CASE REPORT

Cleistanthus collinus poisoning: a case report of intentional poisoningNandakishore Bompelli,¹ Rakesh Reddy C,² Santosh Modani,³ Anirudda Deshpande⁴¹Internal Medicine, Aditya Hospital, Warangal, Telangana, India²Medicine, Aditya Hospital, Warangal, Warangal, India³Cardiology, Max Care Hospital, Warangal, Telangana, India⁴Neurology, Vinayaka Neuro Multispecialty Clinic, Warangal, India**Correspondence to**Dr Anirudda Deshpande,
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SUMMARY

We report a case of 50-year-old male patient from tribal area in South Indian state of Telangana, who ingested the liquid extract from crushed leaves of the plant, *Cleistanthus collinus* with the intention of self-harm. Immediate gastric lavage and activated charcoal administration was done and the patient was subsequently admitted into an acute medical care unit. During first 24 hours of monitoring, the patient was clinically stable. There was mild normal anion gap metabolic acidosis and hypokalaemia on arterial blood gas (ABG) and was corrected accordingly. On second day of admission he developed acute onset shortness of breath. Chest auscultation revealed extensive bilateral coarse crackles. Chest X-ray was suggestive of acute respiratory distress syndrome (ARDS). The patient had to be intubated. Continuous renal replacement therapy (CRRT) was initiated in view of worsening metabolic acidosis and unstable haemodynamics. In spite of appropriate intensive care measures, the patient succumbed to illness. Immediate gastric lavage and activated charcoal administration was done and the patient was subsequently admitted into an acute medical care unit. During first 24 hours of monitoring, the patient was clinically stable. There was mild normal anion gap metabolic acidosis and hypokalaemia on ABG and was corrected accordingly. On second day of admission, he developed acute onset shortness of breath. Chest auscultation revealed extensive bilateral coarse crackles. Chest X-ray was suggestive of ARDS. The patient had to be intubated on day 2. CRRT was initiated in view of worsening metabolic acidosis and unstable haemodynamics. In spite of appropriate intensive care measures, the patient gradually deteriorated, had cardiac arrest and passed away on day 5 of his hospital stay.

BACKGROUND

Ingestion of leaves of plant *Cleistanthus collinus* (CC), is a common way to commit suicide in rural Southern India. CC poisoning appears to be almost exclusive to the Southern Indian states of Tamil Nadu, Pondicherry and the Rayalaseema area of Andhra Pradesh State.¹ No single case is reported is from state of Telangana and this is probably a first case to be reported. In excess of 1000 cases of CC poisoning were reported from various parts of Tamil Nadu between 1926 and 1985.²

The plant CC belongs to the Euphorbiaceae (spurge family). They are a family of flowering plants with more than 300 genera and roughly 7500 species. Most of these species of plants are herbs.

However, those found in the tropics could also be shrubs or trees. The genus *Cleistanthus*, belonging to the family Euphorbiaceae, composes of 140 species native to the region between Africa and the Pacific islands. CC is a toxic deciduous shrub that grows in hilly deciduous forests of Central and South India, Malaysia and Africa. Inexplicably, despite the plant being distributed in various regions of India, no reports about poisoning are available from other parts of India except from Tamil-nadu.³

CC contains a plant poison. It is called by various names depending on the local language spoken in the respective Southern states of India (oduvan (in Tamil language), kadise (in Kannada language), vadisaku (in Telugu language) and oduku (in Malayalam language)). Ingestion of plant leaves or its decoction leads to hypokalaemia, metabolic acidosis, hypotension and hypoxia.³⁻⁴ The mechanism involved is probable distal renal tubular acidosis, acute respiratory distress syndrome and toxin induced vasodilatation, respectively.⁵⁻⁷ Hypokalaemia and acidosis may also induce rhabdomyolysis resulting in myoglobinuric renal failure and neuromuscular (NM) weakness.⁸

Cleistanthin A and cleistanthin B are phytoconstituents of CC. Cleistanthin A and cleistanthin B are chemically aryl-naphthalide lignans. They have been reported to be toxic substances responsible for poisoning. This is probably the first case to be reported from our state. Elaborate case series may be needed to further evaluate the role of early continuous renal replacement therapy (CRRT) in CC poisoning.

CASE PRESENTATION

A 50-year-old man from tribal area of north Telangana (south Indian state) was brought to emergency room with alleged history of consumption of liquid extract of leaves (figure 1) of a toxic herb called 'vadisaku' (in the local Telugu language). As this is an uncommon poisonous substance used for deliberate self-harm, the patient was immediately referred to our tertiary level care hospital by the primary healthcare worker in this village situated in a tribal area. On reaching the ER, patient was admitted and immediately administered gastric lavage.

On admission, the patient was conscious, alert and vital parameters were stable.

Immediate gastric lavage and activated charcoal administration was done and the patient was subsequently admitted into an acute medical care unit.

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Figure 1 The leaves of *Cleistanthus collinus* plant (red arrow).

The patient was admitted in intensive care unit for close monitoring of vital parameters and preliminary blood work up. 12 lead ECG done was normal. The patient was initiated on continuous cardiac monitoring for diagnosing rhythm disturbances, if any in due course. The metabolic acidosis, hypokalaemia and hypomagnesaemia were appropriately corrected. Multiple doses of activated charcoal, N acetyl cysteine infusion and other supportive treatment were initiated. Acid base status and serum electrolytes were monitored two times per day 12 hours apart.

Approximately 72 hours after admission, the patient developed sudden breathlessness. There was rapid desaturation over a period of few hours.

The patient had to be intubated and put on ventilator. The chest X-ray showed diffuse homogenous opacities in bilateral

Figure 2 Chest X-ray anteroposterior view showing bilateral asymmetrical fluffy shadows (predominantly in the lower zone of left lung) on day 5 of admission, suggestive of acute respiratory distress syndrome (red arrows).

lung fields (figure 2). Repeat ABG, renal function tests showed progressive worsening. The patient developed hypotension subsequently and had to be put on inotropic support in the form of norepinephrine and dopamine infusion. CRRT was done in view of worsening metabolic acidosis and unstable haemodynamics. The clinical condition of the patients progressively worsened over the next few days. Patient developed sudden cardiac arrest on day 5 of hospitalisation and succumbed to his illness.

INVESTIGATIONS

On admission, ABG suggestive of normal anion gap metabolic acidosis and hypokalaemia (pH: 7.330, pco₂:29.8, po₂:95.2, hco₃:17.8, K+2.9).

haemoglobin: 12.3 g/L, total leucocyte count: 31 400/cu.mm, platelets: 0.32×10^9 /L. Serum sodium 136 mEq/L, potassium 2.9 mEq/L, calcium 9.1mEq/L and magnesium 1.8 mEq/L, blood urea of 23 mg/dL and creatinine of 1.2 mg/dL.

Initial chest X-ray and two-dimensional echocardiogram was normal.

OUTCOME AND FOLLOW-UP

Patient developed sudden cardiac arrest on day 5 of hospitalisation and succumbed to his illness.

DISCUSSION

A toxic shrub, CC (botanical name) is frequently used for deliberate self-harm in the rural areas of Southern India. The leaves of this plant are frequently consumed (figure 1). Toxicity and repellency activity of CC leaf extracts were found to be effective against stored grain pests and it could be a viable eco-friendly option for stored grain insect pest management.⁹

The pharmacological content of the leaves include aryl-naphthalene lignan lactones—diphyllin, and its glycoside derivatives namely cleistanthin A and B and collinusin. Diphyllin, cleistanthin A and B were collectively known as ‘oduvin’ in the past.¹⁰ In addition, the lignans such as cleistanthin D, cleistanone and cleistanthin C are also present in the leaves.¹¹ The toxicity of the plant is mainly due to the presence of cleistanthin A and B.¹² Other major phytoconstituents in the leaves are 3-O-methyl-d-glucose, heptacosane, 2-hydroxy-7-methoxy-4,5-diphenyl-5 hindeno [1.2-d] pyrimidine, benzenetriol (pyrogallol acid), 1.6-anhydro- α -D-glucopyranose (levoglucosan) and eicosane.¹²

In animal models, this toxin has shown to cause NM blockade resulting in muscular weakness. Mechanism of NM blockade is hypothesised to the reduction in excitability of nerve and muscle membranes. This NM blockade was found to be potentially irreversible. The presence of NM blockade explains the type 2 respiratory failure in these patients. The presence of distal renal tubular acidosis can be attributed to the inhibition of the V-type H⁺-ATPase in the renal tubule. The glycosides, which are the toxic principles in the toxin, have the potential to cause cardiac effects. The ECG abnormalities such as sinus tachycardia, ST segment depression, inverted ‘T’ waves, sinus bradycardia, flat ‘P’ waves and prolonged QT and QTc intervals in 95% of patients suffering from CC poisoning.¹³ Premature ventricular complexes were the most common arrhythmia in these patients.⁴ Ventricular fibrillation and asystole have also been documented as frequent cardiac rhythm abnormality.¹⁴ ST-T changes appeared frequently in these patients that succumbed their illness.³ Elevated cardiac enzymes in these patients, suggest a possibility of direct cardiac myotoxicity.² Oxidation of-SH (thiol) groups may be attributed to the loss of ATPase activity. Inhibition of the thiol/thiol enzymes by lignan lactones is the main mechanism in the toxicity of CC.

Animal studies show glutathione depletion with ATPase inhibition, resultant cellular injury resulting in glomerular degeneration, cerebral gliosis and focal hepatic necrosis.¹⁵

Although all parts of the CC plant are potentially toxic,³ the leaves of the plant are commonly used for homicide/suicide by the rural population. The various methods of alleged deliberate self-harm include ingestion of crushed plant parts, chewing the leaves, consuming a paste/juice of the leaves or a decoction prepared by boiling the leaves in water. When consumed as a boiled extract, CC poison is most lethal.³

The initial clinical presentation of CC poisoning may be deceptive. Many patients are asymptomatic for the first few hours. Some may present with gastrointestinal symptoms such as nausea, vomiting, abdominal distension and decreased bowel sounds.¹² The cardiorespiratory symptoms may include chest pain, dyspnoea, tachypnoea, bradypnoea, tachycardia or bradycardia, hypotension and cyanosis.¹⁶

Some of the neurological manifestations may include mydriasis with visual disturbances, muscle cramps, altered sensorium, giddiness, headache, tremors and ptosis. Fever and dehydration are common during the first 4 days postingestion of the toxin. The haematological derangements in these patients include leucocytosis, elevated hepatic transaminases, elevated creatinine phosphokinase, hyponatraemia, hyperbilirubinaemia and coagulopathy.

Despite aggressive management of these metabolic derangements and acute respiratory distress syndrome (figure 2), mortality occurs in 40% patients of CC poisoning. The death usually occurs within 3–7 days.³

Learning points

- The leaves of toxic shrub *Cleistanthus collinus* (CC) are frequently consumed for deliberate self-harm in the rural areas of Southern India.
- The CC poisoning usually results in distal renal tubular dysfunction leading to hypokalaemia with normal anion gap metabolic acidosis, and acute respiratory distress syndrome.
- The mortality in this poisoning is 40%. Death usually occurs within 3–7 days. Role of early continuous renal replacement therapy in correcting the metabolic derangement needs to be evaluated further through elaborate studies.

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