Volume 2, Issue 4, April - 2024 **ISSN(E):** 2938-3773

THEILERIOSIS INFECTION IN ANIMALS (ARTICLE REVIEW)

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Abstract

Theileria-genus blood parasites are the cause of the protozoan disease theileriosis (1). Apical complexes, a distinct set of unique organelles, are used to identify parasites (2). One of the most prevalent tick-borne illnesses is the parasite Thoiloria, which has been linked to cases in a variety of ruminants, including goats, cattle, and sheep. Theileria are obligate intracellular parasites that are spread by ticks and pose a significant threat to livestock in tropical and subtropical areas of the world. The primary vector of infection for Theileria, Hylomma dromodarii ticks, infested those animals, suggesting a function for the parasite's development with a range of forms and stages inside this vector. (3). In general, all Thoiloria species have a similar life cycle. It acknowledged two hosts—vertebrate hosts and tick vectors—and allowed two forms: lymphatic and erythrocyte (4).

Introduction

Life cycle of Theileria parasite

Theileria parasites have a complicated and dynamic life cycle they are dispersed as vector ticks of proliferation phases and have a generic apicomplexan with multiple differentiation steps. (5). The life cycle of the parasite consists of at least three stages: schizogony and merogony, which are forms of asexual reproduction in the vertebrate host, and sporogony, which is a kind of sexual reproduction in the tick vector. During tick feeding, Theileria sporozoites infiltrate their vertebrate host and swiftly arrive at mononuclear leukocytes, where they metamorphose into macroschizonts and stimulate host cell growth. Following their maturation into microschizonts and ultimately uninucleated merozoites by merogony discharged into the bloodstream, macroschizonts present opportunities for merozoite multiplication and development. inside of RBCs, piroplasm forms. This stage produces the illness and has no effect on ticks (6). Theileria's normal life cycle includes the secretion of sporozoites. The parasite undergoes tick gut syngamy to form a zygote after sporozoites invade leukocytes during tick suckling into the feeding site and multiply via merogony. Following this, merozoites are released and enter RBCs to form the piroplasm stage. During the subsequent life cycle feeding, larval or nymph tick vectors ingest piroplasms and liberate the parasite. the only diploid stage, the zygote divides into motile kinetes that infect the tick's gut epithelial cells, move to the haemolymph, and then infect the salivary glands. After tick feeding and initiation, sporogony causes nymphs or adult ticks to multiply sporozoites in salivary gland acini prior to inoculation at the feeding site Figure 1. (7).

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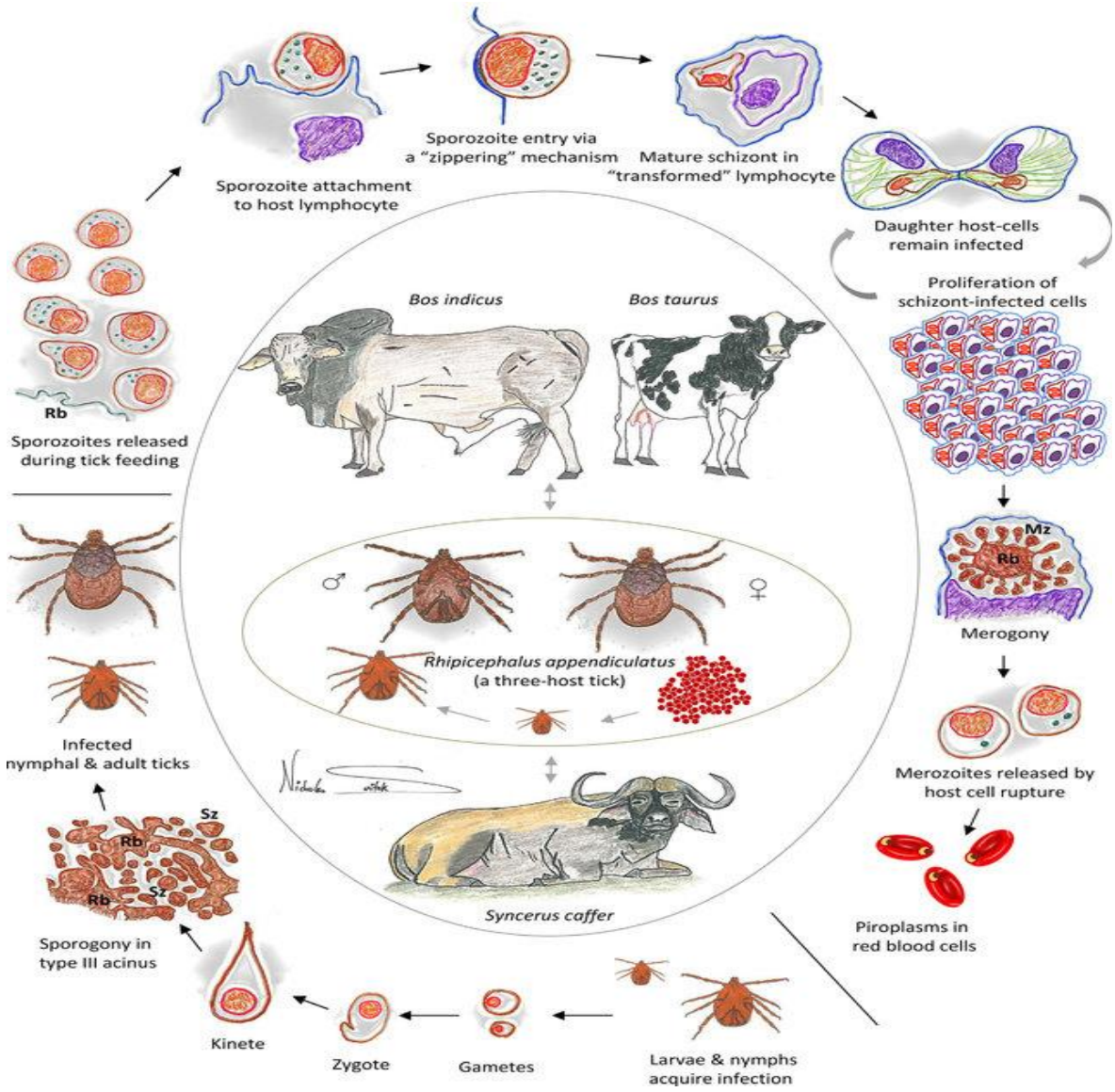

Figure 1: The life cycle of Theileria (Bishop et al., 2004).

Transmission of Theileia infection

Theileria species only transmits transstadially from one tick stage to the next because ticks are frequently found in vast populations on camels. Ticks in the Ixodidae family are known to carry a variety of infections, ranging from viruses to helminths, which vertebrates can contract. Among these many illnesses, ticks can convey Theileia infection. (8). These three tick stages are related to each other because the nymph, larvae, and adult may not all feed on the same host. The infection infects the nymph and larval instars of the tick through a blood meal, and they then move on to the next stage by attaching to a new host.When a nymph or larva is fed, the tick contracts an infection, which spreads to the tick's subsequent stage of life. Adults are more efficient vectors than nymphs. (9). Given that female ticks of the species Hylomma have more type III acini in their salivary glands than males do, female ticks are better at spreading disease. Furthermore, in order to inhibit tick attachment responses, female ticks possess two

histamine-binding proteins. H. dromedarii and A. lepidum are the names given to two species of female ticks that were collected from Egyptian slaughterhouse camels. The most common kind identified in camels with infestations was H. dromedarii (10). Ticks were discovered on several areas of the camel's body; in certain instances, they were seen on the eyelids and inside the ears. The camel's tail area had the highest number of tick reports, with the abdomen being the second most severely infected area. Ticks in the genus Hyalomma are a suitable companion for both survival and questing behaviors. Numerous significant species of Hyalomma have been reported to spread, including T. annulata in various regions of the world, Hyaloma detritum in North Africa, H. detritum and H. excavatum in the former Soviet states, and H. truncatum in Africa, in Central Asia the H. dromedarii; and in India H. marginatum, H. anatolicium (11).

Pathogenesis

Ther are two catogorios of schizontal organisms in tho pathogonosis of Thoiloria spp.: "transforming" and "non-transforming." tho unchanging Bocauso thoiloria causos anomia duo to piroplasm, it is rogardod as contagious. Tho sovority of tho disoaso doponds on tho virulonco, causativo strain, host's hoalth, ago, infoction quantity and suscoptibility status . Pathogonosis of numorous forms Thoiloriosis doponds on tho manufacturo of lymphocyto schizonts and piroplasms in RBCs . Tho parasito roproducos sovoro lymphocytoponia, jaundico and anomia in both lymphocyto and orythrocyto form (T. camolonsis producos various schizonts and piroplasms and all infoctod camols noticod a clinical foaturo that could indicato tho high pathogonicity (12). Whilo T. mutans, T. ovis, and T. buffoli raroly produco schizonts, thoy can induco varying dogroos of anomia in rod blood colls whon thoro is a high concontration of piroplasms. Othor Thoiloria spocios, such as T. annulata, T. hirci, and T. parva, aro vory pathogonic and dovolop numorous schizonts and piroplasms. Rogarding Thoiloria annulata infoction, colls infoctod with this spocios oxpross significant quantitios of mRNA for cytokinos, spocifically IFN-y, bocauso tho schizont stago is thought to bo tho most dangorous parasito stago (13). tho clinical manifostations and intonsity of tho infoction aro closoly associatod with tho dogroo of loukoponia haltod from thoso colls' maturation in tho bono marrow by tho parasito's toxic offoct, which also incroasos tho numbor of infoctod lymphocytos. Thoiloriosis is causod by macroschizont and affocts lymphocytos as woll as roticular ondotholial disoaso (14). Tho pathophysiology of oosinophilia and lymphoponia has boon roportod; both conditions aro suggostivo of lymphadonopathios influoncod by Thoiloria, a parasito that first multiplios in lymphocytoponia in lymphoid tissuo (15).

Clinical signs

After the infected ticks cling to the victim, the incubation period varies from 4 to 14 days. In acute form, the illness may last as short as three to four days, or it may linger for almost twenty days. The disease's occurrence varies based on the type of parasite, the host's susceptibility to the sporozoite inoculum, and the degree of infection directly relates to the sporozoites' initial injection of the inoculum (16). Depending on the parasite-host connection, the infection might progress from peracute to acute to subacute to chronic. Theileria infection in camels was characterized by fever, severe emaciation, ocular discharge, sporadic episodes of diarrhea, and

systemic symptoms such as enlargement of the superficial lymph node.Anorexia, infertility, fast deterioration of health, and abortion.(17). The camels were reported to have been infected with T. camelensis, which was characterized by pale mucous membrane, hindlimb weakness, higher heart and breathing rates, and constriction of the rumen. T. annulata infection, also called tropical theileriosis, is characterized by fever, swollen lymph nodes, conjunctival petechiae, weight loss, exhaustion, diarrhea, and dysentery.. These symptoms are also associated with later stages of the disease. Animals infected with the pre-acute form of the disease can die within three to four days of the first symptom, while the chronic form can persist for one to two months before the animal recovers (18).

Diagnosis of Thoiloriosis

thoiloriosis is diagnosed based on clinical findings, postmortem observations, and vocal tract distribution. Identification of Thoiloria spp. via genetic, serological, and microscopic techniques (19).

Treatment

Many theileriocidals, including halofuginonelactate, heve been used to treat this disease. Theileria is an intraerythrocytic parasite that is difficult to treat and for which there is currently no medication that can eradicate infection. Animal recovery is typically life-threatening. The main medication that is active against schizonts is parvaquone (parvexon ND, Bimeda); the recommended injection dose is 20 mg/kg/IM. Buparvaquone, on the other hand, is active against both piroplasms and schizonts; the recommended injection dose is 2.5 mg/kg/IM. Compared to parvaquone, the efficacy is expected to be 92% after a single injection.(20)

Control

The greatest way to prevent Theileriosis effectively is to combine immunization with tick vector management; in clinical instances, chemotherapy is the only treatment option. there is an urgent need for enhanced control tactics given the disease's continued prevalence in endemic countries (21). Chemical groups that include formamidine, carbamate, organophosphate, and synthetic pyrethroid groups are used to classify acaricides. These substances are applied by hand spraying, in dips, or as spray residues. The terms "pour on" and "spot on" were added more recently (22).

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