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Survey on prevalence of bovine trypanosomiasis in Wonchi Woreda, South West Shoa Zone, Central Ethiopia

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ABSTRACT

Bovine trypanosomiasis is one of the most prevalent and important disease in Ethiopia limiting livestock productivity and agricultural development. A cross-sectional survey of bovine trypanosomiasis was conducted from December 2013 to May 2013 in Wonchi district of South West Shoa zone to estimate the prevalence of bovine trypanosomiasis and assess the risk factors associated with its occurrence. Blood samples were collected from 384 randomly sampled cattle of four conveniently selected kebeles of the district. Thin blood smear was made from the collected blood samples using Giemsa stain. Of the animals examined, the overall prevalence of bovine trypanosomiasis was found to be 2.1%. The highest prevalence was observed in Haro Kono (4.3%) followed by Meti Walga (1.7%). There was statistically significant difference ($P < 0.05$) in the prevalence of the disease among the different kebeles. Older animals were found to be significantly affected than the younger ones. However, no statistically significant variation observed in the prevalence of the disease between the two sexes. Although the present study showed a low level of prevalence in the study area using a test with poor sensitivity; nevertheless, vagarious disease, mitigation strategies is warranted owing to the economic implication of the disease.

1. Introduction

Bovine trypanosomosis is an important protozoan disease caused by the genus *Trypanosoma* transmitted through bites by different species of *Glossina* and by a number of biting flies such as *Tabanus* and *Stomoxys* species. It is characterized by intermittent fever, parasitaemia, anemia, progressive emaciation, and reduced productivity. The most common pathogenic *Trypanosoma* species affecting cattle are *Trypanosoma vivax*, *Trypanosoma congolense*, and *Trypanosoma brucei brucei* Oluwafemi et al., (2007) whereas *T. evansi* is most common in horses and camels (Ravindran et al., 2008). The disease communicated from animals to animals by tsetse flies (*Glossina*) which present in 37 sub-Saharan countries including Ethiopia (Mattioli et al. 2004).

Bovine trypanosomosis is an important livestock disease in Africa, which is considered as a threat to the ongoing effort on poverty alleviation on the continent (Ceechi et al 2008). A recent study estimated the direct annual cost of trypanosomosis to be about 1.34 billion US\$. African livestock producers are administering an estimated 35 million curative and prophylactic treatments annually which costs the producers and the government at least 35 million US\$ (Holmes et al, 2004).

Bovine trypanosomosis and its vectors occur in vast areas of the sub-Saharan Africa with devastating impact on livestock productivity posing a serious threat to the lives and communities. It constitutes the greatest single constraint to livestock and crop production by directly contributing to hunger, poverty, protein malnutrition and suffering of entire communities in Africa (PATTEC, 2002). Of the 165 million cattle found in Africa, only 10 million are found within the tsetse fly free belt, and these are mostly low producing breeds which are maintained on high drug management regimes to keep trypanosomosis at bay (Jones and Davila, 2001). The disease has economic importance due to loss of condition, reduction in milk yield, decrease capacity of work (Ravindran et al., 2008).

Prevalence of the disease depends on rate of exposure, availability of infected animals, the insect reservoir and seasons (Mottilb, et al., 2005). In Ethiopia quite a number of epidemiological studies have been conducted on cattle trypanosomosis (Abebe and Jobre, 1996; Sinshaw, 2006) in different parties of the country. However, no study was conducted currently in Wonchi district on the status of the disease despite the fact that trypanosomosis control programme is in place for the last ten years. Therefore, the objective of this study was to determine the prevalence of bovine trypanosomosis using conventional parasitological technique

2. Materials and methods

2.1. Study area

A study was conducted in four peasant association of Wonchi woreda, namely Meti Walga, Haro Kono, Haro Baseka and Sankele Kake kebelles. This woreda is located in South West Shoa zone of Oromia regional state at 123Km from Addis Ababa. Geographically, Wonchi woreda is located at latitude of 100 38 North and longitude 370 290 W. The district is covered by different vegetation and has an altitude ranging from 1700-2200m above sea level. The woreda receives an annual rainfall of 1310 and 1540 minimum and maximum respectively and a minimum and maximum daily temperature of 10°C and 30°C. Agro-climatically, it can be grouped at 40 % Dega, 55% Weyenadega, and 5% Kola.

2.2. Study design and study animals

Cross-sectional study design was conducted to assess the prevalence of bovine trypanosomosis in the study area. The animals used in this study were local zebu cattle (*Bos indicus*), which are usually kept under an extensive husbandry system. The age of animals was categorized into two age groups (young and old) according to (Delahunfa and Habel, 1986).

2.3. Sample size determination and Sampling Methods

The sample size was determined based on formula described by Thrusfield (2005) with 95% confidence interval at 5% desired absolute precision and by assuming the expected prevalence of 50%. The study areas were

purposively selected depend on previous information on presence of disease and any study performed in the areas. According to the formula indicated, 384 animals were sampled by using simple random sample technique to collect blood samples from individual animals. Equal number of animals was selected from each kebeles.

$$n = 1.962 \cdot \frac{Pex}{d^2} (1 - Pex)$$

Where, N= sample size required

Pex= expected prevalence

d= expected precision/Accepted absolute error

2.4. Parasitological examination

2.4.1. Thin blood smears preparation

A small drop of blood from a micro hematocrit capillary tube was applied to a clean slide and spread by using another clean slide at an angle of 45°C and a smear was made. The smear was air dried and then fixed for 2 minutes in methyl alcohol, the thin smear was flooded with Giemsa stain (1,10) solution for 30 minutes, excess stain was drained and washed by using distilled water, then it was allowed to dry by standing up right and examined for presence of the trypanosome parasite under the microscope (x 100) oil immersion objective lens (OIE 2008).

2.5. Data management and analysis

All collected data, kebeles, age and sex of the animals, and blood examination result were entered to Micro-Soft Excel sheet and analyzed by SPSS version 16. Descriptive statistics was used to determine the prevalence of the parasites across the different risk factors and Pearson's Chi-square test (χ^2) was used to assess the association of the potential risk factors (sex, age, body condition and kebeles) with the prevalence of the parasite. For statistical analysis, a confidence level of 95% and a P-value less than 5% were used to consider the association significant.

3. Results

3.1. Prevalence of the disease in selected kebeles

From the total of 384 bovine examined, over all 8(2.1%) were positive for trypanosomosis (Table 1). The overall prevalence (2.1%) of trypanosomosis in this study was considered to be low when compared with earlier reports from other parts of Ethiopia (Dagnachew, 2005; Sinshaw, 2006 and Efrem et al., 2009) who reported a relatively higher prevalence. The ongoing application trypanosomosis control program in the study area could have contributed to the lower prevalence. Furthermore, density of fly population is another determinant factor for occurrence of trypanosomosis were fly population increases after the short and long rainy season this lies from April to June and September to November. However, this study was conducted in December to May which is in the dry period, hence lower fly population and consequently lowers prevalence of trypanosomosis.

Table 1

Prevalence of trypanosomosis across the four kebeles.

Risk factor	Total animal examined	No positive (prevalence)	χ^2	P-value
Kebeles	28.26	0.048		
H. Konno	96	6(4.3%)		
M. Walga	96	2(1.7%)		
H. Beseka	96	0(0%)		
Sankole Kake	96	0(0%)		
Total	384			
8(2.1%)				

H=Harro, M=Meti.

The higher (4.3%) prevalence of trypanosomosis was recorded in Haro Konno followed by Mexi Walga. There was statistically significant difference (P=0.048) in the prevalence of the disease among the kebeles (Table 1). A relatively higher prevalence of the disease was observed in Haro Konno, could be explained by the fact that this

kebele is located closer to low land area around Ameya Wareda which is known by high tsetse infestation and also suitable for habiting other biting flies which migrate to Haro Konno kebele responsible for variation of the number of infection.

3.2. Prevalence across the selected host related risk factors

According to sex distribution more numbers (2.5%) of females are affected than male animals. There were no statistically significant variation ($P>0.05$) was observed in the prevalence of the disease between the two sex (Table 2). The absences of statistically significant variation between male and female animals in the prevalence of the disease might be due to both sex had equal chance to exposed to the vectors. This result is in agreement with previous reports in the country (Adane and Gezahegne, 2007; Ababayehu et al., 2011) and this might be due to the fact that both sexes have virtually similar exposure to biting flies in grazing areas. Moreover, Tefera et al, (1994) Daya and Abebe (2008), that reported, absence of significant difference in susceptibility between the two sexes.

There was statistically significant difference in the prevalence of trypanosomiasis between the two age categories. The prevalence in old cattle was almost twice greater than the younger ones (Table 2). This could be associated to the fact that older animals travel long distance for feed and to serve for draught power as well as for harvesting crops and this may pose them to high tsetse fly challenge. In addition, young animals are also naturally protected to some extent by maternal antibodies. This finding was in line with previous reports (Rowland et al. 1995; Tesfahiwet and Abraham, 2012) in Ghibe valley which indicated that suckling calves are not allowed to go out with their dams until they are weaned off. Young animals are also naturally protected to some extent by maternal anti bodies (Fimmen et al., 1999). This could result in low prevalence of trypanosome in the younger animals. On the other hand disagreement with Sinshaw (2004) he stated that, absence of significant difference between age groups of the animals.

Table 1

Prevalence of bovine trypanosomiasis based on host related risk factors.

Variable	No. Examined	No. Positive (%)	χ^2 -Value	P-Value
Sex			0.36	0.581
Male	181	3 (1.7%)		
Female	203	5(2.5%)		
Age			23	0.04
Young	105	1(0.9%)		
Old	279	7 (2.5%)		
Total	384	8(2.1%)		

4. Conclusion and recommendation

The current study indicated, overall low prevalence of trypanosomiasis in the study area. The parasitological examination techniques used in this study is of poor sensitivity and the underlying prevalence of the disease in the study area might be higher than the reported frequency. Thus, the disease may have potential impact on production and productivities of the livestock on the area. There were statistically significant difference was observed in the frequency of the disease between age categories and among Kebeles. Therefore further studies are necessary using more sensitive tests like Buffy coat examination to indicate the picture of the of the disease, identify the species of trypanosome parasites circulating in the study area and strategic control of bovine trypanosomiasis and vector control should be strengthened to improve livestock production and agricultural development in the Wonchi district.

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