical outcome was determined to be -6.02 with p-value <.00001. This indicates positive correlation between APACHE 2 score and clinical outcome i.e., higher score had poor clinical outcome.

Table 14: Correlation between different severity scale and Treatment outcome.

	Mean score among all survivors	Mean score among all non-survivors	T- statistics	P- value
Glasgow Coma Scale	12.44	7.06	8.90	**<.00001***
Poison Severity Scale	1.54	2.8	-8.44	**<.00001***
APACHE 2 score	8.66	22.44	-6.02	**<.00001***

The p value was calculated using unpaired t-test, *there is an association between severity scoring and treatment outcome.

5.19 Treatment outcome

The therapeutic outcomes for poisoning cases reveal that 75.8% of patients fully recovered after treatment. A smaller portion, 8.0%, left the hospital against medical advice (DAMA), indicating that these patients opted to discontinue care before completing their treatment. Only 1.0% of cases required referral to a higher center for more advanced care. The mortality rate was 15.2%, showing that despite medical efforts, a significant minority of cases resulted in death. These findings highlight the overall effectiveness of treatment while also pointing to the challenges in managing more severe poisoning cases.

Table 15: Details of treatment outcome in acute poisoning patients.

Therapeutic outcome	Number of patients	Frequency(%)
Recovered	75	75.8
DAMA	8	8
Recommended for higher center	1	1.0
Death	15	15.2
Total	99	100.0

DISCUSSION

The study on poisoning admissions provides valuable insights into the demographics, types of poisoning, and associated factors among the study population. Key findings include that male predominance was observed, with 62.6% of cases compared to 37.4% of females, suggesting that males are more susceptible to poisoning due to higher levels of stress and occupational risks, similar pattern is reported by Ramanath et al. The predominant age group affected was between 19-60 years, indicating that adults are more prone to poisoning due to increased levels of stress on an individual with exposure to different social, economical, and occupational pressure which is similar to study by Nigussie et al.

Intentional poisoning was the most common type, accounting for 94.9% of cases, with agricultural pesticides (48.5%), household products (32.3%), and drugs being the primary agents involved which is similar to study by Getie et al, and contrary to another study by Maheswari E et al, Organophosphates were the most commonly used pesticide for self-harm due to their low cost and easy availability. Household products were the second most common reason for intentional poisoning and also the primary reason for unintentional poisoning, highlighting the importance of public awareness campaigns and regulatory measures to mitigate such risks.

The study identified a concerning association between level of consciousness and treatment outcomes, with unconscious patients having a significantly higher mortality rate compared to conscious patients. Delayed admission to the hospital was associated with higher mortality rates and more complications, emphasizing the urgent need for prompt medical intervention and similar pattern observed by a study conducted by Maheshwari et al. The mortality rate was 15.2%, with paraquat poisoning having a higher mortality rate compared to organophosphates and rodenticides which is contrary to the Ramesha et al. This study identified another correlation between length of stay and mortality rate. Specifically, patient who stayed less than 3 days had a higher mortality rate compared to those who stayed for

more than 3 days. The reported death rate of 15.2%, it is due to late admission to hospital after suicidal attempt. Attention should be paid to the very high percentage of discharges against medical recommendation (8.1%), which is mostly attributable to financial constraints. Additionally, the recommendation of one patient (1.0%) for transfer to a higher center suggests the need for specialized care beyond the scope of the current facility similar pattern observed by a study conducted by Maheshwari et al.

In this study we have found association between referral status and treatment outcome, i.e. patients were referred from other hospital who had received primary treatment before admission to our hospital found to have poor chance of survival compare to non-referral group. This could be due to several reason, one of them might be due to insufficient treatment, most referral cases who had poor outcome had received only gastric lavage, this alone might be inadequate to treat severe poisoning cases. Other causes may increase the time-lapse to initiate the proper treatment due to transfer time, leading to poor treatment outcome. Also, referral cases might involve more severe poisoning cases, making survival less likely.

Supportive treatment was the mainstay of management, including antimicrobials, gastroprotective agents, antiemetics, and intravenous fluids. Antimicrobials are used in in all patients and most commonly used are penicillin, metronidazole followed by cephalosporin. Gastroprotective agents were administered in nearly all cases (99.97%), emphasizing the importance of gastric mucosal protection to prevent or minimize gastrointestinal complications such as ulceration, bleeding, or perforation, which may occur following ingestion of corrosive substances or due to the erosive effects of certain toxins on the gastric mucosa. The high utilization of antiemetics (79.7%) and intravenous fluids (79.7%) reflects the common symptoms of nausea, vomiting, and dehydration frequently encountered in poisoning cases. Bronchodilators (30.3%) and corticosteroids (28.2%) were administered in a subset of cases, indicating the recognition of respiratory symptoms such as bronchospasm or inflammation in certain poisoning incidents. Anticonvulsants were given to ones with K/C/O seizure and Statins and Antiplatelets are given to patients with K/C/O of cardiac disease. The utilization of analgesics (15.1%) reflects the management of pain symptoms associated with poisoning incidents, inotropic support (13.1%) and Anti-HTN (may be required in cases of severe cardiovascular compromise or hemodynamic instability secondary to poisoning-induced shock or cardiotoxic effects of certain toxins. Hepatoprotective agents (29.2%) are

administered to mitigate liver injury and support hepatic function in cases of hepatotoxic poisoning, while intravenous thiamine (40.4%) and antioxidants (27.3%) may be employed to address specific metabolic or oxidative stress-related complications. The administration of injectable vitamin K (31.3%) highlights the management of coagulopathy or bleeding diathesis secondary to poisoning incidents involving anticoagulant rodenticides. Tetanus toxoid vaccination may be administered as prophylaxis in snake bite to where there is a risk of tetanus infection due to contaminated wounds. Supportive treatment was similar to study by Raut et al and contrary to Asari et al. Antidotes were used in 27.3% of cases, including Atropine, pralidoxime, and NAC. Enhanced elimination techniques like gastric lavage (23.2%), activated charcoal (1%), and hemodialysis (2%) were used in specific cases. Lower usage of gastric lavage in this study due to late admission to the hospital which is similar to study by Getie et al, contrary to another study by Maheswari et al.

Early admission to the hospital was associated with a higher survival rate (47.4%), while moderate delay admission (2-10 hours) had a lower survival rate (21.2%). Severe delay admission (>10 hours) had the lowest survival rate (31.3%) and highest mortality rate (10 cases). Nausea and vomiting were the most prevalent symptoms (74%), followed by abdominal pain (21%). These findings are similar to the study conducted by Khoysa S et.*al*. This underscores the importance of recognizing and addressing gastrointestinal symptoms early in suspected cases of poisoning, as they can serve as key indicators of toxic exposure. Less frequent symptoms included jerking movements, anxiety, convulsions, and fever. While these symptoms may be less common, their presence should not be overlooked, as they could signal specific types of poisoning or indicate complications requiring prompt intervention.

The Glasgow coma scale (GCS), acute physiology and chronic health evaluation (APACHE II), and the Poisoning Severity Score (PSS) were used to assess the severity of poisoning. Patients with mild GCS scores (≥13) had a higher recovery rate, while those with severe GCS scores (≤8) had a lower recovery rate and higher mortality rate with only two patients recovering out of 99. Furthermore, a significant proportion of patients in this group (12 out of 99) succumbed to their condition. These results are consistent with the findings of Ramesh et. *al*, and highlight the critical nature of severe neurological impairment in poisoning cases and underscore the urgent need for intensive care and aggressive management strategies to improve patient outcomes.. Acute kidney injury (AKI) and acute liver damage were common

complications, affecting 20% and 19% of patients respectively. Aspiration pneumonia was observed in 8% of cases, highlighting respiratory risks associated with toxic exposures.

Using the poison severity scale, it was observed that a notable percentage of patients in this cohort (15 out of 99) faced mortality, demonstrating a high death rate. These outcomes highlight the essential importance of severe poison exposures and stress the immediate necessity for intensive care and assertive management approaches to enhance patient results in these situations. The results highlight the significance of evaluating poison severity in forecasting patient outcomes and informing clinical management choices. Prompt identification of poison intensity, along with swift intervention and suitable supportive care, is crucial for enhancing patient results and lowering morbidity and mortality linked to poisoning incidents

The study underscores the need for a multidisciplinary approach to manage patients with poisoning, considering the diverse range of complications that may arise. It emphasizes the importance of timely admission, supportive treatment, and targeted interventions addressing mental health and suicide prevention.

The prediction results concerning severity through scoring systems (GCS, PSS, APACHE 2) and their correlation with clinical outcomes aligned with Churi S et al; findings demonstrate outstanding sensitivity and efficacy of scoring as methods for assessing severity in cases of poisoning by pesticides, medications, and household items. The lack of laboratory techniques in hospitals highlights the significance of scoring systems for forecasting severity and mortality rates. The patient's level of consciousness can be evaluated using GCS. Due to its simpler parameters, GCS can be implemented more readily in hospitals. PSS assesses the intensity of the disease following the acute poisoning. The APACHE prognostic scoring system uses fundamental physiological concepts to categorize acutely ill adult patients according to the severity of their condition. It is made up of three components: twelve critical physiologic variables, age, and long-term health condition. The APACHE II score is calculated by summing points from these three areas, yielding an overall score that ranges from 0 to 71 points. The precision of scoring systems significantly differs based on the type of poison ingested. This highlights the need for employing various scoring systems to assess the severity.

MERITS OF THE STUDY

- With a sample size of 99 patients and a prospective observational design, the study offers reliable and generalizable findings on poisoning patterns and outcomes.
- The study provides valuable demographic insights, highlighting a male predominance and identifying the 19-60 age group as the most affected. These findings help in understanding the population groups that are more susceptible to poisoning, which can inform targeted prevention and intervention strategies.
- By identifying agricultural pesticides, household products, and drugs as the primary agents involved in poisoning, the study sheds light on the most common sources of poisoning. This information is critical for developing public health initiatives and regulatory measures aimed at reducing the availability and misuse of these substances.
- Detailed insights into current treatment practices, including the use of antimicrobials, gastroprotective agents, antiemetics, and intravenous fluids, can help refine treatment protocols and improve patient outcomes.
- The use of the Glasgow Coma Scale (GCS), Acute Physiology and Chronic Health Evaluation (APACHE II), and Poisoning Severity Score (PSS) to assess poisoning severity offers a clear correlation between these scores and patient outcomes. This correlation underscores the importance of early severity assessment in guiding clinical management and improving survival rates.
- The study highlights the crucial importance of timely hospital admissions in reducing mortality and complications, advocating for public awareness campaigns and healthcare policies that promote prompt medical intervention in poisoning cases.
- The high prevalence of intentional poisoning highlights the need for targeted mental health interventions and suicide prevention strategies.
- The study's findings can inform public health policies and preventive measures, such as public awareness campaigns and stricter regulations on the availability of common poisons. These measures can help reduce the incidence of poisoning and improve community health.

LIMITATIONS OF THE STUDY

- The study is based on a sample size of 99 patients, which may not be representative of the larger population. The relatively small sample size may limit the generalizability of the findings to other regions or populations.

- The data were collected from a single tertiary care hospital in Dakshina Kannada, which may introduce a location bias. The results may not be applicable to other hospitals with different patient demographics, healthcare facilities, or regional practices.
- As a prospective observational study, the research may be subject to observational bias. The lack of randomization and control groups makes it difficult to establish causal relationships between interventions and outcomes.
- Treatment approaches may vary based on the attending physician's discretion, hospital protocols, or availability of resources. This variation can introduce heterogeneity in treatment outcomes, making it difficult to standardize findings across different cases.
- The study mentions financial constraints and mental health interventions, but it may not fully explore the underlying socioeconomic and psychological factors influencing intentional poisoning cases. These factors are critical for understanding the context of poisoning incidents but may be underrepresented in the analysis.

FUTURE PROSPECTIVES OF THE STUDY

- Comparative research on different treatment protocols can identify the most effective approaches for managing various types of poisoning. This could include comparing the efficacy of different antimicrobials, gastroprotective agents, antiemetics, and intravenous fluids.
- Developing and evaluating targeted prevention and intervention strategies based on the demographic insights, particularly for the most affected age groups and those at higher risk of intentional poisoning. This can include mental health support, community education, and suicide prevention programs.
- Designing and assessing public health initiatives aimed at reducing the availability and misuse of common poisoning agents like agricultural pesticides, household products, and drugs. This could involve stricter regulations, safe storage practices, and public awareness campaigns.
- Using the study’s findings to advocate for policy changes at the governmental level. This might include stricter control measures on the sale of toxic substances, improved labeling and packaging, and enhanced training for healthcare professionals in early detection and management of poisoning cases.
- Special attention to vulnerable populations, including children and the elderly, who may have different poisoning patterns and treatment needs. Tailored prevention and intervention measures for these groups can significantly reduce morbidity and mortality

rates.

- Conducting in-depth research into the psychological aspects of intentional poisoning cases. Understanding the underlying causes and providing appropriate mental health support can prevent such incidents and improve overall community health.
- Partnering with agricultural and household product industries to develop safer alternatives to toxic substances and improve labeling and packaging standards. This can reduce the incidence of accidental poisonings and enhance public safety.

CONCLUSION

This research has underscored the concerning increase in poisoning incidents, especially attributed to the readily available agrochemicals in areas where agriculture is central to the economy. In India, a large segment of the population is uneducated and financially struggling, making the abuse of these hazardous materials a serious public health issue. Our analysis of determinants revealed that elements like age, gender, socio-economic status, and living in rural or urban areas significantly affect both the probability of poisoning and the resulting treatment outcomes. The severity of poisoning varied widely, especially in cases involving agrochemicals, where delayed treatment, lack of awareness, and inadequate first-aid measures often led to severe consequences. Notably, the time elapsed since exposure emerged as a critical determinant, with earlier intervention strongly correlating with better outcomes.

Severity assessment scores employed to evaluate the seriousness of poisoned patients have shown effectiveness in determining the actual severity of the ailment. Nonetheless, depending exclusively on these severity scores is not optimal. Numerous doctors rely mainly on medical history, clinical indicators, and symptoms for diagnosing. Regrettably, symptoms may take time to appear, during which the toxicity might become irreversible or potentially deadly. Moreover, laboratory techniques are not consistently accessible in hospitals, and the absence of quantitative methods results in discrepancies in application. This emphasizes the need for standardized diagnostic protocols.

The supportive care and treatment provided in the hospital were generally robust, but the variability in care quality across different cases highlights the necessity for uniform treatment guidelines. Addressing this issue requires a multifaceted approach. The easy availability of agro-chemicals, often misused for suicide, calls for stringent regulations, including

mandatory prescriptions for their sale by registered physicians or chemists. Establishing Poison Information Centre and implementing standardized treatment protocols across hospitals are crucial steps in improving patient outcomes. Furthermore, mandating psychiatric assessments before discharging patients who have attempted suicide is essential in preventing recurrences.

Legislative measures, such as the enforcement of Sections 273-278, 284, 324, 326, and 328 of the Indian Penal Code, which deal with offenses related to drugs and poisons, must be rigorously enforced and complemented by public awareness campaigns. Educating agricultural workers on the dangers of agrochemicals, promoting the use of protective gear, and controlling the sale of these substances can significantly reduce accidental poisonings. Moreover, the involvement of NGOs and social organizations is crucial in fostering better interpersonal relationships within communities, addressing socio-cultural issues like the dowry system, and providing support to individuals at risk of poisoning.

In conclusion, the findings from this study underscore the urgent need for a comprehensive strategy to tackle poisoning-related morbidity and mortality. This strategy should involve not only administrative and healthcare reforms but also social and educational initiatives. Through collaborative efforts between the government, agricultural industries, healthcare providers, and social organizations, it is possible to mitigate the impact of poisoning and save lives. The path forward lies in balancing regulatory measures with community engagement and support, ensuring that the most vulnerable populations are protected and that the tragic consequences of poisoning are significantly reduced.

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