



## Lesion of Theileriosis In Camel : A review Article



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**T**HEILERIA SPPS. are the primary cause of the protozoal disease called theileriosis, which primarily affects warm-blooded species worldwide. In tropical and subtropical areas, it is among the most prevalent tick-borne illnesses that affect domestic animals, *Theileria camelensis* is a protozoan parasite infecting camel, its presumed vector is ixodid ticks and biting flies. The majority of the parasite forms within the erythrocytes were rod-like in shape and the prescapular lymph nodes impression smears did not contain any schizonts, Blood smears as well as molecular diagnosis. The main clinical manifestations of theileria infection in camels include fever, watery discharge from the eyes, severe malnourishment, and sporadic diarrhea. Additional symptoms and signs that have been noted include sadness abortion, fatigue, reduced production of milk, jaundice, and even mortality. In addition to these systemic symptoms, swelling of the cutaneous lymph nodes was also observed. Clinical exams and relevant laboratory testing are combined to produce a conclusive diagnosis. Clinical signs and the analysis of tissue impression samples, lymph nodes, and Giemsa-stained blood are the basis for the initial diagnosis. Tetracycline and buparvaquone are frequently used to treat theileriosis, with the latter being reserved for clinical situations.

**Key Words:** Camel *Theileriosis*, *Theileria camelensis*, Parasitic infection.

### Introduction

It's well known that camels had multiple benefits since the old centuries for milk, flesh and wool production in dry and semi-dry regions and as a transportation tool [1]. This type of ruminants can survive the severe climate conditions of dry areas due to their special physiological characteristics. However, camels can be affected by a broad range of infections [2-3].

It is well recognized that blood and parasites from the gastrointestinal tract can harm camel health, resulting in anemia, wasting, and in severe cases, death from infection [4]. Ticks carry these protozoa in sub-tropical and tropical regions and have undesirable impacts on animal welfare and economic health [5-7].

*Theileria camelensis* was first recorded in Russia. [8]. Theileriosis is a type of parasitic disease caused by *Theileria* spp. (Piroplasmida, Theileridae) that affects farm, wild, and captivity ungulates. The clinical signs of this disease may differ from mild to fatal and this is because of many factors such as the category of the causative agent and the regional distribution of the infection. Therefore, this protozoal infection is one of the key diseases in different species [9]. *T. Dromedarii* was recorded in India and can infect camels [10]. *T. camelensis* and *T. dromedarii* were further discovered in Egypt, Turkmenistan, Somalia, Saudi Arabia and India. [10-11].

Other than the systemic symptoms, theileria-infected camels typically exhibit fever, eyes watery

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discharge, serious emaciation, and infrequent bouts of diarrhea. Additionally, enlargement in superficially lymph nodes can be observed [12]. The primary vector of *Theileria* spread within camels is *Hyalomma dromedarii* ticks, and it has been reported that this vector contains various stages of parasitic development [13-14].

Directly blood picture microscopic inspection remains the most common and diagnostic method for detecting *T. camelensis* as well as *T. dromedarii* [14-11]. Other research confirmed pathogen infection using the molecular detection method [15-16].

#### *Theileria* spp.

Theileriae belong to the group Theileriidae, genus *Theileria*, the phylum Apicomplexa, order Piroplasmida, and are specifically intracellular parasitic organisms [17]. The most similar disease they have to Babesia is that they differ in that Babesia infections erythrocytes after leukocyte development [1817 -]. Ruminants, both domestic and wild, have been known to contract theileria. The virulent protozoan and cost effective species are *Theileria parva* (which, depending on the strain, leads to turning sickness, Corridor disease, East Coast fever, buffalo disease, January disease, and tropical theileriosis), *Theileria annulata* (which causes Tropical theileriosis), as well as *Theileria taurotragi* (that causes turning sickness)[19-17]. Research has indicated the existence of *Theileria camelensis*. Large-scale camel populations of *Theileria mutans*, *Theileria annulate*, *Theileria equi*, along with *Theileria ovis* [20-21].

#### Classification

*Theileria* is a genus belonging to the phylum Apicomplexa, that additionally comprises Babesia, Toxoplasma, Neospora, Plasmodium and others [9].

#### Morphology

*Theileria* spp. which infect bovine, ovine species and camels can be in different shapes and at different stages of development such as a slender spine-like shape, ring shape, an elongated structure or circular shape in diameter of 3.75 µm, with a nucleus located in the center enveloped by cytoplasm that looks like as a cloud-like structure [14].

The trophozoites of *T. Camelensis* in Giemsa stain blood smear from camel was observed within the infected RBCs. The shape of these trophozoites were not similar to the typical form

Kingdom : *Animalia*

Subkingdom : *protozoa*

Phylum : *Apicomplexa*

Class : *Aconoidasida*

Order : *Piroplasmoida*

Family : *Theileriidae*

Genus : *Theileria*

Species : *Theileria parva*

*T.annulata*

*T.ovis*

*T.camelensis*

*T. equi*

in comparison to other animals since they had a red chromatin line on one side and resembled a light ring, On the other hand, schizont stages appeared as a group of light-bluish bodies which were seen within the infected lymphocytes [11].

There are two types of *Theileria* spp. in blood. The first type is called the Erythrocytes type, and it appears as a parasite in RBCs. many shapes like circles, rods, commas, and elongated shapes whereas the second form in which the parasite is found in lymph nodes is known as (lymphocyte form) which the parasite found in two types macroschizont, which have eight to twelve nuclei, and microschizont, which have fifty to one hundred nuclei and called a koch's blue bodies and appear [22-23].

#### Route of Transmission

Ticks are the major sources of transmission of *Theileria* in ovine, bovine and camels. In both vertebrate and invertebrate hosts, *Theileria* has completed life cycles [24-25,17]. ixodid ticks transmitted *Theileria* spp. *Rh. appendiculatus*, *Rh. duttoni*, and *Rh. zambeziensis* are the vectors of *T. parva*, the more significant parasite. In addition the *Hyalomma* genus Ticks by which *T. annulata* is transmit [24,17,26]. The organism was mechanically transmitted by the blood contaminated mouth parts of biting mosquitoes, such as horses flies as well as camels ked. laboratory animals can affected with theileriosis either through Camel kids (*Hippobosca camelina*) [27- 29] or vertically [30].

### Pathogenesis

Microseizont has a major effect not only on lymphocyte, but also on reticular endothelium degree of leukopenia has very important role in both the severity of the disease and its clinical signs. The maturation of lymphocytes in the bone marrow gets arrested as a result of parasite damage of infected lymphocytes [30,31]. Furthermore, cytokines have another effect on arrested lymphocytes which induce fever, anemia, muscle fatigue, and necrosis [32].

### Signs and symptoms

The appetite is lost gradually after the onset of the disease which eventually leads to emaciation [20, 33]. Superficial lymph node enlarged and become noticeable, elevated body temperature and anorexia, decreased lactation, discharge from the nose and eyes, breathing difficulties diarrhea, malnutrition, weakness, along with recumbency, as well as death [11, 14]. Additional symptoms and signs that have been noted include sadness, abortion, fatigue, reduced production of milk, jaundice, and even mortality [12]. According to [12] and [11], theileriosis infection in camels is primarily manifested by severe emaciation, irregular periods of diarrhea, watery discharge from the eyes, fever, as well as enlargement of the superficial lymph nodes.

### Diagnoses and therapies

Clinical exams and relevant laboratory testing are combined to produce a conclusive diagnosis [26]. Clinical signs and the analysis of tissues impression samples, lymph nodes and Giemsa stain blood are the essential for the initial detection. The recommended diagnostic approach is to use serological techniques like ELISA or indirect fluorescent antibody testing [34,11,17]. They cannot, however, identify every sample that is contaminated due to their lack of sensitivity. A PCR test yields more accurate results in identifying all infected samples. We anticipate that using ELISA, DNA probes and PCR in tandem will significantly improve our current ability to identify afflicted animals [35-37]. In the event of an outbreak, measures to protect against diseases transmitted by ticks can stop the disease from spreading. To do this, it is crucial to use insecticide to dip animals to determine the prevalence of tick-borne pathogens in target animal populations [38]. Furthermore, Iraq, Iran, and Sudan have all seen the success of the cell-line vaccine immunoprophylaxis protocols [39]. reducing the

animals' stress and mobility that are impacted. Theileriosis and other diseases transmitted by ticks can be avoided by implementing suitable tick management techniques [23,40]. Tetracycline and buparvaquone are frequently used to treat theileriosis, with the latter being reserved for clinical cases [41,42].

### Conclusions

*Theileria camelensis* is an infection can occur in camels, it can be transmitted by ixodid ticks and biting flies. The main clinical manifestations of theileria infection in camels include fever, watery discharge from the eyes, severe malnourishment, and sporadic diarrhea. In addition to these systemic symptoms, swelling of the cutaneous lymph nodes was also observed. Tetracycline and buparvaquone are frequently used to treat theileriosis.

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## آفة الثايليريات في الإبل: مقالة مراجعة

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تعد أنواع الثايليريا هي السبب الرئيسي لمرض الأوالي الذي يسمى داء الثايليريات، والذي يصيب في المقام الأول الأنواع ذات الدم الحار في جميع أنحاء العالم. في المناطق الاستوائية وشبه الاستوائية، يعد من أكثر الأمراض التي ينقلها القراد انتشارًا والتي تصيب الحيوانات الأليفة، ثايليريا كاملينسيس هو طفيل أولي يصيب الجمال، وناقله المفترض هو القراد ذو الأكسيد والذباب القارص. غالبية أشكال الطفيليات داخل كريات الدم الحمراء كانت ذات شكل عصوي ولم تحتوي مسحات العقد الليمفاوية أمام الكتف على أي متقسمات، كما أن مسحة الدم وكذلك التشخيص الجزيئي. تشمل المظاهر السريرية الرئيسية لعدوى الثايليريا في الإبل الحمى والإفراز المائي من العين وسوء التغذية الحاد والإسهال المتقطع. تشمل الأعراض والعلامات الإضافية التي تمت ملاحظتها الإجهاد الحزن، والتعب، وانخفاض إنتاج الحليب، واليرقان، وحتى الوفيات. بالإضافة إلى هذه الأعراض الجهازية، لوحظ أيضًا تورم الغدد الليمفاوية الجلدية. يتم الجمع بين الاختبارات السريرية والاختبارات المعملية ذات الصلة لإنتاج تشخيص قاطع. العلامات السريرية وتحليل عينات طبعة الأنسجة والعقد الليمفاوية مع دم جيمزا المصبوغ هي أساس التشخيص الأولي. يُستخدم النتراسيكلين والبوبرافاكون بشكل متكرر لعلاج داء الثايليريوسيس، مع تخصيص الأخير للحالات السريرية.

**الكلمات الدالة:** داء ثايليريا الجمال، ثايليريا كاملينسيس، عدوى طفيلية.