OPEN ACCESS

Saudi Journal of Medical and Pharmaceutical Sciences
Abbreviated Key Title: Saudi J Med Pharm Sci
ISSN 2413-4929 (Print) | ISSN 2413-4910 (Online)
Scholars Middle East Publishers, Dubai, United Arab Emirates
Journal homepage: https://saudijournals.com

Original Research Article **Pharmacy Practice**

Toxicological Profile of Poisoning Cases in a Tertiary Care Hospital

Arathy Radhakrishnan[1], Jesmi George[1], Amith. S[1], Mr. Naveen Kumar Panicker[2*], Dr. Binu Upendran (MD, DNB (MED)[3]

[1]Pharm D Interns, ST Joseph's College of Pharmacy Cherthala Kerala, India
[2]Assistant Professor, Department of Pharmacy Practice, St Joseph's College of Pharmacy Cherthala Kerala, India
[3]DM Dnb Head of Nephrology Department Lourdes Hospital, Ernakulam Kochi, Kerala, India

DOI: 10.36348/sjmps.2022.v08i04.004 | **Received:** 27.02.2022 | **Accepted:** 04.04.2022 | **Published:** 13.04.2022

***Corresponding author:** Mr. Naveen Kumar Panicker
Assistant Professor, Department of Pharmacy Pharmacy Practice, St Joseph's College of Pharmacy Cherthala Kerala, India

Abstract

Our objectives were to identify the most common type and class of poisons, management, lab parameters affected, presence of underlying psychiatric illness, average hospital stay and complications.Retrospective observational study was conducted including all patients who presented with poisoning from 2016 to 2020.From 210 patients reviewed, consisting of 125 females and 85 males, intentional poisoning accounted for 149 cases while accidental poisoning accounted for 61 cases.133 cases were due to drug, 44 cases due to household products, 21 due to insecticide while alcohol, plant and chemical accounted for 4 cases each. Paracetamol was the most commonly misused drug. Most of the patients were managed with supportive measures alone. Antidotes were used in 32 cases. 52 of the intentional and 4 of the accidental poisoning had underlying psychiatric illness. Anticonvulsant poisoning had highest average hospital stay.Only mild variations were observed in lab parameters.11 patients developed complications due to poisoning.

Keywords: Poisoning, Drug, Psychiatric illness, Antidote, Lab parameters, Complications.

1. INTRODUCTION

Toxicology was earlier defined as "the science of poisons [1]". WHO defines poison as any substance that causes harm to a living being? Both pharmacokinetic and pharmacodynamic principles are vital in the assessment and proper management of patients exposed to a poison [2]. The basis of treatment of every poisoned patient includes supportive measures, timely GI decontamination as well as elimination procedures. Most of the specific poisoning treatments such as activated charcoal, whole bowel irrigation, and extracorporeal elimination, chelating agents, antitoxins and urinary alkalinization work by altering the kinetics of the poison [2]. In minor poisoning, symptomatic and supportive treatment is generally not required, whereas this normally is the case for moderate poisoning. In severe poisoning, advanced symptomatic and supportive treatment is always necessary.

1.1. Present scenario of poisoning

Poisoning is said to be the fourth most common cause of death in India. It has been estimated that acute poisoning accounts for 5-6 deaths per lakh of population every year [3]. Higher rates of morbidity and mortality maybe due to the lack of specialized services [2]. WHO reports state nearly 200,000 people die worldwide from accidental poisoning, of which 84 % occur in low and middle income countires [4]. In 2017, the Annual Report of the American Association of Poison Control Centers had recorded above two million cases of exposure to toxic agents.Analgesics were the most common poison seen in adults over age 20 (11.2%) followed by hypnotics, sedatives, antipsychotics and antidepressants [5].

1.2 Importance of the present study

Although a few studies have been conducted on poisoning, most of them are focused on some specific objectives such as most common type of poison or their management. Through our study, we have covered all the relevant information pertaining to a poisoned patient.This will be the first study conducted in India including all relevant details such as clinical features, lab parameters affected, complications and management.

2. EXPERIMENTAL SECTION

MATERIALS AND METHODS

Retrospective observational study conducted over a period of one year, including all patients who

fulfilled the inclusion and exclusion criteria over a period of five years from 2016-2020.

2.1 Aim

To document the causal factors, clinical profile, management and outcomes of patients with poisoning admitted to a tertiary care hospital.

2.2 Goals of study

1. To identify the most common type of poisoning encountered.
2. To identify the most common class of drugs encountered in poisoning.
3. To identify different aspects of management for each type of poisoning encountered.
4. To check for the presence of underlying psychiatric illness in intentional poisoning cases.
5. To find out the average hospital stay for each type of poisoning.
6. To point out the lab parameters affected by each type of poisoning.
7. To identify complications (if any) encountered with each type of poisoning.

2.3 Study site

This study was carried out by collecting details of patients who presented with case of poisoning to Lourdes hospital Kochi. It is a 500 bedded multispeciality tertiary care referral teaching hospital with wide range of amenities. Ethical clearance was obtained from institutional ethical committee.

2.4 Study population

All patients who presented to the hospital with poisoning during the study period were included.

2.5 Inclusion criteria

1. All poisoning cases admitted to the hospital during the study period
2. All emergency visits of poisoning cases
3. Patients of all ages
4. Patients of both genders

2.6. Exclusion criteria

1. Patients admitted with poisoning due to bites.

2.7. Sample size

Sample size (*n*) was calculated with the help of a statistician, a total of 210 patients were included in the study (sample size required was found to be 185 patients).

2.8. DATA COLLECTION

A specially designed data collection form was prepared and relevant data including demographic details, medical and medication history, social history, details of management, current medications were collected. All the required details were collected from medical records and from Lourdes mediware system.

2.9. STATISTICAL ANALYSIS

The collected data were compiled using Microsoft Excel. Analysis was carried out using SPSS software and the results were presented using tables and graphs. The results obtained were compared with relevant studies. Statistical tests such as chi-square test and odds ratio were carried out.

3. RESULTS AND DISCUSSION

3.1. Demographic details

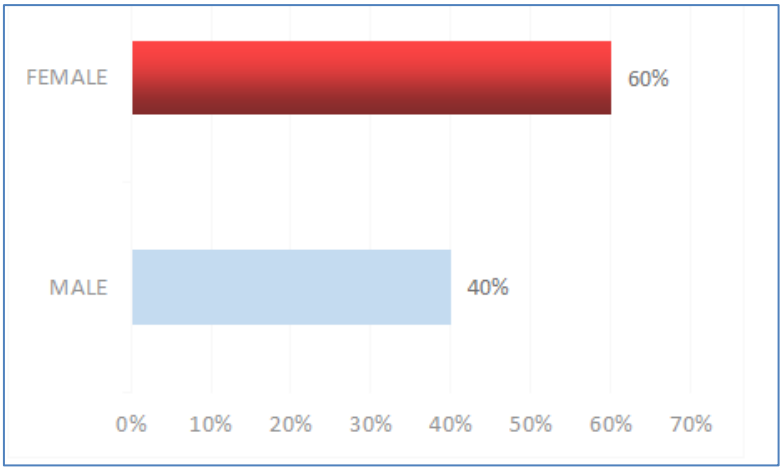

Fig-1: Gender distribution

From a total of 210 patients, 125[60%] were females and 85[40%] were males. Majority of cases were reported from the age group of 21 to 40 years [39%]. A total of 82 cases were reported from this age group which comprised of 28 male patients [13.33%] and 54 female patients [25.71%]. As per our study results, maximum number of cases were reported in the year 2018 - 73 cases [34.7%]. Mean age was found to be 32.2286±19.6032 years. The most commonly observed age was found to be 18 years (10 patients).

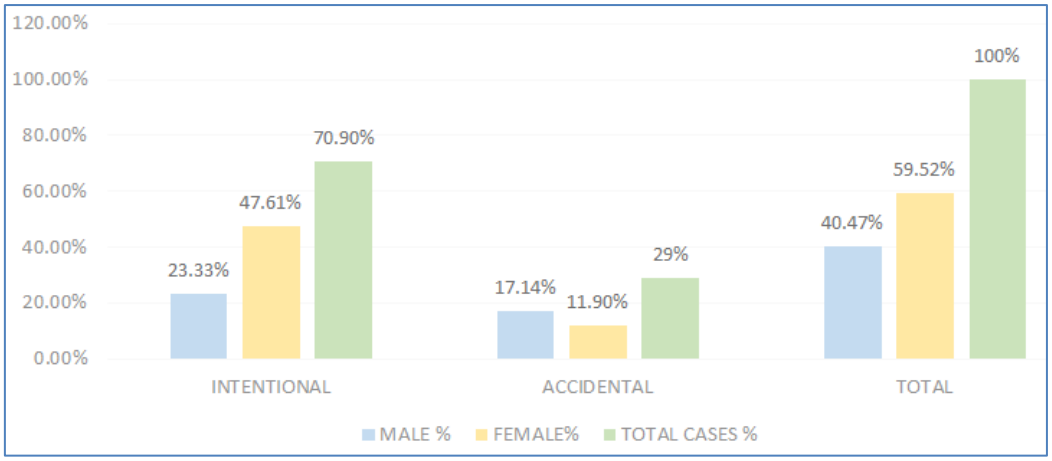

Fig-2: Distribution of intentional and accidental poisoning cases

From 210 cases, intentional poisoning accounted for 149 cases [70.9%] in which 23.33% were males and 47.61% females. 61 cases [29%] were accidental poisoning in which 17.14% were males and 11.9% females. Since the test statistic p value is <0.001, there is statistically significant association between intentional poisoning and gender. From the total of 125 females, majority (80%) reported due to intentional poisoning.

3.2 Different types of poisons encountered

Out of the 210 cases reported, it was found 63.3% (133 cases) were drug poisoning, 21%(44 cases) were due to household products, 10% (21 cases) were due to insecticide poisoning while alcohol, plant and chemical poisoning accounted for 1.9% (4 cases) each.

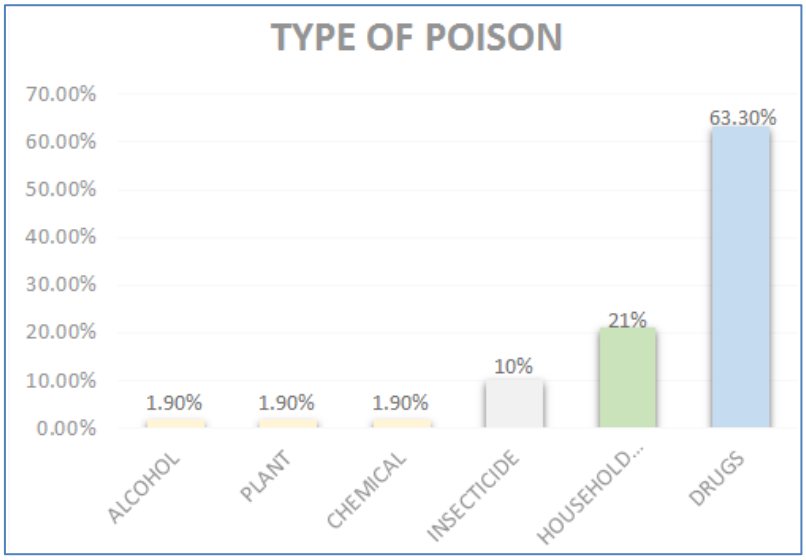

Fig-3: Type of poison

Majority of the cases reported in our study were drug poisoning (test statistic was 42.401 with a p-value <0.001), followed by household products (including kerosene, fabric solution, dettol, phenol etc) and insecticides (pesticides, herbicides, rodenticides). Chemical poisoning is usually from exposure to occupational hazards such as accidental inhalation of ammonia, sulphur dioxide and ethylene oxide fumes. A vast majority of drug poisoning cases were due to use of self -medications which the subjects were taking for their medical condition. More than one drug was commonly used for poisoning.

Drugs were most commonly misused in case of intentional poisoning (51.42%) whereas household products accounts more in case of accidental poisoning(12.85%).

3.3 Different classes of drugs misused for poisoning

Table-1: Classes of drugs misused as poisoning

Class of drugs	Number of cases	Percentage %
Anti-asthmatic	1	0.75%
Anti-histamine	1	0.75%
Antibiotic	1	0.75%
Anti-spasmodic	2	1.5%
Mood stabilizers	2	1.5%
Nsaid	2	1.5%
Hypnotics	3	2.25%
Anti-hypertensive	4	3%
Anti-depressant	4	3%
Anti convulsant	4	3%
Anti-diabetic	6	4.51%
Thyroid hormone	8	6.01%
Unknown drug	8	6.01%
Anti-psychotic	11	8.27%
Anti-anxiety	18	13.53%
Anti-pyretic	24	18.04%
More than one drug	34	25.56%
Total	**133**	**100%**

Drugs are most commonly misused for poisoning. The results obtained from our study indicate that more than one drug was more frequently used for poisoning which accounted for about 25.56% of the cases .This was followed by paracetamol 18.04% which is commonly used as an analgesic and an antipyretic. Its easy availability as an over-the-counter drug may have contributed for its higher use in poisoning. Anti - anxiety agents contributed for about 13.53% of the cases, and the rest of the classes had minor contributions. Benzodiazepines are a group of drugs which find multiple uses. They can be used for a wide variety of conditions. From a total of 210 cases, 22 cases (10.476%) were due to BZD poisoning.

3.4 Management of poisoning

Poisoning cases usually require only decontamination and elimination methods for their management. Use of other supportive measures may also be employed. Drugs such as antacids and anti-emetics were also commonly employed.

3.4.1 Use of antidotes

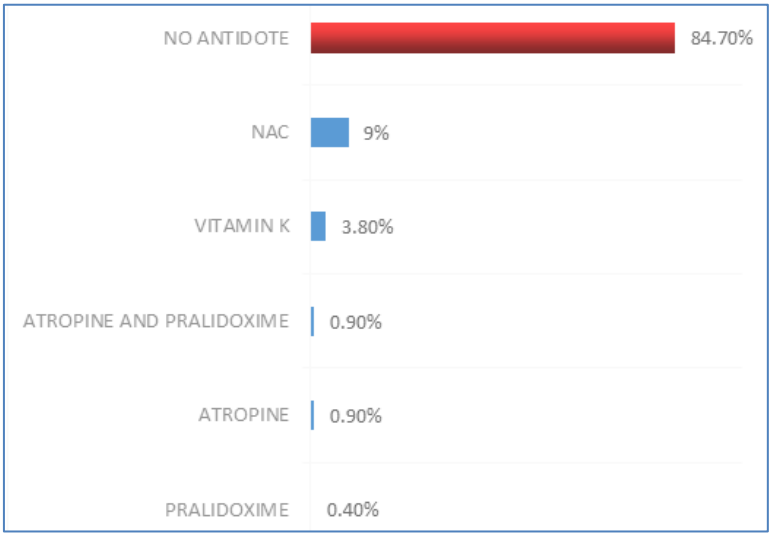

Fig-4: Antidotes used in different cases of poisoning

Most of the poisoning cases were managed effectively with supportive measures and did not require the use of antidote (84.7%). The remaining 15.3% included 19(9%) cases of paracetamol poisoning treated with NAC, 2 cases of organophosphate poisoning treated with atropine and pralidoxime (0.9%), 2 cases treated with atropine alone (0.9%),1 case of organochlorine poisoning treated with pralidoxime (0.4%) and 8 cases of rat poisoning treated with Vit K (3.8%).

3.4.2 Initial management

Almost all of the poisoning cases were managed with at least either one of following: stomach wash, activated charcoal, IV fluids or other supportive measures like supplemental oxygen, dextrose in case of hypoglycaemia and correction of electrolyte disturbances.

Stomach wash was given in 138 cases (65.71%), activated charcoal in 85 cases (40.47%), IV fluids in 135 cases (64.28%) and other supportive measures were given in 140 cases (66.66%).

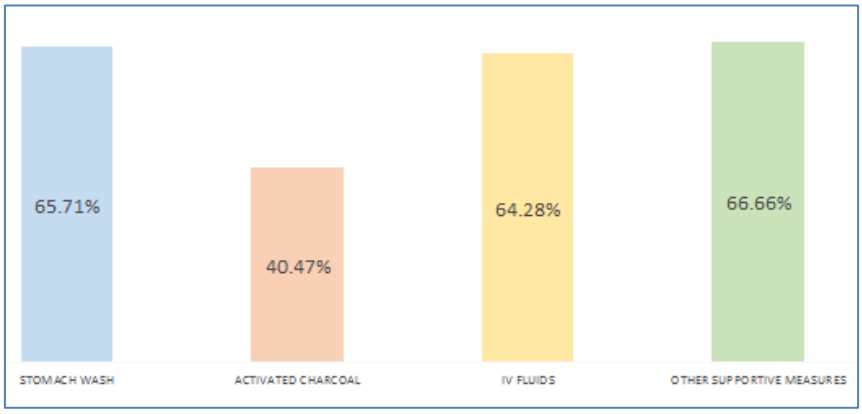

Fig-5: Initial management of poisoning

3.5. Presence of psychiatric illness

Presence of psychiatric illness is usually a major contributing factor in deliberate self-harm. Measures may be taken to prevent such cases by providing education to the patient or their family members.

Psychiatric illness in intentional poisoning

Of the 210 cases, 149 cases were intentional and 61 cases were accidental. From the intentional poisoning cases, 52 cases [34.8%] were having psychiatric illness in the past, comprising of 20 male patients and 32 female patients. Of the 61 cases of accidental poisoning, 4 patients had psychiatric illness (6.5%).

Hence, from the total of 210 cases, 154 (73.3%) patients did not have any underlying psychiatric illness while a total of 56 (26.7%) patients had a history. We found statistically significant association between intentional poisoning and psychiatric illness with a test statistic of 17.78 (p value less than 0.001). The odds of intentional poisoning in patients with psychiatric history was 7.639 times higher than those without a history (95% CI 2.625- 22.233).

We had 56 psychiatric cases out of which 17 were newly diagnosed after being admitted with poisoning condition.

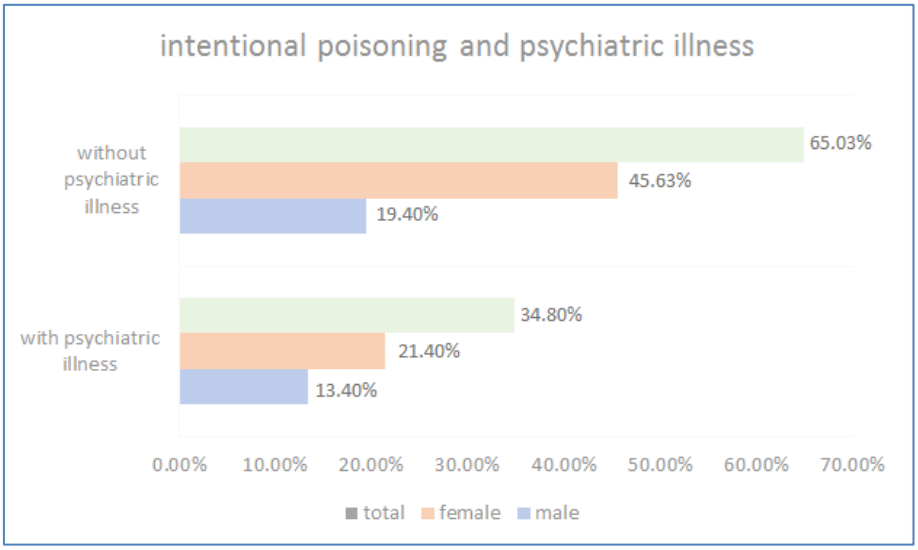

Fig-6: Presence of psychiatric illness in intentional poisoning

3.6 Average hospital stay

By estimating the average hospital stay for different types of poisoning cases, we get a rough idea about the severity of the poisoning. Patients with severe cases of poisoning are admitted for longer period of time while milder cases of poisoning may not even require admission and may be treated as outpatients. Average hospital stay is highest for plant poisoning cases which was 5.25 days and least for chemical poisoning which was 1.75 days.

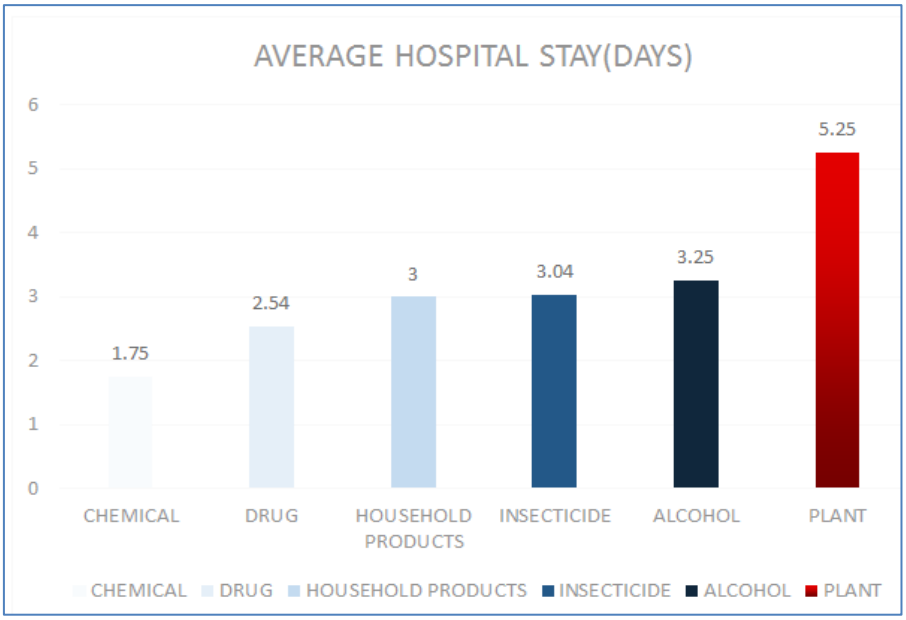

Fig-7: Average hospital stay for different classes of drugs

3.7. Lab parameters affected by poisoning

In most of the poisoning cases, laboratory parameters like TC,ESR , WBC counts were elevated while some of the lab parameters remained within their normal limits . We have tabulated only lab parameters which were either higher or lower than the normal limit.

In alcohol poisoning, SGOT elevations were seen in 3 of the patients while SGPT elevations in 2 patients. Total bilirubin, direct bilirubin and uric acid were elevated in 2 out of 4 patients. 8 out of 10 patients admitted with intake of rat poison had INR elevations indicating a risk for bleeding.

In case of chemical poisoning, PT elevations were observed in 50% (2cases) and in poisoning due to household products; there were no significant deviations in lab parameters.

From 4 cases of poisoning by anti-hypertensives, 2 patients had hypotension. One patient had BP as low as 60/40mmhg while another patient had 100/60mmhg

From the 34 cases of poisoning by ingestion of more than one drugs, ESR was elevated in 15 cases. A single case of poisoning by antihistamine was reported and the patient had decrease in both calcium and magnesium levels.

From the 24 cases of poisoning by antipyretics, ESR was elevated in 9 cases and TC in 8 of the cases. FBS and neutrophil were elevated in 6 patients. Total bilirubin was elevated in 4 patients while direct bilirubin was elevated in 5 patients. SGOT and SGPT were within normal limits in most of the patients. PT was elevated in 15 of the patients. PT elevation and hypotension are the characteristic features of paracetamol poisoning.5 patients had BP 100/60 mmhg, 3 patients 110/70 mmhg and 1 patient with 100/70 mmhg.

3.8. Presence of complications in each type of poisoning

Of the 210 cases reported, only 11 (5.2%) cases had complications due to poisoning. Of the 11 cases, highest number of complications were seen due to household products -5 cases[45.45%] while both plant and drug poisoning caused complications in 3 cases each[27.27%].

All the patients who ingested odollum seeds developed heart problems like heart block and bradycardia since it is a known cardiotoxic agent. Patients who ingested household products like phenol and harpic developed complications associated with GIT.

3.9. Different complications encountered

Name of poison	Type of poison	Complication
Paracetamol	Drug	Coagulopathy
Paracetamol	Drug	Acute pharyngitis
Phenobarbitone	Drug	Cardiac arrest, hypoxic encephalopathy
Odollum	Plant	Sinus bradycardia
Odollum	Plant	Complete heart block, Acute kidney failure
Odollum	Plant	Heart block
Chlorine water	Household product	Esophageal erosion, Reflux esophagitis
Phenol	Household product	Superficial ulcers on Gastric antrum
Phenol	Household product	Dysphagia
Kerosene	Household product	Chemical pneumonitis
Harpic	Household product	Acute errosive gastritis

Time interval between event and arrival to hospital

The time period within which the patient gets medical attention is crucial in case of poisoning. Patients who present within a few hours of poisoning can be treated easily than those who present later. Our data showed that majority of the patients (61.2%) had presented to the hospital within 5 hours of poisoning. The early presentation of patients may have helped in preventing the development of complications.

4. DISCUSSION

Drugs were the most common type of poison while paracetamol was the most common class of poison. Majority of the lab parameters were within normal limits. Most of the patients were managed with supportive measures alone. Antidotes were used in 32 cases. A minor proportion of patients had underlying psychiatric illness. Anticonvulsant poisoning had highest average hospital stay. Only 11 patients developed complications due to poisoning.

Our study paints a picture of the present trends in poisoning. Proper information about the commonly encountered poisons will help healthcare providers to quickly identify the poison and provide the most accurate management at the earliest, thus saving the patient's life. The study also helps to identify the trends in poisoning over the years. Identification of the most commonly encountered class as well as type of poison will help the healthcare providers to be prepared for future encounters. Measures may be taken accordingly to prevent such poisoning by restricting their use or educating the public. Development of standard treatment guidelines can be done for most common poisons by either adopting national or international guidelines or by preparing new standard treatment guidelines in accordance with the available guidelines. This will help ensure that the patient receives the most appropriate treatment at the earliest. By identifying the complications associated with each type of poisoning, care can be taken to look out for these in the future and treat them accordingly. Steps can be taken to assure the continuous availability of antidotes at all times. Emergency care and supportive measures can also be developed accordingly. Training maybe given to all health care providers regarding the management of the commonly encountered poisons. Presence of psychiatric illness is usually a major contributing factor in deliberate self-harm. Correct identification of causal factors will help in better clinical outcomes. Hence in short our study provides an insight into poisoning trends seen over the years. Enforcement of laws which ensure strict control over the sale as well as the use of drugs and other agents misused for poisoning may be helpful. Proper identification and timely management of poisoned patients can be life saving.

A study conducted by Vivek Gopinathan *et al*. on profile and pattern of poisoning cases in a tertiary care hospital showed females were higher(59.34%) in number than males. The results obtained from our study also show similar numbers. There was statistically significant association between sex and type of poison with a test statistic of 19.521(p value less than 0.05) [6].

A study conducted by Eswaran Maheswari *et al*. on poisoning cases presented to emergency department showed that 79.2% of the cases as intentional poisoning and 20.8% of the cases as accidental poisoning. Our results showed 149 intentional poisoning cases (70.9%) [2].

A retrospective study conducted by Vibha C Santosh *et al*. in a tertiary care hospital in Kerala reported that the most common poison was pesticides (52%) ollowed by drugs and chemicals (41.4%), and unknown substances were used in 6.5% cases [4]. In our study, the highest no of cases were drug poisoning (133 cases) followed by household products (44) and insecticides (21) [7].

Limitations of the study

Due to current covid-19 restrictions, we decided to conduct a retrospective study. The results of the study cannot be generalized since the study was conducted in a single centre.

5. CONCLUSION

Proper identification and timely management of patients can be life- saving.

Financial support

No financial supports were provided.

Ethical issue

Ethical clearance obtained from institutional review board.

Conflicts of interest

No conflict of interest.

6. ACKNOWLEDGEMENT

We thank God almighty and all staff from our college and faculty of the hospital at which our research was carried out.

7. REFERENCE

1. Hodgson, E. (Ed.). (2004). A textbook of modern toxicology. John Wiley & Sons.
2. Maheswari, E., Abraham, L., Chacko, C. S., Saraswathy, G. R., & Ramesh, A. C. (2016). Assessment of pattern, severity and outcome of poisoning in emergency care unit. *J Appl Pharm Sci*, *6*(12), 178-183.
3. Ali, I., Sawlani, K. K., Himanshu, D., Chaudhary, S. C., Usman, K., Atam, V., & Mohd, P. K. (2017). Study of pattern and outcome of acute poisoning cases at tertiary care hospital in North India. *J Evid Based Med Healthc*, *4*(6), 2349-2570.
4. Asawari, R., Atmaram, P., Bhagwan, K., Priti, D., Kavya, S., & Jabeen, G. A. (2017). Toxicological pattern of poisoning in urban hospitals of western India. *Journal of Young Pharmacists*, *9*(3), 315.
5. Smarczewski, M. A. P., Osternack, K. T., Garlet, Q. I., Oliveira, C. S., & Mello, R. G. (2021). Systematic review and single-centre toxicology study identified analgesics and benzodiazepines as the main causes of paediatric medication poisoning. *Acta paediatrica*, *110*(3), 1056-1065.
6. Gopinath, V., & Padmakumar, K. (2017). Profile and pattern of poisoning cases reported in a tertiary care teaching hospital in Kerala. *Indian J Forensic Community Med*, *4*(3), 185-188.
7. Santosh, V., & Menon, O. (2018). A retrospective study of clinical profile of acute poisoning in a tertiary care teaching hospital Kerala, India, during 2014-2016. *Int J Sci Stud*, 67-71.