

Zinc phosphide/Rattol poisoning at rural Konkan region

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Abstract

Background: Zinc phosphide is used as a rodenticide and is available as paste, bait pellets, granules, dust, and tracking powder formulations. In Kerala state zinc phosphide has second highest incidence for intoxicant poisoning after organophosphates. **Aims and Objectives:** To study Zinc phosphide/Rattol poisoning at rural Konkan region. **Methodology:** This was a cross-sectional study carried out in the department of Medicine in the patients of Zinc phosphide poisoning during the one year period i.e. March 2017 to March 2018 in the one year 50 patients with Zinc phosphide poisoning admitted to the ward were selected for the study. All details of the patients like age, sex, Mode poisoning, Clinical features, Outcome etc. were noted. These findings were entered to excel sheet and analyzed by Excel software for windows 10. **Result:** In our study we have seen that the majority of the patients were in the age group of 30-40 was in 17[34.00%] followed by 20-30 was in 12[24.00%], 40-50 was in 9[18.00%], 50-60 was in 7[14.00%], >60 was in 5[10.00%]. The majority of the patients were Male i.e. 64% and Female were 46%. The most common mode of poisoning was Suicidal i.e. 90% and Accidental was in 10%. The most common clinical features were Vomiting-90%, Abdominal pain in 80%, Drowsiness-70%, Breathlessness - 56%, Palpitation-24%, Icterus-18%. The majority of the patients were recovered i.e. 88% and Death occurred in 12% patients mostly associated with old age and higher doses of ingestion; 8% patients Referred to Higher centre for the various complications like hepatic failure, renal complications or GI bleeding. **Conclusion:** It can be concluded from our study that the majority of the patients were in the age group of 30-40, the majority of the patients were Male. The most mode of poisoning was suicidal, The most common clinical features were Vomiting, Abdominal pain, Drowsiness-Breathlessness. The mortality was present in 12% patients.

Key Word: Zinc phosphide, Rattol poisoning, Rat Poison.

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INTRODUCTION

Zinc phosphide is used as a rodenticide and is available as paste, bait pellets, granules, dust, and tracking powder

formulations. In Kerala state zinc phosphide has second highest incidence for intoxicant poisoning after organophosphates.¹ Zinc phosphide is most effective fumigants and rodenticides widely used in many countries, especially in developing countries. Upon ingestion, phosphides come into contact with fluids in the gut and are converted to phosphine gas, which is then absorbed into the bloodstream. Phosphine is a highly toxic gas in humans and exerts its effects by many proposed mechanisms, including inhibition of cytochrome C oxidase and oxidative respiration.^{2,3} Phosphine mainly affects the cardiovascular, respiratory, gastrointestinal (GI), hepatobiliary, and hematologic systems and causes electrolyte and metabolic abnormalities.^{2,3} The severe clinical symptoms in patients

with phosphine poisoning include circulatory collapse, hypotension, pulmonary edema, congestive heart failure, cardiac arrhythmia, and acute renal failure.^{2,4,5} No specific antidote has been identified; therefore, the main treatment is supportive care. Although some efforts have been made to establish more effective interventions and medications for management, the mortality rate remains high⁶.

METHODOLOGY

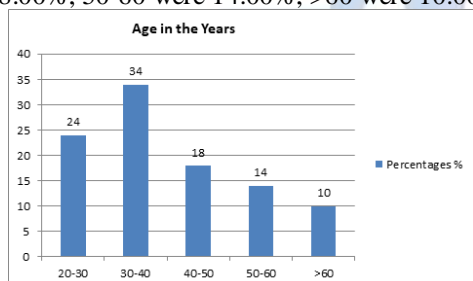
This was a cross-sectional study carried out in the department of Medicine in the patients of Zinc phosphide poisoning during the one year period i.e. March 2017 to March 2018 in the one year there were 50 patients with Zinc phosphide poisoning were admitted to the ward were selected for the study. All details of the patients like age, sex, Mode poisoning, Clinical features, Outcome etc. were noted. These findings were entered to excel sheet and analyzed by Excel software for windows 10.

RESULT

Table 1: Distribution of the patients as per the Age

Age	No.	Percentage (%)
20-30	12	24.00
30-40	17	34.00
40-50	9	18.00
50-60	7	14.00
>60	5	10.00
Total	50	100.00

The majority of the patients were in the age group of 30-40 were 34.00% followed by 20-30 were 24.00%, 40-50 were 18.00%, 50-60 were 14.00%, >60 were 10.00%.



Graph 1: Distribution of the patients as per the Age

Table 2: Distribution of the patients as per the sex

Sex	No.	Percentage (%)
Male	32	64
Female	28	46
Total	50	100

The majority of the patients were Male i.e. 64% and Female were 46%

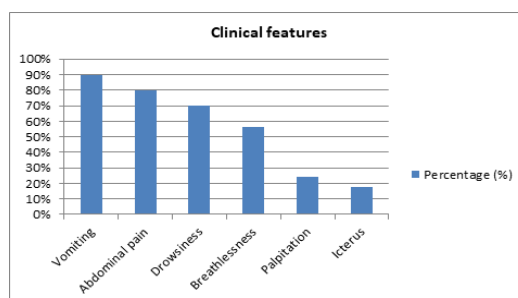
Table 3: Distribution of the patients as per the mode poisoning

Mode poisoning	No.	Percentage (%)
Suicidal	45	90
Accidental	5	10
Total	50	100

The most common mode of poisoning was Suicidal i.e. 90% and Accidental was in 10%

Table 4: Distribution of the patients as per the Clinical features

Clinical feature	No. of patients	Percentage (%)
Vomiting	45	90%
Abdominal pain	40	80%
Drowsiness	35	70%
Breathlessness	28	56%
Palpitation	12	24%
Icterus	9	18%



Graph 2: Distribution of the patients as per the Clinical features

Table 5: Distribution of the patients as per the Outcome in the patients

Outcome	No.	Percentage (%)
Recovered	4	80
Death	6	12
Referred to Higher centre	4	8
Total	50	100

The majority of the patients were recovered i.e. 88% and Death occurred in 12% patients mostly associated with old age and higher doses of ingestion; 8% patients Referred to Higher centre for the various complications like hepatic failure, renal complications or GI bleeding.

DISCUSSION

Zinc Phosphide is an inorganic chemical that is used to control rats, mice, voles, ground squirrels, prairie dogs, nutria, muskrats, feral rabbits and gophers. It is also used as a tracking powder for the control of house mice. It is used on crop areas and on non-crop areas including lawns, golf courses, highway medians, and areas adjacent to wetlands^{7,8}. It may be formulated as a grain based bait, as scrap bait or as a paste. Rodenticide baits usually contain 2.0 percent of zinc phosphide. Zinc Phosphide is a Restricted Use Pesticide (RUP). RUPs may be purchased and used only by certified applicators.

Toxicological Effects/Acute Toxicity: Some formulations of this rodenticide are classified as highly toxic and require the signal word DANGER-POISON on the label. Others are either moderately toxic or only slightly toxic and thus require the signal words WARNING or CAUTION respectively. Zinc phosphide reacts with water and acid in the stomach and causes severe irritation¹². Symptoms of acute zinc phosphide poisoning include nausea, shock, weak heart beat and low

blood pressure, loss of consciousness¹³. Other symptoms include vomiting, diarrhea, cyanosis, rales, restlessness and fever. There are documented cases of adults dying from massive doses of the pesticide (4,000 to 5,000 mg) although others have survived acute exposure of as high as 25,000 mg to 100,000 mg of zinc phosphide if vomiting occurred early and absorption was limited^{9,10}. The LD50 for the technical product (80-90% pure) is 45.7 mg/kg while the LD50 values for lower concentration formulations are slightly higher (i.e. less toxic). In sheep the LD50 ranges from 60 to 70 mg/kg¹³. The inhalation of zinc phosphide or its breakdown product phosphine gas may result in acute toxicity¹³. No specific doses were mentioned in the reference. The compound is non-irritating to the skin and eyes¹². In our study we have seen that The majority of the patients were in the age group of 30-40 were 34.00% followed by 20-30 were 24.00%, 40-50 were 18.00%, 50-60 were 14.00%, >60 were 10.00%. The majority of the patients were Male i.e. 64% and Female were 46%. The most common mode of poisoning was Suicidal i.e. 90% and Accidental was in 10%. The most common clinical features were Vomiting-90%, Abdominal pain in 80%, Drowsiness-70%, Breathlessness-56%, Palpitation-24%, Icterus-18%. The majority of the patients were recovered i.e. 88% and Death occurred in 12% patients mostly associated with old age and higher doses of ingestion; 8% patients Referred to Higher centre for the various complications like hepatic failure, renal complications or GI bleeding. These findings are similar to Satariya Trakulsrichai et al they found the mean age was 39.91±19.15 years. The most common route of exposure was oral (99.3%). Most patients showed normal vital signs, oxygen saturation, and consciousness at the first presentation. The three most common clinical presentations were gastrointestinal (GI; 68.8%), cardiovascular (22.0%), and respiratory (13.8%) signs and symptoms Patients who survived and died showed significant differences in age, duration from taking zinc phosphide to hospital presentation.

CONCLUSION

It can be concluded from our study that the majority of the patients were in the age group of 30-40, the majority

of the patients were Male. The most mode of poisoning was suicidal, The most common clinical features were Vomiting, Abdominal pain, Drowsiness-Breathlessness. The mortality was present in 12% patients.

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