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Case Series Cardiovascular

Indian Journal of Cardiovascular Disease in Women



Article in Press

Electrocardiographic Manifestations of Yellow Oleander Poisoning in Patients Treated at a Tertiary Care Centre

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Received: 07 June 2024 Accepted: 21 May 2025 Epub Ahead of Print: 05 June 2025 Published:

DOI 10.25259/IJCDW 36 2024

Quick Response Code:



ABSTRACT

Yellow oleander grows easily in tropical and subtropical countries, and nearly all components contain a toxin similar to digitoxin. Following ingestion, symptoms can be cutaneous or systemic, ranging from mucositis and blister development to gastrointestinal and cardiovascular complications. Systemic symptoms are caused by sodium potassium ATPase inhibition. Due to the expensive cost of digitoxin antibodies in countries like India, we will manage the patients symptomatically with stomach lavage, followed by monitoring of electrolytes and correction if necessary.

Keywords: Digitoxin antibody, Electrocardiogram, Gastric lavage, Sodium potassium ATPase inhibitors, Yellow oleander

INTRODUCTION

White, red, and yellow oleander plants can thrive in tropical and subtropical climates. These plants are readily found in southern Indian areas. Both foxglove and yellow oleander contain cardiotoxin,^[1] which, like cardiac glycoside, functions as a sodium-potassium ATPase inhibitor, increasing intracellular calcium and contractility. Oleander poisoning is more likely to cause gastrointestinal symptoms than foxglove toxicity. The seeds and roots of the oleander plant are very poisonous.^[2] The fatal dosage is approximately 8–10 seeds and 15–20 g of root.^[3] These poisons can create a variety of rhythmic manifestations in persons who consume them. Early detection and correction of dyselectrolytemia allow for easy management of these manifestations.

CASE SERIES

All four instances are from a single tertiary care center in South India, and they all self-ingested yellow oleander seeds in varying numbers and presented to us at different time periods mentioned in table 1. Since seeds are the most prevalent type of ingestion, all four of the patients in our case series came from rural backgrounds and had easy access to oleander trees despite knowing that the plant was poisonous. Suicide threats or threats were made by the consumption. The most frequent complaints were related to the stomach.

The antidote was not administered, nor were the contents of the stomach lavage tested for plant toxins. Upon their arrival at the emergency room, we performed an electrocardiogram (ECG)

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and collected blood for serum electrolytes. We repeated them and fixed any issues after six hours. After controlling their symptoms, they were discharged in a stable condition.

DISCUSSION

Yellow oleander (*Thevetia peruviana*) is a member of the Apocynaceae family and contains the toxins Thevetin A and B as well as Thevetoxin, Neriifolin, Peruvoside, and Ruvoside. Symptoms of oleander poisoning appear 4 h

after ingestion and are cardiac and gastrointestinal in character.^[4] Oleander can irritate mucosal membranes, leading to burning and increased salivation. Common central nervous system symptoms include confusion, dizziness, drowsiness, weakness, visual abnormalities, and mydriasis. Inhibition of Na-K-ATPase causes a significant increase in the patient's serum potassium levels.^[5] As a result of these alterations, patients may experience arrhythmias and hypotension. Hypotension can disrupt intracellular ATP generation through glycolysis by inhibiting the rate-limiting

Table 1: Showing case summaries.				
S. No	Age	Sex	Presenting complaints	Prognosis
1.	34	Male	Self-ingestion of seeds after crushing, within 6 h of the window period	He was transferred to ICU. His initial ECG and blood tests were also normal. The next morning, he complained of giddiness, and his ECG revealed sinus bradycardia Figure 1]. Electrolytes revealed normal sodium and chloride levels, and potassium was around 5.3 meq/dL. We immediately administered injection atropine and salbutamol nebulization and started him on deriphylline and oral orciprenaline 10 mg twice day. We did an echocardiography, which was completely normal. Other investigations are normal. The patient's symptoms eased after 12 h, and he was discharged in stable condition
2.	38	Female	Presented to EMD after consuming by chewing 10–12 yellow oleander seeds for 12 h	We performed an ECG, which revealed a first-degree AV block shown in Figure 2. The patient's hemodynamics were steady. Blood tests revealed hypokalemia, with potassium levels of 3 mmoL/L and magnesium levels that were below normal. Corrected both. After 24 h, the patient felt better. Send her home in an acceptable condition
3.	70	Female	Following an argument with children, a 70-year-old female self-ingested the 3–4 seeds as it is and presented to us with two episodes of vomiting	We performed activated charcoal gastric lavage. She remained steady during the discharge
4.	22	Male	Presented to us after consuming 3–4 seeds following his parents' reprimand. spilled them without swallowing	His blood parameters, electrocardiogram, and echocardiogram were normal shown in Figure 3

ECG: Electrocardiogram, ICU: Intensive care unit, AV: Atrioventricular, EMD: Emergengy Medical Department



Figure 1: (a) Electrocardiogram of case 1 at presentation. (b) Electrocardiogram of case 1, i.e., sinus bradycardia.



Figure 2: Electrocardiogram of first-degree atrioventricular block of case 2.



Figure 3: M mode two-dimensional echo cardiogram of case 4.

enzyme phosphofructokinase with lactate from anaerobic metabolism.

The treatment is identical to other poisoning situations. Baseline investigations such as complete blood picture, complete urine analysis, renal function test, serum electrolytes, and ECG are required. Both hypokalemia and hyperkalemia can occur; however, the change in magnesium levels in oleander poisoning is minimal,^[6] though it should be taken seriously if it occurs. Activated charcoal is used in gastric lavage.^[7] There are two randomized trials to verify the efficacy, but they have resulted in two disagreements, therefore the effect of charcoal has yet to be proven.

Oleander poisoning can cause both bradycardia and tachycardia.^[8] Sinus brady is the most prevalent cause, and it can be treated with atropine if necessary for temporary peacemaking.^[9] Digoxin-Fab antibody was used to treat tachyarrhythmias, starting with 400 mg over 20 min and increasing to 400–800 mg over 4–8 h by infusion. India, like other emerging countries,^[10] can use Fructose-1, 6-diphosphate (FDP) as a novel antidote in trials for treating oleander toxicity. It is a phosphorylated sugar that serves as a typical physiological intermediate during glycolysis.

During glycolysis, phosphofructokinase converts glucose to fructose-1, 6-diphosphate, which is then transformed into pyruvate. The rate-limiting stage in anaerobic adenosine triphospate (ATP) synthesis from glucose is phosphofructokinase activity.^[11]

When administered intravenously, FDP enters cells and serves as an alternative energy source to glucose. Inhibiting phosphofructokinase can lead to an increase in ATP generation. FDP synthesizes more ATP than glucose does. FDP stimulates Na-K-ATPase activity, which prevents potassium outflow from cardiac cells. Bradyarrhythmias are a characteristic ECG symptom of oleander poisoning. Common ECG abnormalities include several degrees of atrioventricular block, such as first-degree, Mobitz type I or II second-degree, and total heart block, as well as sinus bradycardia, which may be an early symptom. Overall, a patient who may have consumed a plant should have several bradyarrhythmia abnormalities on their ECG immediately evaluated for oleander intoxication.

Although U waves are not typical of oleander poisoning, they should arouse suspicion for aggravating conditions that need immediate correction because they probably reflect electrolyte abnormalities (such as hypokalemia) or bradycardia-related repolarization delay.

In our cases, we treated our patients with gastric lavage and symptomatically without any complications. Compared to foxglove toxicity, early gastrointestinal symptoms are more frequent, which could help with early clinical diagnosis.^[12]

Only 8–10 seeds or 15–20 g of root are needed for fatal intake, which is much less than what is needed for comparable toxicity with foxglove or other toxins that resemble digitalis. In rural areas where this plant is available, the ECG results are highly distinctive and could be a crucial diagnostic hint. Antidote therapy was not given in any of the instances, and botanical toxin testing was not conducted despite the severe symptoms. This can point to a weakness in the management procedures for healthcare facilities in remote areas or with limited funding.

CONCLUSION

Yellow oleander contains very toxic cardiac glycosides, which can impair the contractility of myocardium and vagus nerve conductions. Digi bind (digoxin-specific antibody fragment) is a well-established antidote for oleander toxicity, but its exorbitant cost prevents widespread use. Charcoal is commonly used for gastric lavage; however, its efficacy is still contested. Atropine is often used to treat bradyarrhythmia. Intensive monitoring of blood markers and ECG s may change the outcome. Further research is needed to prove the efficacy of FDP.

Ethical approval: Institutional Review Board approval is not required.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent.

Financial support and sponsorship: Nil.

Conflicts of interest: There are no conflicts of interest.

Use of artificial intelligence (AI)-assisted technology for manuscript preparation: The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

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How to cite this article: Ashwini K, Betham R, Nathani S. Electrocardiographic Manifestations of Yellow Oleander Poisoning in Patients Treated at a Tertiary Care Center. Indian J Cardiovasc Dis Women. doi: 10.25259/IJCDW_36_2024