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Bovine Trypanosomosis in Guba District, Metekel Zone, Northwestern Ethiopia

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Abstract: A cross sectional study was conducted in Guba district, Benishangul Gumuz region, northwest west Ethiopia. The study was carried out on 301 indigenous zebu breeds from February to March 2016 to determine the prevalence of bovine trypanosomosis. The study employs parasitological survey by the use of buffy coat examination and hematological study. The overall prevalence of bovine trypanosomosis in the present study was 5.47%. The predominant species recovered as *Trypanosoma congolense* (62.16%) followed *T. vivax* (24.32%). Mixed infections of *T. congolense* and *T. vivax* (13.52%) were also recorded. The difference in the prevalence of trypanosome infection was recorded in the different sex and body conditioned animals, but the difference was not statically significant ($p>0.05$). The mean PCV of parasitemic animals was significantly lower (23.58) than the aparasitemic animals (25.38). The high prevalence of trypanosomosis indicated the potential impact of this disease on production and productivity of cattle should be taken in to consideration. Therefore, appropriate trypanosomosis and its vectors control strategy should be implemented.

Key words: Guba · Ethiopia · Prevalence · Trypanosomosis

INTRODUCTION

Trypanosomosis is a disease cussed by unicellular parasites found in blood and other tissue of vertebrates. It is a serious disease in domestic live stock causing a significant negative impact on food production and economic growth in many parts of the world, particularly in sub-Saharan Africa [1]. Its epidemiology and impact on live stock production are largely determined by the prevalence and distribution of the disease and its vectors in the affected area. This disease is transmitted mainly by tsetse flies and mechanically by biting flies. The most important species that infected cattle include *Trypanosome congolense*, *T. vivax* and *T. brucei.* Mechanically transmission is particularly important in relation to *T. vivax* and *T. evansi* particularly on the fringe of tsetse areas. It can occur in the presence of biting files of genus *Tabanus, Haematopa, chrysops* and *Stomoxys* [2].

Between the longitude 33°and 38°E and latitude 5° and 12°N tsetse fly infested areas lies in the low land of and also in the river valley of Abay, Baro, Akobo, Ghibe, Didessa and Omo. Currently about 220,000 km^2 area is infested by tsetse flies normally *Glossina fuscipes, Glossina tachnoides, Glossina pallidipes, Glossina marsitans submorsitans, Glossina longipennis*. About 15-20 percent of the low land believed to be suitable for livestock production by one or two species of the tsetse flies [3].

Bovine trypanosomosis is a serious constraint to agricultural production in extensive tsetse infested areas of Ethiopia. It is prevalent in two main regions of Ethiopia i.e. the North West and the southwest regions. In Ethiopia, trypanosomosis is one the most important disease limiting live stock productivity and agricultural development due to its high prevalence in the most arable and fertile land of south west part of the country following the grater basins of Abay, Omo, Ghibe, Didesa and Baro with a high potential for agriculture [4].

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MATERILALS AND METHODS

Study Area: Guba district is located in Benishangul Gumuz regional state, Northwestern Ethiopia. The altitude varies from 1000-1665 meter above sea level. The mean annual temperature ranges from 13-28°C and annual rain fall is about 900-1000 mm. The cattle in the district are local breeds that are kept under traditional extensive husbandry systems with communal herding.

Sample Size Determination and Sampling Method: The simple random sampling technique was applied to collect from the ear vein. The sample size can be determined based on the study type and sampling method for investigation, 95% confidence interval, 5% desired absolute precision and 50% expected prevalence and 301 cattle were sampled by following Thrusfield formula [5].

Study Methods: A small blood was collected from an ear vein using heparinized microhaematocrit capillary tube. A haematocrit tube with a whole blood sample and end was sealed with haematocrit clay. The tube was centrifuged at 12000 revolutions per minute for five minutes. After centrifugation trypanosome were usually found in or just above the buffy coat layer. The capillary tube was cut using a diamond tipped pen 1mm bellow the Buffy coat to include the upper most layers of the red blood cells and 1mm above to include the plasma. The content of capillary tube was expressed on to side, homogenized on to clean side and covered with cover slip. The slide was under x40 objective x10eye piece for the movement of the parasites [6].

Tubes were then placed in a haematocrit and readings were expressed as a percentage of packed cells to the total volume of whole blood. Animals with PCV<24% were considered to be anemic.

Data Analysis: The prevalence was calculated as the number of infected individuals divided by the number of total examined and multiplied by 100. Statistical analyses were conducted using STATA version 12.0 software. Descriptive statistics were used to summarize data. The association between the prevalence of trypanosome infection and risk factors were assessed by logistic regression, whereas the student's t-test was used to assess the difference in mean PCV between trypanosome positive and negative animals. The test result was considered significant when the calculated p-value was less than 0.05.

RESULTS

Out of the total 301 cattle examined 37(12.29%) cattle were positive for trypanosomosis. The prevalence of trypanosomosis was statistically significant (P>0.05) between different study sites (P<0.001) and body condition scores (P<0.001). From the total infected animals (61.9%), 5 (23.8%), 2 (9.5%) and 1 (4.76%) were infected with *T. congolense*, *T. vivax* and with mixed infection of *T. congolense* and *T. vivax,* respectively.

The mean PCV of the animals infected with trypanosomes was significantly lower (p<0.032) than the average PCV of the animals that were parasitologically negative was ones (Table 2).

Table 1: Prevalence of bovine trypanosomosis in different body conditioned cattle and localities of Guba district

Risk Factors	No. of examined	No. of positive (%)	P-value	x^2
Body Condition				
Poor	68	22(32.35.00%)	<0.001	33.23
Medium	222	15(6.76%)		
Good	11	0(0.00%)		
Peasant Associations				
Jadiya	88	0(0.00%)	<0.001	115.88
Babizenda	72	35(48.61%)		
Mankush	147	2(1.36%)		
Total	82	14(17.07%)		

Table 2. Mean packed cell volume and standard deviation of infected and non-infected animal cattle in Guba district

Condition	Number of examined	Mean PCV	95% CI	P-value
Parasitemic	37(12.29%)	23.57	22.44-24.69	<0.001
Aparasitemic	264(87.71%)	25.38	24.85-25.92	
Total	301	25.16	24.67-25.65	

DISCUSSION

The result of the present study revealed an overall trypanosomosis of 12.29%. Similar prevalence of trypanosomosis was reported by Kedir *et al.* [7] in western Ethiopia (13.14%) and Bitew *et al.* [8] from northwestern Ethiopia (11.7%). The study revealed the majority of the infection was due to *T. congolense* (62.16%) followed by *T. vivax* (24.32%). Mixed infection of *T. congolense* and *T. vivax* was also prevalent (13.52%). The higher proportion of *T. congolense* infection in the study was in agreement with trypanosome species prevalence data from other tsetse-infested regions of Ethiopia, where the *T. congolense* is the most prevalent species in cattle [9, 10]. The percentage species distribution in our finding was similar to Kebede, Fetene and Animut [11] finding in Abay Basin (*T. congolense* (66.1%) followed by *T. vivax* (20.8%). The predominant species of *T. congolense* compared to *T. vivax* and the development of better immune response to T. vivax infected animals [12]. Significantly high infection rate was observed in poor body conditioned animals as compared to good and medium ($p<0.05$). Similar results were reported from southern Ethiopia [13].

PCV is the most reliable indicator of anemia in trypanosomosis. In our study trypanosome infection results in a significant decline in PCV, this is in agreement with previous finding that are reported by different authors at different time [14].The mean PCV values of studied animals was significantly ($p<0.05$) varying between parasitemic (21.857±4.857%) and a parasitaemic (24.316±4.93%). The appearance of parasitologically negative animals with PCV values of less than the threshold values (25%) may be due to the inadequacy of detection method used or delayed recovery of anemic situation after current treatment with trypanocidal drugs; and the occurrence of positive animals with PCV of greater than 25% might it be thought of recent infection. Trypanosome infection and mean values obtained in this study in the parasitaemic animals was found to be highly associated. Similar results were also reported by different authors in southern, north western and south western Ethiopia [15, 16]. It was generally accepted that the mean PCV is affected by many factors including helmenthiasis, tick born disease and nutritional imbalances [17].

CONCLUSION

The overall prevalence of bovine trypanosome infection is study area was 12.29%, warranting appropriate intervention methods. Trypanosomosis resulted in lowering herd PCV and significantly affected the body condition of cattle.

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