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Sero-epidemiological survey of dourine *T. equiperdum* in Chencha district of southern region

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Abstract

The study was conducted in Gamo highland, chencha district with an objective to determine the prevalence rate and associated risk factors of the disease. For this study, four villages were selected with high potential of equine. On clinical examination, there were cases with clinical signs of dourine (oedema on the lower abdomen and swelling of testicles and vagina). 32 horses of adult age were examined. Both parasitological (buffer coat technique) and serological tests were conducted. Out of examined horses, there were no findings for parasitological technique, whereas, 5 were Sero-positive for trypanosome antibodies). The study showed a prevalence rate of 15.6% of the disease in the study area. Major constraints that hampered equine production in the study area other than the diseases were feed shortage and poor veterinary service. A disease with clinical sign of dourine was an outstanding disease affecting equine production and productivity in the study area. Therefore, an awareness creation has to be done for development agents and farmers on clinical signs and means of transmission and options of control and prevention of the disease to control further transmission to equine population.

Keywords: Dourine, horses, district, Sero-positive

Introduction

Ethiopia is a country with huge population of equines. The country has got 13.03 million Equine population; 2.15 million horses, 10.8 million donkeys, .08million mules (CSA, 2020)^[4]. Equine population is with high economic importance and with high contribution for economic development and modernization of the country's transportation system to the large. Equine are reared in Ethiopian highlands for several purposes; due to rugged topography they serve as means of transport for mankind, especially serving as an ambulance for sick people and for pregnant mothers and as source of manures. Among the horses aged 3 years and older, about 1.38 million were used for transportation, 0.27 million were for draught and the remaining 0.09 million were used for other purposes (CSA, 2020)^[4]. In the country, the productivity of equine is hampered by several factors like; feed shortage, prevalent diseases and poor husbandry practices. Trypanosomiasis is one of the diseases affecting equine productivity. Sexually transmitted, *T. equiperdum*, which affects equines, is among the non-tsetse transmitted animal trypanosomiasis. *T. equiperdum* differs from other trypanosomes in that it 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. Dourine (*T. equiperdum*) infection is mostly a chronic or acute contagious disease of horses and other members of the family equidae. It is among the major parasitic diseases affecting horses in Ethiopia, which is caused by protozoan parasite *T. equiperdum*. Of the non-tsetse transmitted African trypanosomiasis, dourine is the only trypanosomiasis that is not transmitted by invertebrate vector, but is transmitted exclusively by coitus (sexual intercourse), more commonly from stallion to mare, but also from mare to stallion, due to the presence of the parasite in the seminal fluid and mucous exudates of the penis and sheath of the infected male, and in the vaginal mucus of the infected female. Initially, parasites are found free on the surface of the mucosa or between the epithelial cells of a newly infected animal. Invasion of the tissues takes place, and edematous patches appear in the genital tract. Parasites then may pass into the blood, where they are carried to other parts of the body. In typical cases, this metastatic invasion gives rise to characteristic cutaneous plaques (Gillingwater *et al.*, 2007)^[6].

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Dourine can affect horses, mules and donkeys. The later are generally more resistant and often remain asymptomatic carriers (Claes, *et al.* 2003)^[3]. Dourine is included in list B of OIE notable disease lists (OIE, 2000)^[12]. Dourine is characterized by edematous swelling of external genitalia with mucopurulent discharge from the urethra in the stallion and from the vagina in the mare, followed by gross edema of the genitalia later a characteristic plaque 2-10 cm in diameter appear in the skin and the animal becomes progressively emaciated. The mortality in untreated cases is 50-70%, there is nervous system involvement and progressive emaciation (Sausan *et al.*, 1998). Dourine has been reported in Ethiopia in the province of Arsi and Bale highland (Alemu T., *et al.* 1997)^[1]. There is a report on spreading of the disease outside the previously known endemic foci (Arsi-Bale high land) of Ethiopia (Hagos, 2005)^[8]. A disease with the clinical signs of Dourine with many morbidity and mortality rate was reported from Bureau of Agriculture of Gamogofa zone, Chencha district. Therefore objectives of this study were to determine the prevalence rate and distribution of the disease and to forward possible options of control spread of the disease and to generate baseline information on the epidemiology of the disease in the study area.

Methodology

The study was conducted in Gamogofa zone Chencha district, which is located at an altitude above 2900m a.s.l. For this study four villages (Duko Tsida, Fazo, Duko Mesho and Gindona Gimbele) were selected based on their equine population. In these villages, questioner survey was conducted. Parasitological technique was conducted to detect a parasite, for this, blood sample was collected from jugular vein using a vacutainer tube and was centrifuged then buffer coat techniques was employed. Direct parasitological demonstration of *T. equiperdum* is unusual as it was always very difficult to isolate the organism directly from either the blood or pathological secretions (oedemas. plaques) of infected horses. Even at the earliest stages of the infection (Rouget, 1896; Schneider and Buffard, 1900). Serum sample was also collected for serological technique; serological analysis was conducted in laboratory of College of veterinary medicine, Debrezeit. The sample testing on investigation of (Dourine) *T. equiperdum* infection was conducted at the Bishoftu CVMA Ethio-Belgium VLRI-funded PhD project by using a card agglutination test called CATT/*T. evansi*, which was initially designed to detect *T. evansi* infection (surra), but can also be a valuable method for detection of *T. equiperdum* (dourine) (Claes F., *et al.*, 2005)^[2]. CATT/*T. evansi* is a rapid, direct card agglutination test which uses formaldehyde fixed Commassie stained, freeze-dried antigen of *T. evansi* VAT RoTat 1.2 (Stuart, K., *et al.*, 2008). In the CATT/*T. evansi*, 50 micro litter of serum was diluted with PBS (Phosphate buffered saline solution) and was mixed with 50 micro litter of the reagent (CATT antigen) on a test card; spread over approximately 1.5cm and shaken with electrical rotator arranged at 70 rotation per minute for 5 minutes. The test was checked with positive and negative controls before the whole samples were tested. In the test, positive results were determined at cut-off point dilutions 1:4. The presence of trypanosomal antibodies was revealed by macroscopic agglutination (Hagos A., *et al.*, 2010)^[9]. CATT/*T. evansi* is used as a screening test for trypanosomiasis infection with *T. equiperdum* results in production of circulating antibodies against several surface antigens of the parasite. Such antigens can be demonstrated in the serum of the infected host by

production of a visible agglutination reaction (within about 4 minutes) on the circular area of the test card when the antigen reacts with serum antibody produced against trypanosomal infections. Blood samples were collected from the jugular vein of horses using plain vacutainer tubes and needle, after the site had been wiped with cotton wool soaked in alcohol for serological test. The plain vacutainer tubes were labeled and the blood was allowed to clot overnight at room temperature before the serum was separated and collected into it's container, test tubes. The serum samples were then stored in sterile polypropylene cryogenic vials at -20 °C, and transported under a cold chain using ice-box (coolbox) to the Bishoftu college of veterinary medicine laboratory until they are tested using a card agglutination test.

Description of the study area

Chencha district is one of the districts found in Gamogofa zone, southern region. 90% of the villages of the district are highlands and the rest 10% are mid-highlands. The district is with high population of equine, especially horses. In the highland part of the district, there is high population of horses and Mules, whereas, in the mid-highland mainly Donkeys and mules took higher proportion. Agricultural practice of the district is mixed farming system. Major crops grown in the district are barely, wheat, inset, potato, vegetables and an appeal. Major livestock reared in the district are; sheep, cattle, poultry, horses, goats mules and donkey

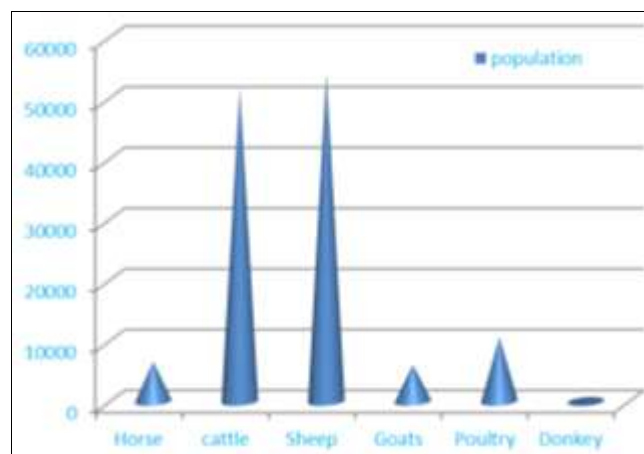


Fig. 1: Major livestock reared in Chencha District

Major feed resources for an animal in the district are; communal grazing land, grain residues, locally improved grass (Desho grass), mineral supplement (bole) and improved grasses. In the district feed shortage occurs mainly during dry season and due to small landholdings it may occur during rainy season too. During these period farmers use as an option; grain residues, inset (False banana) leaf, and bamboo leaf. Major reported livestock diseases in the study area were mainly; Black leg, pastorellosis, trypanosomiasis, internal and external parasites,

Major purposes of rearing equine in the district

Farmers rear equine mainly for fright(as pack animal), for grain threshing, as means of transport both for goods and human being to and from market, for income generation through selling and renting, for traditional ceremonies like wedding and holidays and also as source of manure.

Major diseases affecting equine in the study area

Major diseases reported affecting equines in the district were;

strangles, dourine, `indo & exo parasitosis, and menges. The most favorable time for the occurrence of dourine in the district is on October month (Tikimit) as a result people call the disease in the district “Tikimite”, this could be associated with the breeding season which ranges from October-January/”Tikimit-Tirr”/Interviewed elders said that, previously traders were coming to Chench district riding their horses from Arsi and Bale areas, where the disease is prevalent. This could be the route with which the disease transmitted to Chench Highland.

Result and Discussion

Results of the serological test (CATT/*T. evansi*) for *T. equiperdum* regardless of the difficulties in differentiating the infections caused by *T. equiperdum* and *T. evansi* revealed that 15.6% of the tested animals were sero-positive for *T. equiperdum*. Animals were examined clinically before collection of blood sample for laboratory diagnosis. Diseased animals shown clinically the following signs; swelling of the lower abdomen, inappitence, rotating of the tail, refluxing the neck towards one side, swelling of the vulva & urethra. Animals with clinical signs were of adult age of both sexes. But those of lower age groups are not affected by this disease (with no clinical sign) in the study area. This shows that the disease is transmitted sexually by intercourse. We collected blood sample from 32 equine both for parasitological and serological investigation. Parasitological tests using buffer coat techniques shows no positive result. Whereas on serological tests there were 5 (15.6%) sero-positive cases. The disease is highly affecting productivity of equine especially horses in the study area by causing morbidity and mortality of horses and decreasing their efficiency of production.

Conclusion and recommendation

As equine is a backbone for both economical and social services of communities in the study area, control of the disease have to be given a due attention? Even though it is difficult to be accurate on the presence of *T. equiperdum* in the study area based on this finding, the presence of sero-positive cases and cases with clinical sign of the disease indicates the area is with a risk of dourine. Therefore; attention has to be given towards the control and prevention of the disease in the area, this could be done by; awareness creation for development agents of the village and equine owning farmers, by castrating of diseased male (cases with a clinical sign of dourine) and preventing free mating of sick animal with healthy one and avoiding free release of equine after crop harvesting in open market, and to communal grazing land.

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