Case Report
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Toxicity Episodes of Mimosa invisa in Cattle and Buffaloes

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Abstract

Toxicity episode of *Mimosa invisa* was observed in 16 adult indigenous cattle and 10 buffaloes. The clinical signs were severe perineal oedema and death in cattle and buffaloes which consumed the plant. This study confirmed the plant as a cause for the clinical syndrome of perineal oedema which was an obscure disease. There was a damage to kidney with significant increase in serum creatinine and BUN. The damage to other vital organs like heart and lungs were also noticed both gross as well in histological findings.

Keywords: *Mimosa invisa,* Toxicity, Perineal oedema, Cattle, Buffaloes Obscure

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Introduction

Plant toxicity is being reported recurrently from different parts of Karnataka. More than a dozen obscure diseases are prevalent in Malnad region of Western Ghats. For some of these obscure diseases, toxic plant etiology has been suspected[1]. *Mimosa invisa* is a serious weed in Australia and other South East Asian countries including India[2]. This plant is a good legume manure and a bio-weedicide, in coconut, coffee and tea plantations (Figure 1-2)[3] . It is a good legume manure and a bio-weedicide in coconut, coffee and tea plantations. Cattle and buffaloes accidently consume the plant suffer from severe toxicity. There are unpublished reports of natural toxicity of *Mimosa invisa* in cattle and buffaloes of Karnataka, Kerala and Assam states of India. An effort is done to put the toxicity episodes of *Mimosa invisa* toxicity in cattle and buffaloes on record.

Case report

Sixteen adult indigenous cattle and 10 buffaloes (300-400 kg) were affected with the toxicity by accidental consumption of the fresh aerial part of *Mimosa invisa* (25- 50 g/kg). The animals grazed the plants naturally present in the plantation or the owners offered them without knowing the toxic nature of the plant. The affected animals had reduced ruminal motility and started passing pelleted dung on day 7 and 8. There was ascites, dyspnoea and severe anorexia. Later, these animals showed the development of characteristic perineal oedema (Figure 3-5). All the animals which exhibited severe perineal oedema and died within day 14 of consumption of the plant. Out of 26 animals, 22 animals died. Necropsy was conducted and gross/histology changes were recorded. Blood samples were collected once in 3 days in ailing animals. Usually the course of the toxicity was

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14 days. Haematological parameters like haemoglobin, TC, DC and PCV and serum biochemical parameters like AST, ALT, creatinine, blood urea nitrogen, bilirubin, were estimated. The plant samples were screened for the presence of cyanide, nitrates and oxalates[4,5] .

Figure 1. Mimosa invisa plant grown in areca nut garden



Figure 2. Mimosa invisa plant naturally grown : A close up view



Figure 3. Cattle affected with Mimosa invisa toxicity exhibiting the signs of severe perineal oedema



Figure 4. Cattle affected with Mimosa invisa toxicity exhibiting the signs of brisket oedema

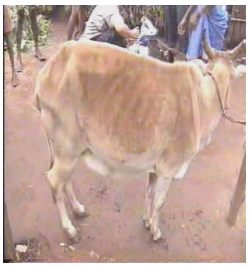
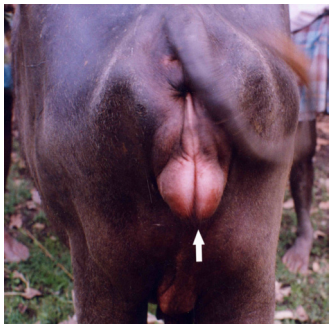


Figure 5. Buffaloe affected with Mimosa invisa toxicity exhibiting the signs of perineal oedema



Results and Discussion

The clinical signs exhibited by the affected animals were reduced ruminal motility, pelleted faeces, ascites and dyspnoea. The development of severe perineal oedema resulted death within 14 days consumption of the plant was also observed. Necropsy revealed anasarca, swollen kidneys, extensive haemorrhages on heart, lungs, kidney, peritoneum and liver. Earlier also, similar necropsy features were observed in calves fed with *Mimosa invisa* [6]. Similarly, the toxicity of *Mimosa invisa* was reported in camels[7]. This was further supported by the report toxicity of *Mimosa invisa* in buffaloes[8].

The nephrotoxicity due to consumption of the plant was evident in gross as well as in histology where the kidney sections of all died animals showed the cytoplasmic vacuolation of endothelial cells in the glomeruli and the tubules with varying degrees of lymphoid cell infiltration in the interstitium. All these changes were suggestive of tubular interstitial nephritis[9]. There was no significant change in AST and ALT values. Gross and histological changes in the heart, and the lungs were also showing degenerative changes indicating toxic nature of the plant on these organs (Figure 6-12).

Figure 6, 7 & 8. Nephrotoxicity exhibited by the animals







Figure 9 & 10. Extensive haemorrhages in heart with supparative changes.



Figure 11. Section of kidney of the animals died due to *Mimosa invisa* toxicity showing severe congestion of inter tubular vessels and focal areas of tubular necrosis with loss of architecture.

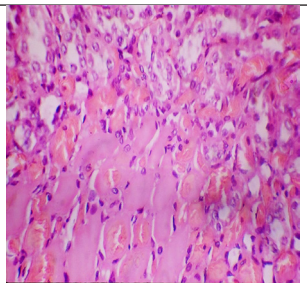
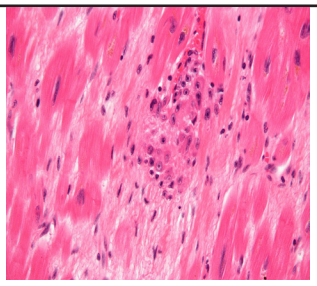


Figure 11. Section of heart the animals died due to Mimosa invisa toxicity showing congestion



There was a significant increase in the concentration creatinine and urea nitrogen (Table 1). An increase in BUN and serum creatinine concentration above the normal value implied that at least 75 % of nephrons were not functioning[10]. There was no significant change in haematological parameters. Similar observations were made in an experiment conducted to study the toxic dose of Mimosa invisa in rabbits where it was revealed that a dose of 25g/kg of Mimosa invisa was toxic to rabbits and that a dose of 30 g/kg produced acute toxicity resulting in death of rabbits. There was also an increase in the levels of serum creatinine and urea with damages to the liver, kidney and heart[11]. A toxicity study of Mimosa invisa was conducted in calf, rabbit and rat and similar findings were observed[12]. Toxicity study of another related plant Mimosa pudica also revealed toxicity in livestock and laboratory animals with less intensity[13].

Table 1. Biochemical profile in toxicity of Mimosa invisa in cattle and buffaloes (Mean±SEM)

Parameter	Apparently healthy cattle (n=10)	**Cattle and buffaloes affected with *Mimosa invisa* toxicity (n=26)**
Alanine amino Transferase (ALT in U/L)	27.5±2.10	27.82±2.53
Aspartate amino Transferase (AST in U/L)	56.2±2.5	58.48±1.54
Blood Urea Nitrogen (BUN in U/L)	18.90±1.61	119.00±1.08***
Creatinine (mg/dl)	1.13±0.20	11.18±0.20***
Calcium (mg/dl)	11.13±1.30	11.12±1.24
Magnesium (mg/dl)	2.60±0.15	2.68±0.13
Phosphorus (mg/dl)	4.90±0.30	4.66±0.20

***P<0.005

Mimosine is said to be the cause of toxicity in animals due to consumption of Mimosa invisa plant[14]. Mimosine was reported to cause toxicity in a heifer consumed the Mimosa invisa plant[15]. The clinical signs and death might be attributed to severe endothelial damage and nephrotoxicity complicated with cardiotoxicity. Mimosine was attributed to be the content of Mimosa invisa plant which is responsible to the toxicity in animals[16,17,18].

In phytochemical screening, the major phytotoxins namely , cyanide and nitrates were not detected. This is in accordance with the finding of many researchors[19,20,21].

An attempt was made to protect the rabbits from the toxicity of Mimosa invisa using a decoction containing Hygrophila auriculata, Tribulus terrestris and *Boerhaavia diffusa* equivalent to 5 g/kg[22].

Further study is required to confirm the role of each phytoconstituent in causing the toxicity in animals. Effort is also needed to elucidate the suitable therapeutic regimen for saving the animals.

Conclusion

The present study revealed the toxic nature of the *Mimosa invisa* which caused severe perineal oedema and death in cattle and buffaloes consumed the plant. This study confirmed the plant as a cause for the clinical syndrome of perineal oedema which was an obscure disease. There was a damage to kidney with significant increase in serum creatinine and BUN. The damage to other vital organs like heart and lungs were also noticed both gross as well in histological findings.

Conflict of interest

No conflict of interest.

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