Global Veterinaria 5 (3): 180-183, 2010
ISSN 1992-6197

Prevalence Rate of Tseste Transmitted Donkey Trypanosomosis in Dale Wabera District, Western Ethiopia

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Abstract: A cross sectional investigation of tsetse transmitted donkey trypanosomosis was undertaken in ten Peasant Associations (PAs) of Dale Wabera district, Western Ethiopia during November, 2007 to March, 2008 to determine prevalence of tsetse transmitted trypanosomosis in donkeys. Blood samples from 255 randomly selected donkeys were examined using parasitological methods. Among the examined donkeys during the study period, 16 donkeys 6.27%, (95% CI: 3.2779, 9.2710) were infected with trypanosomes. Most of the infections were due to *Trypanosoma congolense* (68.75%) followed by *T. brucei* (31.25%). There was no significant difference in the prevalence rate between male 8.23%, (95% CI: 4.0608, 12.4097) and females 2.35%, (95% CI: 0.0, 5.64180). There was significant difference ($P<0.05$) in infection rate between the lowland (below 1400masl) 9.7%, (95% CI: 4.2, 15.3) and midland (above 1400masl) areas 3.52%, (95% CI: 0.45, 6.6). Mean PCV in males and females were 32.5 and 33.3%, respectively. The mean PCV values of parasitaemic and aparasitaemic animals during the study period were 31.3 and 33%, respectively. The range of PCV values in parasitaemic animals was between 25-38% and in aparasitaemic animals between 17-53%. In conclusion, the study revealed that tsetse transmitted donkey trypanosomosis is an important disease and donkeys may serve as a potential reservoir of infection to the epidemiology of the disease.

Key words: *Trypanosoma congolense* · *T. brucei* · PCV · Parasitemic · Aparasitemic

INTRODUCTION

Donkey is one of the most important draught animals, exist in millions and serve a key role in the agricultural economy of the world [1]. It is well adapted to arid, semi - arid areas and temperate regions. The main uses are pack transportation, riding, carting, threshing, farm cultivation [2-4]. Ethiopia has about four million donkeys or 32% of all the donkeys in Africa and 10% of the world donkeys' population [5]. Although donkeys are found in all the ecological zones of the country (arid to alpine), the majority is found in the highlands. In all zones, donkeys are primarily used as pack animals. The low level of development of the road transport network and the rough terrain of the country makes the donkey the most valuable pack animal under the smallholder farming systems of Ethiopia [6].

Donkey is one of the most neglected domestic animals, despite the very important role it plays in the socio-economic life of the Ethiopian farming population [3]. The great value of donkeys to rural, urban and peri - urban communities has been largely ignored by the authorities. In most Ethiopian societies, especially among agricultural staff, donkeys have a bad image and are mildly ridiculed in conversation and through traditional words and phrases [7].

Diseases are the major constraints to draught animal performance [8]. To exploit the donkeys potential to the maximum level, knowledge of the disease conditions affecting this animal is important. One of such diseases that hamper donkey's performance is tsetse transmitted trypanosomosis. A total of 1.23 million equines in Ethiopia are at risk of contracting trypanosomosis [9]. Despite the importance of donkeys in the Ethiopian economy, very little research related to tsetse transmitted trypanosomosis in donkeys has been carried out. Therefore, the objective of this study was to determine the prevalence rate of donkey trypanosomosis in Dale Wabera district, Western Ethiopia.

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MATERIALS AND METHODS

Study Area and Study Population: The study was conducted in randomly selected ten Pas of Dale Wabera district, Western Ethiopia. The PAs lies between latitude 08° 41' 92''- 08° 55'92'' N and longitude 035° 00' 38''- 035° 07' 65'' E. The study area is situated in Birbir watershed which is one the tsetse infested area in Baro Akobo river system. Keto, Bosona and Kuni rivers which are tributaries of Birbir and Dabus river boarder some PA's. The temperature ranged from 12°C to 28 °C while the mean annual rainfall was approximately 1108 mm [10]. The study area is scarcely populated mainly due to the impact of animal trypanosomosis. Mixed livestock and crop farming is the predominant form of production and rain fed agriculture is the commonest production system. The study animals are indigenous breeds of donkeys which are managed in traditional extensive way.

Study Design: A cross-sectional investigation of tsetse transmitted donkey trypanosomosis was carried out in selected district during November, 2007 to March, 2008.

Sampling Method and Sample Size Determination: The sampling strategy was simple random sampling method and the sample size was determined according to the formula given by Thrush field [11] ($n= 1.96^2$ X P. exp. (1- P. exp.)/ d2). The sample size (n) was determined on the basis of the expected prevalence (P. exp.) of 21% and absolute desired precision (d) of 5% at confidence interval of 95%. As a result, a total of 255 donkeys were sampled.

Study Methods and Procedures

Parasite Survey: The Buffy coat examination (BCE), the hematocrit centrifugation (HCT) and thin blood film methods were used according to the procedure given by Parries *et al*. [12].

Data Analysis: Data was coded to Microsoft excel and transferred to westata software for analysis [13]. Descriptive statistical analysis technique was used to analyze the data. The risk of the disease related to the sex and altitude were assessed using Odds ratio (OR). P-value less than or equal to 0.05 considered as statically significant.

RESULTS

Parasitological Finding: The overall prevalence rate of trypanosomosis during the study was 6.27%, (95% CI: 3.2779, 9.2710). *T. congolense* (68.75%) was the most prevalent species followed by *T. brucei* (31.25%). The prevalence rate of trypanosomosis on the basis of sex varies but statistically not significant (P> 0.05), the prevalence rate in male was 8.23%, (95% CI: 4.0608, 12.4097) (92% *T. congolense* and 8% *T. brucei*) and females 2.35%, (95% CI: 0.0, 5.6418) (all infection from *T. brucei* (100%) and males were at higher risk from females by 4.5 times Odds ratio from females. In PAs areas for both sexes, significant differences in prevalence rate of trypanosomosis were seen between altitudes (P < 0.01) shown in table 1.

Hematological Finding: Trypanosome infection significantly reduced the PCV levels in both sexes in all PAs. The lower PCV due to trypanosome infection was pronounced in both females (31.5%) and males (31.3%). Mean PCV in males and females were 32.5 and 33.3%, respectively. The mean PCV values of parasitaemic and aparasitaemic animals during the study period were 31.3 and 33%, respectively as shown in figure 1. The range of PCV values in parasitaemic animals was between 25-38% and in aparasitaemic animals was between17-53%.

Table 1: Over all Trypanosome infections in study area

Variable		No. examined	Positive	Odds	P value	Prevalence rate (%)
Sex	Male	170	14	0.09	0.07	8.23
	Female	85	2	0.02		2.35
PCV	Non- anemic	164	8	0.05	0.22	
	Anemic	91	8	0.10		
Altitude	<1400masl	113	11	0.11	0.04	9.7
	1400 - 1600masl	142	5	0.04		3.52

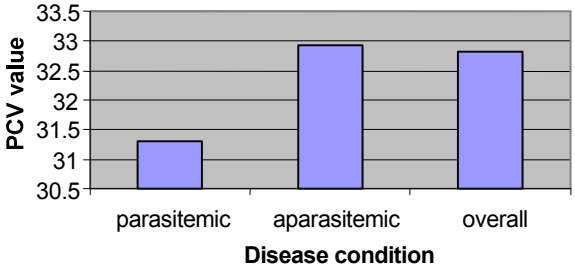

Fig. 1: Over all and mean PCV of parasitaemic and aparasitaemic animals

DISCUSSION

The prevalence rate of tsetse transmitted donkey trypanosomosis observed in this study was 6.27%. The lower prevalence rate of the current study might be due to use of chemo prophylactic drugs in addition donkeys usually tethered around homestead, whereas tsetse files not exist because of human activity and also during the dry season tsetse fly challenge decreases, hence in association with the decrease in fly population during the dry season the prevalence is expected to decrease. Furthermore, the diagnostic technique using BCE was less sensitive. Githiori [14] showed that 3% of animals had trypanosome on BCE, 40.4% had trypanosomal antigen while 36.2% had antibodies, this indicate that if more sensitive tests where used the prevalence may significantly rise.

The predominant trypanosome species was T*rypanosome congolense* accounting (68.75%) followed by *T. brucei* (31.25%) the difference between trypanosome species statistically significant ($p<0.05$) is in agreement with the previous study conducted by Githiori *et al*. [14], Ermiyas [15], Ermiyas and Getachew [16] and Birhanu [17]. Higher *T. congolense* infection in this study suggests the existence of increased contact of donkeys with tsetse vector than biting flies this high ratio of *T. congolense* suggests that the major cyclical vectors are the savannah tsetse flies (*G. m. submorsitans* and *G. palidipes*) which are more efficient transmitter of *T. Congolense* than *T. vivax* in East Africa [18]. Additionally *T. brucei* is known to be more pathogenic than either *T. Congolense* or *T. vivax* and this could mean spontaneous recovery from *T. brucei* infections would be rare [19, 20] hence infection of donkeys by *T. brucei* resulted in death because of this the parasite die before transmitted to others. Higher number of infection due to *T. Congolense* might also be due to the presence of low virulent strains. No *T. vivax* parasite was detected by BCE which could be due to the mild nature of the infection in donkeys.

The prevalence rate on the sex basis is statistically insignificant but there is a difference on the higher prevalence being 6.9% in males and 4.9% in females. The result of different altitude levels showed statistically significant difference ($p<0.05$) with marked decline of infection on increasing altitude. This is in agreement with the previous studies by Wondale [21]. During the study period 113 donkeys were examined below 1400mas1 and 9.7% prevalence was obtained. Surprisingly no female donkeys were encountered in this higher risk area females are at lower risk than males. As a result the prevalence in females decreased. Above 1400 masl 142 donkeys were examined from which 60% were females, at this altitude a prevalence of 3.5% obtained. As altitude increases number of female donkey increases, but the prevalence decreases markedly. In the study area males usually used as a pack animal especially in the lower altitude (<1400mas1), because of high mortality from the disease, hence the farmers would not use donkeys for reproduction purpose.

Degree of anemia in parasitemic donkeys as measured by PCV was lower than aparasitemic, but the variation was not statistically significant. According to Birhanu [17], the effect of trypanosomosis on PCV showed weak and non-significant difference in the absence of nematode infections. This might be the reason why the mean PCV of parasitemic and parasitic donkeys were not significantly different.

In conclusion, trypanosomosis in equine is an important disease in Western Ethiopia where donkeys are extensively kept. Donkey trypanosomes negatively affect the PCV so that trypanosomosis reduce work performance of donkeys. Therefore, it is important to remove the burden of trypanosomosis and make the tsetse infected areas favorable for sustainable land resource utilization.

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