VOLUME - 12, ISSUE - 04, APRIL - 2023 • PRINT ISSN No. 2277 - 8160 • DOI : 10.36106/gjra

Original Research Paper | General Medicine

A STUDY OF CLINICAL PROFILE AND OUTCOME OF RODENTICIDE POISONING IN PATIENTS ADMITTED TO A TERTIARY CARE HOSPITAL IN MANDYA, KARNATAKA.

Dr. Ramakrishna S	Associate Professor, Department of General Medicine, Mandya Institute of Medical Sciences, Mandya, Karnataka
Dr. Chethan Kumar K.L	Assistant Professor, Department of General Medicine, Mandya Institute of Medical Sciences, Mandya, Karnataka
Dr. Mallikarjunarao Daravath*	Junior Resident, Department of General Medicine, Mandya Institute of Medical Sciences, Mandya, Karnataka *Corresponding Author
Dr. Charan Amogh Raj K R	Intern, Mandya Institute of Medical Sciences, Mandya, Karnataka

ABSTRACT

Background: Poisoning is the major health problem in developing countries like India. Rodenticides are one of the commonest substances used for poisoning in India. Rodenticides are the substances used to kill rats. They differ from chemical composition and toxicity profile. Prognosis mainly depends on chemical content of poison. Methods: This retrospective record-based study was conducted between July 2022 to December 2022 at MIMS tertiary care teaching hospital, Mandya, Karnataka, India. Data regarding age, sex, marital status, occupation, socioeconomic status, type of poison, clinical presentation, complications and outcome of poisoning and associated comorbid conditions were collected from the hospital records and documented in the prestructured proforma. Descriptive analysis was carried out by the mean and standard deviation for quantitative variables, frequency and proportion for categorical-variables. **Results:** Out of 96 study subjects, 53 (55.20%) were female, 43 (44.79%) were male. Most common age group was 21 to 30 years (44.76%), followed by 31 to 40 years (26.04%) group. Most common poison was zinc phosphide (47.91%), followed by yellow phosphorous (29.16%). Most common symptom at presentation was nausea, vomiting (59%) followed by pain abdomen (50%). Most common complication was hepatitis 26 (27.08%) patients, followed by hepatic encephalopathy in 6 (6.25%) and cardiogenic shock in 5 (5.20%) patients. Total mortality was 13 (13.54%). **Conclusions:** Among rodenticides Zinc phosphide was most common consumed poison in present study. Yellow phosphorous was most toxic poison and Aluminium phosphide was most lethal poison. Even though there is no specific antidote, early symptomatic treatment is the key in reducing the mortality.

KEYWORDS : Aluminium phosphide, Rodenticide, Yellow phosphorous, Zinc phosphide

INTRODUCTION AND NEED FOR STUDY

Poisoning is a significant issue everywhere in the globe, although its type and the associated morbidity and mortality vary from country to country . The majority of incidents of poisoning are suicidal in character. Pesticides designed particularly to kill rodents are known as rodenticides. The prevalence of rodenticide poisoning varies across the nation. Rodenticide poisoning is still a serious issue for public health in Asian nations.[1] There are large variations in death rates.

Rodenticides are classed as Warfarin and related substances (coumarins and indandiones), inorganic compounds (thallium, arsenic, zinc phosphide, aluminium phosphide, and yellow phosphorus), and convulsants (strychnine). In investigations carried out in North and South India, there were considerable differences in the prevalence of rodenticide poisoning and fatality rates.[2] Yet, there aren't many statistics about these patients' outcomes in the global literature. In order to better understand the clinical profile and outcome of rodenticide poisonings at our hospital, we conducted this study.

Bromadiolone is an anticoagulant often employed as a rodenticide. It is an antagonist of vitamin K and a derivative of 4-hydroxycoumarin of second generation. Because of its strength, it is frequently referred to as "SuperWarfarin." The maturation of vitamin K-dependent clotting factors is prevented because it inhibits Vitamin K epoxide reductase, which is necessary for Vitamin K regeneration. Zinc phosphide and aluminium phosphide (ALP) are the two most often utilised metal phosphides. Zinc phosphide is utilised as bait, whereas aluminium phosphide is employed as a fumigant.

Aluminium Phosphide is a solid fumigant that is used in grain storage. It is also inexpensive and widely available. They are informally known as "Rice Tablets." It comes in tablet shape, with a diameter of around 2cm and a thickness of about 0.5cm. Sizes fluctuate across manufacturers. They usually include 3-3.5 grams of aluminium phosphide. It is sold in an airtight container. When exposed to water or moisture in the air, it emits cytotoxic phosphine gas.

The release of phosphine gas, a cytotoxic chemical that causes free radical mediated harm, inhibits essential cellular enzymes, and is directly destructive to tissues, is ascribed to the toxicity of aluminium phosphide. As ALP combines with water in the body, the following reaction occurs, releasing phosphine: ALP + 3 H2O AL (OH) 3 + PH3, as well as ALP + 3 HCl ALCl3 + PH3 (stomach)

In bait, zinc phosphide is employed. When exposed to water, phosphonate is generated, and it mediates the toxicity. Zinc phosphide hydrolysis is extremely pH dependant. 7.1% of zinc phosphide hydrolyzed in 12 hours at pH 4, whereas 38.8% hydrolyzed in the same time at pH 2.

Yellow phosphorus (white phosphorus) is usually sold as a paste that is applied on bait. The most prevalent brand is "RATOL." Phosphorus is a protoplasmic toxin that can cause cardiac, hepatic, renal, and multi-organ failure.

AIMS AND OBJECTIVES:

- To access the clinical profile of patients consuming rodenticide poison.
- To determine the clinical outcome of the patients consuming rodenticide poison.

METHODOLOGY:

Study Design: Hospital record based retrospective study.

Study Period: 6 months (July 2022 to December 2022)

Study Population: Patients admitted to the General Medicine department, Mandya Institute of Medical Sciences, Mandya.

Sample Size: All patients admitted with rodenticide poison consumption within the study period.

Inclusion Criteria:

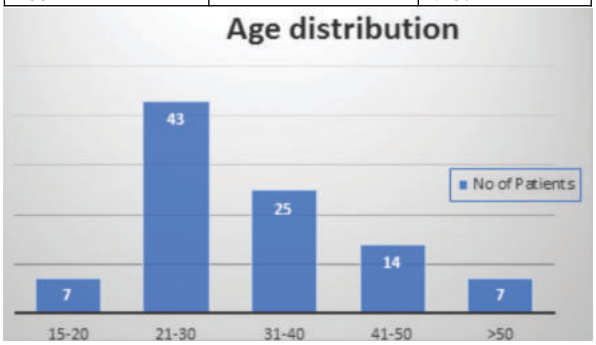
1) All the patients above age of 15 years of either sex will be included.

Exclusion Criteria:

1) Patients with other poison consumption will be excluded from the study.

Table 1: Age distribution

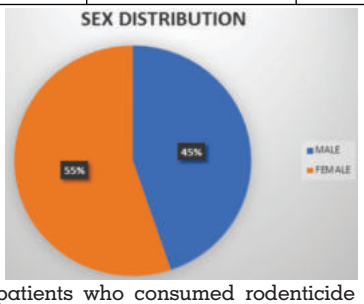
Age in Years	No of patients	Percentage
15-20	7	7.29%
21-30	43	44.76%
31-40	25	26.04%
41-50	14	14.58%
>50	7	7.29%



Among study population, 7 (7.29%) patients belongs to age group between 15-20 years followed by 43 (44.76%) patients belongs to 21-30 years, 25 (26.04%) patients aged between 31-40 years, 14 (14.58%) patients aged between 41-50 years and 7 (7.29%) patients aged more than 50 years respectively.

Table 2 :Sex distribution

Sex	No of patients	Percentage
Male	43	44.79%
Female	53	55.20%



Among 96 patients who consumed rodenticide poison, 53 (55.20%) were female and 43 (44.79%) were male.

Table 3: Type of rodenticide consumed

Chemical compound	Frequency	Percentage
Aluminium phosphide	17	17.70%
Yellow phosphorous	28	29.16%
Zinc phosphide	46	47.91%
Bromadiolone	5	5.20%

Among study patients most common type of poison consumed was Zinc phosphide by 46 (47.91%) patients, yellow phosphorous by 28 (26.16%) patients, followed by Aluminium phosphide by 17 (17.70%) patients and bromadiolone by 5 (5.20%) patients respectively.

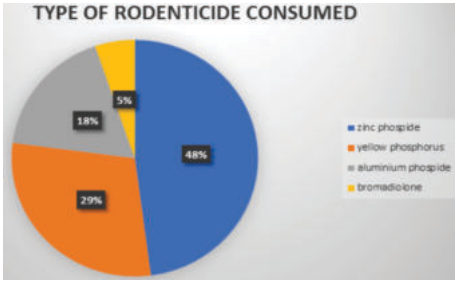
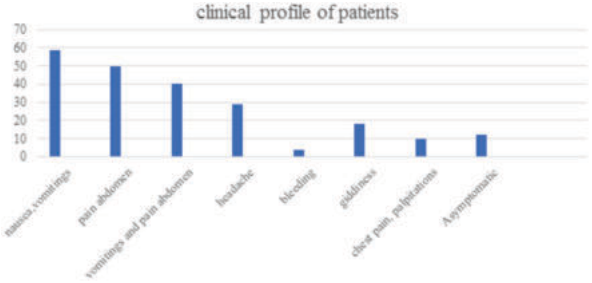


Table 4: Clinical profile of patients

Symptoms	Frequency	Percentage
Nausea, Vomiting	59	61.45%
Pain abdomen	50	52.08%
Vomiting and pain abdomen	40	41.66%
Headache	29	30.20%
Bleeding	4	4.16%
Giddiness	18	18.75%
Chest pain, palpitations	10	10.41%
Asymptomatic	12	12.5%



Most common symptom was nausea, vomiting in 59 (61.45%) patients, followed by pain abdomen in 50 (52.08%), headache in 29 (30.20%), giddiness in 18 (18.75%), asymptomatic in 12 (12.5%), bleeding in 4 (4.16%) patients and chest pain and palpitations in 10 (10.41%) patients respectively.

Table 5: Complication in relation to chemical compound

Complication	Zinc phosphide	Yellow phosphorus	Aluminium phosphide	Bromadiolone	Total
Hepatitis	7	13	6	0	26
Hepatic encephalopathy	0	3	3	0	6
Bleeding	0	5	0	0	5
Cardiogenic shock	0		5	0	5
MODS	0	1	2	0	3

Out of 96 patients, 26 (27.08%) subjects had features of hepatitis with deranged LFT (Liver function test) on third day, yellow phosphorous was causing deranged LFT in 13 (13.54%) patients, aluminium phosphide in 6 (6.25%) and zinc phosphide in 7 (7.29%) patients. 5 (5.20%) patients had elevated prothrombin time with bleeding which was due to Yellow phosphorous compound poisoning. Out of 96 patients, 5 (5.20%) patients developed cardiogenic shock, which was secondary to aluminium phosphide poisoning. Out of 96 patients, 6 (6.25%) patients developed hepatic encephalopathy, out of which 3 (3.12%) were due to yellow phosphorous and 3 (3.12%) were secondary to aluminium phosphide respectively. 3 (3.15%) patients developed MODS (multiple organ dysfunction syndrome) out of which 1 (1.04%) patients due to yellow phosphorous poisoning and 2 (2.08%) patients due to aluminium phosphide poisoning (Table 5).

Table 6: Outcome in relation to chemical compound

Outcome	Survival	Expired	DAMA	Referred
Zinc Phosphide (n=46)	40 (86.95%)	0	6 (13.04%)	0

Yellow Phosphorus (n=28)	17 (60.71%)	5 (17.85%)	3 (10.71%)	3 (10.71%)
Aluminium Phosphide (n=17)	4 (23.5%)	8 (47.05%)	2 (11.16%)	3 (17.64%)
Bromadiolone (n=5)	5 (100)	0	0	0
Total (n=96)	66(68.75%)	13 (13.54%)	11(11.45%)	6(6.25%)

Out of 46 (47.91%) patients who consumed zinc phosphide, 40 patients discharged normally from hospital after treatment, 6 patients went against medical advice. Out of 28 (29.16%) patients who consumed yellow phosphorus, 17 patients were discharged, 3 went against medical advice, 5 expired, 3 were referred to higher centre. Out of 17 (17.70%) who consumed aluminium phosphide, 4 patients were discharged normally from hospital after treatment, 8 patients expired, 2 went against medical advice and 3 patients were referred to higher centre. Out of 5 bromadiolone poisoning patients, 5 patients discharged normally from the hospital after treatment. (Table 6).

DISCUSSION

Rat poison was third most common poison in our hospital, first one was tablet consumption and second one was organophosphorus poison. Easy availability of rat poison at home, and over the counter was the cause for a greater number of rat poison cases in India. Most of the time it was suicidal in nature. These rodenticide compounds show distinctive toxicity among humans and rodents, it mainly depends upon type of compound patients consumed.[3]

In present study out of 96 patients, 53 were females (55.20) and 43 (44.79%) were males, reason may be due family issues. Study done by Kuppegala S et al, at Mysore, Karnataka, showed more in males (54.7%) compared to females (45.3%). Most common age group was 21-30 (44.76%) followed by 31-40 (26.04%). Study done by Balasubramanian K et al, at Pondicherry shows below 30 years (65.80%) were the most common age followed by 31 -40 years (21.7%).[4] Study done by Kuppegala S et al, at Mysore, Karnataka, showed most common age group was 21 -30 years (53.1%).[5] may be due to multiple factors, like family problems, financial problems more in these age group.

Most common rodenticide in present study was Zinc phosphide (47.91%), yellow phosphorous (29.16%), followed by aluminium phosphide (17.70%) respectively. Study done by Kuppegala S et al, at Mysore, Karnataka, showed aluminum phosphide (48.4%) was most common rodenticide, followed by yellow phosphorus (28.1%) and zinc phosphide (18.8%) respectively.[5] Study done by Balasubramanian K et al, Pondicherry shows coumarinwas the most common rodenticide (37.5%), followed by zinc phosphide (33.33%).[4]

Most common symptom was vomiting (59%), followed by pain abdomen (50%), vomiting and pain abdomen (40%), headache (29%), giddiness (18%), asymptomatic (12%), chest pain and palpitations (10%) respectively. Study was done by Balasubramanian K et al, Pondicherry, showed (44%) patients had nausea and vomiting, followed by giddiness (20%) and pain abdomen (20%) and asymptomatic (20%) respectively.[4] Study done by Nalaboth M et al, showed (83%) patients had nausea, vomiting followed by pain abdomen in (55%) of the patients and bleeding in (16%) of the patients.

Study found that hepatitis was common complication in 26 (27.08%) patients followed by 6(6.25%) patients developed hepatic encephalopathy and 5(5.20%) patients developed bleeding complication and 5(5.20%) patients developed cardiogenic shock and 3(3.12%) patients developed MODS. A study done by Balasubramanian K et al. Pondicherry showed hepatitis in 10(8.33%) patients, hepatic encephalopathy in 5(4.16%), bleeding complication in 7(5.83%) patients and cardiogenic shock in 1(0.83%) patients.[4]

Present study showed a mortality rate of 47.05% among aluminium phosphide poisoning cases which is lower the study conducted by Chugh which had a mortality rate of 77.2% and similar to the study by Hemani where the mortality rate was 35%.[6,7] Study found that yellow phosphorus was most toxic compound and aluminium phosphide was most lethal compound causing more mortality. Study done by Balasubramanian K et al, Pondicherry, India, showed Phosphorous compounds was most toxic.[4] Bromadiolone was least toxic rodenticide in present study.

REFERENCES

1. Mack RB. Not all rats have four legs. Superwarfarin poisoning. N C Med J.1994 Nov;55(11):554-6
2. Ramesha KN, Rao KB, Kumar GS. Pattern and outcome of acute poisoning cases in a tertiary care hospital in Karnataka, India. Indian J Crit Care Med.2009 Jul-Sep;13(3):152-5
3. Khurana P, Dalal JS, Multani AS, Tejpal HR. The study of aluminium phosphide poisoning in atertiary care hospital, Amritsar. J Indian AcadForenMed. 2011;33(4):332-6.
4. Balasubramanian K, Sethuraman VK, Balamurugesan K, Vishwanathan S. A retrospective study of clinical profile and outcome of patients with rodenticide poisoning in a tertiary care hospital. IJAM. 2019;6(2):1-6.
5. ChikkaveraiahKuppegal S, Marijayanth M, ReddyPK, Kaluvakuri S. Clinical profile and outcome of rodenticide poisoning in patients admitted to a tertiary care teaching hospital in Mysore Karnataka.IJRMS. 2016;4(11):5023-7
6. Chugh SN, Dushayant K, Ram S, Arora B. Incidence and outcome of aluminium phosphide poisoning in a hospital study. Indian J Med Res.1991;94:232-5.
7. Ahuja H, Mathai AS, Pannu A, Arora R. Acute Poisonings Admitted to a Tertiary Level Intensive Care Unit in Northern India: Patient Profile and Outcomes. Journal of Clinical and Diagnostic Research: JCDR. 2015;9(10):UC01-4.