

Clinical Profile, Laboratory Findings, and Outcomes in Patients with *Cleistanthus collinus* Poisoning: A Prospective Observational Study



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[Visual Abstract](#)

ABSTRACT

Background: *Cleistanthus collinus* is a commonly encountered plant toxin used for deliberate self-harm in South India, leading to significant morbidity. Clinical manifestations can vary widely, with outcomes depending on early identification and aggressive supportive management.

Objectives: To evaluate the clinical profile, laboratory abnormalities, and outcomes in patients with *C. collinus* poisoning.

Materials and methods: This prospective observational study was conducted at Sri Venkateswara Medical College and its affiliated tertiary care teaching hospital in Tirupati, Andhra Pradesh, India. Sixty adult patients with confirmed *C. collinus* ingestion were included. Demographic data, clinical features, laboratory parameters, management, and outcomes were recorded and analyzed using standard statistical methods.

Results: The mean age of patients who consumed *C. collinus* poison was 29.6 ± 10.2 years, with a male predominance (65%). All the cases were due to intentional ingestion. Common clinical features included vomiting (20.0%), fatigue (15.0%), and giddiness (13.3%), while 33.3% were asymptomatic at presentation. Bradycardia (25.0%) was the most frequent cardiovascular abnormality. Laboratory findings revealed hypokalemia, metabolic acidosis, elevated transaminases, and renal impairment (serum creatinine >1.5 mg/dL in 20.0%). Intensive care was required in 13.3% of patients; 11.7% needed mechanical ventilation, and hemodialysis was done in 8.3% of patients. The mean hospital duration of stay was 4.2 ± 2.8 days. Overall survival was 98.3% with one mortality (1.7%). The nonsurvivor had older, comorbid illness, severe renal dysfunction, and required multiorgan support.

Conclusion: *C. collinus* poisoning demonstrates a variable clinical spectrum ranging from asymptomatic cases to severe multisystem organ dysfunction. Early presentation and prompt supportive management are associated with favorable outcomes. Older age, comorbidities, renal impairment, and requirement for intensive care may predict poor prognosis.

Keywords: *Cleistanthus collinus*, Hypokalemia, Metabolic acidosis, Outcomes, Plant poisoning, Renal dysfunction.

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INTRODUCTION

Burden of Poisoning (Global and Regional Trends)

Acute poisoning poses a public health challenge worldwide and particularly in low- and middle-income countries, causing significant morbidity and mortality.¹ Deliberate self-poisoning accounts for a large proportion of emergency department visits and is often associated with underlying socioeconomic and psychological stressors.² In South Asia, pesticide and plant-based toxins are commonly used for self-harm because of their easy availability.³ In India, poisoning continues to be a major cause of suicide-related mortality, especially in rural populations.^{4,5} Plant-derived toxins constitute a significant proportion of poisoning cases in various hospital-based studies across the country.^{5,6}

Cleistanthus collinus as a Regional Toxicological Entity

Cleistanthus collinus is a member of the Euphorbiaceae family, which is widely distributed in South India and is a well-recognized plant used for deliberate self-poisoning.^{7,8} It is known locally by vernacular names such as "Oduvanthalai" and "Vadisaaku," reflecting its easy accessibility and familiarity in rural communities (Fig. 1).⁸

The leaves of the *C. collinus* plant are typically consumed either as a ground paste or as an aqueous extract. Ingestion in the form of a decoction has been associated with more severe toxicity due to enhanced extraction and absorption of active toxic constituents.^{9,10}

Toxic Constituents and their Mechanism of Action

Cleistanthus collinus toxicity primarily stems from its lignan compounds such as

cleistanthin A, cleistanthin B, and diphyllin.¹¹ These compounds disrupt cellular metabolism by inhibiting thiol-dependent enzymes, decreasing intracellular glutathione, and impairing oxidative phosphorylation.^{12,13} Besides, they also inhibit renal tubular proton pumps (V-type H⁺ ATPase), leading to distal renal tubular acidosis and related electrolyte abnormalities, particularly hypokalemia.^{14,15} These metabolic alterations are the basis for many of the clinical features observed following ingestion.

Clinical Spectrum of *Cleistanthus collinus* Poisoning

Clinical manifestations of *C. collinus* poisoning are variable and can evolve over time. Early symptoms are usually nonspecific, with mostly gastrointestinal symptoms such as nausea, vomiting, and abdominal discomfort.^{8,16} With progression of toxicity, patients may develop metabolic acidosis, hypokalemia, neuromuscular weakness, cardiac arrhythmias, and respiratory failure.^{17,18}

In severe poisoning, complications such as acute kidney injury, acute respiratory distress syndrome, and multiorgan dysfunction may occur.^{19,20} Neurological manifestations such as altered sensorium and seizures have also been reported.²¹ Mortality rates ranging from 20% to 40% in patients with late presentation and severe complications were seen in previous studies on *C. collinus* poisoning.^{8,22}

Predictors of Outcome

Poor outcomes in *C. collinus* poisoning are associated with delayed presentation, severe metabolic acidosis, hypokalemia,

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Figure 1: *Cleistanthus collinus* plant (photograph taken by the authors)

respiratory failure, and circulatory shock.^{17,23,24} Early recognition and timely supportive care with correction of electrolyte and acid-base disturbances are critical in improving outcomes.^{25,26}

Variability in Clinical Outcomes

There is considerable variation in the clinical profile and outcomes reported across studies. While earlier reports describe severe toxicity with higher mortality, recent studies indicate improving survival rates reflecting advances in supportive and critical care.^{7,17}

However, much of the available literature is retrospective or focused predominantly on critically ill patients and therefore may not adequately represent the full spectrum of disease.²⁷

Rationale and Objectives

In view of the variability in reported outcomes and limitations of existing data, there is a need for contemporary prospective studies covering the full spectrum of disease severity. Most previous studies have focused on intensive care populations, which may lead to an overestimation of mortality.

In this study, patients admitted to both general wards and intensive care units are included providing a more comprehensive clinical perspective. This approach allows evaluation of the clinical profile, laboratory findings, and outcomes in patients with *C. collinus* poisoning at a tertiary care teaching hospital in South India with the aim of identifying patterns that may reflect evolving trends in disease severity and prognosis.

MATERIALS AND METHODS

Study Design and Institutional Setting

This study was designed as a prospective observational study conducted from the year

2025 to 2026 at Sri Venkateswara Medical College and its affiliated tertiary care teaching hospital in Tirupati, Andhra Pradesh, India. The institution serves as a major referral center catering to urban and rural populations, providing an appropriate setting to study poisoning cases with varied clinical presentations.

Study Population

All patients presenting with a history of *C. collinus* poisoning during the study period were screened for eligibility.

Inclusion Criteria

- Patients aged ≥ 18 years.
- Confirmed history of *C. collinus* ingestion based on:

- Patient or attendant history.
- Identification of plant material.
- Patients who provided informed consent.

Exclusion Criteria

- Patients with co-ingestion of other toxic substances.
- Patients discharged against medical advice before adequate evaluation.
- Sample Size

This was a prospective observational study. All patients with *C. collinus* poisoning who met inclusion criteria during the study period were enrolled. No formal sample size calculation was performed, as the study was exploratory and descriptive. The final sample of 60 patients reflects all eligible cases presenting to our center during the study duration. The modest sample size from a single center limits the precision of estimates for rare outcomes and may restrict generalizability. Larger multicenter studies are needed.

Data Collection

Data were collected prospectively using a structured proforma.

Demographic Data

- Age.
- Gender.
- Place of residence (rural or urban).

Poisoning Details

- Time interval between ingestion and hospital presentation.
- Mode of ingestion (raw leaves or decoction).
- Estimated quantity consumed.

Clinical Parameters

- Vital signs at presentation (heart rate, blood pressure, respiratory rate, and oxygen saturation).
- Presenting symptoms (vomiting, breathlessness, weakness, altered sensorium).

- Clinical signs (hypotension, respiratory distress, and neurological status).

Laboratory Investigations

The following laboratory tests were performed as per standard hospital protocols using calibrated equipment:

- Complete blood count (CBC).
- Liver function tests (LFT).
- Renal function tests (RFT).
- Serum electrolytes (sodium and potassium).
- Arterial blood gas (ABG) analysis.
- Serum lactate.

Outcomes

Primary Outcome

In-hospital mortality.

Secondary Outcomes

- Duration of hospital stay.
- Need for ICU admission.
- Need for mechanical ventilation.
- Occurrence of complications, including metabolic acidosis, hypokalemia, acute kidney injury, and respiratory failure.

Management Protocol

All patients received standard supportive care according to institutional protocols, which included gastric lavage, intravenous fluids, electrolyte correction, acid-base correction, and ventilatory support as required. APACHE II score was used to assess the severity of illness. No specific antidote was used, as none is currently available for *C. collinus* poisoning.

Data Analysis

Data were entered into a Microsoft Excel spreadsheet and analyzed using descriptive statistics only. Continuous variables are presented as mean $\pm$ standard deviation (SD), while categorical variables are expressed as frequencies and percentages. Since there was only one death in the study, no inferential statistical tests or *p*-values were applied. All tables were generated after double-checking the raw data for accuracy. The analyses were also cross-verified using Python (pandas library) for additional precision.

Ethical Considerations

The study protocol was approved by the Institutional Ethics Committee of Sri Venkateswara Medical College, Tirupati (Approval No: 315/SRC/2024, dated 09-12-2024). Written informed consent was obtained from all participants or their legally authorized representatives. Patient confidentiality was strictly maintained by anonymizing the collected data.

Table 1: Demographic profile of patients with *Cleistanthus collinus* poisoning (N = 60)

Characteristic	Value
Age (years), mean $\pm$ SD	29.6 $\pm$ 10.2
Age range (years)	17–60
Gender, n (%)	
Male	39 (65.0)
Female	21 (35.0)
Occupation, n (%)	
Laborer	28 (46.7)
Others	32 (53.3)
Past medical history, n (%)	
No comorbidities	52 (86.7)
Hypertension	4 (6.7)
Type 2 diabetes mellitus	3 (5.0)
Alcohol use, n (%)	42 (70.0)
Smoking, n (%)	8 (13.3)

SD, standard deviation

Table 2: Clinical features and severity markers (N = 60)

Parameter	n (%)
Mode of poisoning	
Ingestion	60 (100.0)
Presenting complaints	
Fatigue/weakness	9 (15.0)
Vomiting/nausea	12 (20.0)
Giddiness/palpitations	8 (13.3)
Asymptomatic (nil complaints)	20 (33.3)
Cardiovascular findings	
Normal	39 (65.0)
Bradycardia	15 (25.0)
Tachycardia/arrhythmia	7 (11.7)
Altered sensorium	12 (20.0)
ICU admission	8 (13.3)
Requirement for mechanical ventilation	7 (11.7)
Requirement for hemodialysis	5 (8.3)
Requirement for vasopressor support	4 (6.7)
Seizures	2 (3.3)

ICU, intensive care unit

RESULTS

Demographic and Baseline Characteristics

Sixty patients with *C. collinus* poisoning were enrolled. The mean age was 29.6 $\pm$ 10.2 years (range: 17–60 years), and 39 (65.0%) were male. Twenty-eight patients (46.7%) were laborers. The majority (52, 86.7%) had no comorbidities. A history of alcohol consumption was present in 42 patients (70.0%), and smoking in 8 (13.3%) (Table 1).

Table 3: Detailed laboratory parameters

Parameter	Mean $\pm$ SD	Abnormal values/remarks
Hemoglobin (gm/dL)	12.4 $\pm$ 1.8	—
WBC count ($\times 10^3/\mu\text{L}$)	8.5 $\pm$ 3.2	Leukocytosis noted in severe cases
Serum creatinine (mg/dL)	1.45 $\pm$ 1.12	>1.5 mg/dL in 12 patients (20.0%)
AST (U/L)	94 $\pm$ 140	Marked elevation (>300 U/L) in severe cases
ALT (U/L)	92 $\pm$ 128	—
ALP (U/L)	78 $\pm$ 52	Mild elevation in some patients
Serum potassium (mEq/L)	3.69 $\pm$ 0.68	Hypokalemia was common
Arterial pH	7.32 $\pm$ 0.12	Metabolic acidosis frequent
Serum lactate (mmol/L)	1.8 $\pm$ 1.4	Elevated in critically ill patients
Anion gap	12.5 $\pm$ 8.5	Elevated in some cases

ALP, alkaline phosphatase; ALT, alanine aminotransferase; AST, aspartate aminotransferase; SD, standard deviation; WBC, white blood cell

Table 4: Management, interventions, and outcomes (N = 60)

Parameter	Value
ICU admission	8 (13.3%)
Mechanical ventilation	7 (11.7%)
Hemodialysis	5 (8.3%)
Vasopressor support	4 (6.7%)
Hospital stay (days), mean $\pm$ SD	4.2 $\pm$ 2.8
Outcome	
Survived	59 (98.3%)
Died	1 (1.7%)

ICU, intensive care unit; SD, standard deviation

Clinical Presentation

The estimated quantity consumed ranged from 3–4 to 15–20 leaves. Most patients presented to the hospital within 8–12 hours of ingestion. The most common presenting complaints were fatigue or weakness, vomiting, nausea, giddiness, and palpitations. One-third of the patients (33.3%) remained asymptomatic at the time of admission. Cardiovascular abnormalities were prominent. Bradycardia was the most common finding, while respiratory involvement and altered sensorium were noted mainly in severe cases (Table 2).

Laboratory Findings

Detailed laboratory parameters on admission are presented in Table 3.

Laboratory abnormalities were consistent with the known toxic effects of *C. collinus* on the cardiac, renal and metabolic systems. Common findings included mild to moderate elevations in hepatic transaminases, varying degrees of renal impairment, hypokalemia and metabolic acidosis with elevated lactate in severe cases.

Management and Outcomes

Patients were managed with supportive care as the mainstay of treatment. This included close

monitoring, intravenous fluids, correction of electrolyte imbalances and acidosis, and organ systems support whenever necessary. Only a minority required intensive care interventions such as mechanical ventilation or vasopressors.

The overall outcome was favorable. The mean hospital stay was 4.2 $\pm$ 2.8 days. Fifty-nine patients (98.3%) recovered completely and were discharged. There was only one death (1.7%) which occurred in an elderly female patient with multiple comorbidities who had ingested a large quantity of leaves and developed severe acute kidney injury along with respiratory failure (Table 4).

Comparison of Survivor and Nonsurvivor

Comparison between the single nonsurvivor and the survivors revealed some notable differences. The nonsurvivor was an older patient (49 years) with comorbidities (type 2 diabetes mellitus) with significantly higher serum creatinine (4.6 mg/dL) and required intensive care with multiorgan support. In contrast, survivors had a mean age of approximately 29 years, fewer comorbidities, lower creatinine levels, and only 11–13% needed ICU or organ support.

These findings suggest that older age, presence of comorbidities, severe renal impairment, and need for multiorgan support were associated with poor outcome in this study.

DISCUSSION

Cleistanthus collinus poisoning is an important cause of plant-based toxic exposure in South India, particularly among young adults with intentional self-harm.⁷⁸ The present prospective observational study provides a contemporary clinical and laboratory profile of affected patients and offers insights into factors associated with disease severity and outcomes.

In this study, the majority of patients were young, with a mean age of 29.6 years, and there was a clear male predominance (65%). This demographic pattern is consistent with prior Indian studies where poisoning is more frequently observed in economically productive age groups and is often linked to psychosocial stressors.^{5,6} The high proportion of laborers in our cohort further supports the association between socioeconomic vulnerability and the risk of toxic ingestion. A notable finding was the high prevalence of alcohol use (70%), which may act as a facilitating factor for impulsive self-harm, as also suggested in population-based studies on poisoning and suicide in India.⁵

All cases in the present study were due to intentional ingestion, with most patients presenting within 8–12 hours. Early presentation likely contributed to the favorable outcomes observed. Similar observations have been reported in recent studies highlighting improved outcomes with early hospital presentation and timely supportive care.²⁸ Notably, one-third of patients were asymptomatic at admission, underscoring the unpredictable clinical course and the importance of close monitoring even in apparently stable individuals.

The clinical spectrum observed was broad, ranging from mild gastrointestinal symptoms to significant cardiovascular and neurological involvement. Bradycardia was the most common cardiovascular abnormality, while tachyarrhythmias were less frequent. These findings are consistent with the known cardiotoxic effects of *C. collinus*, particularly its impact on cardiac conduction.⁸ Neurological manifestations such as altered sensorium and seizures, as well as respiratory compromise, were predominantly seen in patients with severe poisoning, indicating progression to systemic toxicity.^{11,18}

Laboratory abnormalities reflected multiorgan involvement. Hypokalemia and metabolic acidosis were common, with distal renal tubular dysfunction described in both experimental and clinical studies.^{14,17} Elevated transaminases suggested hepatic involvement, although this was generally mild to moderate. Renal impairment was observed in 20% of patients, emerging as an important marker of severity, in line with previous studies on poisoning-related acute kidney injury.²⁰ Elevated lactate levels in critically ill patients further indicated underlying tissue hypoxia and metabolic derangement.

Management in this study was predominantly supportive, as no specific antidote exists for *C. collinus* poisoning.²² The proportion of patients requiring intensive care (13.3%), mechanical ventilation (11.7%) and

hemodialysis (8.3%) was relatively low compared to earlier reports. The overall mortality rate was 1.7%, which is substantially lower than the 5–20% reported in previous studies.^{7,11,29} This difference may be attributed to earlier presentation, improved referral patterns, and advances in supportive and critical care.

Although limited by the low number of adverse outcomes, comparison between survivors and the single nonsurvivor provides clinically relevant insights. The nonsurvivor was older, had comorbid illness, and demonstrated significant renal dysfunction requiring multiorgan support. These findings are consistent with existing literature identifying older age, comorbidities, delayed presentation, and severity of organ dysfunction as predictors of poor outcome in acute poisoning.^{18,23}

Importantly, this study demonstrates lower mortality compared to earlier reports, likely reflecting improvements in early recognition and supportive care. Unlike previous studies that predominantly included critically ill patients, the present study encompasses the full clinical spectrum, including mild and asymptomatic cases, thereby providing a more representative assessment of disease burden and outcomes in current clinical practice.²⁹

The findings of this study reinforce the importance of early recognition and close monitoring in all cases of *C. collinus* poisoning, including those who are initially asymptomatic. Particular attention should be directed toward renal function, electrolyte disturbances, and acid–base status as these parameters correlate with disease severity.^{24,25}

This study has certain limitations. Quantification of ingested toxin was based on patient history and may be subject to recall bias. The sample size was modest, and being a single-center study, the findings may limit generalizability. Additionally, inferential statistical analysis was not feasible due to the low number of adverse outcomes. Despite these limitations, the prospective design and inclusion of consecutive patients strengthen the validity of the findings and provide a realistic representation of current clinical practice.

DECLARATIONS

Ethical Approval

The study protocol was approved by the Institutional Ethics Committee of Sri Venkateswara Medical College, Tirupati (Approval No: 315/SRC/2024, dated 09 December 2024).

Informed Consent

Written informed consent was obtained from all participants or their legally authorized representatives prior to inclusion in the study.

Conflict of Interest

The authors declare that there are no conflicts of interest.

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Author's Contributions

All authors contributed to the study conception and design. Data collection and analysis were performed by the authors. The first draft of the manuscript was written by Dr K Praveen, and all authors reviewed, revised, and approved the final manuscript.

Data Availability

The datasets generated and/or analyzed during the current study are available from the corresponding author on request.

Image Statement

The image used in Figure 1 is an original photograph taken by the authors and has not been previously published.

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