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Therapeutic management of hepatogenous photosensitization in crossbred cattle

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Abstract

Three cattle with the history of anorexia, skin lesions and kicking of abdomen brought to Veterinary Clinical Complex, Veterinary College and Research Institute, Namakkal were taken for the present study. Clinical examination revealed severe skin lesions in low pigmented and sun exposed skin areas with intense pruritus and icteric mucous membranes. Haemato-biochemistry revealed increased AST, GGT, direct bilirubin but decreased total protein and albumin levels. Increased echogenicity of liver was observed in transabdominal ultrasonography. The fodder along with phototoxic plants like *Lantana camera* and *parthenium* were fed to the animals. Based on history, clinical signs, haemato-biochemical evaluation and ultrasonography of liver, the condition was diagnosed as hepatogenous photosensitization. The animals were treated with intravenous fluids, antihistamines, ascorbic acid, antibiotics and liver tonics containing silymarin. Topical application of cetrimide cream application was advised. Animals showed uneventful recovery.

Keywords: cattle, *Lantana*, *Parthenium*, hepatogenous photosensitization, ultrasonography

Introduction

Photosensitization is sensitization of skin to particular wavelengths of sunlight, particularly within the ultraviolet range of the spectrum. This reaction may result either from direct entry of the photocytotoxic compounds or their photoactive metabolites in the circulation either through ingestion or percutaneous absorption (Type-1/primary); congenital (type-2), whereby abnormal haeme synthesis results in accumulation of photodynamic metabolites, including uroporphyrin, coproporphyrin, and protoporphyrin derivatives in the skin or hepatogenous (Type-3). Type 3 photosensitization is caused by abnormal presence of photodynamic pigments/compounds in the skin cells, cornea or mucus membranes results in dermatonecrosis (Mauldin and Kennedy, 2016) [1]. All photodynamic agents are absorbed from gut, detoxified in liver and excreted through bile. In ruminants, phylloerythrin is the end product of chlorophyll. In hepatic damage phylloerythrin is reaching the peripheral circulation and accumulating in epidermal cells and cause dermatitis when exposed to actinic rays of sun (Constable *et al.*, 2017) [2]. The hepatic photosensitisation is most frequently seen in ruminants.

Materials and Methods

Three cross bred cattle (one cross bred Jersey and two Cross bred Holstein Friesian) presented to Veterinary Clinical Complex, Veterinary College and Research Institute, Namakkal with the history of anorexia, skin lesions with pruritus and kicking of abdomen were taken for the study. Cattle with a sudden change in grazing behaviour had such symptoms. The detail clinical examination was performed as per standard protocol. Five millilitre of blood from jugular vein was collected and dispensed in to vacutainer with EDTA (2 ml) and with clot activator (3 ml). Haematology was done with haematological autoanalyzer. Serum biochemical parameters like total protein, albumin, aspartate amino transferase (AST), gamma glutamyl transaminase (GGT), direct bilirubin were estimated by autoanalyzer using commercial biochemical kits. Transabdominal ultrasonographic examination was performed by using MyLab40vet Doppler colour flow ultrasound machine (Esaote, Italy). The animals were treated with hepatoprotectants, laxatives, fluids, antibiotics, antihistamines and ascorbic acid.

Results and Discussion

The animals with photosensitization lesions over skin had icteric mucous membranes (Fig. 1)

and reduced appetite and milk yield. Clinical examination revealed severe skin lesions in low pigmented areas mainly on dorsal region of body (Fig. 2), udder, teats, between knee and fetlock of forelimbs, hock and fetlock of hind limbs and perineal region (Fig. 3). The ear lobes were shrunk, thickened and leathery in nature. Due to pruritus, animals were constantly kicking the abdomen over the skin lesions and leading to thickening and hardening of the skin. In addition, the distal portion of the tail was thickened and hardened, while two hind teats were inflamed and had crusted cracks. Temperature and other vital signs were within normal range. Haemato-biochemistry revealed leukocytosis with neutrophilia and elevation in AST, GGT, direct bilirubin and decreased total protein and albumin levels. Increased echogenicity of liver parenchyma was observed in ultrasonography (Fig. 4).



Fig 1: Icteric mucous membrane



Fig 2: Severe skin lesions on dorsal surface of the body

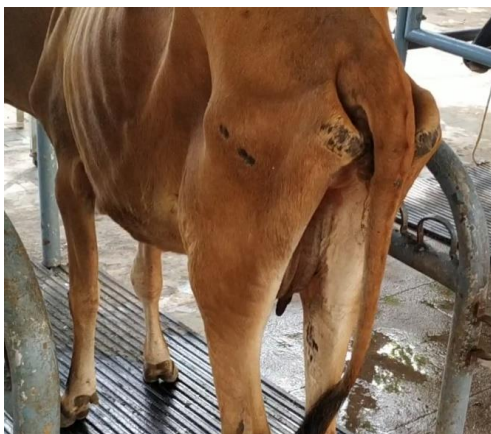


Fig 3: Thickened tail and inflamed hind teats



Fig 4: Ultrasonography - Hyperechoic liver parenchyma

In the present study, the lesions in skin were almost similar to the skin lesions observed in photosensitivity affected herd of Sahiwal cows by Thawait *et al.* (2013) [3]. Increased direct bilirubin would be responsible to stain the elastic tissues which might be responsible for icteric mucous membranes. The serum, biochemical analysis revealed increased AST, GGT and direct bilirubin, but decreased total protein and albumin. (Table 1). The elevated AST and GGT levels and decreased total protein and albumin are indicative of the hepatocellular damage and cholestasis. This compromised liver function was the reason for decreased appetite and because of the liver damaged animal had decreased ability to get rid of photodynamic pigments (Scott and Scott, 1993) [4] particularly phylloerythrin. The similar findings had also been reported by Hussain *et al.* (2013) [5]; Thawait *et al.* (2013) [3]. The phylloerythrin could be in surface of the body and when the actinic rays from sunlight is falling over the surface of the skin leading to local tissue reaction and necrosis. The increased leukocyte count with neutrophilia might be due to secondary bacterial skin infections. In the present study, though liver is compromised, the serum glucose levels were within the normal range.

Table 1: Haemato-biochemical parameters of the affected animals.

Parameters	Cow 1	Cow 2	Cow 3	Reference values
Haemoglobin (g/dl)	11.5	12.0	10.4	8.0 -15.0
Packed cell volume (%)	33	35	31	24 – 46
Red blood cell (x 10 ⁶ /cumm)	5.7	6.2	5.1	5.0 -10.0
Total Leucocyte (/cumm)	15,239	16,990	16,750	4000 -12000
Neutrophil (%)	66	71	69	15-45
Lymphocyte (%)	32	27	28	48-75
Eosinophils (%)	2	2	3	2-15
Total protein (g/dl)	6.3	6.5	6.7	6.7 -7.4
Albumin (g/dl)	2.2	2.4	2.3	3.0 - 3.5
AST (U/L)	390	520	445	78-132
GGT (U/L)	31	35	33	6.0-17.4
Glucose (mg/dl)	45	56	52	45-75
Direct bilirubin (mg/dl)	2.1	1.4	1.7	0.04-0.44

The owners were advised to avoid feeding the phototoxic plants like parthenium and *Lantana camera* and also keep the animals away from direct sunlight with immediate effect. To remove the existing source of photodynamic plants in gastrointestinal tract magnesium sulphate 400 gm (PO) was given to the animals. Debnath *et al.*, 2010 [6] also suggested

the laxatives for elimination of toxic components from gastrointestinal tract of cattle. Dextrose normal saline @ 20 ml/kg per animal was administered to dilute the phototoxic agents which was circulating in the body and to facilitate their excretion from the body. The antihistamines (Chlorpheniramine maleate @ 10 mg/kg SID IM) and antibiotics (Streptopenicillin @ 10 mg/kg BID IM) and B - complex 10 ml IM were administered for five days. As vitamin C levels had been reported to decline due to photosensitivity induced hepatic damage (Hussain *et al.*, 2013), Inj. Ascorbic acid @ 12 mg/kg IV was also administered for five days as an immunity boosting agent and to fasten recovery of the skin. In addition, the animals were administered with oral hepatic stimulants with silymarin and vitamin B complex. The skin lesions were treated with topical cetrimide cream. Sasikala *et al.*, 2018^[7] reported treatment with the liver stimulants and B complex vitamin liquids and topical cetrimide in photosensitization in cattle was effective for speedy recovery.

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