European Journal of Biological Sciences 8 (2): 56-59, 2016
ISSN 2079-2085

DOI: 10.5829/idosi.ejbs.2016.8.02.23850

Bovine Trypanosomiasis and its Vectors in Kiremu District of East Wollega Zone, Oromia, Ethiopia

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Abstract: This current study of Bovine trypanosomiasis in kiramu district is the first to be conducted at the district level. This study was conducted from October to march 2010 to determine the prevalence of the trypanosomiasis and its vectors at four study sites of the district. A parasitological examination of blood samples was done using Buffy coat and blood smear techniques. *T.Congulense* and *T. vivax* were the species of trypanosoma identified with prevalence rate of 5.5% and 0.78% respectively. The Buffy coat technique was more sensitive to detect trypanosomal parasite during examination when compared with the blood smear with the prevalence rate of 4.6% and 3% respectively. The prevalence of trypanosomiasis was variable among the study areas of the district being highest at wadesa Dimma (7.5%) and lowest at Boka with the prevalence rate of 4.8%, where as monthly prevalence rate of the disease was highest on October (7.2%) and lower on January (4.3) and this might be related to the abundance of the vector populations. Stomoxys, Haematopota and Tabanus were some of the biting flies that were trapped, identified and counted by using standard parasitological methods during the study. Glossina Morsitans and Glossina techinoides were the two species of tse tse flies identified during the study.

Key words: Bovine · Glossina · Prevalence · Trypanosomiasis · Kiram

INTRODUCTION

Live stock play a major role in Ethiopia as a source of draft power, milk, meat, manure, income through selling of live animals and source of hide and skin (MOA, 1998). Even though Ethiopia has huge number of live stock population the country could not utilize properly due to the devastating disease, trypanosomiasis.

Currently about 3 million live stock dies due to tsetse transmitted trypanosomiasis which cover one third of the African continent to be estimated 10 million km^2 in sub-Saharan countries. In this area at least 46 million cattle exposed to the risk of contracting tsetse borne trypanosomiasis, as are millions of sheeps, goats, donkey, camel and horse (Reid, 1998) [1].

Regarding Ethiopian situation about 14.8 million of cattle at risk of contracting trypanosomiasis (MOA, 1995). This implies that like other sub-Saharan African countries which are infested by tsetse fly the socio economic impact of tsetse born trypanosome is more serious (Lemecha, 1994) [2].

In more recent studies tsetse fly have progressively invade productive Agricultural area in west and south western part of Ethiopia. Consequently it is estimated that the total area of 220, 000km^2 is currently believed to be infested by different species of tsetse flies (NTTICC).

Trypanosomiases of veterinary and medical importance are sub divided in to sections; the sterocaria and the salivaria based on their development in the insect vectors and vertebrate hosts. All the pathogenic trypanosomiasis in Africa belongs to the section salivaria (Gardiner, 1989) [3]. The three most important trypanosomiasis species affecting cattle are *T. vivax*, *T. congolense T. brucei*. In addition to tsetse flies trypanosomiasis can be transmitted by Haepatophagus flies such as tabanus, Stomoxys and haemotpota…etc. (Codjia *et al*., 1993 [4]; Abebe and Jobre, 1996 [5]). An essential factor is mechanical transmission of trypanosome is interrupted feeding; the flies go quickly from one host to another to transmit the parasite with in short period of time(Souls, 1986) [6].

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The impact of trypanosomiasis and tsetse on socio economic sphere is there for complex and enormous, however, there has been no vaccine against trypanosomiasis for control, but it is possible to suppress or to control the disease by tsetse control strategies as well as by application of curative and prophylactic drugs (Jordans, 1986) [7].

In Oromia regional state east Wollega zone of Kiramu district of Ethiopia, the study of Bovine trypanosomiasis and its vectors are not yet conducted. So there is a need to conduct to further study on Bovine trypanosomiasis and its vectors in the district to establish effective control strategies. Therefore, the objectives of the current study are;

- To determine the prevalence of Bovine trypanosomiasis in Kiramu district
- To identify the trypanosome species circulating in the area
- To identify the vectors involved

MATERIALS AND METHODS

Study Area: The study was conducted in kiramu district which is situated in Oromia regional state of east Wollega Zone that found 140km from Nekemte to ward Northern on the main road that connects Wollega with Amahara region. The area of the district is 813.305km^2 and the altitude ranges from 1400m to 2090m above sea level.

The study area has a climate of weyina dega and kola with mean annual maximum and minimum temperature of 28°C and 15°C respectively. It has annual rain fall of 1800mm; it falls down during the long rainy season which extends from July to August and short rainy season that extends from May to June. The vegetation type of the area is high grass low tree savannah, bamboo and reverine vegetations.

Study Animals: The animals studied were Bovine species of all age groups which are managed under traditional farming and grazing freely. Sampling was done randomly where cattle graze together and during mass vaccination.

Sample Collection: Sample collection was done according to Marry *et al.,* 1983. Brief description of the method is presented below.

Thin Blood Smear Preparation: After the animal was restrained; the hairs around the ear vein was shaved, the area was disinfected with 70% alcohol by pricking the marginal ear vein with lancet and a drop of blood was placed on the one end of the clean grease free slide 3cm from one end and by using smooth edged spreader evenly spreading of the blood across the slide was done by holding the spreader at 45°c and a tail like smear was prepared and allowed to dry, labeling was done by using pencil, the smear was fixed by acetone free absolute methyl alcohol for 3 minutes, the smear was stained by Giemsa working solution which was prepared by mixing one part of Giemsa stock solution with nine parts buffered distilled water and left for 30 minutes, the slide was washed off with tap water and dried, then kept in clean slide box and covered with plastic bag for transportation until examined in Nekemte Vet. Clinic Laboratory.

Buffy Coat Technique Preparation: Buffy coat technique was done after preparation of the vein of the ear, the hairs around the ear vein was shaved, the skin was disinfected by 70% alcohol, by using sterile blood lancet bleeding was done and the blood drown directly in to 75*1.5mm heparin zed capillary tubes by capillary system and filled up to ¾ of the length of the capillary tubes and sealed by soap at one end.

Vector Survey and Control: For trapping of vectors seven biconical traps were used and different genera of flies were captured according to (Challier and Laveissier, 1973). Under the traps cow urine, Acetone and octanol were placed with different quantity. The traps were kept for three consecutive days for six months at the same site. The traps were placed at 100m interval from each other following in and out of the river as well as in savannah wood lands.tse tse flies and some biting flies like Stomoxy, Tabanus and Haematopota were collected.

Methods of Sample Transportation and Submission: The blood smear was fixed for three minutes with acetone free absolute methyl alcohol as soon as collected and stained with Giemsa solutions for 30 minutes, washed, dried and kept in clean slide box, covered with plastic bag to prevent from dust and sun while transportation to Nekemte Vet. Clinic laboratory until examination.

The capillary blood system was processed immediately at a collection site to estimate the level of parastemia and anemia by buffy coat technique. For vectors the traps were removed from the cages. The collected biting flies and other flies were killed by ether placed in screw cupped bottle, preserved by 70% alcohol. The space left above the sample was filled by cotton wool to avoid damage to the flies during transportation.

site and date of capture and name of the collector were labelled by using lead pencil on the container and submitted to Bedelle regional veterinary laboratory [8, 9].

Laboratory Analysis

Sample Storage and Processing: After the samples were presented to the laboratory, all of them kept at room temperature until processed. Identification of the trypanosome in thin blood smear and buffy coat technique, PCV determination and identification of the vectors were conducted according to standard procidure (Murray *et al*., 1983; Souly, 1986).

Microscopic Examination: The stained blood smears were examined under compound microscope using oil emulsion (100*) magnification. For species identification and morphological characterization of the trypanosome, type of flagellum, size and possession of kenetoplast, shape of posterior end of the trypanosome and shape of the parasite were used.

Buffy Coat Technique: The capillary tube which was sealed before centrifuged at 12000 rpm for 5 minutes with microhematocrit centrifuge by placing the sealed end outer most and loaded symmetrically for balancing. Packed cell volume (PCV) was determined by using haematocrit reader. The capillary tube was cut down at a level of buffy coat, a drop of buffy coat was placed on a glass slide and spread and covered by a cover slip. The preparation was examined using bright field microscope system with the consider top out level of parastemia was determined based on the recommendation of Murry *et al*. 1983 (Table 2).

RESULTS

From 384 blood smears, 24(6.3%) were positive for trypanosome. Out of the positive smears 21(5.5) and 3(0.78) were T-congulense and T-vivax respectively. During thin blood examination one babesia species was also detected. There was a slit variation in prevalence rate among the site; highest at Wadesa dimma (7.5%) and lowest at Boka (4.8%), 6.3% and 6.0% at Nechino and Qofqoffe respectively (Table 1) [10, 11].

Blood smear was less sensitive when compared with buffy coat technique to show the parasite (trypanosome). 130 cattle were examined, out of 130 cattle using buffy coat technique 6(4.6) were detected for T-congulense of the same animals examined while blood smear examination only 4(3%) were positive for T-congulense (Table 2).

Based on age and sex the prevalence of bovine trypanosomiasis caused by T-congulense an T-vivax were indicated on Table 5. A slit variation was observed with in sex, greater in female(6.5%) and lower in male (5.9%). However, there was a greater variation with in age which was higher in young (10.9). This might be due to low resistance and infected while they were newly exposed to flies but adult animals were more resistant.

Monthly prevalence of Bovine trypanosomiasis. It was higher in October (7.2%) and lower in January (4.3%).

The prevalence of Bovine trypanosomiasis is not limited to tse tse flies; it is also transmitted none cyclically by bitting flies. This happens through contamination of mouth parts during interrupted feeding of bitting insects such as tabanus, haematopota, Stomox etc. (Codjin *et al*. 1993; Abebe and Jobre, 1996).

Table 1: Prevalence of T-congulense and T-vivax at different study area

PA	No of samples	% of *T-congulense*	% of *T-vivax*	Prevalence rate
Boka	83	4(4.8)	-	4.8
Nechino	128	7(5.5)	1(0.78)	6.3
Wodessa Dimma	106	6(5.7)	2(1.9)	7.5
Qofqoffe	67	4(6)	-	6.0
Total	384	21(5.5)	3(0.78)	6.3

Table 2: Variation of Trypanosome infection rate using blood smear and buffy coat technique

Technique	No of animals examined	No of positive animals
Buffy coat	130	6(4.6%)
Blood smear	130	4(3%)

Table 3: Comparison of the infection rate of animals tasted using blood smear by sex and age

	Sex group		Age group		
	Male	Female	Adult	Young	Total
Positive	11(5.9%)	13(6.5%)	19(5.6%)	5(10.9%)	24(6.3%)
Negative	174(94%	186(93.5%)	319(94.4%)	4(89.1%)	360(93.8%)
Total	185	199	338	338	384

Table 4: Monthly prevalence of Bovine Trypanosomiasis from October to March

Month	No of animals examined	% of Positive animals
October	83	6(7.2)
November	76	5(6.6)
December	64	4(6.3)
January	47	2(4.3)
February	53	3(5.7)
March	61	4(6.6)
Total	384	24(6.3)

Table 5: Captured and identified bitting flies at different months of the study periods

	Species of bitting flies		
Month	Tabanus	Stomoxys	Haematopota
October	38	841	17
November	13	624	6
December	8	610	4
January	0	312	1
February	2	413	0
March	5	437	0
Total	66	3237	28

CONCLUSION

Among live stock, bovine Species have no competitive in providing multi directional benefits to man kind. They are the first line valuable animals serving as a source of meat and milk, traction power for increasing crop production, providing hide and skin as well as source of cash through selling of life animals…etc.

At the study area of kiramu district the presence of bovine trypanosomiasis was clearly identified with the prevalence rate of 6.3% which reveals high infection rate. So, it has been responsible for loss of animals and their products through mortality and morbidity. As a result, it invites the farmers to poverty. The prevalence of the disease was higher at October (7.2%) compared to other months and least at January (4.3%) this may related with the increment and decrement of vector population that leads to raising and falling down of the infection rate. Depending on the above effects, I would like to put the following possible recommendations:

- Detailed studies on bovine trypanosomiasis, Species of trypanosome, Species of vectors and their percentage of distribution in the district and educating the farmers about the problem and control parameters.
- Appling control measures; eradication of vectors, establishing of veterinary clinics, supplementation of curative and prophylactic drugs for farmers and controlling illegal veterinary drugs trading by non professionals.
- Study of drug resistance in the district has to be established.

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