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Prevalence of Bovine Trypanosomosis in Assosa District of Benishangul Gumuz Regional State, Ethiopia

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Abstract: A cross sectional study was conducted from November 2013 up to April 2014 to determine the prevalence of bovine trypanosomosis in Assosa district of Benishangul Gumuz Regional State, Ethiopia. A total of 310 cattle were randomly selected and parasitological and hematological examinations were carried out using Buffy Coat Technique. The packed cell volume (PCV) value of each animal was also measured using haematocrit reader. The overall prevalence of trypanosomosis in the study area was 80(25.8%). Out of positively detected cattle 47(58.75%) were positive for *Trypanosoma congolese*, 16(20%) for *Trypanosoma vivax,* 8(10%) for *Trypanosoma brucei* and 9 (11.25%) for mixed infection. The mean packed cell volume (PCV) value recorded was 17.72±3.356 in *Trypanosoma* positive animals and 27.22±2.748 for animals confirmed *Trypanosoma* negative animals which were statistically significant ($P<0.05$). The study also demonstrated variations in prevalence among different age groups and different body condition scores which were statistically significant ($P<0.05$), however in sex statistically non-significant difference observed ($P>0.05$). The presents study revealed a moderate prevalence in the study area and a vigorous disease mitigation strategy is warranted owing to the economic importance of the disease.

Key words: Packed Cell Volume · *Trypanosoma brucei* · *Trypanosoma congolese* · *Trypanosoma vivax*

INTRODUCTION

The livelihood of more than 85% of the people of Ethiopia depends on the agricultural sector. This sector mainly possesses crop production, livestock production and mixed farming. Since the people are dependent on this sector, the presence of livestock is one of the necessities to this sector. This fact has made Ethiopia to be one of the richest countries in livestock population in Africa [1].

Even though the country is the first in domestic animal population in Africa, the productivity of these animals is low due to a number of factors among which are qualitative and quantitative deficiencies of feed resource base, poor animal performance level, insufficient knowledge on the dynamics of farming systems existing in the country and above all, the presence of different animal diseases [2].

Trypanosomosis is one of debilitating and killing heamo-protozoal diseases of domestic animals and humans, caused by infection with parasitic protozoa of genus trypanosome. It is a major constraint on ruminant livestock production in Africa, Asia and South America. The principal host species affected varies geographically, but buffalo, cattle, camels and horses are particularly sensitive [2, 3].

It is a serious disease in domestic livestock that causes a significant negative impact in food production and economic growth in many parts of the world, exclusively in sub-Saharan Africa extending on both sides of equator from 15°N to 29°S latitude. African Animal trypanosomosis and its vector occur in vast areas of it with devastating impact of livestock productivity [4].

The most important *Trypanosoma* species affecting cattle in Ethiopia are *Trypanosoma congolense*, *Trypanosoma vivax* and *Trypanosoma brucei* in cattle, sheep and goats. Camels are affected by *Trypansosoma evansi* which is common species in camel rearing areas of the country while equines mainly horses are affected by *Tryranosoma equiperdum* in some highland parts of the country [5].

Trypanosomosis is transmitted cyclically by tsetse flies, mechanically by other biting flies and also other means like veneral, iatrogenic and also by coitus. The three main groups of tsetse flies for transmission of

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trypanosomosis are *Glossina morsitans*, which favors the open land of the savanna and *Glossina palpalis*, which prefers the shaded habitats immediately adjacent to rivers and lakes and *Glossina fusca*, which favors the high dense forest areas [6].

This study was designed to investigate prevalence of trypanosomosis in cattle in Assosa district of Benishangul Gumuz region and to identify and determine the dominant trypanosome species and risk factors which influence the prevalence of the disease.

MATERIALS AND METHODS

Description of the Study Area: Assosa district is found in BenishanguleGumuz Regional State, that stretches over 2313 km^2 in a major tsetse and tsetse born Trypanosomosis belt area, characterized by low land plane with altitude range of 580-2731 m.a.s.l. and average temperature of 17 °C-30°C. The average annual rain fall is 900-1350 mm. The major Agricultural activity in the area is mixed farming system whereby crops are cultivated and different species of livestock are kept. The total livestock population of the district is estimated as 20,000 cattle, 7,000 goats, 1,289 sheep, 528 equines and 53,000 poultry according to 2012 district survey. The major livestock diseases of the region are Trypanosomosis, Pasteurellosis, Internal and External parasites.

Study Design and Study Animals: A Cross sectional study was implemented for each of six selected villages. The study animals were categorized in different body condition scores (Good, medium & poor) according to Nicholson and Butterworth [7] age groups categorized (<2= calves, 2-7= young, >7yers=adult) according to Maafrmd [8] and other factor including sex were used to classify the studied animals. Cattles are kept under extensive traditional management system.

Sample Size and Sampling Methods: The sample size were determined by using 95% level of confidence interval and expected prevalence of 28.1% with desired absolute precision of 5% & simple random sampling method were used [9]. A total of 310 blood samples were collected from selected 6 villages of the district based on simple random selection.

Collection of Blood Sample: Blood samples were collected from ear vein using a sterile lancet into a pair of heparin zed capillary tubes (75x1.2mm) from each of the randomly selected animals. Each tube was sealed with crystal seal on one end [10].

The blood samples were centrifuged at high speed (12,000 rpm) for 5 min. Finally the packed cell volume (PCV) values were read by micro haematocrit reader, which can be adjusted individually for the length of the blood column in each tube, to get a value indication on the presence, absence and degree of anemia [11].

After centrifugation, the capillary tube were cut down using diamond pointed pen 1mm below the buffy coat to include the upper most layers of the red blood cells and 3mm above to include the plasma so that the contents will be gently expressed on to a slide, mixed and covered with a cover slip (22 x 22mm). The preparation were then be examined fewer than 10X eye piece in combination with a

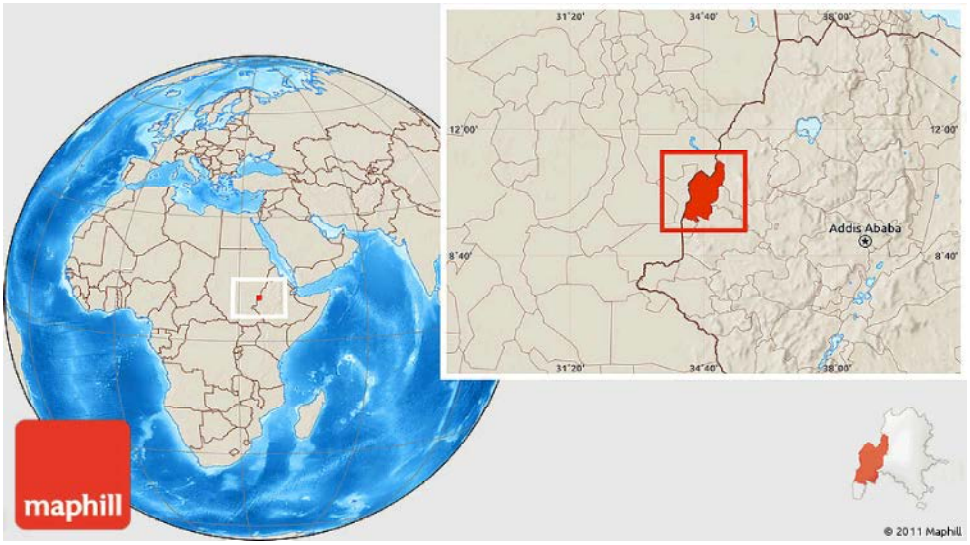

Fig. 1: Map of Benishangul Gumuz region

40X objective microscopes to get optimum view allowing large visual field and sufficient magnification for easy identification of trypanosomes and for their morphological features after Giemsa staining under 100X objective will be used [11, 12].

Data Management and Analysis: During the study period, address, breed, sex, age and body condition score of the animal were recorded using the animal blood sample collection format & enter into Microsoft Excel spread sheet. Hematological & parasitological data were handled very carefully. The entered data were transferred to SPSS version 16 Software, Chi square test were used to compare the prevalence of trypanosomosis in different variables & to determine the relationship between the categorical variables & the result. The prevalence of bovine trypanosome infection was calculated as the number of parasitological positive animal was examined by buffy coat method to the total population at risk [9].

RESULTS

Parasitological Findings: A total of 310 cattle were examined for Trypanosomosis. Out of total Animals examined, 80 (25.8%) animals were infected with trypanosomes.

The Trypanosome species identified in blood smear of cattle were *T. congolense, T. vivax* and *T. brucei*. The highest and the lowest prevalence were recorded in Assosa 19 (31.7%), Amba 8 village 14 (28.3%) Amba 5 village 13 (26.2%), Magalle village 13 (26.2%), Amba14village 11 (22.4%) Amba11village 10 (20%), respectively (Table 1).

From a total of 80 (25.8%) animals infected with Trypanosomosis, 47 (58.75%) were infected with *Trypanosoma congolense,* 16 *(*20%*)* with *Trypanosoma vivax,* 8 *(*10%*) with Trypanosoma brucei* and 9 (11.25%) with mixed infection. In this particular study, it was found out that infection by *T. congolense* species was the most prevalent one as compared to other *trypanosome* species.

The Prevalence of Trypanosomosis is varying in both sexes; the *Trypanosoma* infection in male is slightly higher than in the female. The results obtained during examination were 43 (26.9%) and 37 (24.7%) in male and female, respectively and it was statistically insignificant (P>0.05) (Table 2).

Out of sampled animals, 22 were <2 years old, 160 were 2-7 years old and 128 were > 7 years old. From < 2 years old 2 (9.1%) animals were positive, from 2-7 years old 8(5%) animals were positive and from >7 years old 70 (54.7%) animals were positive for the trypanosomosis. The prevalence of bovine trypanosomosis was

Table 1: Trypanosomosis prevalence in relation to origin (study sites)

PA's(Sites)	No of animalsExamined	TC positive animals	TV positive animals	TB positive animals	Mixed infection	Prevalence (%)
Assosa	60	12(20%)	3(5%)	2(3.33%)	2(3.33%)	19(31.7%)
Magalle	50	7(14%)	4(8%)	0(0%)	2(4%)	13(26%)
Amba5	50	7(14%)	3(6%)	2(4%)	1(2%)	13(26%)
Amba8	50	7(14%)	3(6%)	2(4%)	2(4%)	14(28%)
Amba11	50	6(12%)	2(4%)	1(2%)	1(2%)	10(20%)
Amba14	50	8(16%)	1(2%)	1(2%)	1(2%)	11(22%)
Total	310	47(15.2%)	16(5.2%)	8(2.6%)	9(2.9%)	80(25.8%)

TC=Trypanosomacongolense, TV=Trypanosomavivax, TB=Trypanosomabrucei

Table 2: Prevalence of bovine Trypanosomosis based on host related risk factors

Variables	No examined	Prevalence (%)	X2(P-value)
Sex			
Male	160	43(26.9%)	.197(.657)
Female	150	37(24.7%)	
Age			
< 2years	22	2(9.1%)	95.149(.000)
2-7 years	160	8(5%)	
> 7years	128	70(54.7%)	
Good	31	0(0%)	2.241(.000)
Medium	197	8(4.1%)	
Poor	82	72(87.8%)	
Total	310	80(25.8)	

Table 3: Mean PCV and SD of Infected and Non-Infected Animals

Condition	number mean	PCV(%)±std.Deviation	T test	P-value
Infected	80	17.72±3.356	25.087	.000
No infected	230	27.22±2.748		

statistically significant in different age groups of the animals (P <0.05). From the total of 310 animals examined 31 were good, 197 were medium while 82 were with poor body condition scores. Out of total animals examined 8 (4.1%) animals from medium body conditions and 72 (87.8%) animals from poor body condition scores were positive of trypanosomosis and statistically significant (P <0.05) (Table 2).

Hematological Findings: The mean Packed Cell Volume (PCV) value for a parasitaemic (Noninfected) animals were 27.22±2. 748 and mean PCV value of the parasitaemic (infected) animals was 17.72±3.356. There was statistically significant difference in the mean PCV value between the noninfected and infected animals (P<0.05) (Table 3).

DISCUSSION

The overall prevalence of trypanosomosis was 80 (25.8%) that is in line with findings of Shimelis [13] and Dawud [14] who reported prevalence of 28.1% and 24.7% in and around Assosa and in Mao Komo special district, respectively. The present prevalence is higher than from the report of Bitew *et al*. [15] in Selected Areas of Jabi Tehenan District, West Gojjam of Amhara Regional State, North western Ethiopia (11.7%). From the total prevalence obtained *Trypanosome congolense* accounts for about 47 (58.75%), *Trypanosoma vivax* accounts 16 (20%), *Trypanosoma brucie* accounts 8 (10%) and mixed infection accounts 9 (11.25%) of the total positive sampled cattle were observed during the study period. 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 [13, 15 and 16]. The prevalence *T. congolense* in this study is higher than from previous studies that were conducted in West and North West part of the country as 12.5% *T. congolense* at Medajalala, Western Ethiopia [17], 17.2% at Pawe, North West Ethiopia [18], 17.2% in Metekel district [19] and 19.01% in Goro [20].

The highest and the lowest prevalence were recorded in different villages like Assosa PA 19(31.7%), Amba 8 14 (28.3%), Megelle PA 13(26.2%), Amba 5 PA 13 (26.2%) and Amba14 PA 11 (22.4%) Amba11 PA 10 (20%) villages, respectively. However, there was no significant difference in the prevalence of trypanosomosis in the villages (P> 0.05) that is in line with Shimelis [13] and Dawud [14].

From examined animals 37 (24.7%) and 43(26.9%) were positive for trypanosomosis in female and male, respectively, with statistically no significant difference. Our result disagrees with the Work of Ayana *et al*. [21] who reported prevalence was slightly higher in females (2.50%) than males (1.70%).

The prevalence study in different age groups in the area indicates that *trypanosoma* infection is higher in adult (>7 years) than in animals below two years of ages and there is statistically significant difference (p<0.05). This may be due to chronic nature of the disease and animals below two years of ages less exposed since they are either tethered or kept close to the homestead where tsetse habitat has been destroyed so the trypanosomes challenge is higher in older animals may be due to tsetse feeding preference for old animals and they are usually driven for grazing and watering. This result is in line with the findings of Bitew *et al*. [15] who reported that there is statistically significant difference in infection between the age groups.

Infection in poor and medium body condition animals was significantly higher than good body conditions. This is in agreement with Bitew *et al.* [15]. This is due to development of anemia and progressive loss of body condition in chronic case. According to Getachew [2] the development of anemia is the most reliable indicator of the trypanosome infection, but it also interferes with concurrent disease and nutritional factors.

The different between mean packed cell volume (PCV) value of infected and non-infected cattle in current study was recorded as, 17.72±3.356 and 27.22±2.748, respectively. There was statistically significant difference between the animals, which agrees with previous findings of Ayana *et al*. [21] and Bitew *et al*. [15] who reported that the mean PCV value of parasitaemic animals were significantly (P<0.05) lower than that of aparasitaemic animals.

CONCLUSION

The study result of trypanosomosis and other possible risk factors were found to be negatively affected the packed cell volume (PCV) values and health of

animals. In the present study, the prevalence of trypanosomosis was high. The prevalence of trypanosomosis found in the study area was to be high; therefore further studies on the distribution of tsetse flies and trypanosomosis prevalence should be conducted on wider area of the distribution throughout all season of the year.

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