Austin Journal of Veterinary Science & Animal Husbandry

Open Access

Austin Publishing Group

Research Article

Prevalence of Bovine Trypanosomosis and Apparent Density of Tsetse Fly at Sekoru District, Jimma Zone, Ethiopia

Takele S[1], Kedir M[1], Yusuf A[1], Nesru A[1], Desa G[1]* and Tafesse A[2]

[1]National Institute for Control and Eradication of Tsetse Fly and Trypanosomosis, Kaliti Tsetse Fly Mass Rearing and Irradiation Center, Addis Ababa, Ethiopia

[2]Jimma Zone Sekoru Woreda Livestock and Fishery Development Office, Jimma, Ethiopia

***Corresponding author:** Garoma Desa, National Institute for Control and Eradication of Tsetse Fly and Trypanosomosis, Kaliti Tsetse Fly Mass Rearing and Irradiation Center, P.O. Box 19917, Addis Ababa, Ethiopia

Received: January 28, 2020; **Accepted:** March 02, 2020; **Published:** March 09, 2020

Abstract

A cross-sectional study was conducted from January 2019 to March 2019 at Sekoru districts to determine the prevalenceof bovine trypanosomosis and apparent densities of Tsetse fly Vectors. Standard isolation and identification procedures were performed to identify *Trypanosome* isolates. Baited Monoconical, Biconical and pyramidal traps were used for the vector survey. The overall prevalence of Trypanosomosis was found to be 5.5%. Two *Trypanosome* species were identified during the study period *T. vivax* and *T. congolense*. The highest *Trypanosome* prevalence (30%) was seen in animals with poor body condition than that of those with good (6.25%) and medium (3.42%) body condition. The higher infection rate was observed in female cattle (72.7%) than males (27.3%). The study revealed that packed cell volume (PCV) values of parasitaemic (22.7%) cattle were significantly lower than aparasitaemic (77.3%) cattle. During the entomological survey, two species of tsetse fly: *G. morsitsns submorsitans* and *G. pallidipes* were caught. The overall apparent density of tsetse flies was 4.36fly/trap/day. *Trypanosome* and tsetse fly pose a great threat to cattle residing in study areas. Thus, appropriate intervention measures need to be taken.

Keywords: Cattle; Prevalence; Sekoru district; *Trypanosome*; Tsetse fly

Background

Trypanosomosisis one of the diseases that are caused by flagellated protozoan parasites belong to the genus *Trypanosome*. Trypanosomosis limits the extension of natural herds particularly in Africa where the presence of tsetse fly density access to fertile woody and savannah lands with good grazing potential and livestock rearing [1,2]. It is a serious constraint to agricultural production in extensive areas of the tsetse infested regions which accounts over 10 million square kilometers of the tropical Africa [3,4]. The most economically important *Trypanosome* in livestock are the tsetse transmitted species: *T. congolense*, *T. vivax* and *T. brucei* [5,7]. Tsetse flies in Ethiopia are confined to southwestern and northwestern regions between longitude 33° and 38°E and latitude 5° and 12°N covers an area of 220,000km^2 [8]. The low lands and in the river valleys of Blue Nile, Baro, Akobo, Didessa, Ghibe, and Omo are tsetse fly infested part of Ethiopia. The country is infested with five species of tsetse fly including *G. morsitans submorsitans*, *G. pallidipes*, *G. tachinoides*, *G. fuscipes* and *G. longipennis* and the first four are widely distributed and economically important[9]. According to the reports Tsetse transmitted animal trypanosomosis still remain as one of the largest causes of livestock production losses in Ethiopia [9]. The effects of trypanosomosis is not only the direct losses resulting from mortality, morbidity, infertility of the infected animals and costs of controlling the disease, but also includes indirect losses, which involves livestock and animal power based crop production from the huge fertile tsetse infected areas [10]. However, the distribution and the magnitude of the disease and its vectors are not well understood. Therefore, the aim of this research was to estimate the prevalence of *Trypanosome* in cattle and relative abundance tsetse fly in Jimma zone Sekoru district, southwest, Ethiopia.

Materials and Methods

Study area and period

The study was conducted at the Jimma zone Sekoru district from January 2019 to March 2019. Jimma zone is located 352km south-west of Addis Ababa at latitude of about 70 13'–80 56'N and longitude of about 35,052'–37,037'E.

Study design and population

A cross sectional study was conducted to find out the prevalence of bovine trypanosomosis and apparent density of tsetse fly at the Jimma zone Sekoru district. The study animals were selected by using simple random sampling method.

Sample collection, isolation and identification procedure

Parasitological survey: For parasitological examination a total of 397 blood sample were collected from ear vein of each cattle using microhaematocrit/capillary tube. During blood collection, the necessary bio-data of each animal was recorded. The microhaematocrit/capillary tubes were filled with blood to 2/3 of their length and centrifuged for 3min at 1500rpm and examined for trypanosomes by cutting the capillary tube slightly below the Buffy coat to include erythrocytes. The content of the Buffy coat was poured on a slide and covered with cover slip and examined using a microscope. Species identification was done by morphological

Citation: Takele S, Kedir M, Yusuf A, Nesru A, Desa G and Tafesse A. Prevalence of Bovine Trypanosomosis and Apparent Density of Tsetse Fly at Sekoru District, Jimma Zone, Ethiopia. Austin J Vet Sci & Anim Husb. 2020; 7(1): 1068.

Table 1: The prevalence of Trypanosomeon the basis of study village.

Factors	*Trypanosome* species		Total	Prevalence (%)	P-value
	Negative	Positive			
Village					
Ghibe kela	115	4	119	3.4	0.046
Medale Goraw	105	3	108	2.8	
Doyo kobota	155	15	170	8.82	
Total	375	22	397	5.54	
PCV Value					
PCV ≤ 24	119	5	124	4.03	0.26
PCV > 24	256	17	273	6.22	
Total	375	22	397	5.54	
Body conditions					
Poor	21	9	30	30	0
Medium	339	12	351	3.42	
Good	15	1	16	6.25	
Total	375	22	397	5.54	

Table 2: The prevalence of Trypanosome on the Basis of Trypanosome species Involved.

Trypanosome species	Rate of infection	Prevalence (%)
T. congolense	14	63.63
T. vivax	6	27.3
T. congolense and *T. vivax*	2	9.1
Total	22	100

examination of trypanosomes on Giemsa stained thin blood smears prepared from the positive animals and examined under a microscope using the oil immersion objective [10].

Hematological survey: Blood samples for packed cell volume (PCV) were also collected from the selected cattle using heparinized capillary tubes. The packed cell volume (PCV) was measured after centrifugation of the tubes for 5min at 12,000rpm in microhaematocrit centrifuge and the results were observed using microhaematocrit reader following the standard procedure [11].

Entomological survey: For the entomological study, tsetse flies were collected by 87 traps (8 Biconical, 75 monoconical and 4 Pyramidal) deployed in different positions of the study areas of different Kebele. Traps were deployed in the riverside at approximately 100m apart for 3 consecutive days. In all the traps Phenol and Acetone was used as a bait to attract the flies. Fly catch per trap per day (f/t/d) was determined to calculate the fly density and distribution. Species of the caught flies were identified. Sexing was also done for the flies just by observing the posterior end of the ventral aspect of abdomen by hand lens as a result male flies easily identified by enlarged hypophygeum [12,13].

Data quality assurance and analysis: All the instruments used for sample processing were checked prior to the study. Data consistency and completeness were made all the way during data collection, data entry and analysis. Data were edited, and checked for its completeness and entered into Epi Data 3.1 then exported to Statistical Packages for Social Sciences (SPSS) version 16 for analysis.

Result

Parasitological survey

From the total of 397 blood samples collected in Sekoru district (Ghibe kela, Medale Goraw and Doyo Kobata village) 22 (5.54%) samples were found to be positive for trypanosomes with the lowest prevalence was observed in medale Goraw (2.8%) and the highest was recorded in Doyo kobota (8.82%) villages as indicated in Table 1.

As shown in Table 2 *T. Congolese* 14 (63.63%) was the most prevalent *trypanosome* species followed by *T. viviax* 6 (27.3%) and mixed infection 2 (9.1%).

Depending on body conditions, (9) 30%, (12) 3.42% and (1) 6.25% was recorded in poor, medium and good body condition of animals respectively with statistically significant difference in the infection rate between poor, medium and good body condition ($p< 0.05$) (Table 1).

Hematological findings

The analysis of PCV value in the animals examined for *trypanosome* infection showed that the mean PCV value for the parasitemic cattle was 23.45 ± 0.84 SE whilst the mean PCV value for the aparasitemic cattle was (26.5 ± 0.21 SE) and cattle having PCV ≤24% (anemic) was 4.03% whilst in the cattle having PCV>24% (non-anemic) was 6.22% as indicated in Table 1.

Entomological survey

A total of 742 flies were caught at the time of the study, out of these 452 (60.9%) belong to *G. morsitans* and the remaining is shared by *G. pallidipes* with score of 290 (39.1%). An overall apparent tsetse flies density in study area is 4.36 flies/trap/day. From total tsetse fly

Table 3: Apparent density of flies caught during the study period.

Study Village	Average Altitude	Duration of Trap on the field (day)	Total No of Trap	Tsetse fly species				Flies/trap/day (Apparent density)
					M	F	Total	
Ghibe kela	1216	2	20	*G.morsitans*	40	86	126	3.15
				G.pallidipes	9	35	44	1.1
Medale goraw	1101.3m	2	19	*G.morsitans*	16	8	24	0.63
				G.pallidipes	6	8	14	0.37
Doyo kobota	1293.1m	2	46	*G.morsitans*	97	205	302	3.28
				G.pallidipes	92	140	232	2.52
Total		2	85		260	482	742	4.36

trapped, females occupied large ratio. Out of total of 742 tsetse flies captured, 260 (35%) flies where males and the rest 482 (65%) flies where females (Table 3).

Discussion

The present study revealed that from a total of 397 randomly selected cattle's in the study area, 22 (5.54%) of cattle were positive for trypanosomes. These findings support previous studies undertaken in Lalo Kile district 5.43% [14] and 6.9% in Chena district, south west Ethiopia [15]. However, the prevalence reported in the current study is lower than other reports such as 20.40% in Wolyta and Dawero zones of southern Ethiopia [16] and 12.24% in Botor Tolay District, Jimma Zone [29]. This difference possibly arises from tsetse distribution, low fly–animal contact and parasite and vector control programs practiced in the study area.

The present finding showed that out of 22 positive cattle for trypanosomosis, *T. congolense* was found to be the causative agent in 63.63% (n=14), *T. vivax* 27.3% (n=6) and mixed infection accounted for 9.1% (n=2). The predominate species causing bovine trypanosomosis was *T. congolense* and this finding agreed with previous report from south-western Ethiopia [17-20]. This finding indicated that our study area is suitable for the multiplication of biological vector (tsetse flies) and also showed vector born *trypanosome* species are disseminated in southwest parts of Ethiopia [21,22]. However, the current finding disagrees with in Mulanda, eastern Uganda [23]. The occurrence of disease in three different body condition (poor, medium and good) animals shows the highest prevalence in poor body condition (30%) followed by in medium (3.42%) and good body condition (6.25%). The finding showed that infection rates in poor body condition animals were significantly higher than that of medium and good body condition animals. This is due to poor body condition animals are susceptible to the infectious disease. The reason might be due to reduced performance of the animals created by lack of essential nutrients and poor management by the animal owner [24]. The mean PCV value of *trypanosome* positive animals was significantly lower (23.45 ± 0.842 SE) than that of negative animals (26.5 ± 0.208 SE). This finding is aligned with previous works, which stated a low PCV value of individual animals is a good indicator of *trypanosome* infection [25,26].

The present study also showed that from 85 trap (monoconical, Biconical and Pyramidal) deployed in the study area for 48 hours, a total of 742 flies were trapped among this flies 452 *G. morsitans* and 290 *G. pallidepes* were trapped. The overall 4.36 flies/trap/day apparent density of the tsetse flies was recorded. The current finding is lower than previously reported in Daramallo district 19.14 flies/trap/day [27], 14.97 flies/trap/day in Arbaminch district [28] and 10.9 flies/trap/day Botortolay district. This difference might be attributed to environmental conditions, agro ecological differences and seasonal variation of sampling.

Conclusion

The present work showed a relatively low prevalence of trypanosomosis and apparent density of tsetse flies in Mandura district. However, this is an evidence not to be neglected that tsetse and trypanosomosis has yet continued to pose a considerable threat to cattle of the study area warranting an integrated parasite and vector control to safeguard cattle production and productivity.

References

1. Abebe G and Jobre Y. Trypanosomosis: A threat to cattle production in Ethiopia. Revue de Med Vet. 1996; 147: 897-902.
2. Uilenberg G. A field guide for diagnosis, treatment and prevention of Africananimal trypanosomosis. Adopted from the original edition by boyt WP. FAO, Rome. 1998: 43-135.
3. Alsan M. The effect of the tsetse fly on African development, National Bureau of Economic Research, 105 Massachusetts, Avenue, Suite 418, Cambridge, MA 02138, USA. 2012.
4. Slingenbergh JHW. Tsetse control and Agricultural development in Ethiopia. World Anim Rev. 1992; 70/71: 30-36.
5. Abebe G. Current Situation of Trypanosomosis. In: review article on: Trypanosomosis in Ethiopia. Ethiop J Biol Sci. 2005; 4: 75-121.
6. Mulugeta Desta. Trypanosome infection rate of Glossina morsitans and trypanosomosis prevalence in cattle in upper Didessa valley western Ethiopia. Int. J. Curr. Microbiol. App. Sci. 2014; 3: 378-388.
7. Federica Giordani, Liam J. Morrison, Tim G. Rowan, Harry P. De Koning and Michael P. Barrett. The animal trypanosomiases and their chemotherapy: Parasitology. 2016; 143: 1862–1889.
8. Langridge WP. Tsetse and trypanosomosis survey of Ethiopia. Ministry of overseas development UK. 1976: 1-40.
9. Mulugeta Desta, Sissay Menkir and Ameha Kebede. The study on tsetse fly (Glossina species) and their role in the trypanosome infection rate in Birbir valley, Baro Akobo River system, western Ethiopia. J. Vet. Med. Anim. Health. 2013; 5: 186-194.
10. Murray M, Trial TCM, Stephen LE. Livestock productivity and trypanosomosis, ILCA, Addis Ababa, Ethiopia. 1983.
11. FAO. Training manual for tsetse control personnel. FAO. 1992; 2: 5.
12. Leak SGA, Woume KA, Colardeue C, Duffera W, Feron A, Mulingo M, et al. Determination of tsetse challenge and its relationship with trypanosomosis prevalence. In: livestock production in tsetse infested areas of Africa. Nairobi, Kenya, ATLN. 1987: 43-52.
13. Wellde BT, Hockmeyer WT, Koyatch LM. Immunity in bovine to Trypanosoma congolense induced by selfcure or chemotherapy. In Losos, G and Chounad, A. pathogenesity of trypanosomosis. 1979.
14. Lelisa K, Shimelis S, Bekele J, Shiferaw D. Bovine trypanosomosis and its fly vectors in three selected settlement areas of Hawa-Gelan district, western Ethiopia. Onder J Vet Research. 2014; 81: 715.
15. Alemayehu B, Bogale B, Fentahun T, Chanie M. Bovine trypanosomosis: A threat to cattle production in Chena district, Southwest Ethiopia. Open Journal of Ani Scie. 2012; 2: 287-291.
16. Miruk A, Hagos A, Yacob H, Asnake F, Basu A. Prevalence of bovine trypanosomosis and trypanocidal drug sensitivity studies on Trypanosoma congolense in Wolyta and Dawerozones of southern Ethiopia. Veterinary Parasitology. 2008; 152: 141-147.
17. Abebe G, Jobre Y. Trypanosomiasis: A Threat to Cattle Production in Ethiopia. Revue Med Vet. 1996; 147: 897-902.
18. Zecharias A, Zeryehun T. Prevalence of Bovine Trypanosomosis in Selected District of Arba Minch, SNNPR, Southern Ethiopia. Global Veterinaria. 2012; 8: 168-173.
19. Teka W, Terefe D, Wondimu A. Prevalence study of bovinetry panosomosis and tsetse density in selected villages of Arbaminch. Journal of Veterinary Medicine and Animal Health. 2012; 4: 36-41.
20. Duguma R, Tasew S, Olani A, Damena D, Alemu D, et al. Spatial distribution of *Glossina sp.* And *Trypanosoma sp.* in south-western Ethiopia. Parasit Vectors. 2015; 8: 430.
21. Abebe G. Trypanosomosis in Ethiopia. Review Article. The Biological Society of Ethiopia. Ethiop. J bio Soci. 2005; 4: 75-121.

22. Mulaw P, Scoh J, Pegram R. Acute trypanosoma vivax infection of Ethiopia cattle in the apparent absence of tsetse. Trop Anim. Healthprods. 2011; 16: 141-147.

23. Nabulime L, Mbogua J, Zirintunda G, Asiimwe J, Ekou J. Prevalence of Trypanosomiasis among Zebu Cattle in Mulanda, Tororo District, Eastern Uganda. Scholars Journal of Agriculture and Veterinary Sciences. 2014; 1: 274-278.

24. Urquhart G, Armour J, Duncan J, Dunn A, Jennings F. Veterinary Parasitology 2nd edition. Blackwell Publishing, Scotland. 2006: 212-224.

25. Ali R, Bitew W. Pathogenesis and pathology of Animal Trypanosomosis. In the African trypanosomosis (Ed. HW Mulligan) Vreysen London: Allen and Unwill. 2011: 179.

26. Rowlands G, Leak S, Peregrine A, Nagda S, Mulatu W, et al. The incidence of new and the prevalence of recurrent trypanosome infection in cattle in Southwest Ethiopia, exposed to a high challenge with drug resistant parasite. Acta Trop. 2001; 79: 149-163.

27. Ayele T, Ephrem D, Elias K, Tamiru B, Gizaw D, et al. Prevalence of Bovine Trypanosomosis and its Vector Density in Daramallo District, South Western Ethiopia. J Vet Adv. 2012; 2: 266-272.

28. Wondewosen T, Dechasa T, Anteneh W. Prevalence study of bovinetry panosomosis and tsetse density in selected villages of Arbaminch, Ethiopia. J Vet Med Anim Health. 2012; 4: 36-41.