Clinical and haematological changes in cattle naturally affected with tropical theileriosis

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Abstract

The present study was conducted to record the clinical and haematological changes in cattle infected with *Theileria annulata*. Blood samples were collected from naturally affected cattle presented to Veterinary Clinical Complex, C.V.Sc & A.H., NDUAT, Ayodhya from September, 2017 to April, 2018 and clinical signs were properly recorded. The clinical signs recorded were reduced feed intake, pyrexia, pale conjunctival membrane, dyspnoea, enlargement of superficial lymphnodes mainly prescapular lymphnodes with reduced milk yield. Out of 34 animals screened, total eight animals were positive for *Theileria annulata* in the peripheral blood smear. The mean value of haemoglobin concentration, packed cell volume and total RBCs count was significantly reduced. There was also decrease in total leucocytic count, neutrophils, lymphocytes and monocytes. This study indicate that *Theileria* infection in cattle causes anaemia and leucopenia.

Keywords: Clinical signs, haematology, cattle, *Theileria annulata*, leucopenia

Introduction

Livestock sector play a significant role in Indian economy by contributing 25% to the agricultural GDP of the country. But livestock industry is prone to ticks infestation and haemoprotozoan diseases resulting in reduced performance and production. Theileriosis is a haemoprotozoan disease which is caused by *Theileria annulata*. *Theileria annulata* is prevalent in Asia, North Africa and Southern Europe and cause tropical or Mediterranean theileriosis. This disease causing agent is transmitted by Hyalomma annoloticum (a ixodid tick) having complicated lifecycle (Radostits et al., 2006) [10]. Once the animal is bitten, it takes about 6-8 weeks for the parasite to build up the significant level in the blood. The infected cattle shows signs like fever, dullness, dyspnoea, dysentery, oculonasal discharge, reduced feed intake, enlarged lymphnode (mainly prescapular lymphnode), Leucopenia. The other clinical signs are weight loss, petechial haemorrhages on conjuntival mucosa and cough. Clinico-Haematological changes are the results of degree of parasitemia, degree of anaemia, and severity of hypoxia (Radostits et al., 2006 and Temiz et al., 2014) [10, 13]. The haematological changes in cattle affected with theileriosis include normocytic hypochromic anaemia. Leukogram will show significant increase in monocyte and lymphocytes but neutrophils are reduced. Anemia developed due to oxidative damages to erythrocytes, increase in fragility and destruction in reticuloendothelial system (Singh et al., 2001 and Hasanpour et al., 2008) [13, 5]. Haemoglobin and packed cell volume significantly reduced due to rapid multiplication of parasite inside the RBCs. Diagnosis can be made on the basis of clinical signs and symptoms, history, occurrence of ticks and microscopy of thin blood smear stained with Giemsa.

2. Materials and Methods

2.1 Animals and study design

A total of 34 cattle (2-5 years old) were used in this study and all the animals were cross bred female. Samples were collected from affected cattle presented to Veterinary Clinical Complex, C.V.Sc & A.H., NDUAT, Ayodhya from September, 2017 to April, 2018. The affected cattle were selected on the basis of clinical signs including high fever, general debility, enlarged superficial lymphnodes, corneal opacity, panting and dyspnoea.

2.2 Blood sampling

One blood sample (about 10 ml) was collected from each animal from Juglar vein.

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Samples were collected in vacutainer containing sodium salt of EDTA for haemogram evaluation (haemoglobin concentration, differential leucocyte count, total WBCs, total RBCs and packed cell volume etc.). EDTA was used as an anticoagulant.

2.3 Preparation and examination of blood film
Immediately after taking blood sample from ear vein, thin blood films were smeared from clinically affected cattle. The thin blood smears were air-dried, fixed in methanol for 5 minute and stained with Giemsa stain diluted 10% with buffered water for 30 minute. Smears were examined under oil immersion lens for the presence of Theileria piroplasms in red blood cells as previously described (Khan et al., 2010) [6].

2.4 Haematological profile
An automatic haematology analyser (BC-2800Vet, Mindray) was used for determination of haematological parameters. The measuring principle of haematology analyzer was based on spectrophotometry. The arithmetic mean and standard error were calculated for all the parameters using MS Excel 2010.

3. Results and Discussion
3.1 Clinical findings
The clinical signs recorded were reduced feed intake, pyrexia, pale conjunctival membrane, enlargement of superficial lymphnodes mainly prescapular lymphnodes, oculo-nasal discharge with reduced milk yield. The cows also showed weight loss, weakness, emaciation, corneal opacity, dark colour faeces, dyspnoea and panting (Fig. 1 & 2). Removal of piroplasm infected RBCs by macrophages has been suggested as a cause of high fever and anemia. Similar findings were also reported by Beniwal et al. (2000) [1], Graham et al. (2001) [2], El-Deeb and Younis (2009) [3], Nazifi et al. (2010) [4], Sudan et al. (2012) [5], Saleem et al. (2014) [6] and Saravanam et al. (2017) [7].

3.2 Blood smear examination
The Giemsa stained blood smears examination from cattle showed clinical signs revealed the presence of theileria piroplasms in the red blood cells. Total eight cases were diagnosed during the study period by microscopic examination of the stained blood smear. On the basis of number of piroplasms cases were classified as mild, moderate and heavy (Fig. 1, 2 & 3).This result simulated with the studies of Mahmood et al. (2011) [8], Sudan et al. (2012) [9] and Saravanam et al. (2017) [10].

3.3 Haematological profile
In affected cows, the overall mean value of haemoglobin concentration, packed cell volume and total RBCs count was significantly reduced. This could be attributed to erytholysis by macrophages and monocytes or might be due to immune mediated mechanism. There was also decrease in total leucocytic count, neutrophils, lymphocytes, monocytes, eosinophils and basophils. The reason for leucopenia in theileriosis might be due to destruction of lymphocytes by schizogony in lymphoid organs as the disease nature is lymphoproliferative. The MCH and MCHC were significantly decreased while MCV was increased which was indicative of macrocytic and hypochromic anemia (Table 1). Cytokines, particularly tumor necrosis factor produced by infected mononuclear cells have been proposed as a cause of the observed panleukopenia. The changes observed in the present study corroborated with the findings of Omer et al. (2002) [11], Col and Uslu (2007) [12], Hasanpour et al. (2008) [13], Temiz et al. (2014) [14] and Saravanam et al. (2017) [10].
Diagnosis of theileriosis on the basis of history, clinical signs, hematological and blood smear examination are still good techniques where PCR and ELISA are not available.

5. References


