



Cardiac Manifestations of *Thevetia peruviana* Poisoning: A Descriptive Study from Northern Sri Lanka

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Authors' contributions

This work was carried out in collaboration between all authors. Author SP was involved in drafting the manuscript and revising it critically. Author NS involved in the data collection and statistical analysis. Author TK involved in the designing the study and drafting the manuscript. Author MG was involved the management of patients and revising the manuscript. All authors read and approved the final manuscript.

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ABSTRACT

Background: Poisoning with *Thevetia peruviana* (yellow oleander) is commonly observed in Northern and Eastern provinces of Sri Lanka causing significant morbidity and mortality. It contains cardiac glycosides which are toxic to cardiac muscle that results in cardiovascular dysrhythmias.
Objective: To determine the pattern of cardiac dysrhythmias and outcome of yellow oleander poisoning at a tertiary care center of Northern Sri Lanka.
Methods: A descriptive, cross sectional, prospective study was carried among patients with yellow oleander poisoning admitted to Teaching hospital, Jaffna, Sri Lanka over a period of two years. Twelve lead standard electrocardiography and 2-lead ECG monitoring were performed in all patients during the hospital stay at the cardiology unit. Data were entered in Microsoft Excel sheet

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and was analyzed using SPSS [version 21] analytical package. Results were presented as counts, percentages and mean \pm SD for continuous variables.

Results: 23 out of 44 patients were females. Mean age of the patients was 24.84 [SD \pm 0.43] years. Most of the patients were symptomatic and presented with gastro intestinal symptoms like vomiting, abdominal pain and diarrhea. Bradycardia was the most commonly observed cardiac rhythm abnormality within the first 24 hrs of ingestion of yellow oleander seeds. Sinus bradycardia [75%] was the commonest cause for bradycardia. All patients were treated with multiple doses of activated charcoal irrespective of the time of presentation. Patients with bradyarrhythmias were treated with intravenous boluses of atropine and 12 of them needed temporary pacing.

Conclusion: Most of the victims of Yellow oleander poisoning were young adults. The cardiac toxicity developed within 24 hours of ingestion of the seeds. The risk of toxicity has not related to the number of seeds consumed. Most patients have nonspecific symptoms. AV conduction abnormalities are common. Activated charcoal is useful in most cases.

Keywords: Yellow oleander; toxicity; arrhythmias; Sri Lanka.

ABBREVIATIONS

SD : Standard Deviation
AV : Atrioventricular
IV : Intravenous
ECG : Electrocardiography
VT : Ventricular Tachycardia
VF : Ventricular Fibrillation

1. INTRODUCTION

Poisoning due to ingestion of seeds of *Thevetia peruviana* (yellow oleander) results in significant morbidity and mortality in Sri Lanka. It is a common mode of deliberate self-harm observed throughout Northern and Eastern parts of Sri Lanka. The leaves, flower and seeds of yellow oleander (Fig. 1) are poisonous. It contains cardiac glycosides that are very toxic to cardiac muscle [1]. Ingestion of seeds causes predominantly cardiovascular effects such as bradycardia, varying degrees of heart blocks, atrial or ventricular ectopics and ventricular tachyarrhythmias. Hyperkalemia is a life-threatening sequelae which is an indication for treatment with digoxin immune fab [Digibind]. Continuous ECG monitoring is indicated to detect arrhythmias in patients with severe poisoning [2]. The aim of the study is to evaluate cardiac manifestations of the yellow oleander poisoning and the management out come of these victims at teaching hospital Jaffna.

2. METHODS

2.1 Study Population

44 consecutive patients with yellow oleander poisoning admitted to teaching hospital, Jaffna,

Sri Lanka over a period of two years duration were recruited.

2.2 Electrocardiographic Monitoring

Twelve lead standard electrocardiography [INNOMED Medical ECG machine] and 2-lead ECG monitoring were performed in all patients during the hospital stay at the cardiology unit.

2.3 Statistical Analysis

Data were entered in Microsoft Excel sheet and was analyzed using SPSS [version 21] analytical package. Baseline results were presented as counts and percentages and as mean \pm SD for continuous variables. A $P < 0.05$ will be considered significant.

3. RESULTS

A total of 44 patients with the history of ingestion of yellow oleander seeds were included in the study. Mean age group was 24.84[SD \pm 0.43] years. Almost half of the victims 23/ 44 [52.2%] were females.

The patients have also consumed other substances [organophosphate - 2.3%, alcohol-2.3%, jaggary -34.1%] along with yellow oleander seeds. Almost all patients experienced gastrointestinal symptoms. Vomiting was the predominant symptom [97.7%]. Abdominal pain was reported in 29.5% and diarrhea in 56.8%. Neurological symptoms were seen in 20.5%. Cardiac arrhythmias were reported in 42 patients with yellow oleander poisoning. The most common cardiac arrhythmia observed was sinus bradycardia (75%).

Mortality was observed even after ingestion of few seeds. In contrast the victims who consumed more seeds had good outcome. This could be explained by the fact that severe vomiting precipitated by consuming large number of seeds could have resulted in minimal absorption of the glycosides.

Gastric lavage was given in 25% those presented within 2 hours of yellow oleander ingestion and activated charcoal in 54.5% of patients. Atropine was used among 31.8% of patients with severe bradyarrhythmia and temporary pacing in 27.2% [Fig. 1]. No complications were observed after temporary pace maker insertion. One victim succumbed due to ventricular fibrillation.



Fig. 1A.



Fig. 1B.

Fig. 1. The picture of yellow oleander leaves, flower (1A) and seeds (1B)

Table 1. The common patterns of cardiac arrhythmias among yellow oleander poisoning patients

Cardiac arrhythmias	Nos	Percentage [%]
Sinus bradyarrhythmia	33	75
Sinus pauses	7	15.9
First degree heart block	7	15.9
Wenkebeck phenomenon	6	13.6
2:1 or 3:1 heart block	7	15.9
Complete heart block	5	11.4
Atrial flutter	1	2.3
Ventricular tachycardia	2	4.5
Ventricular fibrillation	1	2.3

Table 2. The indication of temporary pacing among yellow oleander poisoning patients

Indication	Nos	Percentage [%]
2:1 Heart block	1	2.3
Atrial flutter 4:1block	1	2.3
Complete heart block	6	13.6
Second degree heart block	2	4.5
Sinus pauses	2	4.5

4. DISCUSSION

Self-ingestion of yellow oleander seeds is becoming increasingly common method of deliberate self harm in Northern and Eastern parts of Sri Lanka [3], rarely seen elsewhere in the subcontinent [4]. All parts of plant are poisonous however seeds are rich in several cardiac glycosides causing cardiac arrhythmias in a similar way to digitalis [5].

The seeds are highly irritant to gastro intestinal tract leading to persistent vomiting and diarrhea in severe cases. The combination of alcohol and seeds, both of which induce vomiting may explain why some intoxicated patients were rarely found to be seriously symptomatic [6]. The combination of sugar with seeds causes serious poisoning due to possible rapid absorption.

There was no direct relationship between number of seeds and toxicity observed in our study [3]. Common cardiac rhythm disorders of patients presented with the yellow oleander poisoning were sinus bradyarrhythmia, sinus pauses, first degree heart block, Wenkebach phenomena, 2:1 and 3:1 block, complete heart block, ventricular tachycardia and ventricular fibrillation [Table 2]. Ventricular tachyarrhythmias were uncommon and associated with

exceptionally high mortality [7]. Ventricular fibrillation is was noted in severe toxicity [8].

The time course and outcome after eating oleander seed was quite variable [9]. Sri Lankans usually consume the seeds as a whole, that results in decreased bioavailability of the cardiac glycosides. Victims of South India consume seeds after crushing which could result in rapid absorption of cardiac glycosides and may results in severe toxicity [10].

The digoxin immune fab is the specific antidote for management of yellow oleander poisoning [11]. It is shown to be effective in preventing life threatening ventricular arrhythmias, cardiogenic shock, and hyperkalemial [12]. It is currently not available in Sri Lanka. Preventing absorption by gastric lavage and activated charcoal are the cornerstone of treatment in Sri Lanka. Gastric decontamination by the use of single dose and multiple doses of activated charcoal has been evaluated in clinical trials [2]. However there are no definitive recommendations for and against the use of multiple doses of activated charcoal. Parenteral atropine and temporary pacing are used in significant bradyarrhythmia [2]. Isoprenaline infusions are not recommended for the treatment of bradyarrhythmia due to precipitation of ventricular extrasystoles [13]. Ventricular tachyarrhythmias are extremely difficult to manage and are poorly responsive to cardioversion. Most of patients enrolled in the study were treated with activated charcoal and gastric lavage. Intravenous atropine was indicated to manage the bradyarrhythmias in considerable number of patients.

5. CONCLUSION

Poisoning with *Thevetia peruviana* (Yellow oleander) was common among young adults. The cardiac toxicity developed within 24 hours of ingestion of the seeds. The risk of toxicity was unpredictable with the number of seeds ingested. Most patients had nonspecific symptoms. AV conduction defects were common. Activated charcoal is an effective simple method practiced in the absence of specific antidote.

6. LIMITATIONS

This study was limited by its small size of sample from a single center.

CONSENT AND ETHICAL APPROVAL

Ethical approval was obtained for this descriptive study from the directorate of Teaching Hospital

Jaffna, Sri Lanka. Informed written consent was obtained from the participants.

AVAILABILITY OF DATA AND MATERIALS

The datasets during the current study available from the corresponding author on reasonable request.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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