CASE REPORT

Lantana Toxicity in Grazing Cattle

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Lantana Sp. is one of the popular toxic plant and major weeds in many of the countries. It can grow vigorously, invading many areas even at adverse climatic conditions in tropical and sub-tropical areas, damaging field crops. Most lantana poisoning occurs when stock unfamiliar with the plant are introduced to such areas. Animals tend to avoid grazing of lantana unless forced to eat through lack of adequate food, or sometimes, they eat accidentally while grazing. Young animals are most at risk. Red flowered varieties are thought to be the most toxic but some white and pink flowered varieties can also be highly toxic. This poisoning is reported in cattle, sheep, goat, buffalo, ostriches, guinea pigs, rabbits. Its foliage contains pentacyclic triterpenoids that cause hepatotoxicity, jaundice, and photosensitivity in grazing animals. The present paper deals with an outbreak of Lantana poisoning in cattle, which has caused a heavy death toll to the extent of 35.

History, Clinical Observations and Diagnosis

During August 2013, there were sudden deaths among two cattle herds of 150 heads since 10 days in the village Venkatapura, Koppal Taluk and District (Karnataka). For the last 20 days, animals were under migration seeking for grazing land in hilly areas, *i.e.*, from Venkatapura to Sindhanur taluk, then to Navli, Gangavati Tq. (Hilly area). At Navli, owner recorded death of 3 cattle. Then, to Kanakagiri - Muslapur, Gangavati Tq.–Venkatapura, Koppal Tq. Once, animals entered Venkatapura village back, 45 had clinical signs and the death toll raised to 35 within a short span of ten days.

Fig. 1: Animal is dull and depressed

During an investigation, all the ailing animals were examined and the clinical symptoms recorded. Animals were dull, depressed, anorectic, dehydrated, and emaciated (Fig. 1). Most animals showed a temperature of 101-103 °F and photosensitization (Figs 2-4).

Severely affected animals were having diarrhea with strong-smelling black fluid feces, and less severely affected animals were constipated. Muzzle was inflamed, moist, ulcerated, very painful and sloughing off (Fig. 4) or invaded by maggots. Some of the animals were showing necrosis and curling of ear pinna (Fig. 5), swelling of ear pinna, face (Fig. 6), vulval lips and eyelids. Animals exhibited ocular discharge, erosions on a dental pad and yellowish discoloration of the eyes, gums, and vulval mucus membrane (Fig. 7). All the visible mucus membranes were icteric. Blood, serum, rumen fluid and skin scrapping was collected from ailing animals.

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Fig. 2: Photosensitization on the body

Fig. 3: Photosensitization on the ear pinna

Fig. 4: Ulcerated muzzle (Photosensitization)

Fig. 5: Animal showing curling of ear pinna swelling of face and ruffled hair

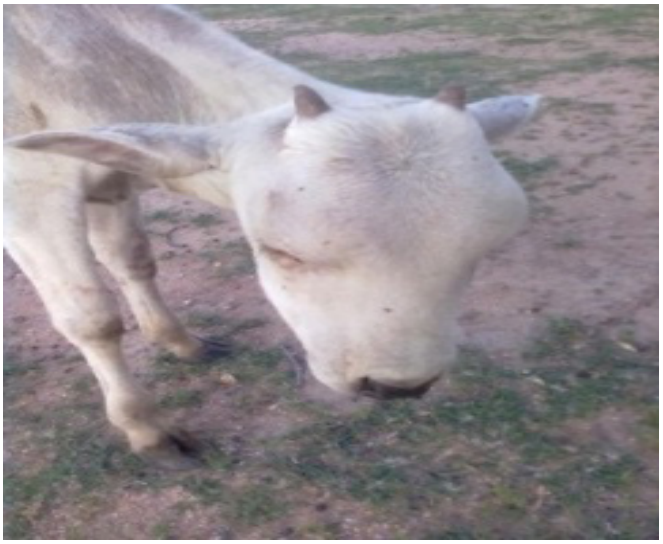

Fig. 6: Animal showing oedematous

The examination of skin scrapings and fecal samples did not reveal any parasites or ova, and the impression smears of skin lesions were negative for any specific pathogens. Protozoan motility of rumen fluid was found to be sluggish and number was low. Hematological alterations were not much significant in ailing animals. A rise in serum AST, ALT, total bilirubin, creatinine and BUN was observed.

One carcass available for post-mortem examination revealed yellowish discoloration of tissues; hard and dry ruminal contents; swollen and yellowish coloured liver; swollen gall bladder; ulcerated muzzle and dental pad. Blood smears and impressions of heart, liver, spleen, kidney and lung tissues taken were negative for any specific pathogens. Aforementioned organ samples were also collected for toxicological analysis, and were negative for nitrate, HCN and OPC poisoning. Tissue samples were subjected for bacterial culturing, but did not yield any growth on nutrient agar, nutrient broth and blood agar.

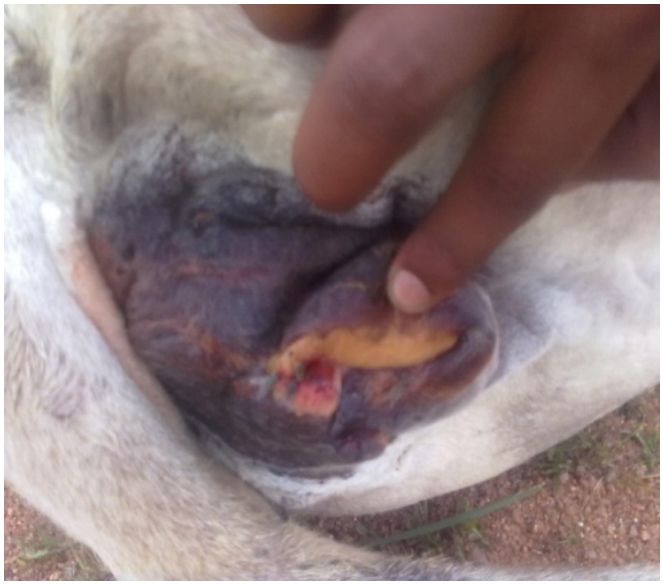

Fig. 7: Icteric vulval lips

Fig. 8: Lantana plant

During a visit, numerous *Lantana sp.* shrubs were found in the field. The farmer had noticed some of the cattle consuming *Lantana* plants (Fig. 8) in the grazing area and on closer examination, it was clear that the plants had been browsed. As there was no facility to carry out analysis of lantana toxicity at IAH & VB, Bengaluru, diagnosis was relayed upon history, clinical signs, field findings of grazing area, necropsy findings and serum biochemistry findings which were very much suggestive of Lantana poisoning.

Treatment and Discussion

The outbreak was managed therapeutically with administration of intravenous fluids (DNS), sodium thiosulphate, ceftriaxone 10 mg/kg b.wt., Meloxicam 1 mL/10 kg b.wt., Chlorpheniramine maleate and Belamyl 5-10 mL. Skin damage was dressed with potassium permanganate, glycerine and povidone iodine ointment. Cattle herds were moved to lantana-free areas and kept in the shade. Animals with severe toxicity had died. However, ten ailing animals with less toxicity recovered uneventfully following prompt treatment. When animals consumed lantana during grazing, it results in acute toxic hepatitis. The detoxification mechanism of liver is severely impaired and a large amount of toxic agents accumulate in the system, which will act as a photodynamic agent (Mathew *et al*., 2013).

Clinical signs are often developed after a few days of consumption of toxic plants. Signs depend on the amount of lantana consumed and the intensity of sunlight to which the animals have been exposed. Signs can appear after one feed and, in acute cases, within 24 hours. Because of lack of history, the diagnosis was delayed. Severely affected cattle almost invariably died within 15-20 days of eating the plant. Even after lesions caused by photosensitivity begin to heal and their liver function returned to normal, many cattle died after being poisoned due to severity of toxicity and prolonged exposure to the plant toxicity. The clinical signs and gross lesions in the post-mortem examination were compatible with those described for acute Lantana poisoning in cattle, sheep, and goats (Munyua *et al*., 1990;Ide and Tutt, 1998).

If an animal eats sufficient quantities of the plant, photosensitization sets in with liver damage and the accumulation of phylloerythrin in the blood, which sensitizes the animal's skin to ultra-violet light. The skin's sensitive areas most severely affected include the nasal and facial areas, and when the skin peels away, a reddish inflamed area is left. The condition also causes marked inflammation in the eyes and sexual orifices. Secondary bacterial infections are usually rampant. Significant Lantana toxins are the triterpene acids, lantadene A (rehmannic acid), lantadene B, and their reduced forms. Lantana poisoning causes obstructive jaundice, photosensitisation, a rise in serum AST activity and elevated hepatic and renal xanthine oxidase activity (Pal *et al*., 2007). Administration of activated charcoal can be done to adsorb the toxins in the rumen and to prevent further absorption (Haritha *et al*., 2019). Drenching with slurry (2.5 kg activated charcoal in 20 litres of electrolyte replacement solution for cattle; 500 g in 4 litres for sheep and goats) is important (Samal *et al*., 2016). Further, liver stimulants can be administered.

Major lantadenes are A, B, C and D and minor like reduced lantadene A and B. Lantadene A and lantadene B cause hepatotoxicity and photosensitisation in grazing animals such as sheep, goats and bovines (Barceloux, 2008) and horses (Burns, 2001). The ingestion of the plant parts can cause pink nose disease, jaundice and muzzle in cattle. Livestock foraging on the plant has led to widespread losses in the various countries including India (Barceloux, 2008).

Lantadenes are biotransformed by hepatic cytochrome P-450 enzymes into toxic compounds that damage the bile canaliculi, producing intrahepatic cholestasis and impairment of the normal flow of bile. The primary toxic action of the lantadenes may result in secondary photosensitization due to the reduced excretion of phylloerythrin, a natural metabolite of the anaerobic fermentation of chlorophyll that normally excreted in bile. Disruption in the biliary elimination of phylloerythrin increases its blood level and deposition in subcutaneous tissues. In non-pigmented areas of the skin or in areas without dark hair, phylloerythrin reacts with solar light, forming reactive molecules that damage the local tissue causing erythema, edema, inflammation, and necrosis of the epidermis.

Lantana, a noxious weed grows in many tropical and subtropical parts of the world. Heavy outbreaks of Lantana poisoning can occur mostly during drought. Both ruminants and non-ruminants, including lab animals are susceptible to the hepatotoxic action of lantana toxins.

An acute episode of *Lantana camara* intoxication in grazing herds of 150 cattle affecting 45 heads and 35 deaths over 20 days was recorded in Karnataka. No antidote is available against the toxic action of *Lantana camara*. Symptomatic treatments have been proposed with limited success. Knowledge of the biochemical mechanism of lantana intoxication at the cellular, subcellular, and molecular levels is essential in order to evolve a successful antidote and more rational therapy during lantana intoxication.

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