

A Prospective Observational Study on Patterns of Intentional Poisoning and Its Treatment in A Secondary Care Hospital

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Abstract:

Background: Poison is a substance that causes injury or illness or death, even when taken in a little quantity. Poisoning is a significant global public health problem ranking 45th in total deaths worldwide. Every year half a million people die due to poisoning. The main aim of the study is to assess the incidence and treatment patterns in intentional poisoning patients. **Materials and Methods:** A prospective observational study for six months duration was conducted at secondary care hospital on 196 cases of Intentional poisoning reported to emergency department from Dec 2021 to May 2022, regarding patient demographics, type of poisoning, and its treatment were collected and analyzed using Microsoft excel 2010.

Results: Of all reviewed cases the common poisoning agents ingested were Rodenticides (46.9%), Herbicides (30.6%), Organophosphates (14.7%), Pyrethroids (4.5%), Sanitizer (0.2%) and drug overdose (0.1%). Maximum poisoning was observed in the age group of 30-39 years with an increased incidence of male predominance. Farmers (32.6), house wives (22.4%), students (19.8%) were prone to poisoning. Majority of the cases were from the patients belonging to medium economic status (48.9%) and illiterates (66.8%). Maximum patients (60.7%) responded to the given treatment. The mortality rate was 39.3% with male predominance.

Conclusion: Rodenticide poisoning is the most common pattern of poisoning. Poisoning rates are seen more among the farmers and the people with 30-39 years of age. Poison information centers could be set up along with first aid facilities and man power provisions at primary health care level.

Key Word: Intentional poisoning, Antidote, Glasgow coma scale, Drug overdose, secondary care hospital.

I. Introduction

A poison is a substance that, in a relatively small amount, has the potential to cause death, severe illness, or adverse effects when introduced into the body¹. As per the World Health Organization (WHO), poisoning arises when individuals consume, ingest, inhale, inject, or come into contact with a sufficient quantity of a dangerous substance (poison) that can lead to illness or fatality². Poisoning represents a medical emergency, and it is imperative to promptly transport the patient to the hospital, regardless of the quantity or type of poison ingested³. The patterns of poisoning observed in a specific region are influenced by several factors such as the availability of toxic substances, the socio-economic status of the population, cultural and religious influences, and the predominant occupations in that area⁴. According to conservative estimates by the World Health Organization (WHO), developing countries, despite accounting for only 15% of global pesticide usage, experience approximately 50% of pesticide poisoning cases. This is primarily attributed to the misuse of chemicals in these countries⁵. Intentional poisoning poses a significant burden on healthcare systems worldwide. According to the World Health Organization (WHO), intentional self-harm is among the leading causes of death globally, with suicide accounting for approximately 800,000 deaths each year⁶. Studies conducted in different regions have reported variations in the choice of toxic substances used for self-poisoning, with variations in drug availability, accessibility, and cultural factors influencing these choices^{7,8}. Poisons are categorized based on their mechanisms of action, which include corrosives (such as acids and alkalis), irritants (such as arsenic), neurotoxins (including opioids and alcohol), cardiac poisons (like digitalis), asphyxiants (such as carbon monoxide), and miscellaneous substances (including pesticides and analgesics⁹).

Intentional poisoning refers to the deliberate ingestion, injection, or exposure to toxic substances with the intent to harm one or others. The clinical presentations can vary depending on the specific toxic agent involved. Symptoms may include altered mental status, drowsiness, confusion, slurred speech, respiratory depression, cardiac arrhythmias, and seizures¹⁰.

Carbon monoxide poisoning: Clinical features include headache, dizziness, confusion, nausea, vomiting, weakness, and eventually loss of consciousness. Carbon monoxide exposure often occurs due to inhalation of exhaust fumes from faulty heating systems, car exhaust, or fires in enclosed spaces¹¹. Poisonous plant or mushroom ingestion: Symptoms can range from mild gastrointestinal upset to severe organ dysfunction, depending on the specific plant or mushroom ingested. Symptoms may include nausea, vomiting, abdominal pain, diarrhea, hallucinations, seizures, liver damage, and renal failure¹². Exposure to pesticides or insecticides: Clinical presentations can vary depending on the specific chemical involved. Symptoms may include respiratory distress, chest pain, gastrointestinal symptoms, headache, dizziness, confusion, seizures, and skin rashes¹³.

General supportive care: Establishing and maintaining a clear airway to ensure proper breathing. Administering supplemental oxygen to support respiratory function if necessary. Providing intravenous fluids to maintain hydration and correct electrolyte imbalances. Monitoring and supporting vital signs, including heart rate, blood pressure, and oxygen saturation¹⁴.

Decontamination: Removing contaminated clothing and washing exposed skin with soap and water. Activated charcoal administration in certain cases to help prevent absorption of the toxic substance from the gastrointestinal tract. Flushing the eyes with clean water or saline if they are exposed to a toxic substance¹⁵.

Specific Antidotes: Antidotes may be available for certain types of poisoning, such as naloxone for opioid overdose or N-acetylcysteine for acetaminophen overdose. These antidotes work by counteracting the effects of the specific toxic substance¹⁶.

Monitoring and Treatment of Complications: Continuous monitoring of vital signs and symptoms. Treatment of complications that may arise, such as respiratory distress, seizures, or organ dysfunction. Administration of appropriate medications to manage symptoms¹⁷.

Poison Control Center Consultation: Contacting a poison control center or healthcare professional for expert advice and guidance regarding the specific poisoning case^{18, 19}.

II. Material and Methods

This prospective observational study was carried out on patients of Department of General Medicine at St. Joseph's General Hospital, Guntur from December 2021 to May 2022. A total 196 subjects (both male and females) of aged

≥ 9, years were for in this study.

Study Design: Prospective observational study

Study Location: This was a secondary care teaching hospital based study done in Department of General Medicine, Medicine at St. Joseph's General Hospital, Guntur.

Study Duration: December 2021 to May 2022.

Sample size: 196 patients.

Inclusion criteria:

1. Either sex
2. Aged ≥ 9 years.
3. Patients admitted to the hospital with intentional poisoning.

Exclusion criteria:

1. Aged <9 years.
2. Patients admitted with accidental poisoning.
3. Food poisoning, near drowning and drug reaction cases was excluded.

Procedure methodology:

After written informed consent was obtained, a well-designed questionnaire was used to collect the data of the patients prospectively. The data collected for the patients' demographics and socio-economic information encompassed their name, age, sex, domicile, educational status, and occupation. Additionally, the questionnaire included details such as the type of poisoning, route of administration, reasons for the poisoning, and the time elapsed after the incident. Furthermore, the questionnaire covered the drug name, GCS score and PSIS score.

Statistical analysis:

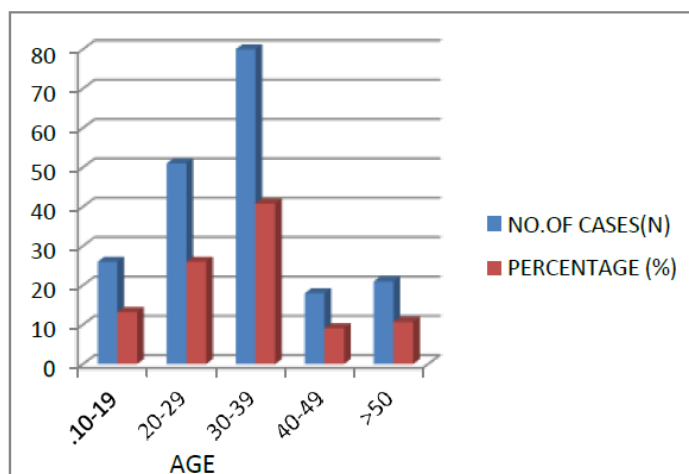
The data collected was analyzed using descriptive statistical analysis. Chi-square/ Fisher test was used to find the significance of study parameters on categorical scale between two or more groups. Results on continuous measurements were presented on mean ± SD (Min-Max) and number (%).for categorical variables.

III. Result

Out of 196 patients of intentional poisoning, majority are found in between the age of 30-39 years and least number in between 40-49 years of age (**Table no 1**).

Table no 1: Frequency distribution of age in the studied patients.

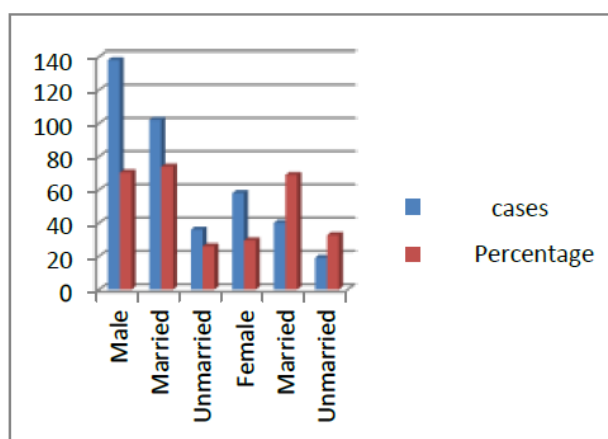
AGE (in years)	NO.OF CASES(N)	PERCENTAGE (%)
10-19	26	13.2
20-29	51	26.0
30-39	80	40.8
40-49	18	9.1
>50	21	10.7



Higher poisoning rate was found among males than females. Information collected based on the marital Status, majority of the cases were noted in married group with slight male predominance (**Table no 2**).

Table no 2: Frequency distribution of gender and marital status in patients.

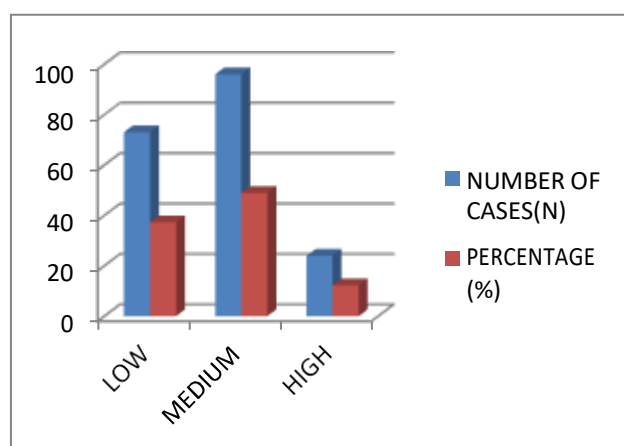
Gender and marital status	cases	Percentage
Male	138	70.4
Married	102	73.9
Unmarried	36	26.0
Female	58	29.5
Married	40	68.9
Unmarried	19	32.7



Economically, majority of the cases were noted from patients belonging to medium economic background followed by lower and higher economic backgrounds (**Table no.3**).

Table no 3: Frequency distribution of economic status in the studied patients

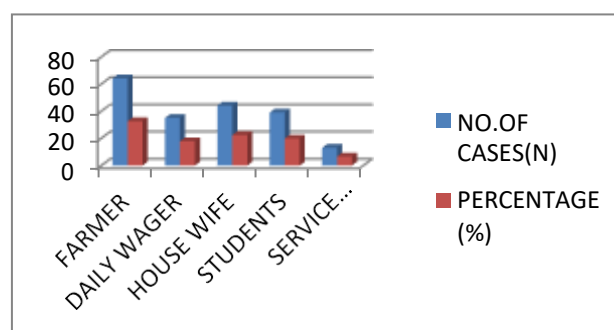
ECONOMIC STATUS	NUMBER OF CASES(N)	PERCENTAGE (%)
LOW	73	37.2
MEDIUM	96	48.9
HIGH	24	12.2



Farmers were highly exposed. Students and house wives were found in high risk of intentional poisoning (**Table no 4**).

Table no 4: Frequency distribution of occupation status in the studied patients.

OCCUPATION	NO.OF CASES(N)	PERCENTAGE (%)
FARMER	64	32.6
DAILY WAGER	35	17.8
HOUSE WIFE	44	22.4
STUDENTS	39	19.8
SERVICE HOLDER	13	6.6

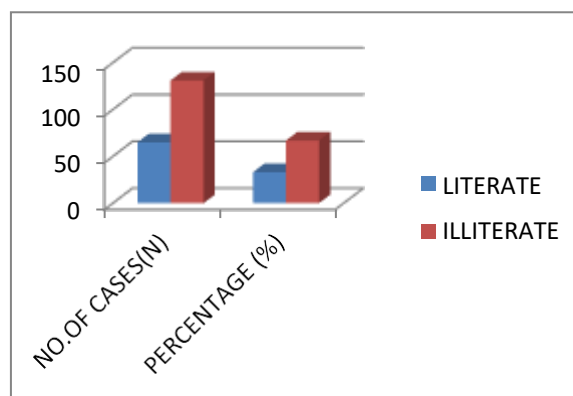


The following are the details regarding distribution of patients based on literacy rate (table no 5).

Table no 5: Frequency distribution of literacy status in the studied patients.

LITERACY	NO.OF CASES(N)	PERCENTAGE (%)
LITERATE	65	33.1

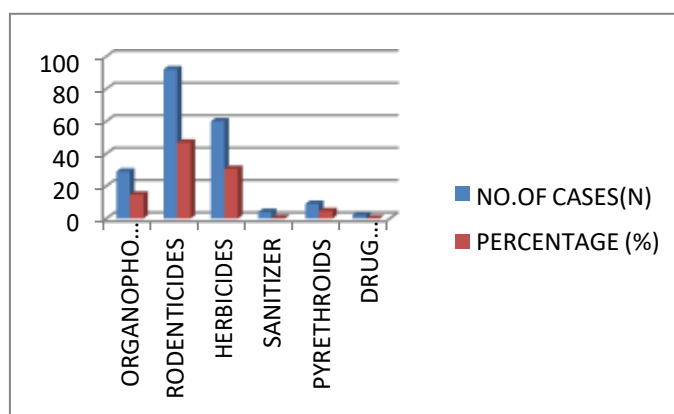
ILLITERATE	131	66.8
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The type of poisoning to which the patients were exposed was assessed. Household and agricultural agents were associated with most intentional poisonings. The most common poisonings reported were rodenticides and herbicides (table no 6).

Table no 6: Patterns of poisoning

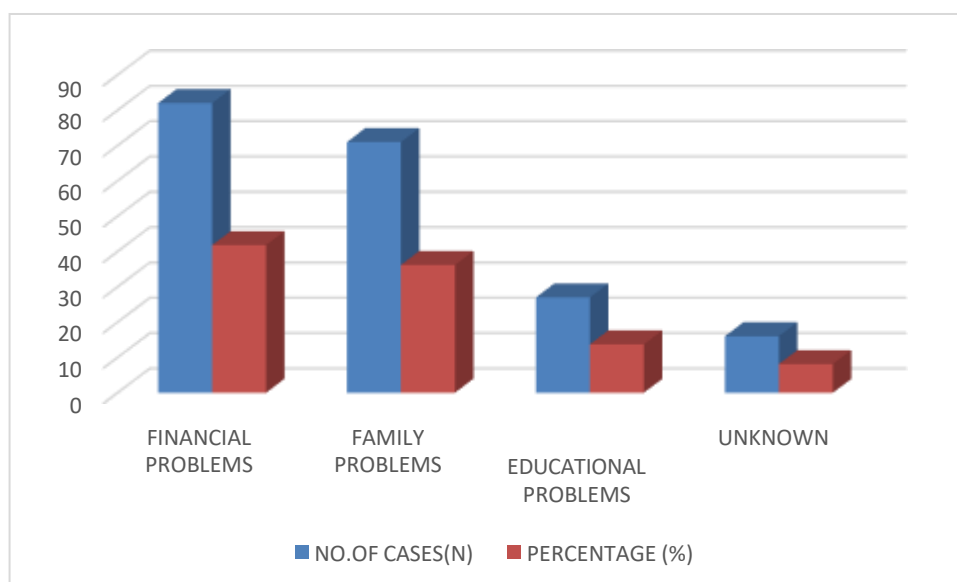
TYPE OF POISONING	NO.OF CASES(N)	PERCENTAGE (%)
ORGANOPHOSPAHTES	29	14.7
RODENTICIDES	92	46.9
HERBICIDES	60	30.6
SANITIZER	4	0.2
PYRETHROIDS	9	4.5
DRUG OVERDOSE	2	0.1



The patients were asked about the reason for poisonings for further psychiatric evaluation. Financial and family problems were more among all the patients (Table no 7).

Table no 7: Reason for poisoning

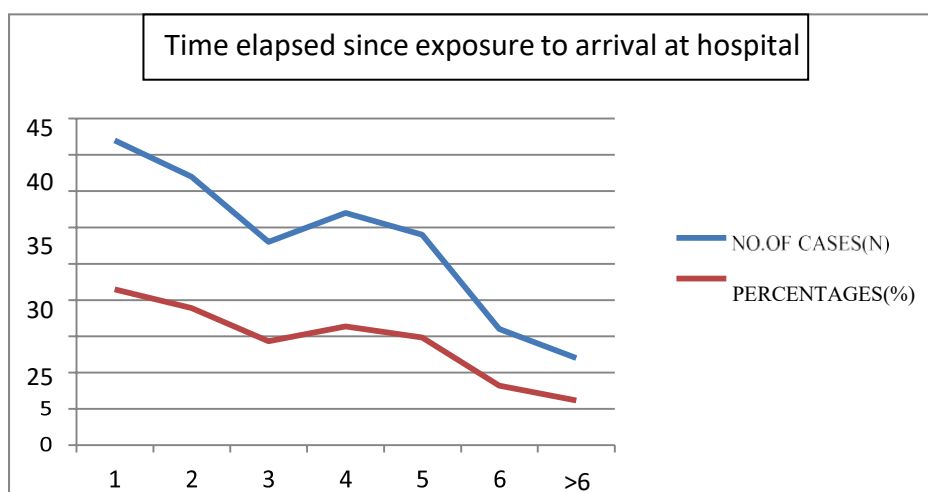
REASON	NO.OF CASES(N)	PERCENTAGE (%)
FINANCIAL PROBLEMS	82	41.8
FAMILY PROBLEMS	71	36.2
EDUCATIONAL PROBLEMS	27	13.7
UNKNOWN	16	8.1



Using the time elapsed since the exposure and arrival at the hospital; majorities were admitted in between 1-4hours (table no 8).

Table no 8: Time elapsed since exposure to arrival at hospital

TIME ELAPSED(WITHINHRS)	NO.OF CASES(N)	PERCENTAGE (%)
1	42	21.4
2	37	18.8
3	28	14.2
4	32	16.3
5	29	14.7
6	16	8.1
>6	12	6.1



The blood pressure of the patients post presenting to the hospital are normotensive (51%), hypotensive (32.1%), hypertensive (16.8%) (Table no 9).

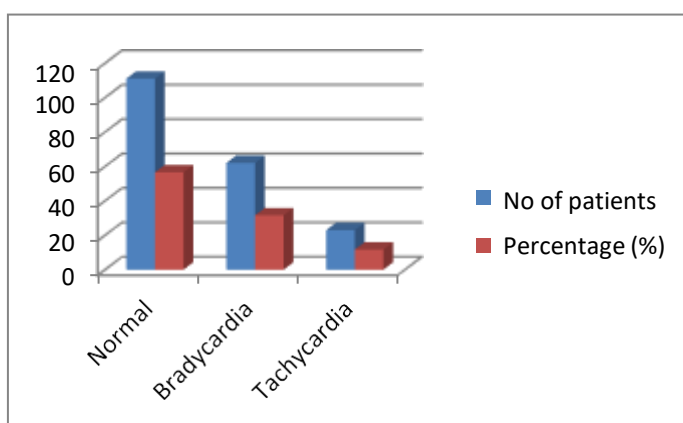
Table no 9: Distribution of patients based on blood pressure

Blood Pressure	No of Patients	Percentage (%)
Normotensive	100	51
Hypotensive	63	32.1
Hypertensive	33	16.8

The following table shows distribution of patients based on Pulse rate (Table no10).

Table no10: Distribution of patients based on pulse rate

Pulse rate	No of patients	Percentage (%)
Normal	111	56.6
Bradycardia	62	31.6
Tachycardia	23	11.7



The following table shows respiratory rate of the patients (Table no 11).

Table no 11: Distribution of patients based on respiratory rate

Respiratory rate	No of patients	Percentage (%)
Normal	120	61.2
Bradypnea	44	22.4
Tachypnea	32	15.3

The following table shows body temperature of the patients (Table no 12).

Table no 12: Distribution of patients based on temperature

Temperature	No of patients	Percentage (%)
Normal	138	70.4
Hypothermia	32	16.3
Hyperthermia	26	13.2

Pierce 's suicide intent scale scoring was also taken to know the psychiatric condition and suicidal ideation in future. Of which 102 members were at low risk with a score of 0-10, 53 members were at medium risk with a score of 11-20, 41 were at high risk with a score of 21-30 .

Poisoning post presenting to medical center included individuals with impaired consciousness (1.02%) GCS < 8, mild toxicity (79.5%) GCS > 13, moderate toxicity (19.3%) (Table no 14).

Table no 14: Assessment of patients based on GCS scale

Severity of toxicity	GCS	Number of Patients	Percentage (%)
Mild	>13	156	79.5
Moderate	12-9	38	19.3
Severe	< 8	2	1.02

The treatment methods for the patients included stabilization (100%), evaluation (82.6%), decontamination (100%), elimination (2.55%), antidote administration (97.4%), nursing and psychiatric care (100%).

Table no 15: Management methods for poisoning patients

METHOD	NO.OF CASES	Percentage (%)
STABILIZATION	196	100
EVALUATION	162	82.6
DECONTAMINATION	196	100
ELIMINATION	5	2.55
ANTIDOTE ADMINISTRATION	191	97.4
NURSING AND PSYCHIATRIC CARE	196	100

Symptomatic treatment was provided to all the patients using antimicrobials, gastro protective agents, oxygen, antipsychotics, vitamin supplements and corticosteroids (table no 16).

Table no 16: Distribution of patients based on treatment

METHOD	NO. OF CASES	PERCENTAGE (%)
ANTIDOTE		
Atropine	28	14.285
N-acetylcystine	69	35.204
INJ.cyclophosphamide	61	31.122
flumazenil	1	0.510
DECONTAMINATION		
Gastric lavage	195	99.489
Nasogastric Aspiration	85	43.367
Haemodialysis	5	2.551
SYMPTOMATIC		
Anti-Microbials	122	62.244
Gastro protective	196	100
oxygen	24	12.244
Antipsychotics	42	21.428
Vitamin supplements	196	100
Corticosteroids	46	23.469

IV. Discussion

We have conducted this study to assess the incidence and treatment patterns in intentional poisoning patients. The study was planned and carried out from December 2021 to May 2022. Out of estimated sample size of 200-300, 196 patients of intentional poisoning were included in the study.

In our study, we found that the patterns of poisoning and its treatment in a secondary care hospital from Guntur region. We found the highest number of cases in between the age of 30-39 years in our study. But whereas in the other study which is conducted at Bangalore, the highest number of cases was found in the age of 21-30 years. This is because of changes in age distributions and different geographical locations throughout the world. In our study, Illiterates are at higher risk of poisonings. In a study conducted among adult population at Bangalore, it has been emphasized that low education level may be associated with increased suicidal rates²⁰.

Our study showed a slight male predominance over female. But, in a study conducted at Diyarbakir, suicide attempts were more common among females. We found the frequency of married men and women was greater than unmarried. Other studies also showed married men and women are higher in number compared to unmarried. Economically, people from medium economic background were at the highest risk. Other studies showed highest poisoning rate among lower economic background. This might be due to socio economic differences across the globe²¹.

Occupationally, many cases were found among farmers, housewives and daily laborers because of the availability of poisoning agents. Poverty and income insufficiency were responsible for higher incidence among laborers and farmers. Family problems like arguments, misunderstandings in married life and dependence of women on husbands are responsible for higher incidence among housewives. Examination fear, parental expectation and substance abuse were common reason for poisonings among students. The study results were same according to a study conducted in TamilNadu²².

Present study revealed maximum numbers of self-poisoning cases were due to rodenticides followed by Herbicides, organophosphates. But according to a study conducted in Telangana, Organophosphates were most common. This could be due to the availability of organo phosphorous pesticides are more in this region²³.

Our study highlighted the importance of time elapsed between intake and arrival at the hospital. It impacts the clinical outcome of the patient. Majority were admitted in between 1-4 hours. They were recovered and managed properly. According to a study conducted at Telangana region, those patients who reached the hospital within 6 hours were discharged from the hospital at the earliest²⁴.

Poisoning patient presenting to medical center included individuals with impaired consciousness (1.02%) GCS < 8, abnormal body temperatures which including hyperthermia (16.3%), hypothermia (13.2%). Abnormal heart rate including tachycardia (11.7%), bradycardia (6.2%). insufficient respiration (15.3%). Abnormal blood pressure including Hypertensive (16.8%), hypotensive (32.1%). Our study specifically emphasizes the treatment methods for the patients along with the antidote administration. Most of the patients are treated with decontamination method and by providing nursing and psychiatric care. Only few patients (4.28%) underwent dialysis. Symptomatic treatment was provided to all the patients using antimicrobials, gastro protective agents, oxygen, antipsychotics, vitamin supplements and corticosteroids²⁵.

Pierce's suicide intent scale scoring was also taken to know the psychiatric condition and suicidal intention in future. Of which 41 members were at high risk with a score of 20-30. The patients who are at high risk, psychiatric consultation and counseling were given.

V. Conclusion

Our study assessed the patterns and treatment of intentional poisoning patients. Rodenticide poisoning was the most common pattern of poisoning. Poisoning occurrence was high among married men and in patients aged between

30-39 years. The patients who have further risk of suicidal intention were identified by using clinical tools and were referred to psychiatric evaluation in order to minimize the risk of next attempt of self-harm.

The reason for poisoning among the majority of patient population was found to be family problems which cannot be treated medically. But, providing awareness, counseling and appropriate supportive care can decrease further attempts in future.

Implementation of Poison information centers and man power provisions at primary health care level would provide a service with considerable health benefits, reducing morbidity and mortality from poisoning.

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