Control and therapeutic management of bovine tropical theileriosis in crossbred cattle

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Abstract Bovine tropical theileriosis (BTT) is a disease of worldwide economic importance in cattle, caused by *Theileria annulata*, a protozoan parasite, and transmitted cyclically by ticks. The disease is one of the serious constraints to dairy industry in endemic areas like India, leading to fatal infections in exotic cattle and significant mortality in cross-bred cattle and zebu cattle. The present report demonstrates the clinical manifestation, haematological alteration and therapeutic management of theileriosis cases in a cross-bred cattle dairy farm at district Bijnor, Uttar Pradesh. Clinical examination of affected animals revealed high rectal temperature (104–106 °F), generalized enlargement of superficial lymph nodes, pallor mucous, apathy and watery blood. The affected animals were severely infested with *Hyalomma anatolicum* ticks. The blood smears examination after staining with Leishman stain revealed the presence of typical *Theileria* organisms. Buparvaquone along with symptomatic and supportive therapy could cure all the animals.

Keywords Bovine tropical theileriosis · Buparvaquone · Tick · Theileria

Introduction

The protozoan parasites *Theileria annulata* bestowing the tick-borne disease bovine tropical theileriosis (BTT), intricate enormous economic losses globally. An estimate stated that BTT imposes about US\$ 384.3 million annually loss on Indian livestock sector (Minjauw and McLeod 2003). The clinical manifestations of BTT diverge from peracute to acute or sub-acute to chronic. It mainly depends upon the damaging effect of the pathogen on lymphoid tissues and susceptibility of the host. The major clinical manifestations of experimental and natural acute theileriosis are pyrexia, generalized lymphadenopathy, anaemia, anorexia, cachexia, respiratory distress, petechiae in conjunctiva, oral and nasal mucosa and unilateral or bilateral exophthalmia (Sengupta et al. 1993; Branco et al. 2010; Sudan et al. 2012). The present report demonstrates the clinical manifestation, haematological alterations and therapeutic management of theileriosis cases in a cross-bred cattle dairy farm at district Bijnor, Uttar Pradesh, India.

Case history, clinical examination, results and discussion

On the request of Chief Veterinary Officer, Bijnor, Uttar Pradesh with the history of four animals suffering with high fever and temperature was not coming to normal level even after the treatment, an investigation was conducted in private dairy farm of fifteen adult crossbred cattle and six young calves at village Kambhor, district Bijnor, Uttar Pradesh, India. The owner reported that nine adult cattle and one calf were suffering pyrexia and anorexia since last 3–4 days. He also reported that one adult has been

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succumbed within 2 days of pyrexia and anorexia. Clinical examination revealed generalized enlargement of superficial lymph nodes, pallor mucous, high rectal temperature (104–106 °F), apathy and watery blood in all affected animals. On further clinical examination, the affected animals were severely infested with ticks. Samples of ticks were taken from the animals for identification of ticks. Further, blood smears were prepared from the marginal ear vein and brought to laboratory, stained with Leishman stain and examined under the oil immersion lens of a light microscope (Zafar et al. 2006). Blood smear examination revealed presence of piroplasm in the RBCs and schizonts in the mononuclear cells (Fig. 1). On laboratory examination, the ticks were identified as *Hyalomma anatolicum*.

Approximately, 2.5 ml blood was also obtained in EDTA containing tubes from the jugular vein and used for hematological examinations. The mean values of hematological panels revealed $6.19 \pm 1.25 \times 10^6/\mu\text{l}$ red blood cell counts (RBCs) and 7.78 ± 1.8 g/dl hemoglobin concentration. While, white blood cells count was $16.11 \pm 3.34 \times 10^3/\mu\text{l}$ and granulocytes, lymphocytes and monocytes counts were $13.78 \pm 2.68 \times 10^3/\mu\text{l}$, $1.99 \pm 0.71 \times 10^3/\mu\text{l}$ and $0.55 \pm 0.24 \times 10^3/\mu\text{l}$, respectively.

The affected animals were treated with buparvaquone (Butalex) at a dose rate of 2.5 mg/kg body weight intramuscularly and advised to be repeated after 7 days; meloxicam (Melonex) was given at a dose rate of 0.3 mg/kg intramuscularly daily for 3 days. A total 5 ml of a commercial formulation containing vitamin A 2.5 lac IU, vitamin D₃ 25,000 IU, vitamin E 100 IU, and biotin 12.4 mcg/ml (Intavita-H) was also given intramuscularly at the weekly intervals for three times. Topical application of flumethrin 1 % pour-on preparation (Bayticol pour-on) over the vertebral column was also advised. From day second post-therapy a remarkable improvement in the

clinical condition was noticed by the concerned Veterinary Officer and owner. The owner reported the animals regained their normal appetite within 7 days post-therapy and substantial reduction in the size of superficial lymph-nodes was noticed.

A significant feature of the disease is anemia owing to overproduction of cytokines and reactive oxygen species (Nazifi et al. 2009; Saleh et al. 2011). Implication of oxidative stress for development of anemia in animals affected with theileriosis has been reported by the previous scientific workers (El-Deeb and Younis 2009; Nazifi et al. 2011). Previously antioxidant potential of vitamins A, D₃, E and H has been demonstrated (Singh et al. 2012) and the administration of these vitamins in the present cases might have helped to ameliorate the anemia of affected animals by mitigating the *Theileria* induced oxidative damage to erythrocytes. Buparvaquone is a promising compound for the therapy and prophylaxis of all forms of theileriosis. The adjunction of antioxidants and anti-theilerial agents can salvage the animals from fatal theileriosis. Moreover, large scale clinical studies are on adjunctive antioxidant is required to provide a novel therapeutic regimen of theileriosis. However, to prevent the infection of *Theileria* infection in animals in vitro attenuated schizontal cell culture vaccine is available with trade name of ‘Rakshavac T’ manufactured by Indian immunologicals limited, Hyderabad (Singh et al. 2014). It is further recommended that the high valued animals or high yielding animals may be vaccinated with this vaccine to prevent them with *Theileria* infection.

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Fig. 1 Blood smear examination of an affected cow showing presence of schizonts in a mononuclear cell

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