

Outcome in *Cleistanthus Collinus* Poisoning: A Cross Sectional Study

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Abstract: *Cleistanthuscollinus* also called 'oduvanthalai' in tamil has become one of the commonest used plant poison in Southern India. Since it is easily available, it is used by villagers especially females, for suicidal purposes. It has become a challenge to Medical Professionals to treat the poisoning because the causes of death are varied. Though all parts of the plant are poisonous, only leaves are used for the purpose of self harm because they are readily available. It is consumed as a poison in raw form like chewing, crushing and making a juice from the leaves and also as a decoction by boiling the leaves with water. We are going to analyse which of the preparations of the poison carries higher mortality so as to enable the healthcare professionals to deliver better care to patients admitted with *Cleistanthuscollinus* poisoning.

Keywords: *Cleistanthuscollinus*, Oduvan leaves, Poisoning

1. Introduction

Cleistanthuscollinus, a toxic shrub, is used for deliberate self-harm in rural South India. The genus *Cleistanthus*, belonging to the family Euphorbiaceae, comprises 140 species native to the region between Africa and the Pacific islands. *C. collinus* is a toxic deciduous shrub that grows in hilly deciduous forests of Central and South India, Malaysia and Africa.[1,2]

C. collinus in India is popularly known in: Hindi as Garari; Tamil, as Oduvanthalai; Telugu, as Vadise; Malayalam, as Nilapala; and Bengali, as Karajuri.[1,3] All parts of the plant are potentially toxic.[3] The leaves are commonly used for poisoning humans (suicide or homicide) and animals (cattle and fish poison) and as an abortifacient, especially in rural South India.[1] Extracts of leaves, roots and fruits have been used in acute gastrointestinal disorders. The method of ingestion of the plant for deliberate self-harm includes swallowing the crushed plant parts; chewing the leaves; consuming a paste/juice of the leaves or a decoction prepared by boiling the leaves in water.[3] Patients may be asymptomatic or present with common gastrointestinal symptoms of vomiting, nausea and abdominal pain; and, occasionally, diarrhea, constipation, dysphagia, salivation, abdominal distension and decreased bowel sounds.[4,5] Cardio-respiratory presentations include chest pain, dyspnea, tachypnea or bradypnea, tachycardia or bradycardia, hypotension and cyanosis.[6] Documented clinical neurological abnormalities are mydriasis with visual disturbances, muscle cramps and weakness, altered sensorium, giddiness, headache, altered speech, tremors and ptosis.[4,7]. *In vitro* exposure to *C. collinus* extract results in significant inhibition of vacuolar H⁺ATPase (vesicular proton pump) activity in the renal brush border membrane. Inhibition of the V-type H⁺ATPase in the renal tubule could explain the presence of distal renal tubular acidosis demonstrated in animal models and human subjects.[8] A separate study has demonstrated that specifically Diphyllin inhibits the V-type H⁺ATPase.[9] There is no evidence of inhibition of the sodium-potassium pump.[10] Death usually occurs within 3-7 days (majority of deaths occurring on the third day) of consumption.[3,11] Consumption of a boiled

decoction of leaves (rather than other methods of ingestion) has consistently been shown to result in higher mortality rates across clinical studies. A larger number of leaves (>60) consumed was also associated with a higher rate of mortality. [3]

2. Aims of the Study

- 1) To determine and compare the outcome of poisoning based on preparation of the poison
- 2) To determine the sexwise mortality

3. Materials and Methods

Study design: Cross Sectional Study

Inclusion Criteria

- 1) Patients presenting with *Cleistanthuscollinus* poisoning.
- 2) Subjects over 14 years of age.
- 3) Subjects seeking late medical care.
- 4) All modes of ingestion.

This study was conducted at Govt. Tiruvannamalai Medical College Hospital. Available records of patients who were admitted between January 2017 and May 2018 were considered and scrutinized. After applying the inclusion criterias, a total of 226 patients were included in the study. Among them 85 were males and 141 were females. A document was prepared with details of the subjects, sex, age, and the mode of preparation of the poison. We mainly included the outcome of the poison that is whether the patient survived or not at the end of their stay in the hospital.

4. Statistical Analysis

The results are inferred on the basis of statistical tools viz., Pearson Chi-Square, Fisher's exact test.

5. Observation and Results

Size of the group was 226 numbers which included 85 males and 141 females.

1) Sex wise distribution and Outcome

			Outcome		Total
			Survived	Died	
Sex	Male	count	72	13	85
		% within sex	84.70%	15.30%	100.00%
	Female	count	86	55	141
		% within sex	61.00%	39.00%	100.00%
Total		count	158	68	226
		% within sex	69.90%	30.10%	100.00%

Of the total 226 subjects 158, that is 69.9 % survived and 68, that is 30.1 % died irrespective of sex. Considering sex wise mortality, the rate of mortality for males was 15.3 % and that of females was 39 %. Analysis shows the Significance of the study.

2) Age group wise distribution and Outcome

			Outcome		Total
			Survived	Died	
Age	14-20	count	68	12	80
		% within age	85.00%	15.00%	100.00%
	21-40	count	63	51	114
		% within age	55.30%	44.70%	100.00%
	41-60	count	18	4	22
		% within age	81.80%	18.20%	100.00%
	>60	count	9	1	10
		% within age	90.00%	10.00%	100.00%
Total		count	158	68	226
		% within age	69.90%	30.10%	100.00%

Out of the four age groups, the age of 21-40 showed significant mortality rate when compared to other groups.

3) Mode of ingestion wise distribution and outcome

			Outcome		Total
			Survived	Died	
Mode	Chewing	count	81	3	84
		% within mode	96.40%	3.60%	100.00%
	Crushing	count	31	5	36
		% within mode	86.10%	13.90%	100.00%
	Juice	count	41	12	53
		% within mode	77.40%	22.60%	100.00%
	Decoction	count	5	48	53
		% within mode	9.40%	90.60%	100.00%
Total		count	158	68	226
		% within mode	69.90%	30.10%	100.00%

From the statistics we come to know that there is significant association of mode of preparation and mortality. The highest mortality was observed with consumption of a decoction of the plant leaves.

Finally we come to know, after statistical analysis, that there exists a definite significance between mode of preparation of the poison and mortality and sex wise mortality.

6. Discussion

There are only a few human studies that correlate gender, age, mode of ingestion and mortality. The plant part ingested was the leaf and when taken in decoction form was more fatal as observed in previous studies. From the analysis and calculations it is well established that the aims of this study

are accomplished.

Out of the total 226 subjects, a higher mortality rate of 39.0% was observed in female population when compared to males who had a mortality rate of 15.3 %. The rate of increased mortality in females may be attributable to easy availability and free access to the plant. The analysis is significant.

Age group wise mortality pattern show a higher mortality rate in 21-40 age group. This can be due to the fact that majority of self poisoning subjects fall in this group due to various reasons.

When comparing the mode of ingestion, irrespective of gender, highest mortality rate was observed with consumption of decoction (90.6 %) which is evident from previous studies.

Ramya Das et al in their study showed that female preponderance was seen in the age group of 13 to 20 years. This may differ from region to region and our study showed a female preponderance in the age group of 21-40. The study included 76 patients with *Cleistanthuscollinus* poisoning. But both the study shows more number of patients falling under 21-40 year age group independent of sex.[12]

Chanaveerappa Bammigatti et al in his study showed more or less equal distribution (52.9% females) in gender with slight female preponderance. The study also showed that majority of the included subjects (51%) fall under 21-40 years age group. It also included that majority of death by poisoning occurred with ingestion of decoction (77.8 %). These results correlate well with our study.[13]

Analyses of extracts from the plant, including the leaves, reveal a complex group of compounds.[14] The toxic active principles in the leaves are aryl naphthalenelignan lactones—Diphyllin and its glycoside derivatives Cleistanthin A and Cleistanthin B; and Collinusin. Diphyllin, Cleistanthin A and B were collectively known as “Oduvin” in the past.[15] In addition, the lignans Cleistanthin C, Cleistanthin D and Cleistanone, are present. The toxicity of the plant has been attributed primarily to Cleistanthin A and B. [16]

One of the major causes of mortality is Hypokalemia and Renal failure. Death usually occurs within 3-7 days (majority of deaths occurring on the third day) of consumption. Even though early intervention is initiated in the early course of the disease, death occurs in a considerable number of patients owing to the unpredictable course of the illness.

7. Conclusion

Females form a larger portion of *Cleistanthuscollinus* poisoning. Higher mortality rate is seen in female population. 21-40 year age group is highly vulnerable for death. Consumption of a decoction of leaves result in highest mortality rate among self poisoning with *Cleistanthuscollinus*.

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