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Full Length Research Paper

Prevalence of bovine trypanosomosis in selected areas of Jabi Tehenan district, West Gojam of Amhara regional state, Northwestern Ethiopia

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Cross sectional study was conducted in Jabi Tehenan district of West Gojjam administrative zone from October 2008 to April 2009 to determine the current prevalence rate of bovine trypanosomosis. In the parasitological survey, blood samples of 300 cattle were examined using a buffy coat technique. The PCV value of each animal was also measured using hematocrit reader. The overall prevalence of trypanosomosis was found to be 11.7% and it consists of 16, 10 and 9% in Regeb Kebero Meda, Weyenema Workema and around Finote Selam peasant associations respectively. The most positive cases were due to *Trypanosoma congolense* (54.3%) followed by *Trypanosoma vivax* (45.7%). The mean PCV value (%) of parasitaemic and aparasitaemic animals during the study period were 20.3±4.1 SD and 25.29±4.67 SD with a significance difference ($p < 0.05$). The study also demonstrated variations prevalent among different age groups and between both sexes which were statistically insignificant ($p > 0.05$). Infection rate in poor body condition animals were significantly higher than good body condition animals ($p < 0.05$). The present prevalent study generated valuable information on the epidemiology of bovine trypanosomosis in the study area and revealed that trypanosomosis is an important disease in the study area.

Key words: Amhara, bovine, Ethiopia, Jabi Tehenan, prevalence, trypanosomosis.

INTRODUCTION

Trypanosomosis is a serious disease in domestic livestock that causes a significant negative impact in food production and economic growth in many part of the world, particularly in Sub-Saharan Africa (Taylor, 1998; Uilenberg, 1998; Tesfaye, 2002). African animal trypanosomosis and its vectors occur in vast areas of Sub-Saharan Africa with devastating impact on livestock productivity (ILRAD, 1994). Its epidemiology and impact on livestock especially cattle production are determined largely by the prevalence and distribution of the disease and its vectors in the affected area (PATTEC, 2001).

Tsetse flies (*Glossina*) inhabit wide range of habitats covering over 10 million km^2, representing 37% of the African continent and affecting 37 countries (Finelle, 1980) including Ethiopia. Approximately 30% of the total cattle population in the African continent and about 50 million people are exposed to animal trypanosomosis and human sleeping sickness, respectively (WHO, 2006).

In Ethiopia, trypanosomosis is one of the most important disease limiting livestock productivity and agricultural development due to its high prevalence in the most arable and fertile land of South-west and North-west part of the country following the greater river basins of Abay, Omo, Ghibe and Baro with a high potential for agri-cultural development. Currently, about 220,000 km^2 area is infested with tsetse flies namely *Glossina pallidipes, Glossina morsitans, Glossina fuscipes, Glossina tachinoides* and *Glossina longipennis* (MOA, 1995). The most important trypanosome species affecting livestock in Ethiopia are *Trypanosoma congolense, Trypanosoma vivax* and *Trypanosoma brucei,* in cattle sheep and goat, *Trypanosoma evansi* in camel and *Trypanosoma equiperdum* in horse (Abebe, 2005). In the Amhara region of north-west Ethiopia, trypanosomosis is

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considered an important disease of cattle (Cherenet et al., 2004; Shimelis et al., 2005; Sinshaw, 2004) but systemic studies have not yet been carried out on the epidemiology, prevalence and economic significance of bovine trypanosomosis in this site. Therefore the objectives of the study were to assess the prevalence of bovine trypanosomosis, to identify and determine the dominant trypanosome species in the study sites and to compute different parameters such as PCV in relation with trypanosomosis.

MATERIALS AND METHODS

Study area

The study was conducted in Jabi Tehenane district of west Gojjam administrative zone of Amhara regional state. The district covers an area of 112,772.1 ha and bordered by Quarit and Dega Damot in East, Burie in West, Sekela in North, and Dembecha and Abay River in the South. The annual mean temperature for most part of the district is 14 - 32°C and the elevation varies from 1500 - 2300 m above sea level (m.a.s.l) with mean annual rain fall of 1250 mm. The livestock populations that are found in Jabi Tehenan district include cattle, sheep, goat, horses, mule, donkey and poultry. Among these animals, cattle are the dominant species raised in the area. The cattle population in the district is estimated to be about 187,481(CSA, 2009).

Study design

Cross sectional survey was conducted to determine the prevalence of bovine trypanosomosis.

Sample size and sampling method

Simple random sampling technique was followed, to select the study animal and the desired sample size was calculated according to the formula given by Thrusfield (2005).

Study method and procedure

Buffy coat technique

Blood was collected from an ear vein using heparinized micro–haematocrit capillary tube and the tube was sealed. A heparinized capillary tube containing blood was centrifuged for 5 min at 12,000 rpm. After the centrifugation, trypanosomes were usually found in or just above the buffy coat layer.

The capillary tube was cut using a diamond tipped pen 1 mm below the buffy coat to include the upper most layers of the red blood cells and 3 mm above to include the plasma. The content of the capillary tube was expressed on to slide, homogenized on to a clean glass slide and covered with cover slip. The slide was examined under ×40 objective and ×10 eye piece for the movement of parasite (Paris et al., 1982).

Thin blood smear

A small drop of blood from a microhaematocrit capillary tube to the slide was applied to a clean slide and spread by using another clean slide at an angle of 45°, air dried and fixed for 2 min in methyl alcohol, then immersed in *Giemasa* stain (1:10 solution) for 50 min. Drain and wash of excess stain using distilled water, allowed to dry by standing up right on the rock and examined under the microscope with oil immersion objective lens.

Measuring of packed cell volume (PCV)

Blood samples were obtained by puncturing the marginal ear vein with a lancet and collected directly into a capillary tube. The capillary tubes were placed in micro haematocrit centrifuge with sealed end outer most. The tube was loaded symmetrically to ensure good balance.

After screwing the rotary cover and closing the centrifuge lid, the specimens were allowed to centrifuge at 12,000 rpm for 5 min. Tubes were then placed in haematocrit and the readings were expressed as a percentage of packed red cells to the total volume of whole blood. Animals with PCV < 24% were considered to be anemic.

Body condition scoring

The body condition was done according to Nicholson and Butterworth (1986) from 1 to 9 scales.

Data analysis

Row data on individual animals and parasitological examination results were inserted into MS excel spread sheets to create a data-base and transferred to SPSS version 16.0 software program for data analysis. Chi-square was used to compare the prevalence of trypanosome infection in different variables, districts, peasant associations, age and sex, while student-t test was utilized to compare the mean PCV of the infected animals with that of non-infected animals.

RESULTS

Prevalence

Out of the total 300 cattle examined, 35 (11.7%) were found positive to trypanosomosis. The prevalence varied between different study areas; 9% in around Finote Selam to 16% in Regeb Kebero Meda peasant asso-ciation (Table 1). However, the difference is statistically insignificant ($p > 0.05$). The most prevalent trypanosome species in the study area was *T. congolense* (54.3%) followed by *T. vivax* (45.7%) (Table 1).

Hematological findings

Out of the observed animals, 35 of them had mean PCV value of 20.31% and the overall mean PCV value of the study also resulted in 24.71%. Statistically significant difference ($p < 0.05$) in mean PCV was observed between infected and non infected animals (Table 2).

Table 1. Prevalence of cattle *Trypanosoma* species of in the selected areas of Jabitehnan woreda.

Area	Total examined	*T. vivax* (%)	*T. congolense* (%)	Prevalence (%)
Around Finote Selam	100	7(77.8)	2 (22.2)	9
Weyenma Workema	100	4 (40)	6 (60)	10
Regeb Kebero Meda	100	5(31.25)	11 (68.75)	16
Total	300	16 (45.7)	19 (54.3)	11.7

$\chi^2 = 2.782$; $p = 0.249$.

Table 2. Mean packed cell volume and standard deviation of infected and non-infected cattle in selected areas of Jabitehnan woreda.

Condition	Number	Mean PCV (%) ± std. deviation	t- test	p-value
Infected	35	20.31±4.10	6.0116	0.001
Non-infected	265	25.29±4.67		
Total	300	24.71±4.87		

Table 3. Prevalence of trypanosomes with body condition score, age and sex.

Variables	Number	Infected (prevalence)	χ^2	p-value
Body condition				
Good	155	9 (5.8)	10.687	0.001
Poor	145	26 (17.9)		
Age				
1 - 2 year	36	3 (8.3)		
3 - 5 year	110	14 (12.6)	0.486	0.784
>5 year	154	18 (11.8)		
Sex				
Male	153	17 (11.1)	0.094	0.760
Female	147	18 (12.2)		

Prevalence of trypanosomes based on body condition score, age and sex

Cattle infected with trypanosome have lower body condition score than the non infected animal (Table 3). This difference is statistically significant ($p < 0.05$). A higher infection rate was observed in adult animals and animals above two years of age in the study area but the variation was not statistically significant ($p > 0.05$). The prevalence of trypanosome infection was higher in female than male animals; however there was no statistically significant differences observed between two sexes ($p > 0.05$) (Table 3).

DISCUSSION

The study revealed that the prevalence of bovine trypanosomosis in the area was 11.7% (35/300) which was in agreement with the previous findings by Shimelis et al. (2005) but lower than the previous work reported by Solomon (1997). The discrepancy between reports might be due to the presence of large study time gap, application of relatively well designed methods of tsetse control and treatment, expansion of cultivation in the area which indirectly affects flies distribution, expansion of veterinary clinic, and awareness of people towards the control and treatment of the disease were improved.

The higher proportion of *T. congolense* infection in the study area is in agreement with trypanosome species prevalence data from other tsetse infested region of Ethiopia where *T. congolense* is the most prevalent species in cattle (Abebe and Jobre, 1996). *T. vivax* was the dominant species in around Finite Selam peasant association. This is due to the location of the study site which was located on the edge of a fly belt. Jordan (1986) and ILRAD (1990) have reported that as the

distance from recognized edge of tsetse belt areas increase, the species of trypanosome most encountered and diagnosed is *T. vivax* because *T. vivax* has the ability to adopt and establish itself in the absence of tsetse flies and is transmitted by other biting flies.

The mean PCV value of studied animals was significantly ($P < 0.05$), varying between parasitaemic (20.31%) and aparasitaemic (25.29%) animals. This result was in agreement with the previous result reported by Sinshaw (2004). The mean PCV of trypanosome-positive cattle was 21.6% and statistically significant differences ($p < 0.05$) between affected and non affected animals were observed. Anemia is one of the most indicators of trypanosomosis in cattle (Stephen, 1986). The level of anemia or PCV usually gives a reliable indication of the disease states and reduces performance of infected animals (Trail et al., 1993).

Infection rate in poor body condition animals were significantly ($p < 0.05$) higher than good body condition animals and was in agreement with Mussa (2002). Although higher infection rate was observed in adult animals and animals above two years of age, in the present study no statistically significant difference was observed in both age and sex ($p > 0.05$).

This result is in agreement with the previous research result reported by Sinshaw (2004). This could be due to the fact that adult animals travel long distance for grazing and draft as well as harvesting of crops to tsetse challenged areas. Rowlands et al. (1999) in Ghibe valley indicated that suckling calves do not go out with their dams but graze at homesteads until they are weaned off. Young animals are also naturally protected to some extent by maternal antibodies (Fimmen et al., 1999). This could result in low prevalence of trypanosome that was observed in calves.

Conclusions

From this study it is possible to conclude that trypanosomosis is an important disease and a potential threat affecting the health and productivity of cattle in fertile areas of Jabi Tehenane district of west Gojjam administrative zone. The major species of trypanosomes in the study area were *T. congolense* followed by *T. vivax*.

The prevalence of the disease varies from site to site. Infection with trypanosomosis negatively affects PCV and body condition. This indicated that trypanosome infection of cattle in the study areas causes loss of body weight and production. Further study on the occurrence of tsetse and trypanosomosis at different season of the year, at different altitude and different species of animals should be conducted. Trypanosmosis control measures which are practical to Ethiopia such as tsetse control methods should be applied unless it will be devastating for the cattle in the study area.

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