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Mechanically Transmitted Bovine Trypanosomosis in Tselemty Woreda, Western Tigray, Northern Ethiopia

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Abstract: The study was conducted in five villages of Tstelemty woreda, Western Tigray. The data was gathered to observe the prevalence of mechanically transmitted trypanosomosis in cattle. Blood samples were collected from 300 heads of randomly selected cattle of both sexes and different age groups. The body condition of the study animals was also recorded. Samples collected for PCV evaluation were used to prepare blood films for the morphological identification of the parasite. An overall prevalence of trypanosome infection in the study area was 2.66% and all of these infections were due to *Trypanosoma vivax*. This study revealed that there was no statistically significant difference ($p>0.05$) in the prevalence between male (1.02%) and female (3.46%) and between adult (3.18%) and young (1.25%) animals. The prevalence of trypanosome infection in medium body condition was 1.88% and that of poor conditioned animals was 4.54%. The difference was not statistically significant ($p>0.05$). Mean PCV value of parasitemic animals was 21.8% and this value was significantly lower than ($p<0.05$) that of aparasitemic animals with mean PCV of 29.4%. The study area is known as free of tsetse fly infection. Although, the present study indicated low prevalence of bovine trypanosomosis (2.66%) in the study area, the potential impact of *Trypanosoma vivax* infection on production and productivity of cattle shall not be undermined. Studies should also be conducted on the biting flies that are responsible to transmit the infection among the cattle population. Therefore, attention should be given to control the disease.

Key words: Bovine trypanosomosis, tselemty woreda, tigray, prevalence, *T. vivax*

INTRODUCTION

Trypanosomosis is a parasitic disease caused by species of flagellated protozoa belonging to the genus trypanosoma which in habit the blood plasma, various body tissuesand fluids of vertebirate host (Radostitis *et al*., 2000). The disease is transmitted cyclically by tsetse flies (*Glossina* species) and non-cyclically by other biting flies. *Trypanosoma equiperdum* is the only exception which is venereally transmitted among equine populations (Abebe, 2005).

The most important trypanosome species affecting livestock in Ethiopia are *T. cogolense*, *T. vivax* and *T. brucei* in cattle, sheep and goats. Camels are affected by *T. evansi* which is common species in camel rearing areas of the country while equines, mainly horses are affected by *T. equiperdum* in some highland parts of the country (Abebe, 2005). *T. congolense* and *T. vivax* are most prevalent trypanosomes that infect cattle in the tsetse infested and tsetse free areas of Ethiopia, respectively (Abebe, 2005). Although, tsetse is the vector responsible for the cyclical transmission of trypanosomes, the biting flies can transmit the parasite mechanically (Cherenet *et al*., 2006).

In most high land parts of Ethiopia Trypanosomosis is not generally regarded as an important disease. However upon routine blood examination, close to 10% of the herd was found to harbor *T. vivax* infection. The ability of the parasite to adapt to ways of mechanical transmission has enables *T. vivax* to establish itself in the vast high land plateaus of Ethiopia (Abebe, 2005). According to Sinshaw *et al*. (2006) apart from cyclical transmission, it is highly considered that mechanical transmission is a potential threat to livestock productivity in some parts of Ethiopia.

T. vivax constituted the majority of infections in the tsetse free zone (Cherenet *et al*., 2006). Control strategies in trypanosomosis concentrate on vector control, parasite

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(causal agent) control using with chemotherapy and chemoprophylaxis and use of trypanotorelant animals (Uilenberg, 1998).

Information on prevalence and distribution of species of trypanosomes in an area is very helpful to design suitable control methods and help in planning for development programs. Therefore, this study was designed to determine the prevalence of bovine trypanosomosis in the study area.

MATERIALS AND METHODS

Study area: The study was carried out in Tselemty woreda in the North West part of Tigray regional state, Northern Ethiopia. Mekelle is the regional capital which is some 783 km far from Addis Ababa. Tselemty is located at 38°25 East and 13°48 North at an altitude of 1400 m above sea level.

The annul rain fall and temperature range of the woreda is 800-1200 mm and 28-38°C, respectively. The total livestock population of the woreda is estimated to constitute 163,925 cattle, 1,999 sheep, 181,027 goat, 4,478 equines and 193,808 poultry.

For the purpose of this study, five villages namely; Hidembesa, May baria, Tsegab abay, Enkoyliham and Tsaeda kerni were selected. Farming system in the area is mixed type in which both crop production and animal husbandry are practiced. The villages have similar climatic features (Fig. 1).

Study animals: This study was carried out on 300 heads of naturally grazing local cattle in five villages. The number of animals sampled from each sites was based on the animal population of the study areas. Information on the sex, age, body condition of cattle and PCV from selected animals was recorded.

Study design: The study was cross sectional multistage sampling with convenient selection of the woreda and villages. The study animals were sampled at random where the blood samples were collected to determine the prevalence of trypanosome infection.

Parasitological technique: Blood was taken from the ear vein of each study animals subsequent to bleeding with piercing lancet.

The haematocrit capillary tube was filled 3/4th of its length and sealed using crystal seal at one end. Then, the capillary tube was put symmetrically with the sealed part out side and centrifuged at 1200 rpm for 5 min using microhaematocrit reader (Murray *et al*., 1983). The PCV range of 26-42 was recorded as normal

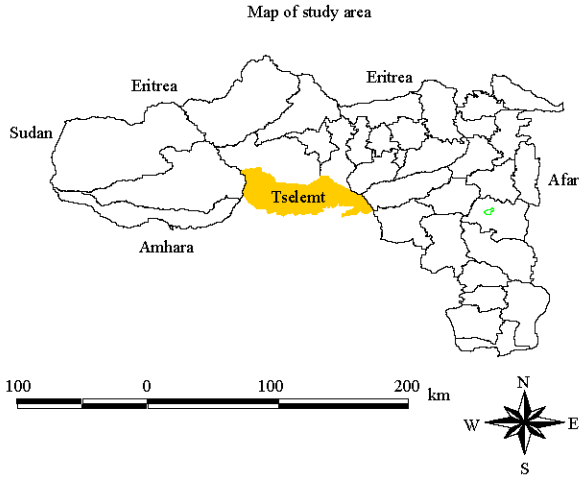

Fig. 1: Map of Tselemty woreda

(Coles, 1986). Subsequent to measuring the PCV, the capillary tube was broken 1mm below and 1 cm above the buffy coat layer and the content was expressed on the slide and then covered with 22×22 mm cover slip. The samples were then examined for trypanosomes based on the type of movement in the microscopic field. Confirmation of trypanosome species by morphological characteristics was done after staining the blood smear with Giemsa. The examination of all samples was made with oil immersion microscope (Murray *et al*., 1983).

Age: The prevalence of trypanosomosis on age basis was determined by grouping all the study animals as young and adult. Young and adult represents those animals in the group between 1 and 3 years old and >3 years old, respectively.

Body condition: Body condition was recorded as per the recommendations of Nicholson and Butterworth (1986).

Sample size and sampling methods: The sampling method employed was simple random sampling. The total number of animals required for the study was calculated based on the equation given by Thrusfield (1995). Since, there was no information in the study area 20% expected prevalence was taken to calculate the sample size:

$$n = \frac{1.96^2 \ (Pexp \ (1\text{-}Pexp))}{d^2}$$

Where:

n = Required sample size
1.96 = The value of Z at 95% confidence interval
Pexp = Expected prevalence of trypanosomosis (20%)
D = Desired absolute precision level at 95% confidence interval

Data analysis: Data on individual animal parasitological examination results were inserted into Excel spread sheets program to create a data base and transferred to STATA software program of the computer before analysis. The prevalence of trypanosome infection was calculated as the number of parasitologically positive animals as examined by the buffy coat method (Murray *et al*., 1983) divided by the total number of animals investigated at that particular time and this was multiplied by 100. Univariance analysis was conducted to compare the differences between the factors recorded. Two sample t-test was utilized for the comparison of the mean PCV values of the parasitemic and aparasitemic animals. Differences between categories of the recorded variables were tested for significance at 95% confidence interval and probability levels of 0.05 or less ($p<0.05$).

RESULTS AND DISCUSSION

Parasitological findings: Trypanosomal infections were detected in 8 animals out of a total of 300 heads of cattle sampled. *T. vivax* was the only trypanosome species found in the study area with an overall prevalence of 2.66%.

Site: A total of 300 heads of cattle were sampled in five study sites (Tsaeda kerni, Enkoyliham Hidembesa, Tsega abay and May barya). The prevalence of *T. vivax* at Tsaeda kerni and Enkoyliham was 4.16 and 8.33%, respectively (Table 1). No positive cases were detected from the other sites (Hidembesa, Tsega abay and May barya). The difference between the two sites which were found positive were not significant ($p>0.05$).

About 7 (3.46%) from a total of 202 female animals and 1 (1.02%) from 98 males were positive for bovine trypanosomosis. The statistical analysis showed that there was no significant difference ($p>0.05$) between the two sexes. Similarly, no statistically significant difference ($p>0.05$) was observed between the age groups for trypanosome infection (Table 2). The majority of sampled animals were medium and poor in body condition. Of the 300 animals sampled, 1.88 and 4.54% prevalence of bovine trypanosomosis was recorded in medium and poor group of animals, respectively. But there was no positive sample in those animals having good body condition and it was analyzed by omitting this group. The statistical analysis result showed that no significant difference between medium and poor body conditions (Table 2).

Haematological findings: The recorded PCV of animals analyzed to compare the PCV values of parasitemic and aparasitemic animals indicated that parasitemic cattle had shown lower mean PCV values compared to aparasitemic animals and the difference was statistically significant ($p<0.5$) (Table 3).

Table 1: The prevalence of bovine trypanosomosis on site basis (p value = 0.526)

Sites	No. of examined	Positive	Prevalence (%)	95% CI
Enko liham	60	5	8.33	[3.11, 15.11]
Tsaeda kerni	72	3	4.16	[1.08, 12.49]
Hidembesa	60	0	-	-
May barya	60	0	-	-
Tsegab abay	48	0	-	-
Total	300	8	2.66	[1.24, 5.38]

Table 2: Prevalence of bovine trypanosomosis on different factors considered

	No.			
Factors	Examined	Positive	Prevalence (%)	95% CI
Sex				
Female	202	7	3.46	[1.52, 7.290]
Male	98	1	1.02	[0.05, 6.360]
Age				
Young	80	1	1.25	[0.07, 7.290]
Adult	220	7	3.18	[0.05, 6.360]
Body condition				
Good	62	0	-	
Medium	106	2	1.88	[0.32, 7.310]
Poor	132	6	4.54	[1.86, 10.05]
Total	300	8	2.66	[1.24, 5.380]

Table 3: Mean PCV of parasitemic and aparasitemic animals

State of animals	No. examined	Mean PCV	SD	SE
Non-infected	292	29.41	3.81	0.22
Infected	8	21.87	2.47	0.87

T. vivax was the only trypanosome species found during the study period. This is in accordance with the results obtained from a survey condacted in Amhara region by Cherenet *et al*. (2006) who reported that *T. vivax* constituted the majority of infections in the tsetse free zone. The prevalence of bovine trypanosomosis was low (2.66%) during the study period. Although, the actual prevalence was low in the study area, attempt was made to maximize the sample size to increase the precision of the data. The decrease in prevalence in the early dry season would be complimented by the fact that owners take their animals for trypanocidal drug treatment and as the infected animal decreases, the source of infection decreases. Even though, data was not collected during the rainy season, Sinshaw *et al.* (2006) revealed that there is significantly high infection rate following the months with high rain fall due to the emergency of biting flies at high rate. This implies that the low prevalence of trypanosomosis in this study may be related with the decrease in fly population during the dry season.

The statistical analysis result revealed that there was no significant difference ($p>0.05$) in prevalence of bovine trypanosomosis between the two sexes. This finding is similar to the report of Dagnachew *et al*. (2005) in Abay basin areas of northwest Ethiopia. The difference in

trypanosome prevalence between the age groups was also not significant ($p>0.05$). This might be due to the fact that those sampled animals may have similar opportunity in getting contact with fly on grazing areas. Seyoum reported similar findings in three woredas of North shewa zone. There was no significant difference ($p>0.05$) recorded between the study sites. The areas are close to each other with similar climatic conditions. The prevalence of trypanosomosis and its vectors vary with climatic factors mainly rain fall, humidity, temperature, ecology and vegetation coverage of different areas. The prevalence of trypanosome infection on body condition basis was compared between animals with medium and poor body condition and the difference was not significant ($p>0.05$).

Anemia is one of the most important clinical signs of trypanosomosis (Radostitis *et al*., 2000). The mean PCV of parasitemic animals (21.87%) was found to be significantly lower than that of aparasitemic animals (29.41%). The lower mean PCV of parasitemic animals was reported by several researchers (Cherenet *et al*., 2006; Dagnachew *et al*., 2005; Dinka and Abebe, 2005; Sinshaw *et al*., 2006; Van den Bosseche *et al*., 2000).

CONCLUSION

An overall prevalence of trypanosome infection in the study area was generally low (2.66%) and all of these infections were due to *Trypanosoma vivax*. There was no statistically significant differences ($p>0.05$) in the infection prevalence of the disease between sex, age and body condition groups as well as villages. The mean PCV of parasitemic animals due to *T. vivax* infection was significantly lower than aparasitemic animals.

RECOMMENDATIONS

The study area is known as free of tsetse fly infection. However, studies should be conducted on the biting flies responsible to transmit the infection among the cattle population. Detailed research should be conducted covering wide area to study the prevalence of trypanosomosis and the seasonal pattern of the disease. Although, the present study indicated low prevalence of bovine trypanosomosis (2.66%) in the study area, the potential impact of *Trypanosoma vivax* infection on production and productivity of cattle shall not be undermined. Therefore, attention should be given to control the disease.

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