



E-ISSN: 2320-7078

P-ISSN: 2349-6800

JEZS 2019; 7(4): 1056-1058

© 2019 JEZS

Received: 22-05-2019

Accepted: 25-06-2019

RK Gupta

Department of Veterinary
Pathology, C.V.Sc & A.H,
NDUAT, Kumarganj, Ayodhya,
Uttar Pradesh, India

D Niyogi

Department of Veterinary
Pathology, C.V.Sc & A.H,
NDUAT, Kumarganj, Ayodhya,
Uttar Pradesh, India

HK Singh

Department of Veterinary
Parasitology, C.V.Sc & A.H,
NDUAT, Kumarganj, Ayodhya,
Uttar Pradesh, India

Sonu Jaiswal

Department of Veterinary
Clinical Complex, C.V.Sc & A.H,
NDUAT, Kumarganj, Ayodhya,
Uttar Pradesh, India

PK Chaudhary

Department of Veterinary
Physiology and Biochemistry,
C.V.Sc & A.H, NDUAT,
Kumarganj, Ayodhya, Uttar
Pradesh, India

VK Varun

Department of Veterinary
Clinical Complex, COVAS,
SVPUAT, Meerut, Uttar
Pradesh, India

Correspondence**RK Gupta**

Department of Veterinary
Pathology, C.V.Sc & A.H,
NDUAT, Kumarganj, Ayodhya,
Uttar Pradesh, India

Clinical and haematological changes in cattle naturally affected with tropical theileriosis

RK Gupta, D Niyogi, HK Singh, Sonu Jaiswal, PK Chaudhary and VK Varun

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 anemia 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 conjunctival mucosa and cough. Clinico-Haematological changes are the results of degree of parasitemia, degree of anemia, and severity of hypoxia (Radostits *et al.*, 2006 and Temiz *et al.*, 2014) [10, 15]. 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.

Samples were collected in vacutainer containing sodium salt of EDTA for haemogram evaluation (haemoglobin concentration, differential leukocyte 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 hematology analyser (BC-2800Vet, Mindray) was used for determination of haematological parameters. The measuring principle of hematology 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) [4], El-Deeb and Younis (2009) [3], Nazifi *et al.* (2010) [8], Sudan *et al.* (2012) [14], Saleem *et al.* (2014) [11] and Saravanam *et al.* (2017) [12].

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) [7], Sudan *et al.* (2012) [14] and Saravanam *et al.* (2017) [12].

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 erythrolysis 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) [9], Col and Uslu (2007) [2], Hasanpour *et al.* (2008) [5], Temiz *et al.* (2014) [15] and Saravanam *et al.* (2017) [12].



Fig 1: A cattle affected with theileriosis showing emaciation



Fig 2: A cattle affected with theileriosis showing ocular discharge and corneal opacity.

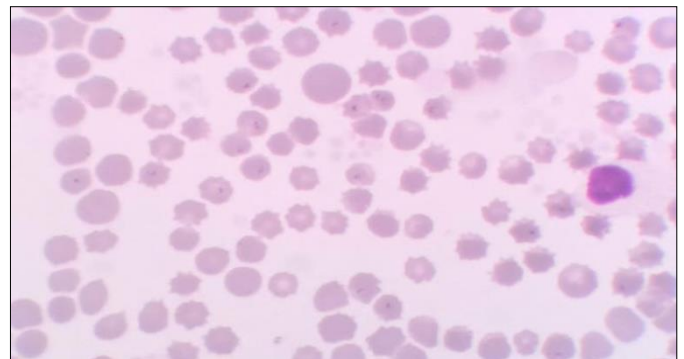


Fig 3: Blood smear stained with Giemsa showing few intra-erythrocytic piroplasms (mild infection).

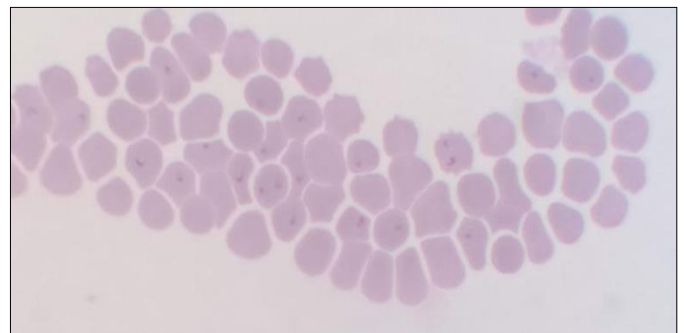


Fig 4: Blood smear stained with Giemsa showing numerous intra-erythrocytic piroplasms (moderate infection).

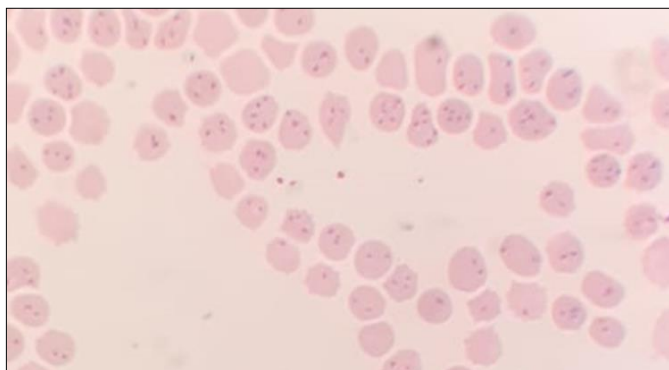


Fig 5: Blood smear stained with Giemsa showing numerous intra-erythrocytic piroplasms (heavy infection).

Table 1: Haematological findings in cattle affected with theileriosis

Parameter	Units	Reference range	Mean \pm SE
TLC	$\times 10^3 \mu/L$	5-16	5.24 ± 0.18
Neutrophil	$\times 10^3 \mu/L$	2.8-6.3	2.31 ± 0.13
lymphocyte	$\times 10^3 \mu/L$	4.2-5.8	2.53 ± 0.26
Monocyte	$\times 10^3 \mu/L$	0.2-0.7	0.13 ± 0.16
RBC	$\times 10^6 \mu/L$	5-8	3.86 ± 0.87
Haemoglobin	g/dL	8-14	5.42 ± 0.31
PCV	%	26-35	22.37 ± 1.83
MCV	fL	40.6-55.2	56.78 ± 2.13
MCH	pg	13.5-20.5	12.37 ± 0.38
MCHC	g/dL	30.5-38.5	23.28 ± 0.23
platelet	$\times 10^3 \mu/L$	120-600	206 ± 9.28

4. Conclusion

In the present study, it was concluded that tropical theileriosis in cattle affect clinical and haematological parameters to a great extent. These changes may act as a tool for diagnosis, prognosis and selection of the treatment to be given. Diagnosis of theileriosis on the basis of history, clinical signs, hematology and blood smear examination are still good techniques where PCR and ELISA are not available.

5. References

1. Beniwal RK, Sharma RD, Nichani AK. Determination of duration of immunity of calves vaccinated with the *Theileria annulata* Schizont cell culture vaccine. *Veterinary Parasitology*. 2000; 90:25-35.
2. Col R, Uslu U. Changes in selected serum components in cattle naturally infected with *Theileria annulata*. *Bulletin of the Veterinary Institute in Pulawy*. 2007; 51:15-18.
3. El-Deeb WM, Younis EE. Clinical and biochemical studies on *Theileria annulata* in Egyptian Buffaloes with particular orientation to oxidative stress and ketosis relationship. *Veterinary Parasitol*. 2009; 164(2-4):301-305.
4. Graham SP, Brown DJ, Vatansever Z, Waddington D, Taylor LH, Nichani AK *et al*. Proinflammatory cytokine expression by *Theileria annulata* infected cell lines correlates with the pathology they cause *in vivo*. *Vaccines*. 2001; 19:2932-2944.
5. Hasanpour A, Moghaddam GA, Nematollahi A. Biochemical, hematological and electrocardiographic changes in buffaloes naturally infected with *Theileria annulata*. *Korean Journal of Parasitology*. 2008; 46(4):223-227.
6. Khan IA, Khan A, Hussain A, Riaz A and Aziz A. Hemato-biochemical alterations in cross bred cattle affected with bovine theileriosis in semi arid zone.

- Pakistan Veterinary Journal. 2010; 31(2):137-140.
7. Mahmood YS, Elbalkemy FA, Klass IC, Elmakkawy MF, Monazie AM. Clinical and hematological study on water buffaloes and cross bred cattle naturally infected with *Theileria annulata* in Sharkia province Egypt. *Ticks Tick Borne Disease*. 2011; 2(3):168-171.
 8. Nazifi S, Razavi SM, Reiszadeh M, Esmailnezhad Z, Ansari-Lari M. diagnostic values of acute phase proteins in Iranian indigenous cattle infected with *Theileria annulata*. *Veterinarski Archiv*. 2010; 80:205-214.
 9. Omer OH, Haroun EM, Mahmoud OM, Abdel-Magied EM, El-Malik KH. Haematological profiles in pure bred cattle naturally infected with *Theileria annulata* in Saudi Arabia. *Veterinary Parasitology*. 2002; 107(1-2):161-168.
 10. Radostits O, Gay C, Hinchcliff K, Constable P. *Veterinary Medicine: A textbook of the diseases of cattle, sheep, goat, pigs and horses* (10th Ed.). WB Saunders Company, London, UK, 2006.
 11. Saleem MI, Tariq A, Shazad A, Mahfooz SA. Clinical, epidemiological and therapeutic studies on bovine tropical theileriosis in Faisalabad, Pakistan. *Iraqi Journal of Veterinary Science*. 2014; 28:87-93.
 12. Saravanam M, Ranjithkumar K, Babu Prasanth N, Yogeshpriya S, Jayalakshmi K, Kannak K. clinical, haematological changes and therapeutic efficacy of buparvaquone with oxytetracycline against the natural infection of *Theileria annulata* in cattle. *International Journal of Livestock Research*. 2017; 7(10):128-133.
 13. Singh A, Singh J, Grewal AS, Brar RS. Studies on some blood parameters of cross bred calves with experimental *Theileria annulata* infections. *Vet Res communications*. 2001; 25:289-300.
 14. Sudan V, Sharma RL, Yadav R, Borah MK. Turning sickness in a riverine buffalo naturally infected with *Theileria annulata* and its successful therapeutic management. *Comp. Clin. Path*, 2012. DOI 10.1007/s00580-012-1566-7.
 15. Temiz M, Altug N and Yuksek. Relationship between degree of anemia and blood gases in cattle with theileriosis. *Turkish Journal of Veterinary and Animal Sciences*. 2014; 38: 82-87.