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Incidence of caprine theileriosis and its therapeutic management

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Abstract

Caprine theileriosis is a tick-borne infectious disease of goats predominantly caused by *Theileria lestoquadi*, *T. luweshuni* and *T. uilenbergi* transmitted by the ixodid ticks of the genus *Rhipicephalus* and *Hyalomma* species. Incidence of Theileriosis from a two years old Jamunapari doe and its successful therapeutic management is reported in this study. Pale mucous membranes, pyrexia, jowl edema, lymph adenopathy of superficial lymphnodes with acariasis were the prominent clinical findings in caprine theileriosis in the present study. Theileriosis infection was confirmed by detection of piroplasms in red blood cells of Giemsa stained peripheral blood smears. Anaemia, reduced haematocrit, leucocytosis, hypoproteinaemia and hypoalbuminaemia were the significant haematobiochemical abnormalities recorded in the goat. Therapeutic management of the animal with single dose of buparvoquone and oxytetracycline along with haematinics resulted in uneventful recovery of the affected goat.

Keywords: Caprine theileriosis, therapeutic management

Introduction

In rain fed regions of India, goats play a significant role in the food and nutritional security of poor people where the agricultural production is uncertain. Small ruminant rearing particularly goats is advantageous than large ruminant rearing/enterprise due to less capital investment, lack of huge input requirement including minimal expense on feeding, ease of marketing and comparatively less intensive animal husbandry and management techniques, (Kumar *et al.*, 2010) [8]. Poor nutritional status of goats reared in extensive management systems in India is commonly associated with lack of adequate pasture/grazing lands, meagre concentrate feeding and improper health cover which are considered as probable risk factors associated with diseases. Diseases affecting small ruminants particularly, vector borne haemoprotzoan diseases are acting as limiting factor in the successful small ruminant production systems. *Babesia* spp., *Theileria* spp. and *Anaplasma* spp. are the common tick/vector borne agents affecting small ruminants and reported in various countries like Pakistan (Naz *et al.*, 2012) [12], United Kingdom (Phipps *et al.*, 2016) [13] including India (Hitaishi *et al.*, 2017) [7] resulting in huge economic losses (Torres *et al.*, 2012) [17]. Highly pathogenic *Theileria* spp. of for small ruminants are *Theileria lestoquadi* (causative agent of malignant theileriosis), *T. uilenbergi*, and *T. luweshuni* (Yin *et al.*, 2007) [18] and *T. ovis* or *T. separate* infections usually results in benign subclinical infections (Alessandra and Santo, 2012) [3]. Numerous scientific reports on the incidence of bovine theileriosis in various states of India but very few/scanty on the incidence and clinical management of the disease in small ruminants. The paper deals about the rare incidence of theileriosis in a goat flock and its successful therapeutic management.

Materials and Methods

A two years old Jamunapari doe was presented with the history of anorexia, pyrexia, jowl edema to Veterinary Clinical Complex, Veterinary College and Research Institute (VC&RI), Namakkal, Tamil Nadu, India for therapy. Anamnesis revealed that the goat was from a farm flock maintained in a semi intensive system of management, consisting of fifty two Jamunapari goats of various age groups. Elaborative investigation revealed that the incidence was started with gradual onset of hyporexia in three goats followed by complete anorexia, jowl edema and death of two within a week. Clinical examination of affected animal revealed pale pink mucous membranes, lymph adenopathy of superficial lymphnodes, jowl edema and pyrexia with acariasis (Plate 1 & 2).

Peripheral blood smears were prepared from a drop of blood collected from the ear vein of affected goat and stained with Giemsa stain for detection of piroplasms as per the protocol pointed out by Sahoo *et al.* (2017) [15]. Blood sample was collected aseptically from the jugular vein in EDTA vials and clot activator vials (2ml) for haematobiochemical analysis in automated serum biochemical analyser (Vetscan2, Abaxis, United Kingdom and Biosystems Diagnostics Pvt. LTD, India). Detection of Piroplasm (parachute, comma shaped) in the red blood cells of the Giemsa stained peripheral blood smears by microscopy confirmed theileriosis in the goat. Anaemia, leucocytosis (Haemoglobin – 6.7 g/dl, red blood cells (RBC) - $15.11 \times 10^6/\mu\text{l}$, White blood cells (WBC) – $14.9 \times 10^3/\mu\text{l}$, packed cell volume (PCV) - 26.84%) and hypoproteinaemia with hypoalbuminaemia (total protein – 5.31 g/dl and albumin – 1.4 g/dl) were the abnormal haematobiochemical findings noticed in the goat.



Fig 1: Plate-1: Theileriosis – pale pink mucous membrane in goat



Fig 2: Plate-2: Intermandibular odema in caprine theileriosis

First day therapeutic regimen consisting of intravenous administration of Oxytetracycline @ of 20 mg/kg body weight (Steclin, Zydus – Cadila Animal health care Ltd., Ahmedabad, India) with normal saline followed by intramuscular injection of flunixin meglumine @ of 1.1 mg/kg body weight (i/m) (Megludyne, Virbac Animal Health India, Maharashtra, India), buparvoquone @ 2.5 mg/kg body

weight (Butalex™, MSD Animal Health, Ahmedabad, India) and subcutaneous administration of ivermectin @ 0.2 mg/kg body weight (Neomec, Intas Pharmaceuticals, Ahmedabad, India). Bivinal plus (B complex liver extract with vitamin B12 injection, Alembic pharmaceuticals Ltd., Vadodara, India) was given (3 ml) intramuscularly as a supportive therapy and therapy was repeated for seven days except buparvoquone and ivermectin. Therapy also inclusive of administration of Ferritas bolus (Iron, folic acid, Vitamin B12, Intas Pharmaceuticals, Ahmedabad, India) one bolus Per os, once daily to improve the anaemic status and Yeasacc bolus (Alltech biotechnology private limited, Karnataka) Per os, twice daily to enhance and sustenance of rumen microflora for ten days. Clinical status of the animal was improved progressively from the first day of treatment and uneventful clinical recovery was noticed after tenth day of treatment. As a tertiary preventive measure all goats were treated with ivermectin @ 0.2 mg/kg body weight for acariasis.

Results and Discussion

Theileriosis is a major tick-borne haemoprotozoan disease caused by number of *Theileria* spp., an intracellular protozoa affects domestic animals in the tropical and subtropical countries of the world. It is a major threat to livestock industry and a constraint to goat production as its association with high morbidity and mortality linked with tremendous economic losses (Shruthi *et al.*, 2017) [16]. *Theileria* spp. are transmitted by Ixodid ticks of the genus *Hyalomma*, *Haemophysalis* and *Rhiphicepahlus* (Meenu *et al.*, 2021) [10]. Species of *Theileria* infecting goats in tropical and subtropical countries of the world including India are *T. lestoquardi*, *T. luwenshuni*, *T. uilenbergi*, *T. separata*, *T. ovis* and *T. recondite* (*T. recondita*) (Begam *et al.*, 2018) [6]. Highly pathogenic *Theileria* spp. for small ruminants are *Theileria lestoquardi*, *T. uilenbergi* and *T. luwenshuni* and low pathogenic species are *T. ovis* and *T. separate* (Yin *et al.*, 2007) [18]. *Theileria* infection in goats was confirmed in this case by detection of comma and parachute shaped piroplasms in the RBCs and similar findings also reported by Altay *et al.* (2007) [2]. Shruthi *et al.* (2017) [16] reported pleomorphic piroplasms in red blood cells of *Theileria* affected goats including rod, pear, dot, nail, comma, oval, parachute, round, semi comma forms in Karnataka state of India. Even though microscopic examination of stained blood smears is less sensitive for detection of low level of parasitaemia in theileriosis affected animals than molecular techniques like polymerase chain reaction (PCR) (Rabeya Begam *et al.*, 2019) [14], it can be used as a rapid confirmatory diagnostic test for initiation of curative treatment in *Theileria* affected animals.

Significant haematobiochemical parameter changes in caprine theileriosis in this study are anaemia, reduced haematocrit, leucocytosis, hypoproteinaemia and hypoalbuminaemia which is responsible for intermandibular edema in affected goat. AL-Amery and Hasso, (2002) [1] reported that anaemia in theileriosis is due to removal of erythrocytes infected with piroplasms by immune system and leucocytosis due to hiked proliferation of lymphocytes in the initial phase of infection. This is in concordance with the findings Banka *et al.* (2020) [5] who reported anaemia, low PCV and leucocytosis who opined that alterations in osmolality of circulating blood that decreases the ability of red blood cells undergo deformation under certain pathophysiological conditions which results low microvascular perfusion and organ dysfunction. Serum

biochemical findings of Meenu *et al.* (2021) [10] was in contrast to the present study, where hyperproteinaemia in caprine theileriosis. Hypoproteinaemia with hypoalbuminaemia in small ruminant theileriosis was also reported by Al-fetly (2012) [4]. Hypoproteinaemia with significant lower albumin levels may be the reason for intermandibular odema in the affected goat in the present case study.

Buparvoquone as it is drug of choice for the therapeutic management of all forms of theileriosis and combination of with oxytetracycline is recommended for successful therapeutic management of caprine theileriosis (Kumar *et al.*, 2019 and Banka *et al.*, 2020) [11]. Hence, the affected goat was treated with a single dose of buparvoquone and oxytetracycline for seven days with supportive therapy. Supportive therapy with anti-inflammatory drug flunixin and multivitamin preparations with haematinics is recommended to reduce the inflammatory process associated with theileriosis and improve anaemic status of animal respectively (Nagar *et al.*, 2019) [11]. Negative impact of oxytetracycline therapy on the survival and function of rumen microflora was ameliorated by administration of yeasacc bolus and the animal was uneventfully recovered. Similar treatment regimen with few modifications was also followed by Banka *et al.* (2020) [5].

Early clinical and laboratory diagnosis associated with early therapeutic intervention of caprine theileriosis, control of acarids and improving general nutritional status of animal by adequate of concentrate, roughage feeding are the essential strategies recommended for successful clinical and preventive management of caprine theileriosis.

Conclusion

Caprine theileriosis is a sporadic yet a disease of economic importance. Quick diagnosis with early therapeutic intervention, acarids control, enhancing the host immunity through recommended concentrate and roughage feeding, micronutrient supplementation of goats and proper health cover are the essential strategies recommended for successful clinical and prophylactic management of caprine theileriosis.

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