

Original Research Article

Epidemiological and clinical profile of various plant poisons in a tertiary care center in South Tamilnadu, India

Meena Kumari, Pattu Swarna Latha*, Kalyanasundaram

Department of General Medicine, Tirunelveli Medical College Hospital, Tirunelveli, Tamilnadu, India

Received: 04 July 2019

Revised: 20 July 2019

Accepted: 30 July 2019

*Correspondence:

Dr. Pattu Swarna Latha,

E-mail: lathaamalan@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Plant poisoning is a common scenario in a toxicology unit. Some of the plants contain active components used as medicines. However, some of the plant constituents are poisonous with wide variety of clinical manifestations. Authors aimed to study the pattern of various types of plant poisons and clinical presentations and complications of various plant poisons admitted in our toxicological unit.

Methods: A total of 87 patients admitted with history of plant poison ingestion, in toxicological unit of Tirunelveli medical college were studied. It was a retrospective observational study and was done over a period of one year.

Results: Out of 87 cases studied, 92% were due to consumption with suicidal intention. Plant poisoning ranks second only to pesticide poisoning. Among the plant poisons encountered 66.6% were due to Oleander poison, followed by Datura (8%) and Glory lily (5.7%). Common parts of plant consumed by patients include seeds and plant oils. Vomiting and abdominal pain were the commonest presentations. Encephalopathy, dyselectrolytemia and arrhythmias were the notable complications in our study.

Conclusions: Early admission and prompt first aid and monitoring at tertiary care center are key to the reduced mortality. The study throws light on various manifestations, toxic parts and complications of plant poisons.

Keywords: Cardiotoxicity, Datura, Glory lily, Neem oil, Oleander seeds

INTRODUCTION

Poison is defined as a substance which acts deleteriously on human health. An ideal poison should be cheap, easily available, colorless, odorless, tasteless, highly toxic, capable of painless death. Even drug overdose will be considered as poisoning.¹

The poisonous nature of any part of the plant is due to production of toxic substances. Poisonous plants encountered in India include.²

1. Contact irritant poisons - Castor, Calotropis, Croton, Glory lily, Marking nut, Papaya and Red pepper
2. Cardio toxic glycosides - Aconite, Oleander
3. Neurotoxic - Calotropis, Cassava, Datura, Strychnos
4. Hepatotoxic plants - Neem
5. Miscellaneous - Areca nut, Cleistanthus.

Aims of the study were to prevalence and types of plant poisons and to study various manifestations of plant poisons and their complications.

METHODS

The study was done in Toxicology unit of Tirunelveli Medical College, South Tamil Nadu. 87 patients admitted from January 2018 to December 2018 with history of consumption of plant poisons were studied. This was a retrospective observational study. patients whose age was above 13 years upto 60 years of age were included in the study. Patients with cardiac diseases, liver diseases, kidney diseases and prior neurological diseases were excluded from the study. Daily monitoring and clinical and laboratory profile of patients were studied. Blood sugar, urea, creatinine, complete blood counts, bilirubin, Alanine transaminase, Aspartate trasaminase, Alkaline phosphatase were done for all the cases.

Statistical analysis was done using Chi-square and Fisher’s exact test and a P value <0.05 was considered significant.

RESULTS

A total of 87 cases of exposure to poisonous plants were included in the study. Female to Male ratio of distribution was 1.5:1. Mean age was 34+5.2 years. Out of the total cases admitted to the toxicology unit only 6.5% of cases were due to consumption of plant poisons. 80 cases (91.9%) were suicidal and 7 cases were poisoning due to accidental or consumption for medicinal purpose (Figure 1).

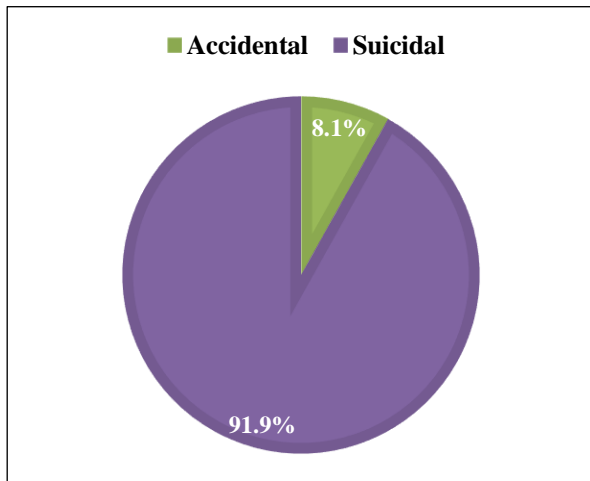


Figure 1: Mode of poisoning.

Plant poisoning was the second common poisoning in our study next only to pesticides (77.9%) (Table 1). Oleander poisoning was the commonest plant poison (66.6%) followed by datura (8%) and glory lily (5.7%). Bitter apple, Cactus extract, Eucalyptus oil, Castor oil and Neem oil poisoning were less common (Table 2). Various parts of the poisonous plants are encountered in our toxicological unit as enlisted in Table 3. Vomiting and abdominal pain are the common symptoms in patients who consumed plant poisons (Table 4).

Table 1: Pattern of common poisoning cases.

| Type of poison | Number of Patients | Percentage |
|---------------------------------|--------------------|------------|
| Pesticide poisoning | 1040 | 77.9 |
| Hair dye | 62 | 4.6 |
| Plant poisons | 87 | 6.5 |
| Rat killer | 29 | 2.1 |
| Kerosene poison | 28 | 2.0 |
| Phenol and household Toiletries | 80 | 5.9 |
| Miscellaneous | 10 | 0.7 |
| | 1334 | |

Table 2: Distribution of common plant poisons.

| Plant poison | Number of patients | Percentage |
|----------------|--------------------|------------|
| Oleander | 58 | 66.6 |
| Datura | 7 | 8.0 |
| Glory lily | 5 | 5.7 |
| Bitter apple | 4 | 4.5 |
| Cactus extract | 4 | 4.5 |
| Eucalyptus oil | 2 | 2.2 |
| Mehendi | 2 | 2.2 |
| Castor oil | 1 | 1.1 |
| Neem oil | 1 | 1.1 |
| Cleistanthus | 1 | 1.1 |
| Cannabis | 2 | 2.2 |
| | 87 | |

One patient had consumed bitter apple for laxative purpose as suggested by a traditional healer. Out of 6 cases of Datura poisoning, one patient had consumed it for treatment of abdominal pain and another patient, for treatment of asthma. 2 females had consumed Gloriosa superba for Pelvic inflammatory disease and dysuria. Neem oil and castor oil were consumed for abdominal pain.

Oduvanthalai poisoning presented with hypokalemia. 5 cases of oleander seed poisoning developed mild hyperkalemia which recovered with salbutamol nebulisation. 9 cases of oleander seed poisoning developed arrhythmias and 2 cases expired. Toxic encephalopathy was noticeable in neem oil, eucalyptus oil and datura ingestion.

A 1 case of Gloriosa superba ingestion subsequently developed coagulopathy, hematemesis and thrombocytopenia on day 4 which recovered in a week’s time. She also developed acute onset alopecia which started on day 9 (Table 5).

Unfortunately, in our study we did not encounter other poisonous plants intake such as Abrus precatorius, Parthenium, Atropa belladonna, Clesithantus, Cerebra odollum which are common in other parts of India. In our

study most of the exposures were of minimal toxicity probably due to ingestion of low quantity. All exposure were ingestional.

Table 3: Common plant poisons and their toxic parts.

| Plant | Common Names | Tamil | Toxic Parts |
|-----------------------|-------------------------|---------------------------|--|
| Cerebra thevetia | Yellow oleander | Arali | All parts including Leaves, Roots, Seeds |
| Datura Stramonium | Thorn apple Jimson weed | Oomathai | Seeds, Flower leaves |
| Citrullus Colocynthis | Bitter apple | Kumattikai | Fruit, Root, Pulp |
| Gloriosa superb | Flame lily | Senkaanthal/ Karthigaipoo | Tubers and roots |
| Opuntia dillenii | Cactus | Sappathi kalli | Latex extract |
| Ricinus communis | Castor Beans | Amanakku, Vilakkennai | Entire plant, esp. seeds |
| Azadirachta indica | Neem | Vembu | Seed, Oil |
| Calotropis procera | Milk weed, madar | erukampo | Milky latex |
| Lacusonia inermis | Henna | Maruthani | Leaves |
| Eucalyptus globulus | Eucalyptus oil | Nilgri oil | Oil |
| Cleistanthus collinus | Garai | Oduvanthalai | Leaves |

Table 4: Clinical presentations of plant poisons.

| Symptomatology | No of patients |
|-------------------|----------------|
| Vomiting | 55 |
| Abdominal pain | 62 |
| Giddiness | 14 |
| Palpitation | 49 |
| Seizures | 3 |
| Altered sensorium | 11 |

Table 5: Prevalence of complications in poisonous plant ingestion.

| Complications | No of patients |
|------------------|----------------|
| Hypokalemia | 1 |
| Hyperkalemia | 5 |
| Arrythmia | 9 |
| Encephalopathy | 11 |
| Alopecia | 1 |
| Coagulopathy | 1 |
| Thrombocytopenia | 1 |

DISCUSSION

Herbal therapy is widely prevalent in Indian society especially in rural areas. Contrary to the common belief that plant products are safe, some of them are toxic. Toxic plants and their products are used for deliberate self-harm due to the easy availability. It is estimated that close to 80% of people in different communities use different type of traditional medicine for the treatment of various disease.³

Medicinal plants are largely used in children, but the toxic effects of these plants are challenging issues.⁴⁻⁷

Findings have shown that traditional medicinal plants contribute significantly to acute poisoning in children.⁸ A large study in 1453 intoxicated cases showed that medicinal plants can cause acute poisoning and complications such as hepatic and renal failure in children.⁹

In developing world, poisoning with *Thevetia peruviana*, *Datura* species, and *Cleistanthus* cause significant number of deaths each year in South Asia. In our study, majority of cases were adults when compared to adolescents. The incidence had a slight female preponderance while a study showed equal distribution.¹⁰ In our study oleander is the commonest plant poison followed by *Datura*, *Gloriosa* contrary to the previous study.

Oleander

This is grown as ornamental plant all over India. There are three varieties: Pink oleander, yellow oleander and white oleander



Figure 2: Yellow oleander.

The *vetia peruviana* (yellow oleander) seeds are highly toxic although all parts of the plant are poisonous. The

toxins are cardiac glycosides oleandrin, oleandrogenin and oleandroside. Cardiac arrhythmias and hyperkalemia are lethal complications. Toxicity is treated by activated charcoal, N- acetyl cysteine.^{11,12}

Calcium chloride is contraindicated in – hyperkalemia due to oleander toxicity - due to the presence of hypercalcemia. Digoxin specific Fab fragment is the specific antidote.¹³ Consumption of >3 seeds resulted in significant mortality. 2 cases expired due to ventricular arrhythmias similar to the previous study. The cardiac glycosides have vagotonic effects, resulting in bradycardia and heart block. Inhibition of Na+K+ ATPase in skeletal muscle results in hyperkalemia. In our study the predominant plant was yellow oleander (*Thevetia peruviana*) the toxins are thevetin, thevetoxin, etc.

Datura



Figure 3: Datura.

All parts contain alkaloids such as atropine & hyoscyamine. Seeds are taken for suicidal purpose and also for abuse as deliriant. Symptoms are due to anticholinergic actions – dry mouth, mydriasis, tachycardia, restlessness, hallucinations. Physostigmine is the specific antidote. All cases recovered in our study.¹⁴

Gloriosa superba



Figure 4: Gloriosa superba.

It is a common plant poison in India. Also called as glory lily, it is the state flower of Tamil Nadu. The toxic principles colchicine and gloriosin are present in the root. Initially gastrointestinal toxicity predominates later hypotension, bone marrow suppression, dyselektrolytemia and multi organ failure occurs^{15,16}. In our study one patient developed acute onset alopecia. Another patient developed pancytopenia which recovered

spontaneously over 2 weeks. There was no mortality in our study group. Anti-colchicine antibodies have been developed in France for the management of poisoning with the drug form of colchicine.¹⁷

Citrullus colocynthis (Bitter apple)

It is called as kumattikai in Tamil. Fruits, root and pulp are toxic. Ingestion causes GI irritation and renal injury. The ill effects are due to cytotoxic and antimetabolic cucurbitacins.^{18,19}

Kallippaal - Cactus Extract (Nopal) (Opuntia - Prickly Pear) Ficus indica

It is a contact irritant and also used as illegal abortifacient. No serious toxicity has been reported.

Cleistanthus Collinus

Cleistanthus Collinus is a unique plant poison encountered in Tamilnadu. The extract contains Glycosides, Lignan lactones like cleistanthin A and B, Collunusin and diphylin. All parts of the plant are toxic. ECG abnormalities include nonspecific ST-T changes, Flat P, QTc Prolongation, Prominent U wave. Clinical features include abdominal pain, vomiting, visual disturbances, hypotension, hypokalemia, respiratory failure and death.²⁰⁻²²

Eucalyptus oil

Eucalyptus oil is a traditional herbal medicine used for common ailments. Unlike in children the two cases in our study had consumed the oil with suicidal intentions. Clinical features include depression of conscious state, vomiting, seizures, giddiness, ataxia. Case recovered well with iv phenytoin. Similar presentation were observed by Tibballs J and Karunakara.^{23,24}

Neem Oil

Neem oil is a medicinal oil because of anti - oxidant property. It has anti- cancer properties and inhibits bacterial growth. It has a complex of constituents including nimbin, nimbidin, nimbolide and limonoids. Toxic ingestion results in neurotoxicity and hematotoxicity - resulting in vomiting, drowsiness, metabolic acidosis, polymorphonuclear leucocytosis, anemia and encephalopathy.²⁵⁻²⁷

CONCLUSION

Plant poison is the second most common poisoning in South India next to pesticide poisoning. Studies related to plant poisons in India are minimal. Hence this study aims to highlight the importance of identification of plant poisons, prompt treatment and monitoring. Plant poisons are harmful and poisonous. Timely intervention and monitoring are key steps in treatment of plant poisoning.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

- Singh NP, Guleen kaur. Poisoning - Basic considerations and Epidemiology. In: YP Munjal ED. API Textbook of Medicine. 9th edition. Mumbai: Jaypee Brothers Publicaions;2012:1934.
- Ballantyne B, Mars TC, Turner P. Fundamentals of toxicology. General and Applied Toxicology. New York: McMillan;1995:1309-1427.
- Ghosh N, Ghosh R, Mandal V, Mandal SC. Recent advances in herbal medicine for treatment of liver diseases. *Pharm Biol.* 2011;49(9):970-88.
- Ekor M. The growing use of herbal medicines: Issues relating to adverse reactions and challenges in monitoring safety. *Front Phamacol.* 2014;4:177.
- Patel SS, Beer S, Kearney DL; Phillips G, Carter BA. Green tea extract: A potential cause of acute liver failure. *World J Gastroenterol.* 2013;19(31):5174-7.
- Tiongson J, Salen P. Mass ingestion of jimson weed by eleven teenagers. *Del Med J.*1998;70(11):471-6.
- Palatnick W, Tenenbein M. Hepatotoxicity from castor bean ingestion in a child. *J Toxicol Clinical Toxicol.* 2000;38(1):67-9.
- Malangu N. Contribution of plants and traditional medicines to disparities and similarities in acute poisoning incidents in Botswana, South Africa and Uganda. *Afr J tradit complement altern med.* 2014;11(2):425-38.
- Ghorani – Azam A, Sepahi S. Plants toxins and acute medicinal plants poisoning in children : A systematic literature Review. *J Res Med Sci.* 2018;23:26.
- Prakash Babu S, Chandrika DG, Kulkarni MR .Plant poisoning –an observational study in a tristate region emergency department. *International journal of medicine and public health.* 2016;5(10):2158-62.
- Gopalakrishnan SK, Kandasamy S. Oleander toxicity- The clinical spectrum and mortality prediction: an observational study. *Intern J Medicine Update.* 2017 Jan;12(1):4-8.
- Dwivedi S, Rajpal S, Narang S. Cardiotoxic manifestations of yellow oleander poisoning and its treatment: A case report. *Indian Heart J.* 2006;58(6):450-1.
- DKS Subrahmanyam, Muktha V. Plant poisoning. In :YP Munjal Ed. API textbook of medicine. 10th ed. Mumbai. Jaypee Publications. 2015:2644-45.
- horani-Azam A, Sepahi S, Riahi-Zanjani B, Ghamsari AA, Mohajeri SA, Balali-Mood M. Plant toxins and acute medicinal plant poisoning in Children *J Res Med Sci.* 2018;March;23(1)26.
- Aleem HM. Gloriosa superba poisoning. *JAPI* 1992;40:541-2.
- Dunuwille R, Balasubramanian K Bibile SW. Analysis of alkaloids in Gloriosa superba. *Ceylon J Med Sci.* 1968;17(1):1.
- Baud FJ, Sabouraud A, Vicaut E, Taboulet P, Lang J, Bismuth C, et al. Brief report:Treatment of severe colchicine overdose with colchicine specific Fab fragments. *NEJM* 1995;332(10):642-5.
- Wink Michael : Ben - Erik Van Wyk: Coralie Wink (2008). *Handbuch der giftigen und Psychogktiven Pflanzen* . ISBN 978 - 3-8047-2425-9.
- Pfab R. Poisoning by Citrullus colocynthis. Unknown to us, a frequent poisonous plant in foreign travel. *MMV. Fortschr Mede.* 1999;141 (31.32):41-2.
- Kesri R, Joseph J, Henry RA, Thomas A, Rao GG. Cleistanthus collinus poisoning ; Diagnostic dilemma and N- Acetyl cysteine as a possible treatment option. *JAPI.* 2016;64(1);142.
- Mohan A, Naik Gs et al. 2016. Cleistanthus collinus poisoning experience at a medical intensive care unit in a tertiary care hospital in South India. *Indian J medical Res* .143(6);793-7.
- Subrahmanyam DK, Mooney T, Reveendran R, Zachariah B. A clinical and laboratory profile of Cleistanthus collinius poisoning. *JAPI.* 2003;Nov 21;57:1052-4.
- Tibballs J. Clinical effects and management of Eucalyptus oil ingestion in infants and young children. *Med J Aust.* 1995;163(4):177-80.
- Karunakara B, Jyotirmanju C. Eucalyptus oil poisoning in children. *J pediatr sci.* 2012;60:1-6.
- Alzohairy MA. Therapeutics Role of Azadirachta Indica. *Evid Based complement Alternat Med.* 2016;7382506.
- Mishra A, Dave N. Neem oil poisoning : Case report of an adult with toxic encephalopathy. *Indian J Critical Care Medicine.* 2013;Sep-Oct;17(5):321-2.
- Dhongade RK, Kavade SG, Damle RS. Neem oil poisoning. *Indian Pediatr.* 2008;56-7.

Cite this article as: Kumari M, Latha PS, Kalyanasundaram. Epidemiological and clinical profile of various plant poisons in a tertiary care center in South Tamilnadu, India. *Int J Res Med Sci* 2019;7:3517-21.