

PREVALENCE OF TROPICAL THEILERIOSIS IN CATTLE THROUGH BLOOD SMEAR EXAMINATION IN SUMEL DISTRICT, DUHOK PROVINCE

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ABSTRACT

In Iraq, bovine theileriosis, or tropical theileriosis is a significant disease, that causes economic losses in livestock. The main causative agent is *Theileria annulata*. The current study was conducted from March to August of 2022 to estimate the prevalence rate of tropical theileriosis in cattle from Sumel District, Duhok Province, Kurdistan Region, and factors linked with infection. A total of 160 blood samples were collected from cattle (with 96 females and 64 males). Thin blood films were prepared and stained with Giemsa stain, then examined under the microscope to screen morphological stages of *Theileria* spp. within infected red blood cells of the cattle. The results revealed a higher prevalence rate of tropical theileriosis in cattle in older females (44.38%) than in males (22.5%). Additionally, the prevalence rate of infection was higher in March (23.75%) compared to April, May, and June (13.75%, 11.87%, and 11.25%, respectively), in contrast to July and August (4.38% and 1.88%, respectively). These differences were found to be significant at a P value < 0.05. To reduce this high rate of infection and minimize economic losses in livestock an effective control method is required to reduce hard tick infestation as the primary vector for infection) and to implement regular monitoring of infections.

KEYWORD: Tropical Theileriosis, Cattle, Prevalence, Microscopic, Sumel, Duhok

1. INTRODUCTION

Theileria species are blood parasites under the kingdom Protista that are transmitted by hard ticks to small and large ruminants, mainly in tropical and subtropical areas (Brown, 1997). Tropical theileriosis is a common disease of cattle and is caused by *Theileria annulata* and transmitted by *Hyalomma* species of hard tick (Uilenberg, 1981; Ismael and Omer, 2021). *T. annulata*, causes high morbidity and mortality rates in infected cattle and results in impaired growth of animals, affecting animal production including (milk and meat production) and all these will lead to economic losses in livestock (McCosker, 1979; Uilenberg, 1995). *T. annulata*, has an indirect life cycle, the definitive host is domestic animals and the vector or intermediate host is *Hyalomma* hard tick (Mehlhorn and Shein, 1984). Cattle are infected with theileriosis, when infected *Hyalomma* ticks bite it during biting and blood meals inject the infective stage (sporozoites) into the animal (host), and infect the lymphocyte in which asexual reproduction begins and forming schizonts (Shaw, 1997), then schizonts are ruptured and merozoites are

released and infected red blood cells (RBCs), and inside the RBCs reproduced and form many Piroplasms, and finally initiate the sexual reproduction by producing a male and female gametes is an infective stage for the tick (Tretina *et al.*, 2015).

Tropical theileriosis's primary symptoms are fever, a minimal amount of ocular discharge and nasal discharge, salivation, enlargement of the superficial lymph nodes, respiratory distress, jaundice, and death from asphyxia (Omer *et al.*, 2003). The most frequent lesions were subcutaneous and intramuscular hemorrhages, pulmonary emphysema, swollen lymph nodes, and enlarged spleen. The liver is larger than usual, and excessive pericardial and pleural fluids are visible. Microscopy has shown the existence of Koch's bodies in several organs as well as masses of lymphoid cells that are actively proliferating in the lymph nodes and spleen (Irvin and Mwamachi, 1983).

The traditional diagnosis of theileriosis is based on clinical symptoms and microscopic examination of both stained lymph smears for the detection of the schizont stage and stained blood smears for the detection of Piroplasms (Aulakh *et*

al., 2006). Due to an extremely low parasitemia level, parasites may not be detected by traditional methods in cases of sub-clinical and chronic phases of disease (Tuli *et al.*, 2015). Therefore, serological and molecular methods are more sensitive for the detection of tropical theileriosis (Aktas *et al.*, 2006; Liu *et al.*, 2008; Tuli *et al.*, 2015). The current study aimed to study the microscopic prevalence of Tropical theileriosis in cattle in Sumel District, Duhok Province, Kurdistan Region, Iraq.

2. MATERIALS AND METHODS

2.1. Study Area:

The current study was conducted in Sumel District, Duhok Province, Kurdistan region, Iraq. Sumel district is one of the largest districts of Duhok Province and has a population that mostly works in the animal and agricultural sectors.

2.2 Collection of blood samples:

During the current study between period (March 2023 to August 2023), 160 blood samples were collected from the jugular vein of weak cattle that had main clinical infections such as

high fever (41°C), enlargement of pre-scapular lymph nodes, nasal discharge, jaundice, and a history of tick infestation. Blood samples were collected from both sexes of cattle with age groups between (< 1 year to more than three years). From each animal, a blood smear was prepared from the ear capillary vein according to the standard thin parasitological key (Coles, 1986). After the thin blood smears were prepared, dried, fixed with methanol 70%, and stained with Giemsa stain for 20-30 minutes and examined under the microscope (100 X) with a drop of oil emulsion and estimated the parasitemia.

2.3. Statistical Analysis:

The analysis of data from the current study was carried out by using Chi-square and P values at <0.05 (Selim *et al.*, 2022).

3. RESULTS

Depend on the microscopic examination of stained thin blood smears revealed different shapes of *Theileria* spp. within infected RBCs of cattle as shown in Figure 1.

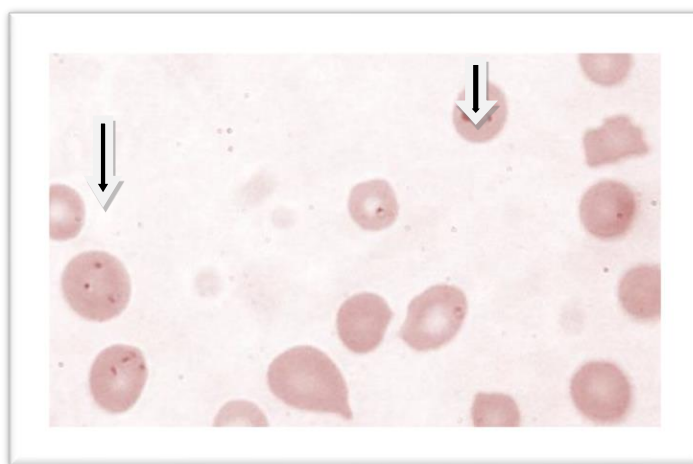


Fig. (1): *Theileria* spp. within infected RBCs stained with Giemsa stain under the microscope (1000 X)

Table 1: During the current study, 107 (66.88%) thin blood smears were positive for *Theileria* spp. out of 160 samples as shown in Table 1.

Table (1): Prevalence of Tropical Theileriosis in cattle in Sumel, Duhok Province:

	Total No. of examined Animal	No. of Positive cases	%
Cattle	160	107	66.88

Table 2: Shows the infection rate of tropical theileriosis in cattle according to gender was higher in females (44.38%) than in males (22.5%)

as shown in Table 1. These results were not significant at a P value <0.05.

Table (2): Prevalence of Tropical Theileriosis in cattle in Sumel District, Duhok Province according to gender:

Gender	Total No. of examined Animal	No. of Positive cases	%
Female	96	71	44.38
Male	64	36	22.5
Total	160	107	66.88

The chi-square statistic is 1.3379. The *p*-value is .512237. The result is *not* significant at a *P* value < 0.05.

Table 3: The findings demonstrated that the prevalence of tropical theileriosis significantly increased with cattle age, reaching 37.5% in older cattle (>3 years old). For cattle (1-3 years old), it

was 18.13%, compared to 11.25% for animals (< 1-year-old) as shown in Table 3. These data were not significant at a *P* value at <0.05.

Table (3): Prevalence of Tropical Theileriosis in cattle in Sumel District, Duhok Province according to age groups:

Age group	Total No. of examined Animal	No. of Positive cases	%
< 1 year	30	18	11.25
1-3 years	47	29	18.13
>3 year	83	60	37.5
Total	160	107	66.88

The chi-square statistic is 0.6822. The *p*-value is .953509. The result is significant at a *P* value < 0.05

Table 4: shows the prevalence of Tropical Theileriosis in cattle in Sumel District, Duhok Province according to different months, showing a higher prevalence rate in March (23.75%) and

in April, May and, June (13.75%, 11.87%, and 11.25%) respectively compared with in July and August (4.38% and 1.88%) respectively and were significant at a *P* value <0.05.

Table (4): Prevalence of Tropical Theileriosis in cattle in Sumel District, Duhok Province according to month:

Month	Total No. of examined Animal	No. of Positive cases	%
March	50	38	23.75
April	32	22	13.75
May	30	19	11.87
June	21	18	11.25
July	17	7	4.38
August	10	3	1.88
Total	160	107	66.88

The chi-square statistic is 5.0667. The *p*-value is .750419. The result is *not* significant at a *P* value < 0.05.

4. DISCUSSION

Tropical theileriosis is an important clinical infection of cattle throughout the world in many countries. It additionally results in significant economic losses (Col and Uslu, 2007). Tropical theileriosis is endemic in cattle in several regions of North Iraq, according to several studies (Mohammad Al-Saeed *et al.*, 2010; Ahmed *et al.*, 2021).

This study aimed to investigate the prevalence of tropical theileriosis in cattle in Cattle of Sumel District, Duhok Province, Kurdistan Region, Iraq, and the potential associated factors present in this district. In the current study, the overall rate of infection was high (66.88%). This high rate of

infection of bovine theileriosis in the current study is consistent with findings from other research projects conducted in Iraq (Al-Zubaidy, 1982; Alkhaledi, 2008). This outcome is in agreement with Mohammad Al-Saeed *et al.*, (2010), who found a high infection rate of tropical theileriosis in Duhok City. This high rate of infection recorded in Sumel District may be related to the weather in this area is characterized by high summer temperatures, mild rain in the autumn, and winter rainfall. These seasonal changes create the ideal conditions for hard tick reproduction, the only vector of theileriosis (Mohammad Al-Saeed *et al.*, 2010). Difference rates of infection in the same area may be associated with the size of the sample, time of

sampling, different hygienic conditions, poor management, weather, and the immune response of the host (Abaker *et al.*, 2017).

The data of the present study reveals that a higher infection rate of tropical theileriosis was recorded in females than in males (44.38% and 22.5%) respectively. The result is similar to the result of Zangana and Naqid, (2010) in Duhok City. The main reason is that male stock, which is primarily used for meat and draught, gets treated with fewer precautions. These data disagreed with the data of a study done by Anter, (2019) in Egypt and prevalence was in males and females (44.68% and 23.08%) respectively.

In association with age groups, a high prevalence rate of infection was recorded in the age group of more than three years old, and a low rate of infection in young animals (less than one-year-old) was (37.5% and 11.25%) respectively. These outcomes are in agreement with the results of a study done in Duhok by Zangana and Naqid, (2010) and another one done in Tunisia by Sallemi *et al.*, (2018). These may be related to the immune system of animals reduced with the increasing age (Omer *et al.*, 2003).

The present study also reported different prevalence rates of tropical theileriosis according to seasons a higher prevalence rate was shown in the spring season and a low rate in the summer season. These results are highly constituted as showed by Hussein Oleiwi *et al.*, (2022), who reported the same results of bovine theileriosis in Shattrah District, Thi-Qar Province, Iraq. Because theileriosis is strongly associated with the season of development and the presence of hard ticks (Selim *et al.*, 2022). These data disagreed with the results of a study done by Zeb *et al.*, (2020), who reported that the infection rate was higher in the autumn season.

CONCLUSION

A high prevalence rate of tropical theileriosis in cattle had been recorded in Sumel District, Duhok Province, Kurdistan region, Iraq was (66.88%). The level of tick infestation is crucial for the occurrence of infection, especially in older cattle in March (23.75%) and in April, May, and June (13.75%, 11.87%, and 11.25%) compared with July and August (4.38% and 1.88%) according to risk factor analysis. To reduce infection rates and financial losses, tick control programs should be put in place together with periodic monitoring of tropical theileriosis.

Ethical Approval:

The study proposal was approved by the ethics committee of the College of Health Sciences,

University of Duhok, Iraq on the 7th of February of 2023.

Conflict Of Interest:

The author declares that there is no conflict of interest regarding the research data and tools used in this study.

Declaration Of Competing Interest:

The author declares that there is no conflict of interest regarding the research data and tools used in this review article.

Author Contribution:

The author conceived this work and drafted and finalized this paper.

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