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Clinical Profile and Outcome of Patients Presenting to ER with Acute Rodenticide Poisoning

Kathyayini V R[1], Gireesh Kumar K P[2], Sreekrishnan T P[3], Manna Maria Theresa[4], Vivek U[5], Riaz Ahamed D[6]

Author's Affiliation:

[1,4-6]Postgraduate Resident, [2]Head of Department, [3]Assistant Professor, Department of Emergency Medicine, Amrita Institute of Medical Sciences, Kochi, Kerala 682041, India.

Corresponding Author:

Kathyayini V R, Postgraduate Resident, Department of Emergency Medicine, Amrita Institute of Medical Sciences, Kochi, Kerala 682041, India.

E-mail: vrkathyayini@gmail.com

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Abstract

Background: Rodenticide consumption is one of the most common suicidal poisoning. The compounds vary in their chemical composition, mechanism of action, lethal dose and effects. Absence of a specific antidote along with rapid deterioration to multi organ failure has escalated the mortality. This study is intended to predict the clinical profile and the outcome of patients presenting to the ER of a tertiary care center in South India with acute rodenticide poisoning.

Methods: A retrospective cross sectional analysis of all acute rodenticide poisoning cases presented to the ER of a tertiary care centre in south India during the period between 1st January 2018 to 1st December 2019 after fulfilling both inclusion and exclusion criteria was done. The clinical profile and outcome of patients presenting with acute rodenticide poisoning were assessed.

Results: A total of 39 patients were included in the study population, of which 18(46.2%) were females and 21 (53.8%) were males. The mortality associated with rodenticide poisoning is 33.3%. Out of the 39 patients, 21 patients had acute liver failure , 16 had met the Kings college criteria for liver transplant, but liver transplant was done in only 2 patients and out of which 1 survived. On detailed analysis,two parameters SGOT, SGPT and the presence of hepatic encephalopathy correlate with mortality.

Conclusion: The study revealed that, the mortality associated with rodenticide poisoning is high (33.3%) and certain factors like SGOT, SGPT and the presence of hepatic encephalopathy are strong predictors of mortality in acute rodenticide poisoning.

Keywords: Rodenticides; Acute liver failure; Kings College Criteria.

Introduction

Rodenticide poisoning is associated with high morbidity and mortality in patients presenting to emergency department with accidental and deliberate poison ingestion. An annual incidence of 500,000 cases has been reported.[1] Reports showed that the rate of poisoning in developing countries ranges from 0.07 to 0.7%.[2] In India, suicidal and accidental poisoning of rodenticide with yellow

phosphorous has more incidence of drug induced acute liver failure compared to paracetamol.[3] It is cheap and easily available in the market, in various forms such as powder, cake, paste etc. Coumarins, aluminum phosphide, zinc phosphide, and yellow phosphorous are more easily available and commonly used rodenticides for deliberate self-harm.[4] Rodenticide poisoning can range from asymptomatic presentation to life threatening complications and death, based on the amount and type of rodenticide ingested. No specific antidote has been identified and hence supportive care forms the mainstay of treatment.[5] This study assess the clinical profile and outcome of patients presenting to emergency room with rodenticide poisoning.

Methodology

Selection and Description of Participants

A retrospective cross sectional analysis of all rodenticide poisoning cases presented to our ER during the period between 1st January 2018 to 1st December 2019 after fulfilling both inclusion and exclusion criteria.

Inclusion criteria includes acute rodenticide poisoning cases and age more than 15 years.

Exclusion criteria includes pregnancy, co-ingestion of other poisons, chronic poisoning cases and patients who got transferred to other facilities.

Technical Information

The study was conducted in the Emergency Medicine Department of Amrita Institute of Medical Sciences, Kochi. The data collected from each patient includes age, gender, time of presentation to ED after ingestion, bilirubin, creatinine, SGPT, SGOT and PT INR. The clinical, demographic profile and outcome of the patients presenting to ER with acute rodenticide poisoning were recorded and evaluated.

Statistics

Data was entered in MS Excel and analyzed using IBM Statistical package for Social version 20 software. The computed variables include age, gender, time of presentation to ED after ingestion, SGOT, SGPT, PT INR, creatinine at the time of presentation and on the fifth day of ingestion and the outcome of patient.

Results

The current study was a retrospective cross sectional study conducted in patients presented to Emergency Room with acute rodenticide poisoning after fulfilling both inclusion and exclusion criteria. A total of 39 patients were enrolled with acute rodenticide poisoning. The base line characteristics of the study population is furnished in table 1 and table 2.

Table 1: Mean distribution of demographic variables and clinical parameters.

Variable	Mean	Std Deviation
Age	23.56 years	6.125
Time after Ingestion	67.51 hours	53.278
Systolic BP	110.72 mm of Hg	15.931
Diastolic BP	68.03 mm of Hg	12.531
Heart Rate	88.33 beats /min	22.284
Respiratory Rate	21.41/min	3.740

Table 2: Mean distribution of Biochemical parameters.

Variable		Mean	Std Deviation
Bilirubin at Time of Presentation	alive	3.130000 mg/dl	3.2330097
	dead	6.640769mg/dl	4.3091327
SGOT at Time of Presentation	alive	597.830769mmol/L	619.8910335
	dead	1310.184615mmol/L	1908.9094093
SGPT at Time of Presentation	alive	476.138462mmol/L	595.8429787
	dead	820.630769mmol/L	915.0423901
PT at Time of Presentation	alive	37.626923sec	24.4612765
	dead	53.384615sec	19.6294781
INR at Time of Presentation	alive	3.698077	2.8275304
	dead	5.344615	2.3945202
Creatinine at Time of Presentation	alive	0.753846mg/dL	0.2125103
	dead	1.209231mg/dL	0.7600051
SGOT on 5th Day of Ingestion	alive	2224.44mmol/L	2296.2329537
	dead	468.191304mmol/L	338.8173575
SGPT on 5th Day of Ingestion	alive	1034.222mmol/L	744.2188
	dead	400.548mmol/L	330.2953
PT on 5th Day of Ingestion	alive	57.889sec	15.7833
	dead	44.652sec	27.7920
INR on 5th Day of Ingestion	alive	5.8889	1.83333
	alive	3.130000 mg/dl	3.2330097

A total of 39 patients were included in the study population, of which 18 (46.2%) were females and 21 (53.8%) were males (Fig. 1). The mean age of presentation was 23.56 years, out of which 26 were less than 25 yrs of age. In our study 97.4% had suicidal ingestion of rodenticide and 2.6% had homicidal ingestion. The mortality associated

with rodenticide poisoning is 33.3%. Out of the 39 subjects, 8 (20.51%) had consumed bromadiolone, 20 (51.28%) consumed yellow phosphorus and 11 (28.2%) had consumed Zinc phosphide (Fig. 2), of which yellow phosphorus caused highest mortality (40%) (Fig. 3). The median time in which the patients presented to our ED after rodenticide ingestion is 72hrs (minimum 2hrs and maximum 216 hrs). Among the study population, 76.9% had nausea and vomiting as initial symptoms, 30.7% had abdominal pain as presenting symptom, 20.5% had giddiness and 2.5% had seizures (Fig. 4). In our study 10.2% were asymptomatic. SGOT and SGPT on the 5th day of ingestion correlates with the mortality associated with rodenticide poisoning (p values: SGOT – 0.028, SGPT – 0.008). Presence of hepatic encephalopathy has strong correlation with mortality(p value- 0.001). Bilirubin and Creatinine levels correlates with mortality associated with rodenticide toxicity (p value: 0.05 and 0.036 respectively). Out of 39 patients, 21 patients had acute liver failure, 16 had met the Kings college criteria for liver transplant, but liver transplant was done in only 2 patients and out of which 1 survived.

Table 3: Criteria for Liver transplantation in acute Liver Failure.

Criteria of King's College, London
Acetaminophen cases
Arterial pH <7.3, or
INR >6.5 andSerum Creatinine >3.4 mg/dL
Non Acetaminophen cases
INR >6.5, or
Any three of the following:
Age <10 years or >40 years
Duration of jaundice before encephalopathy >7 days
Etiology: non A, non B hepatitis, idiosyncratic drug reaction, in determinate
Serum bilirubin >17.6 mg/dL
INR>3.5(PT>50 seconds)

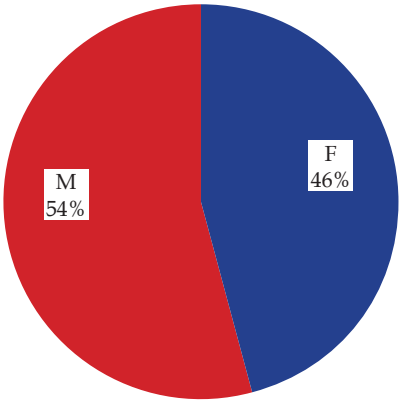

Fig. 1: Graphical representation of the gender distribution of poisoning in the study population.

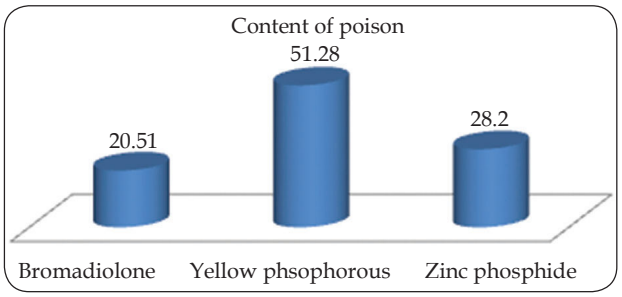

Fig. 2: Graphical representation of the distribution of constituents of rodenticide.

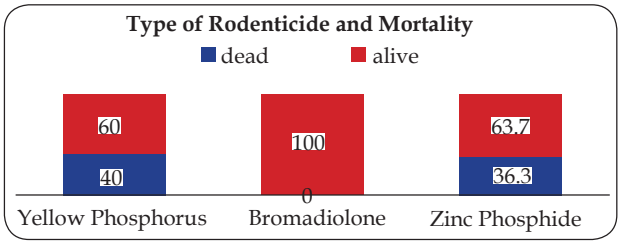

Fig. 3: Graphical representation of constituents of rodenticide and their mortality rate.

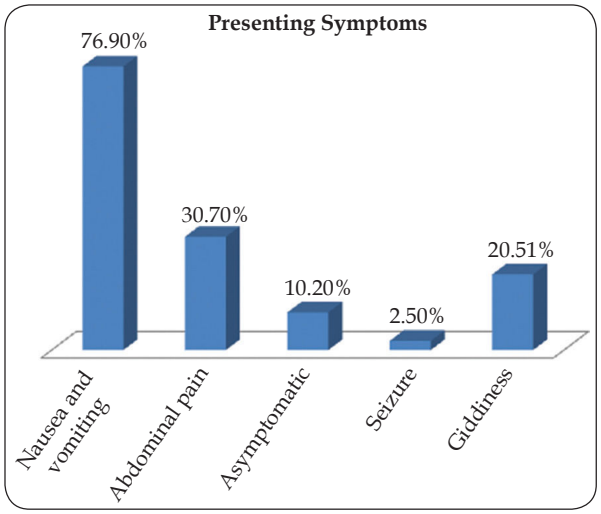

Fig. 4: Graphical represntation of presenting symptoms in rodenticide poisoning.

Discussion

Rodenticides are any commercially available toxic product that is used in killing rats, mice, squirrels and other small rodents. Rodenticide toxicity is one of the most common poisoning globally especially in the developing countries. They vary in constitution, and includes toxic compounds like zinc phosphide, yellow phosphorus, sodium monofluoro acetate, fluoro acetamide, arsenic, thallium and superwarfarin compounds.[6] The compounds have different mechanism of actions, toxic doses and lethal effects. Hence each compound constitute a different toxidrome.

Out of the 39 patients 46.2% were females and 53.8% were males. This is comparable to the study done by Arunkumar et al in Stanley Medical College.[6] But in the study conducted by Prasad Bharat. S et al, 53.34% were females and 46.6% were males. The mean age of presentation was 23.56 years. This is comparable with the study conducted by Prasad Bharat .S et al in Amrita Institute of Medical Sciences where the mean age was 23.06 years.[7] Suicidal tendencies are more common in the third decade of life.[8]

In our study 20.51% had consumed bromadiolone, 51.28% consumed yellow phosphorus and 28.2% had consumed Zinc phosphide of which, yellow phosphorus caused higher mortality (40%). Contrastingly Kavitha Balasubramaniam et al reported that 37.5% had consumed bromadiolone, while 33.3% had zinc phosphide and 21.7% had yellow phosphorus.[9] Nalabothu et al, reported similar distribution to the current study – 44.3% had consumed yellow phosphorus, followed by 28.9% zinc phosphide and 21.6% bromadiolone.[10]

The mortality associated with rodenticide poisoning in the current study is 33.3%. The mortality associated with yellow phosphorus poisoning in study conducted by Arunkumar et al was 50% while it was 40% in our study.[6] There was a mortality of 36.3% associated with Zinc phosphide toxicity reported in our study while it was 46.66% in the study conducted by Prasad Bharat et al.[7]

In our study 97.4% had suicidal ingestion of rodenticide and 2.6% had homicidal ingestion. Study by Kavitha subramaniam et al 93.4% had suicidal ingestion, 2.2% had homicidal ingestion and 4.4% had accidental mode of consumption[9]. In our study accidental ingestion cases are not reported probably because patients in age group less than 15 years were excluded. Among the study population, 76.9% had nausea and vomiting as initial symptoms, 30.7% had abdominal pain as presenting symptom, 20.5% had giddiness and 2.5% had seizures. In our study 10.2% were asymptomatic. Most of the patients had overlap of symptoms during presentation. In a study conducted in Manipal, 85.7% had nausea and vomiting and 56.7% had abdominal pain as presenting symptoms.[10]

Out of 39 patients, 21 patients had acute liver failure , 16 had met the Kings college criteria for liver transplant(table 3), but liver transplant was done in only 2 patients and out of which 1 survived. There is no specific and effective antidote against rodenticide poisoning , liver transplant forms the main life saving therapy when patients develop acute liver failure. Some patients in acute liver failure following rodenticide poisoning who were conservatively managed had improved.

In this study, SGOT and SGPT on the 5th day of ingestion correlates with the mortality associated with rodenticide poisoning (p values :SGOT – 0.028,SGPT – 0.008).But the SGOT and SGPT values at the time of presentation had no correlation with mortality. The alterations in liver enzymes present later, mostly 72 hours after the ingestion. Patients with no significant alteration in SGOT and SGPT should also be closely monitored as the alterations can set in later. Bilirubin and Creatinine levels at the time of presentation correlates with mortality associated with rodenticide toxicity (p value :0.05 and 0.036 respectively). Presence of hepatic encephalopathy was shown to have strong correlation with mortality(p value- 0.001) in our study. In a study conducted by Vivek Saraf et al, presence of Hepatic encephalopathy and an INR value of more than 6 were the best predictors of mortality[11]. But in our study INR value at the time of presentation as well as after 5 days of presentation showed no correlation with mortality.

Study limitation

Most of the cases presented to our ER after initial management and the mean time of presentation was 72 hours. Hence the significance of initial interventions like early gastric lavage, early administration of N acetyl cysteine etc could not be assessed.

Conclusion

In our study, out of the 39 patients, 21 patients had acute liver failure. Among patients with ALF, 16 patients had met the Kings college criteria for liver transplant. Liver transplant was done in only 2 patients and out of which one survived. The mortality associated with rodenticide poisoning is 38.2%. In our study SGOT and SGPT on the 5th day of ingestion correlates with the mortality associated with rodenticide poisoning (p values :SGOT – 0.028,SGPT – 0.008). Presence of hepatic encephalopathy has strong correlation with mortality (p value- 0.001). Hence transaminase (SGOT & SGPT) values on the 5th day of ingestion and presence of hepatic encephalopathy could be used as predictors of mortality.

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