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Short Communication

Clinical investigation and therapeutic management of equine theileriosis in horses in Patna

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Abstract

Equine theileriosis (Equine piroplasmosis) is a tick-borne disease of equines caused by intra-erythocytic haemoprotozoa, *Theileria equi* and usually associated with progressive weakness, fever, anorexia, haemoglobinuria, icterus and lameness in horse. In this study, blood smear examination from peripheral capillaries in horses shows the presence of *T. equi* parasitaemia either 1% or <1% in different animals. The biochemical values of ALT (U/L), AST (U/L), serum creatinine (mg/dL) and blood urea nitrogen (mg/dL) were significantly ($p<0.05$) higher on the day of presentation of case revealed the alternation in functions of liver and kidney in equine theileriosis. Diminazene aceturate along with supportive therapy was effective in treatment of *T. equi* infections in horses. Further, an investigation on its prevalence, development of more sensitive and specific immunodiagnostic tests, specific drug and vaccines is the need of the hour.

Keywords: Diminazene aceturate, Horse, Liver function, Parasitaemia, Theileriosis

Highlights

- Equine theileriosis is a tick-borne disease caused by *T. equi*
- Theileriosis in equine is associated with fever, anorexia, haemoglobinuria and lameness
- Alternation in kidney and liver function are usually present in equine theileriosis
- Giemsa staining technique is commonly used for diagnosis
- Diminazene aceturate along with supportive therapy is quite effective in treatment

Equine theileriosis is a tick-borne disease of horse caused by intra-erythocytic haemoprotozoa, *Theileria equi*. *T. equi* formerly known as *Babesia equi* is more pathogenic than *B. caballi* and its prevalence is related to distribution of vector ticks of genus *Boophilus*, *Dermacentor*, *Hyalomma* and *Rhipicephalus*. It is widely distributed in countries where the horses are reared but considered endemic in tropical and sub-tropical area. *T. equi* is smaller than *B. caballi* and is present as single, pairs or tetrads within the RBC (Malekifard et al., 2014). Piroplasmosis in horse is a fatal disease with variable clinical sigs of fever, progressive weakness, anaemia, haemoglobinuria, colic and jaundice (Carter & Rolls, 2022). Intra-vascular and extra-vascular haemolysis along with erythrocytic phagocytosis contributes in anaemia, bilirubinuria and haemoglobinuria. There is dearth of information on the prevalence of equine theileriosis in horses of Bihar. Hence, present study was undertaken to detect and study the haemato-biochemical changes associated with *Theileria equi* and its management in horse.

A total of five male horses between age group of 7 to 20 years presented at the Veterinary Clinical Complex (VCC), Bihar Veterinary College, Patna with clinical signs of in appetence to anorexia, fever (102-103.5^{0}F), increased respiratory rate and history of tick infestation. All of these animals were found positive for *T. equi* based on Giemsa stain blood smear examination of suspected animals in the present study. The blood samples were collected from the ear capillary vein for examination of haemoprotozoan parasites and from jugular vein aseptically for haemato-biochemical evaluation. The blood smear was examined by Giemsa stain under oil immersion and haematological parameters *viz.*, Hb, TEC, TLC, DLC were estimated by using Vet haematology Analyser (Mindray) and biochemical parameters *viz.*, serum creatinine, BUN, ALT, AST, calcium, sodium, chloride and potassium were estimated by using Coral clinical system kits. Treatment of *T. equi* infected animal was done with Diminazene aceturate @ 3.5 mg/kg b wt as single intramuscular dose (Barman & Sharma, 2014; Ana et al., 2018) along with supportive therapy which includes inj Dextrose 5% @ 10 mL/kg b wt, Ringer Lactate @ 10 mL/kg b wt, inj Flunixine meglumine@ 2.2 mg/kg b wt and B complex @ 10 mL intravenous once in a day for 5 days.

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The clinical examination of horse showed the presence of mild fever (3/5), haemoglobinuria (1/5), lameness (1/5), sweating (2/5), increased respiratory rate (3/5) and tachycardia (2/5). The blood smear examination revealed the presence of small intra-erythrocytic piroplasm indicative of *T. equi* organisms (Fig. 1).

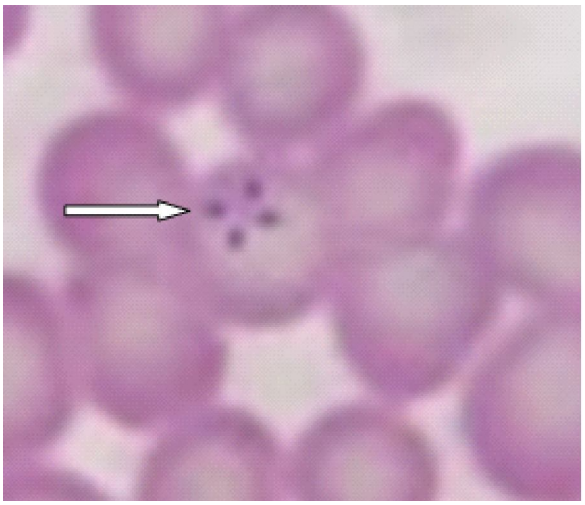

Fig. 1. Giemsa-stained blood smear illustrating *Theileria equi* in red blood cells (1000x magnification)

The parasitaemia for *T. equi* was observed either 1% or <1% through blood smear examination in different animals. On day of presentation of case at VCC, haematological values *viz*., haemoglobin (gm/dL) and lymphocytes (%) were significantly ($p<0.05$) lower, whereas the neutrophils (%) values were significantly ($p<0.05$) higher, as compared to post-treatment values on day 15. Significant ($p<0.05$) reduction in the value of haemoglobin (gm/dL), TEC ($x10^6/\mu L$) and haemoglobinuria may be due to intra-vascular destruction of parasitised erythrocytes. Neutrophilia and lymphopenia in this report may be associated with inflammatory changes and migration of lymphocytes in the lymph nodes as reported by Graham and Gile (1998). The biochemical values of ALT (U/L), AST (U/L), serum sodium (mEq/kg), serum creatinine (mg/dL), and blood urea nitrogen (mg/dL) were significantly ($p<0.05$) higher on day of presentation of case as compared to post treatment values (Table 1) revealed the alternation in functions of liver and kidney in equine theileriosis. Significant elevation of GOT, GPT, BUN and creatinine revealed the involvement of liver and kidney functions in *T. equi* infected horses (Vidhyalakshami et al., 2018).

The animals treated with diminazene aceturate (Bruning, 1996) along with supportive therapy showed marked improvement in clinical signs and the blood smear examination on day 7 and 15 of treatment showed the absence of any intra-erythrocytic piroplasm. The low parasitaemia (1%) along with variable clinical signs in present study may be due to endemicity of theileriosis in equine in India. The symptoms of *T. equi* infections are rarely observed in endemic area as foal receives passive immunity from its dam and in future foal develops its own antibodies when exposed to theileria organisms (Schein, 1988). The equids infected with *T. equi* remain carrier for lifelong although infection of *B. caballi* is cleared in few years (Onyiche et al., 2019).

Table 1. Pre and post haemato-biochemical changes associated with *T. equi* infection in horse

Sl No.	Parameters	Pre-treatment (day 0) n=5	Post-treatment (day 15) n=5
1.	Haemoglobin (gm/dL)	10.01±0.9	12.7±0.16*
2.	Total erythrocytes count ($x10^6/\mu L$)	5.18±0.54	6.22±0.09*
3.	Total leukocytes count ($x10^3/\mu L$)	7.66±0.9	6.86±0.31
4.	Neutrophils (%)	79.00±5.06	63.00±0.4*
5.	Lymphocytes (%)	18.8±4.64	33.2±0.73*
6.	Monocytes (%)	2.6±0.6	3.8±0.58
7.	Platelets count ($x10^5/\mu L$)	1.26±0.04	1.3±0.07
8.	Blood Urea Nitrogen (mg/dL)	33.39±4.7	19.1±1.02*
9.	Serum creatinine (mg/dL)	1.86±0.11	1.36±0.05*
10.	Alanine Amino-transferase (U/L)	37.2±2.1	25.0±2.49*
11.	Aspartate Amino-transferase (U/L)	42.0±3.55	28.2±1.5*
12.	Calcium (mg/dL)	11.55±0.31	12.24±0.14
13.	Sodium (mEq/L)	135.35±1.5	130.04±0.74*
13.	Potassium (mEq/L)	4.43±0.25	4.12±0.12

Results are expressed in terms of mean values (M) and standard error (SE) at *P< 0.05.

The diminazene aceturate was used as specific drug for *T. equi* infection in present study as it controls the symptoms and improve the clinical signs (Bruning, 1996). The medicines currently available for the treatment of *T. equi* infection are not having potential to eliminate or prevent its infection in equine (Kerber et al., 2009). There are many anti-protozoan drugs available for treatment of babesiosis in equines but most frequently used are diminazine

aceturate and imidocarb dipropionate (Barman & Sharma, 2014). In this study, post-treatment parasitemia was absent, but it may reappear with immune suppression in future (Rothschild & Knowles, 2007). Recovered immunocompetent animals from acute infections of theileriosis become asymptomatic carriers. It acts as reservoirs of *T. equi* in the presence of its tick- vector in endemicity (Heim et al., 2007). The endemicity of equine theileriosis in India significantly impacts the livelihood of owners and the economy due to reduced work efficiency, high treatment costs, and potential mortality.

The effective drugs which can eliminate the *T. equi* organism from the blood are still not available, which makes the infected horse carrier for life long. Further, investigation on its prevalence, development of more sensitive and specific immune-diagnostic tests, specific drug and vaccines is the need of the hour.

Conflict of interest: Authors declare no competing interest.

Author's contribution: MK: Involved in disease investigation, treatment procedure, data generation, and preparing original draft; VKS: Involved in disease investigation and treatment procedure; KPS: Involved in disease diagnosis, blood parameters investigation; PS: Involved in disease investigation and treatment procedure; GDS: Manuscript editing and designing.

Data availability statement: The corresponding author is willing to provide the data upon reasonable request.
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