RESEARCH ARTICLE

Clinico-hematological Study of Theileriosis in Gir and Jaffrabadi Calves

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Abstract

The present study was undertaken to know the hematological alteration in *Theileria* infected Gir and Jaffrabadi calves in and around Junagadh, Gujarat. Young calves (less than one year of age) with suspected clinical signs of hemoprotozoan infection, presented at the Veterinary Clinical Complex of the College in Junagadh, were taken in this study. Out of 64 suspected cases examined, 13 (20.31%) were found positive for *Theileria* infection by microscopic blood smear examination. The prevalence of *Theileria* infection was more in the rainy season (27.27%) followed by summer (26.31%) and least in the winter season (8.69%). *Theileria* infection was significantly ($p < 0.05$) higher in young calves of less than 6 months of age (31.0 %) as compared to calves of 6–12 months of age (9.1%). A nonsignificant higher infection was recorded in Gir calves (22.22%) than Jaffrabadi calves (17.85%). There was no effect of breed, sex or season on *Theileria* infection in Gir and Jaffrabadi calves in and around Junagadh. Hematological studies revealed anemic condition and increased total leukocyte count with neutrophilia and lymphocytopenia.

Keywords: *Gir* cattle, Hematology, Jaffrabadi buffalo, Prevalence, Theileria, Young calves.

Ind J of Vet Sci and Biotech (2019): 10.21887/ijvsbt.14.4.10

Introduction

Bovine theileriosis is a tick-borne hemoprotozoan disease of cattle and buffalo caused by several *Theileria* species. Among them, *T. parva*, the cause of East Coast fever and *T. annulata*, the causative agent of tropical theileriosis are the most pathogenic and economically important species (Abdela and Bakele, 2016). They are transmitted by Ixodid tick of the genus *Rhipicephalus* and *Hyalomma*, respectively. In India, *T. annulata* is the most common species of *Theileria* transmitted by *H. anatolicum* tick and causes bovine tropical theileriosis (Bhatnagar *et al.,* 2015). Though all breeds of bovine are equally susceptible to theileriosis, the purebred exotic and their crosses, as well as the young calves, are highly susceptible to this disease (Radostits *et al.,* 2007). Calves born of dams immunized against *T. annulata* with cell culture vaccine were also susceptible to tropical theileriosis. 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 (Singh *et al.,* 2017). Calf mortality due to theileriosis acts as one of the major factors to livestock upgrading programme in the Indian subcontinent. Although theileriosis has become a serious and lethal disease in young calves, there is scant literature on the hematological studies on the disease in these indigenous pure breed calves. 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-hematological changes in the affected calves.

Materials and methods

The study was conducted during the month of January to December on the Gir and Jaffrabadi calves, presented at

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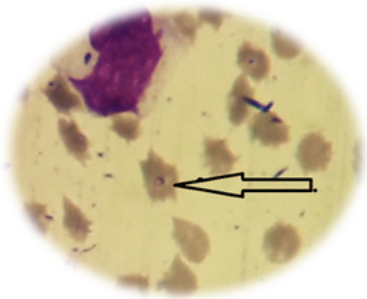
How to cite his article: Brahmbhatt, N.N., Kumar, B., Thakre, B.K., Parmar, V., Choravada, D.R., Patel, J.A. (2019). Clinico-hematological Study of Theileriosis in Gir and Jaffrabadi Calves. Ind J of Vet Sci and Biotech., 14(4):36-39

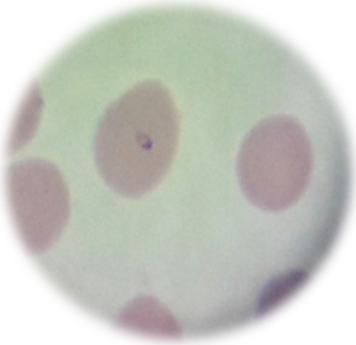
Source of support: Nil

Conflict of interest: None

Submitted: 03/03/2019 **Accepted:** 09/03/2019 **Published:** 20/4/2019



Pleomorphic T. annuala in blood smear



Jaffrabadi buffalo calf and *T. annuala* in blood smea

Veterinary Clinical Complex of the College, from Junagadh region. The clinical signs, age, sex, breed season and detailed history were recorded in history sheets. The blood samples were collected from the jugular vein of calves, showing clinical signs of hemoprotozoan infection, in sterile K_3-EDTA vacutainer. To identify the *Theileria* infection, thin blood smears were prepared, stained with Giemsa stain and examined for the presence of blood protozoan parasite under oil emersion. A total of 64 animals were screened and hematological analysis was performed on all positive blood samples using Automatic Whole Blood Analyzer (Mindray BC–2800 Vet).

Statistical Analysis

Animals were grouped according to breed (Gir and Jaffrabadi), sex (male and female), age (1–6 months and 7–12 months) and season (summer; March to June, rainy; July to October and winter; November to February). The rate of infection is presented in percentage and the effect of breed, sex, age or season on *Theileria* infection were tested by the chi-square test. The differences were considered significant if $p < 0.05$.

Results and discussion

A total of 64 blood samples were screened by blood smear examination, out of which 13 (20.31%) were found positive for *Theileria* infection (Table 1). The positive blood smears revealed the presence of piroplasms inside erythrocytes. Earlier researchers (Acharya *et al.,* 2016; Singh *et al.,* 2001) have reported a higher incidence of theileriosis in exotic and crossbred cattle than indigenous breeds. This is due to higher susceptibility of the exotic population to the disease, but in the present study, the indigenous breeds are recorded with a higher incidence of theileriosis. This may be due to the higher *Hyalomma* tick population (unpublished) under the favorable conditions like the hot and humid climate of Junagadh district and poor immunity in young calves.

Season-wise infection was highly prevalent in rainy 06 (27.27%) followed by summer 05 (22.72%) and least in winter season 02 (10.00%). A similar incidence of theileriosis during the rainy season has been reported by earlier workers (Panda *et al.,* 2011; Masare *et al.,* 2009). The age-wise occurrence was highest in young calves of 1 to 6 month of age (32.25%) than older age (7 to 12 months) calves (9.10%). This indicates a lack of immunity in younger calves (1–6 month) especially cell-mediated immunity (CMI) than the older age (7–12 month) calves. Moreover, significantly higher infection (p <0.05) was recorded in young Gir calves of less than 6 months of age. However, no significant difference (p >0.05) was found between two age groups of Jaffrabadi buffaloes. These findings were similar to those of previous workers (Velusamy *et al.,* 2014), who reported a higher incidence of disease in calves below 2 month age (73.33%) than older ones (above 2 months, up to 12 month age).

Out of 64 animals, 10 (20.83%) females and 3 (18.75%) male animals were found positive for *Theileria* infection (Table 1). The difference between male and female sex within the breed was not significant. Usually, dairy farmers are interested in raising female calves as replacement stock and are very less interested in rearing/spending on male calves, hence the number of male calves presented for diagnosis was less. Similar observations were recorded by Panda *et al.* (2011)

Table 1: Season, age and sex-wise prevalence of Theileria infection in bovine calves

		No. positive (13/64)		*Percentage*		
Animal and environmental attributes		*Gir*	*Jaffrabadi*	*Gir*	*Jaffrabadi*	*Overall*
Season	Rainy	04/13	02/09	30.76	22.22	27.27
	Summer	03/12	02/10	25.00	20.00	22.72
	Winter	01/11	01/09	09.09	11.11	10.00
Age	Young calves (<6 months)	06/16*	04/15	37.50*	26.66	32.25
	Older claves (6 to 12 months)	02/20	01/13	10.00	7.69	9.10
Sex	Female	07/27	03/21	25.92	14.28	20.83
	Male	01/09	02/07	11.11	28.57	18.75
	Overall	08/36	05/28	22.22	17.85	20.31

*p < 0.05 between young and older calves

Table 2: Haematological indices (Mean ± SE) observed in bovine calves infected with Theileria parasite

Hematological parameters	*Gir calves*	*Jaffrabadi buffalo calves*	*Reference range cattle*	*Reference range buffalo*
Hemoglobin (g/dL)	7.45 ± 0.58	7.80 ± 0.60	8-–14	10–14
TEC (million/µL)	4.34 ± 0.23	4.64 ± 0.57	5 - 9.5	5.5–8.5
PCV (%)	23.75 ± 0.09	25.86 ± 0.81	24 - 44	30-40
MCV (fL)	59.50 ± 1.30	59.60 ± 1.14	40 - 60	42-58
MCH (pg/L)	17.14 ± 0.55	17.68 ± 0.88	10–17	13–20
MCHC (g/dL)	28.13 ± 1.05	27.82 ± 1.05	30–36	30–36
Platelets (105 /µL)	3.78 ± 0.46	4.00 ± 0.61	1–10	2–10
TLC (103/µL)	9.76 ± 0.59	9.58 ± 0.53	4–11	6–12
Neutrophil (%)	60.50 ± 4.80	59.20 ± 4.32	15–45	30–40
Lymphocytes (%)	36.00 ± 5.11	37.4 ± 2.62	40–75	50–65
Monocytes (%)	2.75 ± 1.01	3.20 ± 0.84	2–8	3–8
Eosinophils (%)	1.25 ± 0.46	1.40 ± 0.55	1–15	1–2
Basophils (%)	0	0	0–2	0–1

and Sahoo (1991), where a higher prevalence of theileriosis was found in females than males. The present study was carried out in Junagadh district, which is the main hub of Gir cattle and Jaffarabadi buffaloes. The findings show the breed wise distribution of *Theileria* infection in Gir (22.22%) and Jaffrabadi calves (17.85%) with an overall occurrence of 20.31% in young indigenous bovine calves.

In most of the cases, common clinical signs recorded were anorexia, pyrexia, enlarged prescapular and prefemoral lymph nodes, unable to stand, pale conjunctival mucus membrane, nasal discharge, coughing, diarrhea, respiratory distress, lacrimation, anemia, and icterus. Ganga *et al.* (2010) also reported similar clinical signs in theileriosis affected animals. Reason for enlargement of superficial lymph nodes could be attributed to lymphoid hyperplasia in the early stage of the disease.

The hematological analysis was carried out for 13 naturally infected bovine calves. The hematological data of infected bovine calves were compared with the normal hematological reference range of cattle and buffalo, obtained from the book of Veterinary clinical diagnosis & laboratory method by Brar and Sandhu (2014). The mean values of haemoglobin (Hb), packed cell volume (PCV) and total erythrocyte count in the affected Gir calves and Jaffarabadi calves were 7.45 ± 0.58 and 7.80 ± 0.60 gm%, 23.75 ± 0.09 and 25.86 ± 0.81 %, and 4.34 ± 0.23 and 4.64 ± 0.57 million/µL, respectively. These values were lower than the normal values of cattle and buffalo. These results were similar to the findings of Masare *et al.* (2009) and Sangwan and Sangwan (2007), who also reported marked fall in hemoglobin, TEC and PCV values in *Theileria* infected bovine calves. Among erythrocyte indices, MCHC (gm/dL) values were decreased in affected bovine calves as compared to healthy calves (Table 2). However, the MCV (fL) and MCH (pg/L) values did not show any change in affected calves as compared to normal reference values of bovines. In contrary, Chaudhary *et al.* (2015) reported increased hematological values of MCV and MCH in theileriosis infected cattle.

Conclusion

The higher incidence of *Theileria* infection was recorded in calves of 1-6 month of age than 7–12 month of age. There was no effect of breed, sex or season on *Theileria* infection in Gir and Jaffrabadi calves in and around Junagadh. Hematological studies revealed anemic condition and fall in all hematological indices in theileriosis affected calves, alarming the owners and professionals to take appropriate early preventive measures.

Acknowledgments

Authors are extremely thankful to the Dean of Veterinary College, and Vice Chancellor of Junagadh Agricultural University, for providing facilities to carry out this research work.

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