



## A Study on Retrospective Analysis of Poisoning Cases in A Tertiary Care Hospital

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### ABSTRACT

Poisoning is a therapeutic emergency and one of the causes of morbidity and mortality in the world. The objectives of this study were to analyze the pattern of poisoning cases along with various parameters such as types of poison used, poison severity, and outcomes. It is important to know the pattern, severity, and outcome of acute poisoning cases to take appropriate planning, prevention, and management techniques. A retrospective study was carried out by collecting the poisoning cases from Medical Record Department, details of patients admitted to the Emergency and Intensive Care Unit with the history of poisoning during the period between October 2013 to October 2018 after obtaining ethical clearance from the institutional ethical committee of AIMS, BG Nagara. A suitably designed data collection form was designed and used to collect the data. A total of 618 cases were included in the study, the maximum patients in the study population were males (62.62%) than females (37.38%) and most of them were between the age group of 16-25(30%). The majority of the patients were farmers 34.79%. In unintentional accidental poisoning, snake bite and bee sting were (51%) the most common patterns of poisoning observed and those who are intentionally poisoned were 49%. OP compounds were the most common type of poison (25.89%) among the study population. The severity of the poisoning was assessed by the poison severity score. The severity of poisoning most was minor, i.e., 42.07%, followed by a moderate 29.29 % and severe 16.67%. Most commonly prescribed antidotes were a combination of Inj. Atropine & Inj. Pralidoxime (18.12%) among poisoned patients. In the clinical outcome, 74.43% were recovered. Pesticide compounds and tablet consumption were the most common type of poisons. Provision for reducing lag time and early treatment at the initial stage of poisoning or snake bite is effective in reducing the duration of hospitalization and possibly mortality.

**Keywords:** Poisoning, tertiary care hospital, severity, outcome.

### INTRODUCTION

Poisoning is a significant global health problem<sup>1</sup>. It is a huge epidemic of non-communicable disease which can take place in all areas and countries and can affect people of all age and income groups and therefore it's necessary to know the kind and extremity of poisoning to take the right preventive measures<sup>2</sup>. Poisoning is a condition or a process in which an organism becomes chemically harmed severely by a toxic substance is swallowed, inhaled or absorbed after coming in contact with the skin, eyes or mucous membrane. Poisoning is also called toxicosis or intoxication<sup>3</sup>.

A case of poisoning is also defined as the overdose of drugs, medicaments, and biological substances and or wrong substances given or taken in error (T36-T50, International Statistical Classification of Disease and Related Health Problems -10<sup>th</sup> Revision (ICD-10)<sup>4</sup>. According to the WHO, more than 3 million poisoning cases have been reported each year, of which 99 percent are from developing countries<sup>5</sup>. An intoxication to both deliberate and accidental is one of the major causes of hospitalization<sup>6</sup>. Poisoning is a crisis faced by the majority of the population all over the world, and its type, as well as the associated morbidity and mortality, vary from country to country<sup>7</sup>.

Poisoning is the fourth most common cause of mortality in India, particularly in rural areas. According to The

World Health Organization (WHO), globally more than three million acute poisoning cases with 0.3 million deaths occur annually. Chemical poisons are divide into two groups those that come into direct human contact (medications, cosmetics) and those that are not meant for human contact (household or domestic products, industrial products, agricultural pesticides, petroleum products, and non-pharmacological herbs). Poisoning may occur through local absorption (eyes, skin, lungs or GI tract), systemic absorption or through both routes<sup>8</sup>.

The commonest causes of poisoning in developing countries are pesticides which include organophosphates, carbamates, chlorinated hydrocarbons, pyrethroids, and aluminum or zinc phosphide. Poisoning is a qualitative term used to define the potential of a chemical substance in acting adversely or deleteriously on the body<sup>9</sup>.

All cases of poisoning that result from accidental use of drugs and chemical substances or the use of drugs by children due to curiosity are known as accidental or non-intentional poisoning<sup>10</sup>.

Pesticides, drugs, and plant products are the usual agents for deliberate poisoning whereas bites and stings are responsible for a lot of accidental poisoning<sup>11</sup>. Poisoning from occupational, accidental and intentional exposure is a major public health problem in India. The reason behind this upsurge is agriculture-based economics,



poverty, unsafe practices, literacy, ignorance, and easy availability of highly toxic pesticides. The majority of victims of poisoning are from lower socioeconomic status<sup>12</sup>.

Snakebite is also a major problem worldwide. According to estimates, more than 5 million venomous snakebites occur every year and nearly 125,000 of those who suffer snakebite die, with the majority of the deaths occurring in the rural areas because of inadequate primary treatment and lack of tertiary care facilities<sup>13</sup>. Snake envenomation produces a diverse range of clinical effects, from minimal envenomation such as pain, itching, puncture wounds and mild edema to highly fatal symptoms such as bleeding, renal failure, hypotension and shock, particularly with the viper bites, and sudden flaccid paralysis and respiratory failure in neurotoxin bites.

Patterns of envenomation depend on the species of snakes, which can be broadly categorized into four different families, namely Colubridae, Elapidae, Viperidae and Hydrophidae which can cause minimal envenomation, neurotoxicity, vasculotoxicity and myotoxicity, respectively<sup>14</sup>.

Acute pesticide poisoning is one of the most common causes of intentional deaths worldwide. Pesticide poisoning is a significant problem in India because predominantly it is an agrarian country about 60- 80% of the rural population depending on agriculture. Pesticides are routinely used for advanced farming and are readily available over the counter for agriculture purposes. Therefore, a pesticide is an easy accessing source for suicidal purpose<sup>15</sup>.

The availability of standard treatment protocols for managing various poisons and educational programs for rural people may prove more effective for better management and positive outcome<sup>16</sup>.

It is important to know the nature and severity of poisoning to take prompt appropriate treatment to save; life and reduce morbidity and mortality<sup>17</sup>. PSS is a simple tool, which can be involved in the training module of medical officers for better assessment of treatment<sup>18</sup>.

Clinical course and outcome depend on the agent used, amount consumed, the time taken for hospitalization and treatment in India 5-6 persons or lakh population die due to poisoning yearly<sup>19</sup>. Periodic epidemiological and clinical studies are necessary to understand the pattern of poisoning in each region. It is important to know the natural severity of poisoning in categorize to take proper preventive procedures. Studies of this nature will be useful in the development and organizing of critically ill acute poisoning cases<sup>20</sup>.

Retrospective prevalence studies also provide important data on the relationships between a risk factor and a disease. These studies are observational. However, these prevalence studies, by carefully choosing the level of

exposure and methodologically measuring the occurrence of the disease. When carefully designed, these studies often only need to collect the information already in place<sup>21</sup>. A retrospective study looks backward and examines exposures to suspected risk or protection factors about an outcome that is established at the start of the study.

A retrospective uses existing data that have been recorded for reasons other than research. A retrospective case series is the description of a group of cases with a new or unusual disease or treatment.

This study focuses on the assessment of pattern, severity, the outcome of poisoning cases admitted in an emergency care unit in inpatients visiting the emergency department as there are no such studies conducted in the hospital.

## MATERIALS AND METHODS

### Study site

The study was conducted in Adhichunchanagiri Hospital and Research Centre (AH&RC), B. G Nagara. AH & RC is a 1050 bedded rural tertiary care teaching hospital. In that, 100 beds in general male ward and 50 beds in general female ward, 14 beds in MICU, 6 beds in ICCU, 5 beds in casualty. This hospital provides primary and specialized health care facilities to people in and around Nagamangala Taluk. The hospital has various departments like Anaesthesia, ENT, General Medicine, Obstetrics, and Gynaecology, Ophthalmology, Orthopaedics, Paediatrics, Psychiatry, Radiology, Skin and STD and Surgery.

All patients admitted to the emergency and intensive care unit were included in the study.

### Study design

This study was a retrospective study.

### Study period

The study was carried out for 6 months.

### Study criteria

#### Inclusion criteria

- All inpatients admitted to the emergency and intensive care unit, medicine.

#### Source of data

- Data collection form
  - Reason for admission
  - Treatment details
  - Lab reports
  - Nurse's note
  - Case note
  - Discharge summaries



### Study approval

The study approved by Institutional Ethical Committee, AH&RC, BG Nagara, (AHRC No: AIMS/IEC/1632/2017-2018).

### Statistical analysis

The data were subjected to descriptive statistical analysis using Microsoft Excel, Microsoft Word and Excel have been used to generate bar graphs, pie charts, and tables.

### Study procedure

This is a retrospective study. All patients admitted to the emergency and intensive care unit with the history of poisoning from October 2013 to October 2018 were included in the study. A suitably designed data collection form was designed and used to collect demographic details, the reason for admission, treatment details, lab reports, etc. The data was collected and analyzed by Microsoft excel.

The poison severity score was developed as a tool to document encounters with poisoned patients. Poison severity score grades severity as (0) none, (1) minor, (2) moderate, (3) severe, (4) fatal poisoning.

## RESULT AND DISCUSSION

A total of 618 cases were included in the study. Out of this, 387 were males and 231 females. The majority of the subjects came under the age group of 16-25 i.e., 187 subjects, followed by the age group were 26-35 i.e., 157 subjects and 46-55 i.e., 140 subjects.

**Table 1:** Demographic details of the patients.

Age Group	Frequency	Percentage (%)
< 15	55	9%
16-25	187	30%
26-35	157	25%
36-45	75	12%
46-55	140	23%
> 55	4	1%
<b>Gender Distribution</b>		
<b>Female</b>	231	37.38%
<b>Male</b>	387	62.62%

Table 1 shows the distribution of patients based on age and gender. A total of 618 poisoning cases were included during the study period, out of which, 387(62.62%) were males and 231(37.38%) females. The majority of the subjects came under the age group of 16-25 i.e., 187 subjects (30%), followed by the age group were 26-35 i.e., 157subjects (25%) and 46-55 i.e., 140subjects (23%).

**Table 2:** Pattern of poisoning

Pattern of poisoning	Frequency	Percent
Intentional Poisoning	303	49
Unintentional Poisoning	315	51
Total	618	100

Table 2 shows the distribution of the pattern of the poisoning of patients. Out of 618cases, the majority are unintentionally poisoned 315(51%) and 303(49%) are intentionally poisoned.

**Table 3:** Route of administration of poison by the patient

Route of administration	Frequency	Percent
Oral	361	58
Topical	243	39
Inhalation	14	2
Total	618	100

Table 3 shows the route of administration of poisons. Out of 618cases, the majority of poisons consumed by the patient by oral route 361(58%) followed by topical 243(39%) and inhalation 14(2%).

**Table 4:** Route of administration of poison by the patient

Route of administration	Frequency	Percent
Oral	361	58
Topical	243	39
Inhalation	14	2
Total	618	100

Table 4 shows the route of administration of poisons. Out of 618 cases, the majority of poison consumed by the patient by oral route 361(58%) followed by topical 243(39%) and inhalation 14(2%).

Table 5 shows the different types of poisons consumed by the patient. Among 618 patients, the majority of subjects were consumed OP compound 160(25.89%) which mainly includes glyphosphates, dimethoate (roger), profenofos, followed by Snakebite 126(20.39%) followed by Bee Sting 82(30.27%).

Table 6 shows the poison severity score of different types of the poisoning of patients. The poison severity score can be categorized according to the severity of the poison. It includes None (0), Mild (1), Moderate (2), Severe (3), and Fatal(4). Out of 618 cases, 260(42.07%) cases are minor followed by 181(29.29%) cases are moderate and 102(16.50%) cases are severe.

Table 7 shows the antidote prescribed for the poisoning cases. Among these Antidotes, no antidotes are prescribed in the majority of patients 388(62.46%) and 112(18.12%) patients, Inj. Atropine and Inj. Pralidoxime are given. 55(8.90%) patients received Inj. Atropine, followed by Anti Snake Venom 28 (4.53%).



Table 8 shows that out of 618 patients, 460(74.43%) patients were recovered, followed by 148(23.95%) were discharged against medical advice and 10(1.62%) were referred to higher center.

Poisoning is a significant global health problem<sup>1</sup>. It is a huge epidemic of non communicable disease which can take place in all areas and countries and can affect people of all age and income groups and therefore it is necessary to know the kind and extremity of poisoning to take the right preventive measures<sup>2</sup>.

**Table 5:** Different types of poison consumed

Types of poisoning	Frequency	Percentage
OP poisoning	160	25.89
Snake bite	126	20.39
Bee sting	82	13.27
Tablet consumption	67	10.84
Unknown compound poisoning	34	5.50
Rat poisoning	33	5.34
Unknown bite	16	2.59
Kerosene poisoning	13	2.10
Pyrethroid poisoning	13	2.10
Scorpion sting	10	1.62
Non-op poisoning	9	1.46
Benzodiazepine poisoning	6	0.97
Insecticide poisoning	5	0.81
Lakshman rekha poison	5	0.81
Acid poisoning	3	0.49
Aluminium phosphide poisoning	3	0.49
Fungicide poisoning	3	0.49
Pesticide poisoning	3	0.49
Phenol poisoning	3	0.49
DDT powder	2	0.32
Turpentine oil poisoning	2	0.32
Wasp sting	2	0.32
Others	18	2.88

**Table 6:** Poison severity score

Poison Severity Score	Frequency	Percent
Minor	260	42.07
Moderate	181	29.29
Severe	103	16.67
None	45	7.28
Fatal	29	4.69
Total	618	100.00

**Table 7:** Antidotes Used

Antidote Used	Frequency	Percent
No antidote used	386	62.46
Inj. Atropine, inj. pralidoxime	112	18.12
Inj. Atropine	55	8.90
Inj. ASV	28	4.53
Inj. Atropine, inj. pralidoxime	6	0.97
Inj. Atropine	5	0.81
Inj. pralidoxime	5	0.81
Inj. Atropine, inj. pralidoxime	4	0.65
inj. Atropine, inj. pralidoxime	3	0.49
Inj. Atropine, inj. neostigmine	3	0.49
Inj. ASV, inj. atropine, inj. neostigmine	2	0.32
Inj. ASV	1	0.16
Inj. Atropine, inj. pralidoxime	1	0.16
Inj. ASV	1	0.16
Inj. Atropine, inj. pralidoxime	1	0.16
Inj. Atropine, inj. Neostigmine	1	0.16
Inj. pralidoxime	1	0.16
Inj. Acetylcystine	1	0.16
Inj. Atropine, inj. ASV	1	0.16
Inj. Calcium gluconate	1	0.16
<b>TOTAL</b>	<b>618</b>	<b>100.00</b>

**Table 8:** Outcome of patient

Outcome of Patient	Frequency	Percent
DAMA	148	23.95
Recovered	460	74.43
Referred to higher centre	10	1.62
Total	618	618

Poisoning is a condition or a process in which an organism becomes chemically harmed severely by a toxic substance or venom of an animal. Poisoning occurs when a toxic substance is swallowed, inhaled or absorbed after coming in contact with the skin, eyes or mucous membrane. Poisoning is also called toxicosis or intoxication<sup>3</sup>.

A case of poisoning is also defined as the overdose of drugs, medicaments and biological substances and/or a wrong substance given or taken in error (T36-T50), International Statistical Classification of Diseases and Related Health Problems–10th Revision (ICD-10)<sup>4</sup>. According to the WHO, more than 3 million poisoning cases have been reported each year, of which 99 percent are from developing countries<sup>5</sup>. An intoxication to both deliberate and accidental is one of the major causes of hospitalization<sup>6</sup>. Poisoning is a crisis faced by the majority

of the population all over the world, and its type, as well as the associated morbidity and mortality, vary from country to country<sup>7</sup>.

A total of 618 poisoning cases were collected from the Medical Record Department.

### Demographic characteristics of poisoning cases

In our study, out of 618 cases, the male population was more 387(62.62%) compared to females 231(37.38%). A similar finding was observed in the study conducted by Mate. V that showed that male predominant was more i.e., 71.8% compared to females 28.2%<sup>1</sup>. A study conducted by Dhanya S .P also showed that a greater proportion of the study population was males 56.35% when compared to females 43.65%<sup>5</sup>.

The majority of poisoning cases in our study belonged to the age group 16-25(30%) years. These findings are similar to a study conducted by Maheswari E, who showed that the age group of 21-30 years (37.62%) was more predominant for poisoning<sup>2</sup>.

Stratification of poisonous patients based on occupation showed mostly people from agricultural background i.e., farmers (34.79%) were poisoned, and this trend of exposure every year is similar according to statistical analysis of various studies. A similar finding was observed in the study conducted by Vanishree that showed, farmers (36.5%) are more exposed to poisoning as compared to other occupation<sup>6</sup>.

Educational qualification of poison patients in our present study was SSLC (27.83%) were more prone to poisoning followed by illiterate (24.92%).The study similarly conducted by Mate V also showed that the majority of cases were schooling (36.3%),this shows that literate people are more predominant for poisoning<sup>1</sup>.

### Pattern of poisoning

The pattern of poisoning observed in our study was more unintentional i.e. (51%) followed by intentional (49%). A similar study conducted by Thapa SR et al., showed that a greater proportion of poisoning was unintentional i.e. 66.2% and intentional poisoning was 33.8%<sup>10</sup>.

### Route of administration of poison

The most common route of exposure to those poisoning was observed in the oral route that is 58% followed by the topical route was 39%. A similar study conducted by Thapa SR et al., showed that a greater proportion of poison was consumed by an oral route that is 79.05%<sup>10</sup>.

### Different types of poison consumed

In our study, indicated that the most common causes of poisoning were organophosphorus compound. It accounts for 160(25.89%) poisoning cases. The second most common cases were snake bite 126(20.39%) followed by bee sting poisoning 82(13.27%) and tablet consumption 65(10.52%). The increased availability of OPCs has increased the incidence of ingestion, resulting in

increasing suicidal and accidental poisoning. OPP is an important preventable public health problem in developing countries. OP poisoning ensures very commonly in southern India, were farmers customize a significant fraction of the population who commonly used OP compound like parathion as insecticides. This, due to the easy accessibility of these compounds, an enormous number of suicidal cases is stumbling upon in this region. OP poisoning is a medical emergency and the patients are invariably admitted to the hospitals through emergency services. The poisoning may be suicidal, accidental or homicidal. OP pesticide intoxication are estimated at 3 million per year worldwide with approximately 300,000 deaths.

The OP compounds are normally esters, thiol esters, or acid anhydride derivatives of phosphorus-containing acids. A similar study conducted by Thapa SR showed that OP compounds contributed (45%) poisoning cases. A majority of victims of poisoning are farmers, they consumed op compounds more as compared to other agents. This is because of the easy availability of op compounds like parathion, Malathion, etc<sup>10</sup>.

### Poison severity score (PSS)

The present study analyzed that the severity of poisoning using PSS showed that, 42.07% of the cases were classified as minor, 29.29% were classified as moderate, 16.67% were severe and 7.28% were classified as none (not showing any symptoms). A similar study conducted Maheswari E, showed that 52.6% of the cases were classified as minor, 20% were classified as moderate and 27.3% were classified as none (not showing any symptoms)<sup>3</sup>.

### Treatment assessment and clinical outcome

In our study, out of 618 cases, the most common causes of poisoning were OP compound 160(25.89%). The second most common cases were snake bite 126(20.39%) followed by bee sting poisoning 82(13.27%) and tablet consumption 65(10.52%). Inj. Atropine and Inj. Pralidoximeis prescribed in the majority of patients 112(18.12%) and in 55(8.90%) patients received Inj. Atropine, followed by ASV 28(4.53%). In 386(62.46%) patients there is no antidotes are given to the patient. Similar findings were observed in the study conducted by Shivanranjani V, who showed that Atropine(81.6%) and pralidoxime (59.2%) were used as antidotes for OP poisoning<sup>6</sup>.The clinical outcome of our study showed that 460(74.43%) patients are recovered from poisoning followed by 148 (23.95%) were discharged against medical advice and 10(1.62%) were referred to higher centers. These findings are similar to a study conducted by Maheswari E et al; that showed 100 (99.01%) recovered and 1 (0.99%) died<sup>3</sup>.

The increasing mortality rate of patients is due to the consumption of the highly toxic substance, delayed arrival to the hospital and inappropriate treatment.



## CONCLUSION

The study showed that the most commonly observed intentional poisoning was pesticides. Among pesticides, OP was the most common poisoning. Snakebite and honey bee sting was the most commonly observed unintentional/accidental poisoning.

The high incidence of suicide by poisoning among young adults can be checked by frequent psychological counseling and by tackling their problems sympathetically. The majority of the study population was prescribed with an antidote in a combination (Atropine + Pralidoxime) followed by atropine and ASV. Organophosphates are the most commonly used agents for poisoning followed by snake bite, bee sting, and tablet consumption. The severity of poisoning was assessed by using a poison severity score. Majority of patients recovered which indicates a good emergency and intensive care management at this hospital

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