

## A STUDY OF CARDIAC ARRHYTHMIAS IN YELLOW OLEANDER SEED POISONING- AN OBSERVATIONAL STUDY IN A TERTIARY CARE CENTRE

G. Bhaskar<sup>1</sup>, A. Magesh<sup>2</sup>, V. P. Kannan<sup>3</sup>

<sup>1</sup>Associate Professor, Department of General Medicine, Thanjavur Medical College, Thanjavur.

<sup>2</sup>Assistant Professor, Department of General Medicine, Thanjavur Medical College, Thanjavur.

<sup>3</sup>Associate Professor, Department of General Medicine, Thanjavur Medical College, Thanjavur.

### ABSTRACT

#### BACKGROUND

Yellow oleander seed poisoning causes a wide variety of rhythm disturbances, electrocardiographic variations and abnormalities. Some of them primarily due to cardio active glycosides and some are secondary to other factors like electrolyte imbalance. Hypoxia, acidosis etc.

#### MATERIALS AND METHODS

This is a single center non randomized prospective study, in determining the type of cardiac arrhythmias among patients in and around Thanjavur District admitted as yellow oleander seed poisoning in Thanjavur Medical College Hospital during the period of one year. These cases were followed in the respective wards till their discharge or death. ECG was taken in all cases immediately after admission.

#### RESULTS

In our study mortality was increased if seed consumption was more than three. Study reveals ECG abnormalities in 75% of patients. ECG abnormalities can be seen even if only one seed was consumed. Varying arrhythmias were observed in a same patient which emphasizes the continuous monitoring or sequential ECGs are mandatory. ECG abnormalities lasted for 4 days which emphasizes ECG monitoring or sequential ECGs for a minimum of 4 to 7 days.

#### CONCLUSION

In our study mortality is seen if seed consumption is more than three. Study reveals ECG abnormalities in 75% of patients. ECG abnormalities can be seen even in only one seed consumed. Sinus bradycardia is the commonest arrhythmia observed. ECG abnormalities lasted for 4 days which emphasizes ECG monitoring or sequential ECGs for minimum of four days.

#### KEYWORDS

Yellow oleander seed poisoning, Cardiac toxicity.

**HOW TO CITE THIS ARTICLE:** Bhaskar G, Magesh A, Kannan VP. A study of cardiac arrhythmias in yellow oleander seed poisoning- an observational study in a tertiary care centre. *J. Evid. Based Med. Healthc.* 2018; 5(28), 2100-2104. DOI: 10.18410/jebmh/2018/435

#### BACKGROUND

Cardiac glycosides in yellow oleander will alter the cardiac muscle physiological properties such as automaticity, rhythmicity, conductivity and contractility.<sup>1,2</sup> In yellow oleander poisoning the abnormality in automaticity and rhythmicity are seen as follows-

- A) Slowing of Automaticity – sinus bradycardia
- B) Alteration of Rhythmicity – Escape rhythm presenting as-
  1. Sinus bradycardia with junctional escape rhythm.
  2. AV dissociation
  3. Escape rhythm without sinus activity.

From various ECG findings it was found that certain areas in the conducting system of heart was more involved than others. Sinus node was most commonly involved in the form of SICK SINUS SYNDROME<sup>5</sup> followed by AV junction.<sup>6</sup> Left bundle branch was almost never involved in oleander poisoning.

Yellow oleander contains many cardio active glycosides very similar to digitalis.<sup>7</sup> Many of the rhythm disturbances are explained by autonomic imbalance mediated by vagus nerve. Therefore there is good response to atropine in the management of oleander poisoning.

In Yellow Oleander poisoning most of the primary T wave changes seen are suggesting an abnormality of the repolarization due to toxic effects, producing an element of myocarditis and further influenced by electrolyte imbalance mostly related to potassium changes.<sup>8</sup> ECG abnormalities in yellow oleander poisoning is multifactorial so it can be studied in relation to various factors.

1. The role of cardio active glycosides<sup>3</sup>
2. Contributory autonomic system alterations in arrhythmogenesis
3. Electrolyte imbalance

*Financial or Other, Competing Interest: None.*  
*Submission 21-05-2018, Peer Review 27-05-2018,*  
*Acceptance 04-06-2018, Published 03-07-2018.*  
*Corresponding Author:*  
 Dr. A. Magesh,  
 Assistant Professor,  
 Department of General Medicine,  
 Thanjavur Medical College, Thanjavur.  
 E-mail: mageshond@gmail.com  
 DOI: 10.18410/jebmh/2018/435



4. Myocarditis
5. Acidosis<sup>4</sup>
6. Hypoxia
7. Hypotension and shock
8. Vascular factors
9. Combination of factors

Yellow Oleander glycosides closely resemble other cardiac glycosides in structure as well as toxic and pharmacological effects. In decreasing order of Potency the glycosides of yellow oleander are perovoside, Rovoside, Thevetin – A, Neriifolin, Cereberin are Thevetin – B. They are all have an aglycone (Digitonigenin or its derivatives combined with a sugar and act by inhibiting NA +K+ATPase<sup>9,10</sup> Yellow Oleander poisoning may produce a picture of toxic myocarditis and this can explain some of the ECG changes. Although there is no single specific ECG finding in myocarditis, the most common finding is diffuse T wave changes in the form of T wave inversion in many leads. Hence an element of myocarditis is present in yellow oleander poisoning and steroids are used in the treatment.

**Aim of Study**

1. To study various cardiac arrhythmias in yellow oleander seed poisoning.
2. To study the types of arrhythmias with time interval of poisoning.
3. To study serial electrocardiographic changes.
4. To correlate the amount of seeds consumed, incidence and severity of arrhythmias and mortality.
5. To study the time lapse of electrocardiographic changes becoming normal.

**MATERIALS AND METHODS**

**Design**

This was a single center non randomized prospective study, in determining the type of cardiac arrhythmias among fifty three patients with yellow oleander seed poisoning.

**Study Period**

Patients in and around Thanjavur district admitted with yellow oleander seed poisoning in Thanjavur Medical College hospital during the period of one year between Feb. 2017 to Feb. 2018 were taken up for this study.

**Study Centre**

This study was carried out at Department of Medicine, Thanjavur Medical college Hospital, Thanjavur, South India. All these cases were examined in detail in the wards and the findings were recorded. These cases were followed in the respective wards till their discharge or death. All the details about poisoning like color of the oleander, number of seeds, forms of consumption like past grounded or chewed, with or without leaves, with or without alcohol and with or without food or empty stomach were enquired. Time of poisoning, vomiting after poisoning and was there any first aid given were enquired. All cases were examined clinically for pulse rate, blood pressure, and state of higher functions,

cardiovascular system, respiratory system and central nervous system involvement.

**Laboratory Investigations**

- URINARY EXAMINATIONS
  - Urine albumin
  - Urine sugar
  - Urine deposits.
- BLOOD EXAMINATIONS
  - Blood urea
  - Blood sugar
  - Serum creatinine
  - Serum electrolytes.

ECG was taken in all cases immediately after admission. Routine conventional limb leads, chest leads and long strip were taken. Routinely in all cases serial ECGs were taken at 12 hours interval for first 72 hours of admission. Thereafter ECGs were taken every 24 hourly till discharge or death. Patients were routinely treated with stomach wash followed by Ryle’s tube aspiration, IV fluids and steroids, with continuous monitoring of few cases. Atropine and Isoprenalin was given if pulse rate falls below 60 per minute. Due to lack of pacing facility temporary or permanent pacemaker was not tried.

**RESULTS**

**Age and Sex Incidence**

Out of the total of 53 cases, 22 cases were males and 31 were female. Male: Female ratio was 1:1.4. Percentage of males in this study was 42.31%. In men, the common age group was 15-20 years and the number of cases in this age group was 16 (72.73%). Number of cases in the age group of 21-30 years were 5 (22.73%). The poisoning was less common in the age group of 31-40 and the number of case was 1 (4.54%). Incidence appears more in females than males and the percentage of females in this study was 58.49%. In females also the common age group of poisoning was below 20 years of age and the number of cases in this age group were 18 (58.06%) Number of female patients in the age group of 21-30 years were 8 (25.81%) and between 31-40 years were 5 (16.13%). It is shown in (table 1) given below. (Figure 1)

Age Group in Years	Male		Female	
	Number of Patients	%	Number of Patients	%
15 – 20	16	72.73%	18	58.06%
21 – 30	5	22.73%	8	25.8%
31 – 40	1	4.54%	5	16.13%
<b>Total</b>	<b>22</b>	<b>42.31%</b>	<b>31</b>	<b>58.49%</b>

*Table 1. Age and Sex incidence*

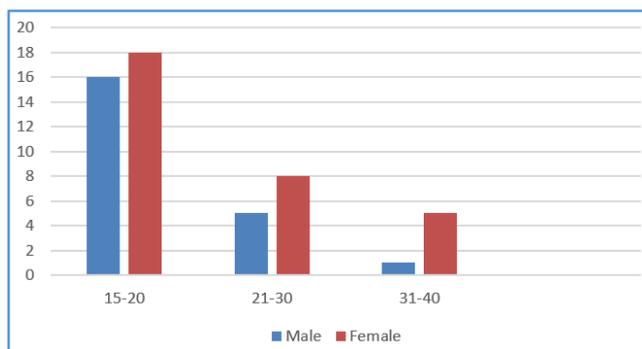


Figure 1. Age and Sex Incidence

**Forms of Consumption**

The seeds were taken in many forms but the most common form of consumption was grounded form. Number of patients consumed in grounded form were 33 (64.21%) and in paste form were 14 (26.41%) and in bitten and chewed form were 3 (5.66%). Only 2 (3.72%) patients had consumed leaves along with seeds. It is shown in table below (Table-2) (Figure 2).

Total Number of Patients	Form of consumption	Number of Patients	Percentage
53	Grounded	44	64.21%
	Paste	14	26.41%
	Chewed	3	5.66%
	Seeds with Leaves	2	3.72%

Table 2. Showing the Forms of Poison Consumed

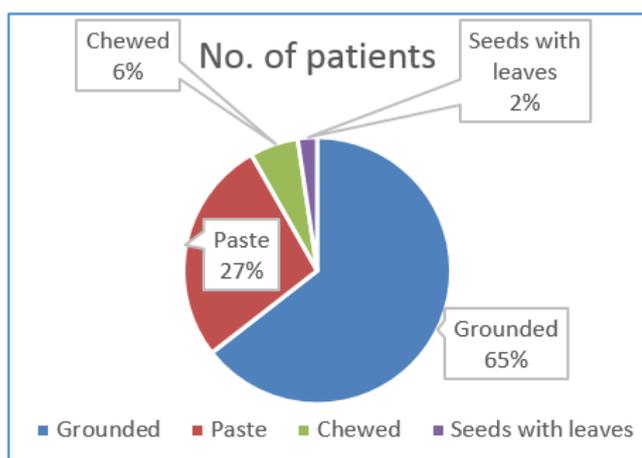


Figure 2. Showing the Forms of Poison Consumed

In grounded and paste form the alkaloid availability is more and hence the electrocardiographic manifestations and mortality were high in this form. Most of the poisons consumed were seeds, poisoning by leaves were less. Even in those cases they did not exhibit serious manifestations. Out of 3 deaths, 2 deaths occurred when they had taken in grounded form and 1 death had occurred when taken in paste form.

**Time Interval between Consumption of Poison and Admission**

Number of patients admitted within 6 hours of poisoning were 41 (77.36%) between 6-12 hours of poisoning were 10 (18.87%) and beyond 12 hours of poisoning were 2 (3.77%). This is shown in table 3 given below (Table-3) (Figure 3).

Total Number of Patients	Time Interval between poisoning and admissions	Number of Patients	%
53	Less than 6 hours	41	77.36%
	6-12 hours	10	18.86%
	More than 12 hours	2	3.77%

Table 3. Showing Time of Admission after Poisoning

When the delay was more than 10-12 hours the chance for mortality is high.

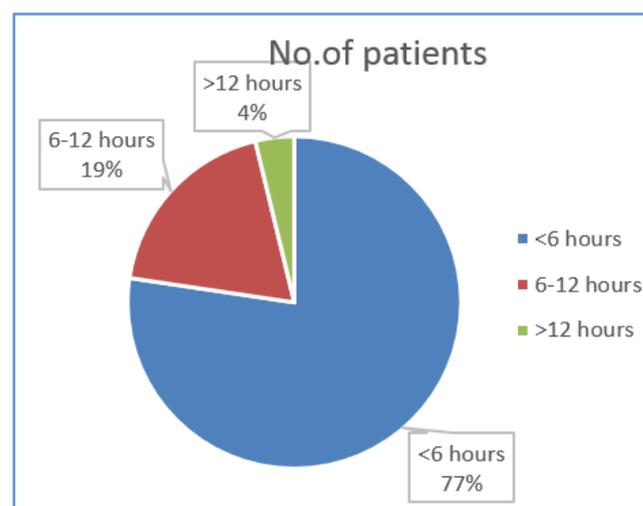


Figure 3. Showing Time of Admission After Poisoning

**Incidenece of ECG Abnormalities**

Out of the total of 53 patients, 39 patients had electrocardiographic abnormalities and 14 patients had normal ECGs. This is shown in (table 4) given below.

Total	Number of cases with ECG abnormalities	%	Number of cases with Normal ECG	%
53	39	73.58%	14	26.42%

Table 4. Showing Incidence of ECG Abnormalities

In general ECG abnormalities were noted when patients consumed more than 3 seeds.

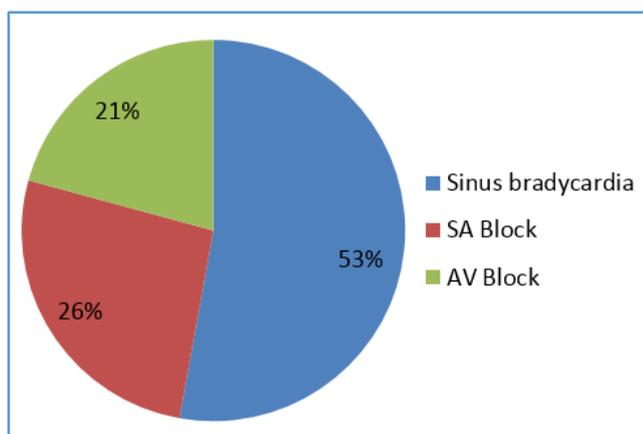
Approximately 75% of cases of oleander seed poisoning had ECG abnormalities.

**Time of Appearance of ECG Abnormalities**

Out of the total of 53 cases 5 (9.43%) cases were admitted within 2 hours of poisoning and in that five cases 4 (80%) had ECG abnormalities. In one (1.89) patient ECG abnormalities appeared as late as 18 hours after poisoning. In this study ECG abnormalities were noted as early as within 2 hours and as late as 18 hours of poisoning.

**Types of Arrhythmias Found**

Out of the total of 53 patients, 28 (52.83%) had showed sinus bradycardia. Sinus bradycardia was the commonest form of arrhythmia noted in this study. Next common arrhythmia noted was Sino atrial block in 14 (26.42%) cases and third common form of arrhythmia was AV Nodal Block in 11 (20.75%) cases. Similar type of observation was noted by A.V. Anjaneyalu.<sup>2</sup> Rare forms of arrhythmia in this study were ventricular tachycardia, atrial fibrillation and second degree atrioventricular block. One case of ventricular tachycardia was documented by S.R. Gupta.<sup>5</sup> Atrial fibrillation was not reported by anybody so far. (Figure 4)



**Figure 4. Types of Arrhythmias Found**

**ECG Abnormality and Mortality**

In our study mortality was not seen when patient consumed below 3 seeds. Mortality appears high when patient consumed more than 3 seeds. There seems to be a definite abnormality in ECG, even though there is no mortality. If patient had taken more than one seed, there appears to direct relationship between ECG abnormality and mortality. In any person consuming more than 4 seeds, there is a definite ECG abnormality and if seeds are more there is definite mortality. In this study 3 patients were expired. All the three patients showed nonparoxysmal junctional tachycardia in their ECG. No other patient had this type of arrhythmia. So non paroxysmal junctional tachycardia could be the dangerous form of arrhythmia. Dangerous arrhythmia we meant the arrhythmia which causes mortality.

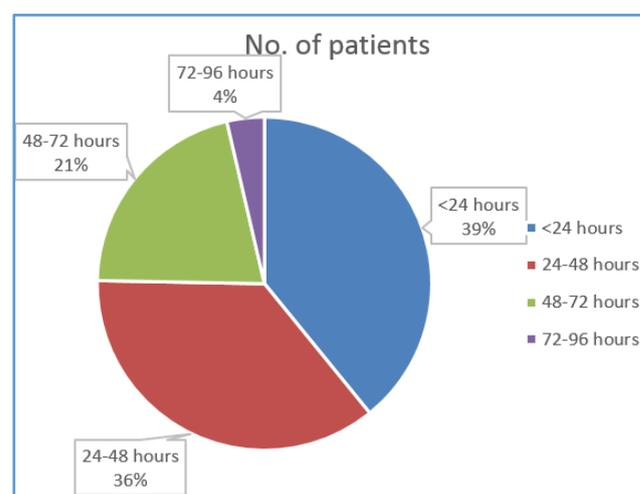
**Time of Disappearance of ECG Abnormality**

Out of 39 patients with ECG abnormalities, 13 (33.3%) patients ECG reverted to normal within 24 hours after admission, 12 (30.77%) patients ECG became normal between 24-48 hours after admission, 7 (17.94%) patients ECG became normal between 48-72 hours and 4 (10.26%)

patients ECG became normal between 72-96% hours after admission. This is shown in table given below. The ECG abnormality persisted up to 4 days so in all cases ECG to be monitored for 4 days compulsorily. (Table-5) Fig: 5

Time of disappearance of ECG abnormalities in hours	No. of Patients	%	No. of deaths
Less than 24 hours	13	33.3%	
24-48	12	30.77%	
48-72	7	17.94%	3
72-96	4	10.26%	

**Table 5. Showing Time of Disappearance of ECG Abnormalities**



**Figure 5. Showing time of Disappearance of ECG Abnormalities**

**DISCUSSION**

This study conducted in Thanjavur medical college included 53 patients consumed oleander. On analysing the results, it is shown that female gender is more prone for poisoning. Most of them took it in grounded or paste form, which itself carries high mortality. Almost most of the arrhythmias occurred in the study population, bradycardia being the most common which is more consistent with previous studies on oleander poisoning. ECG changes are independent of the number of seed consumed, but mortality correlates with the number. All the patients must be carefully watched for sudden cardiac arrest due to arrhythmias. Our study included only 53 patients and further studies were to be conducted in future for better understanding.

**CONCLUSION**

- In our study mortality is seen if seed consumption is more than three
- Study reveals ECG abnormalities in 75% of patients.
- ECG abnormalities can be seen even if only one seed consumed.
- Sinus bradycardia is the commonest arrhythmia observed.

- Ventricular tachycardia and atrial fibrillation are rarer forms of arrhythmias observed.
- Occurrence of non-paroxysmal junctional tachycardia carries high mortality.
- Varying arrhythmias are observed in a same patient which emphasizes the continuous monitoring or sequential ECGs are mandatory.
- ECG abnormalities lasted for 4 days which emphasizes ECG monitoring or sequential ECGs for minimum of four days.

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