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## Theilerial infection in young bovine calves in Odisha, India

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### Abstract

The present study was conducted for a period of twelve months from July 2015 to June 2016 to study the incidence of theileriosis and hemato-biochemical changes in the affected young bovine calves in and around Bhubaneswar. The calves of less than one year age with clinical signs of theileriosis presented/ represented to Teaching Veterinary Clinical Complex or Department of Veterinary Pathology, C.V. Sc. & A.H., OUAT were included in the study. Out of 93 suspected cases examined, 83 (89%) were found positive for bovine tropical theileriosis by blood smear examination with presence of intraerythrocytic piroplasms in different shapes like round, oval, coccoid, signet ring, dot, racquet, pear, rod or bacilli indicating high prevalence among calves in Odisha. Distribution of positive cases of theileriosis was more in rainy season (48%) followed by summer (33%) and least in winter season (19%). Most of the positive cases (81/83) were in the crossbred calves. In majority of cases, common clinical signs recorded were anorexia, pyrexia, enlarged prescapular and prefemoral lymph nodes, trembling while standing, pale conjunctival mucus membrane, corneal opacity, haemoglobinuria, nasal discharge, coughing and grinding of teeth, cachexia, diarrhoea. In the present study, all of the blood indices significantly lowered than the average value of apparently healthy calves indicating anaemia. The Hb%, PCV%, TEC, TLC, serum total protein and albumin in affected calves were 8.93gm%, 25.87%, 4.58 million/cc, 6.88 thousands/cc, 5.89g/dl, and 2.39g/dl respectively.

**Keywords:** Bovine tropical theileriosis, calves, pathology

### 1. Introduction

Theileriosis is a tick borne hemoprotozoan disease caused by the parasite belonging to genus *Theileria* under Family Theileridae [1]. Among different species of *Theileria*, *Theileria annulata* and *Theileria parva* are considered as most pathogenic to bovines causing lymphoproliferative diseases. *T.annulata* causes a severe form of the disease called Bovine Tropical Theileriosis (BTT). This is transmitted by ticks of *Hyalomma* spp. causing lethal infections and considerable mortality. The ileriosis are found particularly in tropical and subtropical regions in Africa, the Middle East, Southern Europe, Asia where it causes significant economic losses. The hot and humid climate acts as highly favorable criteria for the development and survival of tick vector and is a constant source of infection to susceptible animals [2]. The disease has been occurring in most of the states and have been reported from Odisha [3, 4], Punjab [5], Haryana [6], Gujarat [7], North Bangalore [8] and Uttarakhand [9] by various workers in several years. Though all breeds of cattle are equally susceptible to theileriosis, the purebred, exotic, their crosses as well as the young calves are highly susceptible to this disease. Recent epidemiological studies in calves for theileriosis in India have shown that clinical cases of tropical theileriosis occur mainly in young calves below two months of age. Calves born of dams immunized against *T. annulata* with cell culture vaccine were also susceptible to tropical theileriosis [9]. The newborn calves presented high risk group during summer and rainy season because of immediate exposure to infected ticks which are more active during this period. Calf mortality due to theileriosis act as one of the major impediments to livestock upgrading programmed in Indian subcontinent [10]. Although theileriosis has become a serious and lethal disease in young calves now-a-days, there are scanty literatures on the pathological studies on the disease in these age groups. Hence, the present research work on bovine tropical theileriosis in young calves was conducted to study the incidence of the disease in calves and the clinico- hematobiochemical changes in the affected calves.

## 2. Materials and methods

**2.1 Collection of data, clinical samples and screening for theileriosis-** The blood samples received at Teaching Veterinary Clinical Complex and Department of Veterinary Pathology, College of Veterinary Science and Animal Husbandry, OUAT during July 2015 to June 2016 from calves with clinical signs similar to theileriosis were examined. The clinical signs, age, sex, breed, season etc. were recorded. The blood samples were screened for theileriosis by examination of Giemsa stained blood smears. A total of 93 cases were screened and 83 were found positive. The positive blood samples were further put to haematological examination and 23 serum samples were collected for biochemical studies.

### 2.2 Hematobiochemical and Microscopic Examination-

Thin blood films on slide were prepared immediately as quick as possible after collection of blood. These smears were allowed to air-dry and fixed with methanol for about 3-5min followed by staining with Giemsa stain diluted down with distilled water 1:10 ratio and keep it for about 35-50min. After washing, the slides were air-dried and examined with microscope using oil immersion lens at 1000X magnification. Blood samples for haematology were examined for estimation of Hb%, PCV, TLC, TEC, DC etc. by following routine methods [11]. For serum collection five ml of blood was collected aseptically using clot activator vial from each of the twenty three theileria positive calves. The vials were kept undisturbed for about 60 minutes and then serum was collected in sterile serum vials. The serum samples were stored at -20 °C until further tests. Serum biochemical parameters like glucose, Total protein, albumin, and urea were estimated by using biochemical kits supplied by Crest Biosystems, Goa in microlab 300 semiautomatic machine at TVCC, CVSc& AH.

### 2.3 Statistical analysis

The average of hematobiochemical values in theileriosis positive calves were compared with that from apparently healthy calves. The apparently healthy calves were randomly selected from field. The comparison was done to observe the effect of theileriosis on the hematobiochemical parameters in calves. Data were analyzed by one-way analysis of variance (ANOVA), with post hoc analysis by Duncan's multiple comparison tests using SPSS 20 software, and expressed as mean  $\pm$  SE, with  $P < 0.05$  considered statistically significant.

## 3. Results and Discussion

**3.1 Epidemiological study-** A total of 93 blood samples from suspected cases were screened by blood smear examination out of which 83 (89%) were found positive and 10 (11%) cases were found negative. The positive blood smears revealed presence of piroplasms inside erythrocytes in various shapes including round, oval, coccoid, signet ring, dot, racquet, pear, rod and bacilli. The majority (81) of positive cases were from crossbred calves. Many workers [4, 12-15] have reported higher incidence of theileriosis in exotic and cross bred cattle than indigenous breed. This is due to higher

susceptibility of exotic population to the disease. Season wise distribution of cases showed that the disease was highly prevalent in rainy 40(48%) followed by summer 27(33%) and least in winter season 16(19%). Higher incidence of theileriosis during rainy season has been reported by some workers [4, 14]. The cases were more in older calves of 7-12 month age than younger calves might be due to passive immunity from mother. Also it is noticed that farmers prefer to give anti theilerial treatment to calves without going for blood examination because calves need a smaller dose due to less body weight and the drug acts both preventive and curative purpose. These findings were in contrary to finding of previous workers [16] who reported higher incidence of disease in calves below 2 month age (73.33%) than older ones (above 2 month and up to 12 month age) presented to TVCSC, COVAS, Udgir, Maharashtra. Seventy one (86%) of positive cases was female and 12 (14%) were male calves. As the market value of male crossbred calf is less and also dairy farmers are interested in raising female calves as replacement stock, the owners are not interested for rearing and spending on male calves. As a result, the number of blood samples from male calves presented for diagnosis is less. Similar observations were made by some workers [12, 14] who reported higher prevalence of theileriosis in females than males.

**3.2 Clinical Signs-** In majority of cases, common clinical signs recorded were anorexia, pyrexia, enlarged prescapular and prefemoral lymph nodes, trembling while standing, pale conjunctival mucus membrane, haemoglobinuria, nasal discharge, coughing and grinding of teeth, cachexia, diarrhoea, respiratory distress, lacrimation, anemia, icterus and protrusion of eyeballs during the research. Many previous workers [1, 8, 15-20] have also reported similar clinical signs in theileriosis affected animals. Reason for enlargement of superficial lymph nodes could be attributed to lymphoid hyperplasia in early stage of the disease. The corneal opacity was due to local infiltration of white blood cells.

**3.3 Haematobiochemical study-** The haemoglobin percentage (Hb%), Packed cell volume percentage (PCV%) and Total erythrocyte count (TEC) (million/ cumm) in the affected calves were  $8.93 \pm 0.24$  gm%,  $25.87 \pm 0.73$  and  $4.58 \pm 0.13$  millions/ cumm respectively. These values were significantly lower ( $P < 0.05$ ) than the average values apparently healthy calves. This result was similar to the findings of many previous workers [15, 16, 21, 22] who also reported marked fall in haemoglobin, TEC and PCV values in theileria infected calves. There was significant lowering ( $P < 0.01$ ) of Total leucocyte count ( $6.88 \pm 0.20$  thousands/cumm) in affected animals. Similarly, some workers [23, 24, 25] have reported lower Hb%, PCV%, TEC and TLC value in affected cattle. Among erythrocyte indices, MCV (fl) and MCHC (%) values showed significant lowering ( $P < 0.05$ ) in affected calves as compared to healthy calves (Table 1). MCH (pg) values didn't show any significant change in affected calves as compared to apparently healthy calves. In contrary, some workers [25] have reported increased MCV and MCH values in haematological studies in theileriosis infected cattle.

**Table 1:** Haematological parameters in apparently healthy and affected calves

Parameters	Apparently healthy	Affected	Significance
Hb (gm%)	12.64 ± 0.38	8.93 ± 0.24	**
PCV (%)	38.40 ± 1.09	25.87 ± 0.73	*
TLC (10 <sup>3</sup> /cumm)	9.88 ± 0.44	6.88 ± 0.20	**
TEC (10 <sup>6</sup> /cumm)	6.46 ± 0.17	4.58 ± 0.13	*
MCV (fl)	59.43 ± 0.28	56.59 ± 0.60	*
MCH (pg)	19.57 ± 0.23	19.58 ± 0.16	NS
MCHC (%)	32.93 ± 0.36	34.74 ± 0.26	*
N (%)	32.5 ± 1.61	31.69 ± 0.99	NS
E (%)	3.7 ± 0.56	2.80 ± 0.27	NS
B (%)	0.4 ± 0.16	1 ± 0	*
L (%)	62.4 ± 1.55	64.08 ± 1.00	NS
M (%)	1 ± 0.24	1.58 ± 0.12	NS

(\* Significant at  $P < 0.05$ , \*\* Significant at  $P < 0.01$ )

Serum biochemical studies revealed significant lowering ( $P < 0.05$ ) in total protein (5.89 ± 1.03 g/dl) and albumin (2.39 ± 0.20 g/dl) value in affected calves as compared to apparently healthy calves where as non-significant difference was noticed for globulin value (3.50 ± 1.02 g/dl) and urea (25.26 ± 3.11 mg/dl). This is in accordance with findings of previous researchers [15] who observed reduction in total protein and albumin values in serum of theileriosis affected calves. Glucose value showed significant lowering ( $P < 0.05$ ) in affected calves as compared to healthy calves where as non-significant decrease was noticed for Urea value (Table 2). Similarly, hypoglycemia has been reported in theileriosis affected cattle [26].

**Table 2:** Serum biochemical parameters in apparently healthy and affected calves

Parameters	Apparently healthy	Affected	Significance
Total Protein (g/dl)	7.68 ± 0.88	5.89 ± 1.03	*
Albumin (g/dl)	4.19 ± 0.67	2.39 ± 0.20	*
Globulin (g/dl)	3.48 ± 0.88	3.50 ± 1.02	NS
Glucose (mg/dl)	75.53 ± 0.8	28.21 ± 3.62	**
Urea (mg/dl)	25.33 ± 1.95	25.26 ± 3.11	NS

(\* Significant at  $P < 0.05$ , \*\* Significant at  $P < 0.01$ )

#### 4. Conclusions

From the present work, it was concluded that occurrence of Bovine tropical theileriosis is very high (89% in suspected blood samples) in bovine calves particularly in crossbred ones in Odisha. Epidemiological studies revealed higher incidence of the disease in crossbred calves of 7-12 month age group and during rainy season. Most common clinical signs recorded in calves were anorexia, pyrexia, enlarged prescapular and prefemoral lymph nodes, trembling while standing, pale conjunctival mucus membrane, haemoglobinuria, nasal discharge, coughing and grinding of teeth, cachexia, diarrhoea, respiratory distress, lacrimation, anemia, icterus and protrusion of eyeballs during the research. Haematological studies revealed anemic condition and fall in all haematological indices in theileriosis affected neonatal calves. Serum biochemical studies revealed significant lowering in total protein and albumin value and hypoglycemic condition in theileriosis affected calves.

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