Abstract

Aims: 1. To study the clinical features in patients with Cleistanthus collinus poisoning; 2. To study in them the effect of Cleistanthus collinus poisoning on the various organ systems and metabolic parameters using standard laboratory investigations.

Methods: All patients admitted to the hospital between September 1998 and April 2000 were studied. Statistical analysis of the results was done using chi-square test, Fisher’s exact test and Student’s ‘t’ test.

Results: Forty-six cases were studied, 15 (32%) of whom died. Eighty percent of the patients were in the second to third decade. The female:male ratio was 3:2. Ingestion of the poison as a decoction prepared from the leaves and ingestion of a large number of leaves otherwise were associated with a poor outcome. While survivors remained relatively asymptomatic, fatally poisoned patients presented with significant clinical signs and symptoms, however, laboratory abnormalities such as hypokalaemia, hyponatremia, an elevated AST / LDH / CPK / CPK-MB, nonspecific ST-T changes and QTc prolongation on ECG, metabolic acidosis and hypoxia with widened alveolar-arterial oxygen difference (A-aDO₂) were seen in both groups.

Conclusion: It is a poisoning seen in the young with significant mortality. Cause of death appears to be mainly due to its cardiac and respiratory effects. Metabolic disturbances especially hypokalaemia was a prominent feature. Most deaths occurred on the 3rd day and all within a week. No specific antidote is available.

INTRODUCTION

Cleistanthus collinus (Fig.1), a plant poison, is unique to the southern Indian states of Tamilnadu and Pondicherry. No reports are available about poisoning from other parts of India, though Modi’s Textbook of Forensic Medicine¹ cites cases from preindependent Bengal. Why this is so remains unexplained despite the widespread distribution of this plant.

Cleistanthus collinus is known by various names in different parts of India viz., Oduvanthalai / Nillipalai in Tamilnadu and Pondicherry, Kadiše in Andhra pradesh, Karlajuri in West Bengal and Garari in the Hindi speaking belt.² All parts of the plant are poisonous. Extract of the various plant parts yielded a multitude of compounds of which the glycosides, arylnapthalene lignan lactones are toxic.³⁻⁹ These lignan lactones include cleistanthin A and B, collinusin and diphyllyin, which in the past were known collectively as oduvin.¹⁰

MATERIAL AND METHODS

Forty-six patients admitted between September 1998 - April 2000 with history of consumption of Cleistanthus collinus plant parts were studied, prospectively. Daily clinical monitoring was done. Blood investigations, including urea,
sugar, creatinine, bilirubin, ALT, AST, alkaline phosphatase, CPK, CPK-MB, LDH levels, arterial blood gas (ABG) analysis and toxin assay using Digoxin Radio Immuno Assay kit (ICN Pharmaceuticals, New York) was done within Day : 1-3. ECG and blood electrolytes were done daily. The digoxin kit was used for to assay the toxin as the toxins are glycosides

Statistical analysis was done using chi-square and Fisher’s exact test and a ‘p’ value < 0.05 was considered significant.

RESULTS

Tables 1 and 2 summarize the observations. The age of the patients ranged from 13-65 yrs, the majority (37/46 cases) being below 30yrs (80%) with 25 cases in their 3rd decade (54%). Fifteen patients expired. The overall female to male ratio was 28:18, while 11:4 in the expired group. Eight of the 11 female patients and one of the four male patients i.e., nine of the 15 patients took the poison in decoction for psychosomatic illness and impulsiveness were the cause of ingestion and all those who took it on impulse survived. The poison was ingested in one of the following ways swallowing the hand crushed plant parts especially the leaves, chewing the leaves and swallowing them, making a decoction by boiling the leaves in water and drinking it and making a paste of the plant parts and leaves and swallowing it.

Fifteen of the 46 cases studied died resulting in 32.6% mortality. Clinical features in those who died included vomiting, pain in abdomen especially epigastric, breathlessness, visual disturbances like clouding/blurring/coloured vision, giddiness, drowsiness, fever, tachycardia and terminally hypotension and or respiratory arrest. Survivors were asymptomatic or transiently symptomatic with abdominal pain, visual symptoms and giddiness. In contrast, laboratory abnormalities were seen in both groups.

ECG changes included QTc prolongation and non-specific ST-T changes. Blood biochemistry showed hypokalaemia, increased AST/LDH/CPK/CPK-MB levels in most, hyponatraemia, hyperbilirubinaemia and elevated urea levels in the occasional patient. ABG showed metabolic acidosis, hypoxia and a widened alveolar-arterial O2 gradient / difference (A-aDO2 gap) especially in those with respiratory failure. The widened A-aDO2 gap persisted despite assisted ventilation indicating possibly an abnormality in oxygen transfer at the alveolar-capillary level. Toxin assay by digoxin kit was positive in sixteen out of the twenty-seven cases assayed, with higher levels in those who expired (Table3). All deaths occurred within six days of ingestion with the majority occurring on the third day. The cause of death was refractory hypotension, respiratory failure or both and sudden death.

DISCUSSION

Till date there are only three human studies. The age,
gender, mode of ingestion and mortality trends were similar to those observed in the previous studies. The number of cases (22%) peaked in the month of September. The plant part ingested was the leaf and when taken in decoction form was more fatal as observed in previous studies. In addition, in this study, the ingestion of more than two handfuls (> 60) of leaves in any form was found to be harmful. Most of the clinical features described were also noticed in the previous studies except for the visual symptoms and giddiness.

ECG changes were mainly in the form of non-specific ST-T changes. QTc prolongation was not a prominent feature. These findings were in contrast to the study by Kurien et al., where QTc prolongation was a prominent feature but similar to the observations made by Das et al. The ST-T changes were significantly more in those who died. Hypokalaemia per se could not be the cause of death as suggested by Kurien et al. since it was corrected in nine of the 15 patients who died. Hyponatraemia of < 130 mmol/l though seen significantly more in the mortality group was less common, a finding also observed by Kurien et al. The enzymes AST, LDH, CPK, CPK-MB were elevated in both the survivors and those who died but in later it was more severe. A cut off value of 3.1 mmol/l could be diagnostic as well as measure of the severity of poisoning. Hypokalaemia per se could not be the cause of death as suggested by Kurien et al.'s since it was corrected in nine of the 15 patients who died. Hyponatraemia of < 130 mmol/l though seen significantly more in the mortality group was less common, a finding also observed by Kurien et al. The enzymes AST, LDH, CPK, CPK-MB were elevated in both the survivors and those who died and those who died had significantly higher CPK-MB levels as compared to those who survived (80 ± 43 IU/L vs 58 ± 21 IU/L, 'p' value 0.039) suggesting a possible cardiotoxic effect as also observed by Kurien et al. The ALT and alkaline phosphatase levels were normal indicating absence of any liver injury. In animal studies a decrease in the activity of these enzymes has been observed.

ABG showed a picture of metabolic acidosis and, additionally in those with respiratory failure, hypoxia with widened A-aO2 gradient. This could indicate that it might also be causing lung injury. Pulmonary toxicity as a cause of mortality has also been documented by Das et al. but not by Kurien et al. who found that death was due to its cardiotoxicity.

Digoxin kit assay showed the phytotoxins to cross-react unlike observations in literature. Though levels were higher in those who died it is unlikely to be of diagnostic value as levels were not consistently high. The role of Anti-Dig Fab fragment in its management, hence, remains doubtful. Various methods have been employed in the past for detecting the toxins in urine and blood viz., ELISA, thin layer chromatography (TLC), HPLC, spectrophotometry.

In animal studies -SH containing compounds were found to be beneficial. Our study did not show any reduction in the -SH containing enzymes as seen in the animal studies. The value of these compounds needs to be evaluated in these patients is no human slides are available at present. The specific antidote is not yet available.

References