



A review on Epidemiology of *Trypanosoma equiperdum*(dourine) infection in equines

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Abstract

Trypanosoma equiperdum(dourine) is a parasitic venereal disease of equines caused by the flagellate protozoan *Trypanosoma equiperdum* of the order *Trypanosomatida*, family *Trypanosomatidae* and subgenus *Trypanozoon*. This agent does not survive very long outside its hosts and is not transmitted by fomites; therefore, parameters associated with resistance to physical and chemical are not meaningful. Dourine is not transmitted by an invertebrate vector. It is transmitted during breeding or infected mares may occasionally pass infection to foals. *T. equiperdum* may be found in vaginal secretions of infected mares, and seminal fluid, mucous exudate of the penis, and sheath of stallions. Dourine is endemic in some African, Asian and Latin American regions, as well as the Middle East and Eastern Europe. Dourine is among the multiple health and welfare problems affecting working equids, parasitic diseases are one of the major constraints to their productivity and work performance, which often leads to high morbidity and mortality.

Keywords: *Trypanosoma equiperdum*, epidemiology, equines

Introduction

Trypanosoma equiperdum infection (dourine) is a chronic or acute contagious parasitic venereal disease of equines caused by the flagellate protozoan *Trypanosoma equiperdum* of the order *Trypanosomatida*, family *Trypanosomatidae* and subgenus *Trypanozoon*. Other species within this subgenus are *T. brucei* and *T. evansi*. Recent genomic studies propose that *T. equiperdum*, along with *Trypanosoma evansi*, are subspecies of *T. brucei*. One hypothesis asserts that the disease

condition “dourine” is actually a host-specific immune response to either *T. equiperdum*, *T. brucei* or *T. evansi* infection (Suganuma *et al.*, 2016; Brown and Torres, 2008).

The protozoan parasite is primarily a tissue parasite that is rarely detected in the blood. There is no known natural reservoir of the parasite other than infected equids. It is present in the genital secretions of both infected males and females. The incubation period, severity, and duration of the disease vary considerably; it is often fatal,

however spontaneous recoveries do occur as do latent carriers and subclinical infections. Donkeys and mules are more resistant than horses and may remain in apparent carriers (Brunet *et al.*, 1998; Suganuma *et al.*, 2016).

This agent does not survive very long outside its hosts and is not transmitted by fomites, therefore, parameters associated with resistance to physical and chemical actions (i.e. temperature, chemical/disinfectants, and environmental survival) are not meaningful (Coetzer and Tustin, 2004).

Epidemiology

Dourine is not transmitted by an invertebrate vector. It is transmitted during breeding or infected mares may occasionally pass infection to foals. Average mortality associated with acute disease approaches 50% (especially in stallions) (Suganuma *et al.*, 2016).

Hosts

Hosts of dourine are horses, mules and donkeys. There is no known natural reservoir of the parasite other than infected equids. Rats, mice, rabbits and dogs can be infected experimentally; rodents are used to prepare antigen for diagnostic tests (Brown and Torres, 2008). Positive complement-fixation (CF) tests have been obtained from zebras, although it has not been shown that zebras can be infected with *T. equiperdum* or transmit the disease. Improved breeds of horses seem to be more susceptible to the disease. The disease in these animals often progresses rapidly and involves the nervous system. In contrast, native ponies and donkeys often exhibit only mild signs of the disease. Infected male donkeys, which may be asymptomatic, are particularly dangerous in the epidemiology of the disease, for they may escape detection as carriers (WOAH, 2020).

Transmission

Natural transmission occurs directly from animal to animal during coitus; mainly from stallion to

mare, but may also be transmitted from mare to stallion. The infection is not always transmitted by an infected animal at every copulation. There is currently no evidence that arthropod vectors play any role in transmission. Rarely, foals may be infected via the mucosa (conjunctiva), during parturition or by drinking milk from an infected dam. Foals may then transmit disease when they are sexually mature (Coetzer and Tustin, 2004). Asymptomatic stallions may carry *T. equigenitalis* on their external genitalia for years. The primary site of localization is the urethral fossa. Foals may become infected at birth and remain infected until mature (Brown and Torres, 2008).

Sources of Infection

T. equiperdum may be found in vaginal secretions of infected mares, and seminal fluid, mucous exudate of the penis, and sheath of stallions. Rarely, infected mares have been reported to pass the infection to their foals, possibly from infected mare to fetus via placenta. Trypanosomes have been detected in the mammary secretions of some infected animals (Cuypers *et al.*, 2017).

Geographic Distribution

Dourine was once widespread, but it has been eradicated from many countries. Diagnosing dourine can be difficult, especially where other trypanosomes are also present, and the current distribution of this organism is unclear. Between 1995 and 2015, published papers and reports to the World Organization for Animal Health (OIE) suggested that this disease is endemic in parts of Africa and Asia. *T. equiperdum* is also reported to exist in South America, although there is little or no recent information from this region. In addition, dourine may occur in some areas where testing is not done (Lai *et al.*, 2008).

Clinical Diagnosis

Incubation period is very variable and could be from one week to a few months or longer. For the purposes of the OIE Terrestrial Animal Health Code, the incubation period for dourine is 6

months. Severity and duration of disease vary considerably. Though the disease is often fatal, spontaneous recoveries do occur but may result in latent carriers. Diagnosis is most commonly based on clinical evidence supported by serology (Perrone *et al.*, 200; Buscher *et al.*, 2019).

Diagnosis on physical signs is unreliable because many animals develop no sign. When signs are present, however, they are suggestive of a diagnosis of dourine. If "silver dollar plaques" occur, they are considered pathognomonic for dourine (Brown and Torres, 2008).

Clinical manifestations include fever, local oedema of the genitalia and mammary glands, oedematous coetaneous eruptions, knuckling of the joints, incoordination and unilateral facial and lip paralysis, ocular lesions, anaemia, progressive weight loss and emaciation, nervous form may set in after emaciation and oedema and lead to weakness, lameness mostly of the hind legs resulting in a 'staggering movement', and gait abnormalities (Pascucci *et al.*, 2013).

Clinical signs are marked by periodic exacerbation and relapse, ending in death, sometimes after paraplegia or, possibly, recovery; acute disease lasts only 1–2 months or, exceptionally, 1 week. A chronic, usually mild, form of the disease may persist for several years. In fatal cases, the disease is usually slow and progressive, with increasing anaemia and emaciation, although the appetite remains good almost throughout (Coetzer and Tustin, 2004).

Morbidity and Mortality

The severity and duration of dourine may vary with the virulence of the strain and the health of the horse (e.g., nutritional status, concurrent illnesses) and existence of stressors that may precipitate a relapse. While some animals progress to the end stage of the disease within 1-2 months, experimentally infected horses have survived up to 10 years. More severe disease is usually seen in improved breeds of horses, while donkeys, mules and native ponies tend to be more resistant. Subclinical infections have also been

described. The mortality rate in untreated cases is estimated to be 50-70%. However, apparent recoveries have been questioned by some, in view of the long course of the disease and the waxing and waning clinical signs. Some authors feel that nearly all cases are eventually fatal (Scacchia *et al.*, 2011).

Prevention and Control

It is uncertain whether antibiotic treatment eliminates or hastens elimination of *T. equiperdum*. Natural clearance may take several months (Brown and Torres, 2008).

Sanitary Prophylaxis

Control of the disease depends on compulsory notification and slaughter of infected animals. Movement control is enforced by legislation in most countries. Good hygiene at assisted matings is also essential o fences may help control the spread, although stallions have been reported to serve mares over fences (Brown and Torres, 2008).

Medical Prophylaxis

There are no vaccines available for this disease. Pharmaceutical therapy is not recommended because animals may improve clinically but remain carriers of the parasite (Claes *et al.*, 2003).

Conclusion

Dourine is among the multiple health and welfare problems affecting working equids, parasitic diseases are one of the major constraints to their productivity and work performance, which often leads to high morbidity and mortality. Currently dourine is spreading and becoming a potential threat to the equines in the study site through unrestricted movement of animals outside of the endemic foci for trade and transportation purpose. Diagnosis of *T. equiperdum*, the causative agent of dourine in horses by standard parasitological techniques is difficult owing to the low numbers of parasites present in the blood or tissues fluids

and the frequent absence of clinical signs of disease. As the distribution of the dourine not limited by environmental factors; it is possible through un restricted movement of infected or carrier animals, or through uncontrolled animal breeding.

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