

Rodenticidal Poisoning in a Tertiary Centre in North Kerala



Medical Science

KEYWORDS : Rodenticide , Yellow phosphorous ,superwarfarin

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ABSTRACT

Aim - To determine the clinical profile and biochemical parameters in rodenticide poisoning and to evaluate the morbidity and mortality of rodenticide poisoning

Materials and methods A retrospective observational study at Academy of Medical education , Pariyaram ,Kannur ,Kerala during the period of 3 years from September 2011 to September 2014

Results Total 62 patients were admitted with rodenticide poisoning during this period in ACME. Most common rodenticide was yellow phosphorous (paste form) 33 patients(53%) .Complications developed in 11 cases of yellow phosphorous ingestion. There were 20 patients with zinc phosphide powder ingestion and 9 patients with superwarfarin (bromadiolone) ingestion. Overall mortality was 7 patients(11.2 %). Most lethal agent was paste (3% yellow phosphorous) followed by powder (zinc phosphide).

Conclusion Common rodenticides ingested were Yellow phosphorous and zinc phosphide with high morbidity and mortality rate. Earlier presentation had a better outcome. Patients presented with superwarfarin ingestion had an excellent outcome.

Introduction

Rodenticidal poisoning is common in emergency departments in India and is an important cause of mortality among acute poisonings.

Unlike most of the other common poisonings like organo-phosphorous poisoning and paracetamol poisoning which have antidote ; phosphorous based rodenticidal poisoning has no antidote. Rodenticides are very cheap , widely available and minute amount can produce significant morbidity and mortality. Rodenticide ingestion is mostly suicidal ,rarely homicidal and sometimes accidental .Very few studies are done in rodenticide poisoning in india inspite of it being causing considerable mortality and a uniform protocol is not available for the treatment due to lack of studies .

In Northern Kerala ,rodenticides are frequently used for agricultural & domiciliary purposes This is the most common type of poisoning leading to death in emergency department here .

Objectives

- 1) To determine the clinical profile and biochemical parameters in rodenticide poisoning
- 2) To evaluate the morbidity and mortality of rodenticide poisoning

Materials and methods

Study design : A retrospective observational study
Study locality : Academy of Medical education , Pariyaram ,Kannur ,Kerala All the patients admitted in Toxicology ICU and medical wards during the period of 3 years from September 2011 to September 2014

Methods : A retrospective observational study of cases of various rodenticidal poisoning admitted in emergency, ICU and medical wards under department of medicine, Medical College Pariyaram from 01 September , 2011 to August 30 , 2014 .

Data collection Details of patients with rodenticide poisoning was collected from the medical record section ACME and from the records in the emergency department. The data was be entered in specifically designed proformas for evaluation. Statistical analysis was done by using mean ,range, standard deviation and percentage.

Diagnosis of rodenticide intoxication was based on exposure history, and confirmed by clinical manifestations as well as physical and laboratory examination. The type of rodenticide was verified by container or packaging information

Inclusion criteria On the basis of patients detailed history, signs & symptoms and documentary proof ,rodenticidal poisoning were identified and kept in study group.

Exclusion criteria Suspected poisoning were excluded from study. Also patients with co-ingestants and physical injury were excluded. Statistical analysis was done by using mean ,range, standard deviation and percentage

Review of literature Rodenticides available commercially are of 2 types . Phosphorous based including Zinc and aluminium phosphide and anticoagulants based .

Inorganic phosphorus Phosphorus, which is marketed in the form of a paste, is a very effective and popular rodenticide, because of its easy availability and affordability. Non availability of an effective antidote and its high toxicity, makes the treatment challenging. The mortality is high due to an increased incidence of heart failure, pulmonary oedema and hepatic failure. The popular brand of paste form of rodenticide is Ratol which is 3% yellow phosphorous and costs Rs 20 in local market.

When phosphorus mixes with fluids in the stomach, phosphine gas (PH₃) is released. Phosphine is rapidly absorbed, thus causing systemic poisoning by the inhibition

of oxidative phosphorylation, resulting in cellular hypoxia.

Phosphine results in oxidative stress by the induction of free radicals and catalase inhibition .

Phosphorus is a general protoplasmic poison causing cardiac, hepatic, renal, and multiorgan failure. The patient with phosphorus intoxication passes through three stages. The first stage occurs during the first 24 hours in which patient is either asymptomatic or has signs and symptoms of local gastrointestinal irritation. The second stage occurs between 24 to 72 hours after ingestion. It is an asymptomatic period and the patient may be discharged prematurely. There may be mild elevation of liver enzymes and bilirubin in this stage. The third stage (advanced) occurs after 72 hours until the resolution of symptoms or death. (Brent J,2005)Patients may present with acute hepatic failure, coagulopathy, and deranged liver function. Some patients may develop acute tubular necrosis and present with acute renal failure. Central nervous system effects include changes in mental status like confusion, psychosis, hallucinations, and coma. Cardiac toxicity includes hypotension, tachycardia, arrhythmias, and cardiogenic shock. (Tally RC,1972)

There is no specific antidote for yellow phosphorus. Treatment is directed at removal of the poison and supportive therapy. Gastric lavage with potassium permanganate is recommended to convert the phosphorus to relatively harmless oxides. Careful monitoring of hepatic and renal function and management of their failure is required. Liver transplantation has been done in suitable candidates for acute hepatic failure.(Santos O,2009)

Fernandez and Canizares in a series of 15 patients have reported a mortality of 27%, confirming that yellow phosphorus is extremely lethal when ingested. (Fernandez O U ,1995)

Since rodents are developing resistance to rodenticides containing warfarin, rat poisons containing yellow phosphorus are widely used. The yellow phosphorus rodenticides pose a special problem in that the product directions suggest that the paste be applied to bread to enable ingestion by rodents, thus making it appealing to children as well

Anticoagulants

Anticoagulant pesticides are used widely in agricultural and urban rodent control. Most cases of anticoagulant rodenticide exposure involve young children and, as a consequence, the amounts ingested are almost invariably small. In contrast, intentional ingestion of large quantities of long-acting anticoagulant rodenticides may cause anticoagulation for several weeks.

Clinical features

Substantial ingestion produces epistaxis, gingival bleeding, widespread bruising, haematomas, haematuria with flank pain, menorrhagia, gastrointestinal bleeding, rectal bleeding and haemorrhage into any internal organ

Severe blood loss may result in hypovolaemic shock, coma and death.

The first clinical signs of bleeding may be delayed and patients may remain anticoagulated for several days (warfarin) or days, weeks or months (long-acting anticoagulants) after ingestion of large amounts.

The INR (International normalised ratio)

should be measured 36-48 hours post exposure. If the INR

is normal at this time, even in the case of long-acting formulations, no further action is required.

If there is no active bleeding and the INR is < or =4.0, no treatment is required; if the INR is > or =4.0 phytonadione 10mg should be administered intravenously.(watt W BE ,2005)

Results

Retrospective study period was from September 2011 to september 2014.

Total 62 patients were admitted with rodenticide poisoning during this period in ACME ,Pariyaram which satisfied the inclusion criteria.. Out of which 28 were females(45%) and 34 (55%) were males. Commonest age group was between 20 to 30 yrs - 34 patients (55%). Most common mode of poisoning was suicidal -52 patients(83%). Commonest route was ingestion.

Most common presenting symptoms were nausea and vomiting and seen in 50 patients(80%) and abdominal pain in 34 patients(54%) .Few cases also presented with palpitation and sweating 6 patients presented in shock.

Deranged lab findings on third day of admission included leucocytosis in 30 patients and prolonged prothrombin time in 18 patients. Increased serum bilirubin in 11patients (17%).

Most common rodenticide was yellow phosphorous (paste form) 33 patients(53%) .Complications developed in 11 cases of yellow phosphorous ingestion. There were 20 patients with zinc phosphide powder ingestion and 9 patients with superwarfarin (bromadiolone) ingestion. 8 patients developed cardiogenic shock. 4 patients in our study remained asymptomatic for 2 days then developed delayed hemorrhagic complications. 4 patients who developed complication went for discharge against medical advice.

Overall mortality was 7 patients(11.2 %).Most lethal agent was 3% yellow phosphorous followed by zinc phosphide. Of the 7 patients expired ,5 patients ingested yellow phosphorous and 2 patients Zinc phosphide powder .Cause of death in Zinc phosphide was cardiogenic shock while in yellow phosphorous was hepatic failure and multiorgan dysfunction. There was no mortality in patients with ingestion of cakes which contained anticoagulants.Also those patients who presented earlier for the treatment , within first 4 hours ,had a better outcome than those who presented after 4 hrs of ingestion.

4 patients who developed complications went for discharge against medical advice. 4 cases of our study developed symptoms after 2 days of rodenticide ingestion only which shows that early discharge should be avoided in rodenticide poisoning .

Discussion

In our study , most of the patients ingested phosphorous compounds. Of the 62 patients 33 patients took yellow phosphorous and 20 patients took zinc phosphide powder and 9 patients took super warfarin .All these rodenticides are easily available in the study locality Kannur, Kerala. Majority of patients were young in 20-30 age group. Other studies in India like Indranil banerjee et al in West Bengal and K M Ramesh et al in Karnataka also found that younger age group 20-30 yrs as commonly affected.In our study 50 patients(80%) were having underlying psychiatric illness.

Patients presented with ingestion of yellow phosphorous developed liver failure followed by multi organ dysfunction. Mortality for yellow phosphorous was 15% (5 of the 33 patients) , for zinc phosphide 10% (2 out of 20) and there was no mortality for ingestion with super warfarins.

Many patients in our study were given N-acetyl cystiene even though its role in rodenticide poisoning is not well established .

Conclusion

Common rodenticides ingested were Yellow phosphorous and zinc phosphide with high morbidity and mortality rate. Earlier presentation had a better outcome.

Patients presented with superwarfarin ingestion had an excellent outcome.

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