

Full Length Research Paper

## Prevalence of bovine trypanosomosis in Wolaita Zone Kindo Koish District of Ethiopia

Eyasu Adale and Ahmed Yasmine\*

School of Veterinary Medicine, Wollo University, Dessie, P. O. Box 1145 Dessie Ethiopia.

Accepted 4 December, 2013

Cross sectional study was conducted in Kindo Kioish District, Wolaita administrative zone of SNNPRS from October 2011 to June 2012 to determine the prevalence rate of bovine trypanosomosis. In the parasitological survey, blood samples of 268 cattle were examined using a buffy coat technique and thin smear under Gimsa stain. The packed cell volume (PCV) value of each animal was also measured using hematocrit reader. The overall prevalence of trypanosomosis was found to be 6.3%. The prevalence varied between different study areas; 5.6% in areas of low vegetation cover including (Henza, Chalanche and Moundena) to 7.2% in areas of high vegetation over (Moliticho and Fejena Mata) respectively. The most positive cases were due to *Trypanosoma congolense* (58.8%) followed by *Trypanosoma vivax* (29.4%) and mixed infection of these two species was observed in 11.8% of animals. The mean PCV value (%) of parasitaemic and aparasitaemic animals during the study period were  $23.8 \pm 1.89$  SD and  $25.6 \pm 1.38$  SD with a statistically significance ( $p < 0.05$ ) difference between the two groups. The study also demonstrated variations in the prevalent among different age groups and between both sexes and body condition which were statistically insignificant ( $p > 0.05$ ).

**Key words:** Bovine, Ethiopia, Kindo koisha district, prevalence, trypanosomosis.

### INTRODUCTION

Trypanosomosis is a disease caused by several species of protozoan parasites (*Trypanosomes*) found in the blood and other tissues of vertebrates including livestock, wildlife and people (Stephen, 1986; Tayler, 1998; WHO, 2006). It is one of the most important diseases of livestock, which hampers agricultural production in sub-Saharan Africa including Ethiopia (Awoke, 2000; PATTEC, 2001; Abebe, 2005; Bitew, et al., 2011). According to FAO (2000) trypanosomosis caused a reduced crop production due to insufficient animal traction power, reduced rates of calving, increased mortality, reduced milk off take was reported.

In Ethiopia, trypanosomosis is one of the most important disease limiting livestock productivity and

agricultural development due to its high prevalence in the most arable and fertile land of South-west and North-west part of the country following the greater river basins of Abay, Omo, Ghibe and Baro with a high potential for agricultural development. Currently, about 220,000 km<sup>2</sup> area is infested with tsetse flies namely *Glossina pallidipes*, *Glossina morsitans*, *Glossina fuscipes*, *Glossina tachinoides* and *Glossina longipennis* (MOA, 1995). The most important trypanosome species affecting livestock in Ethiopia are *Trypanosoma congolense*, *Trypanosoma vivax* and *Trypanosoma brucei*, in cattle sheep and goat, *Trypanosoma evansi* in camel and *Trypanosoma equiperdum* in horse (Abebe, 2005).

Trypanosomosis was considered to be an important

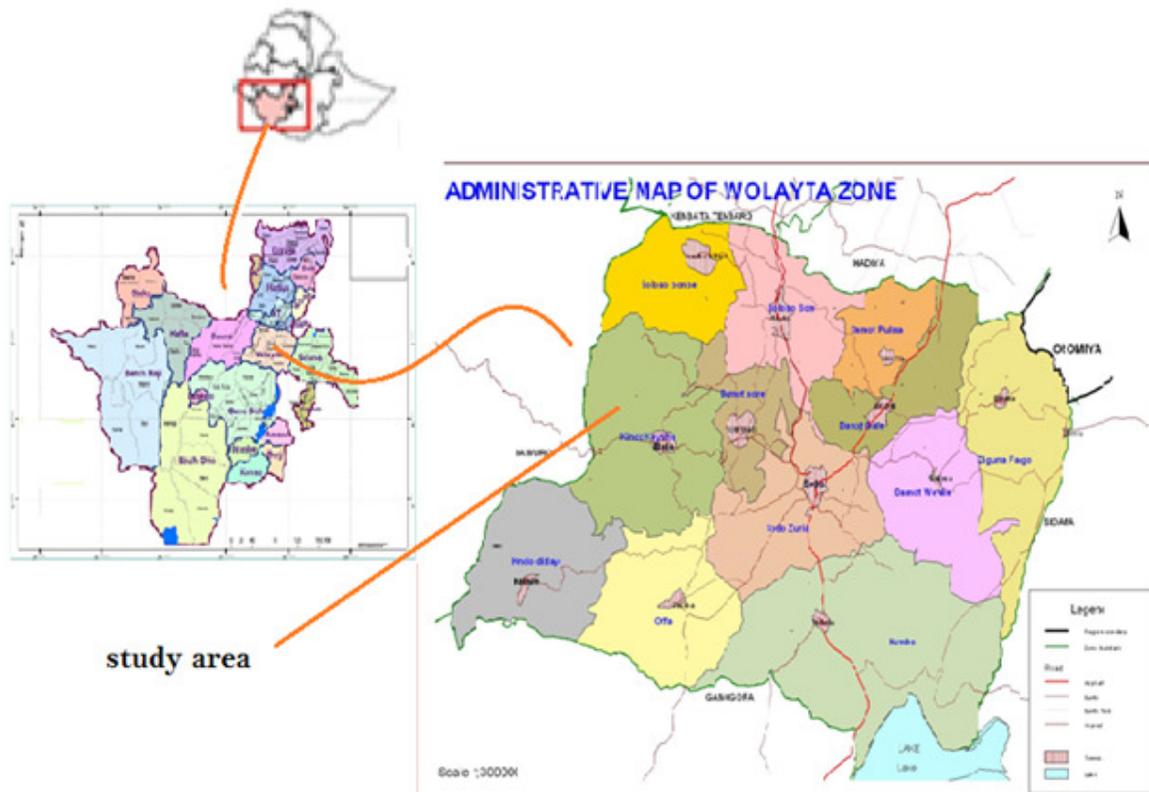


Figure 1. Map of the study area.

disease of cattle in different part of the country in reports of (Abebe and Jobre, 1996; Solomon, 1997; Mussa, 2002; Tesfaye, 2002; Cherenet et al., 2004; Sinshaw, 2004; Shimelis et al., 2005; Bitew et al., 2011). However studies have not yet been carried out on the epidemiology, prevalence and economic significance of bovine trypanosomosis in the study site. Therefore the objectives of the study were to determine the prevalence of bovine trypanosomosis in study area, to identify the dominant species of trypanosomes and some associated risk factors and to compute packed cell volume (PCV) in relation to trypanosomosis.

## MATERIALS AND METHODS

### Study area

The study was conducted in Kindo Koisha district wolayta zone of southern region of Ethiopia. It is located at about 420 Km of south west of Addis Ababa located on 7° 58" N and 37° 14" latitude and 37° 56" E longitude and it has an altitude of 600-1700 m.a.s.l. and its total area is estimated to be 17,187 hector of land (Figure 1) The distribution of rain is bimodal, with short rain from January to April and long rains from June to mid September. The average annual rainfall is 904 mm, the maximum and minimum daily temperature is 29.20 and 21°C respectively. The vegetation is savanna type with scattered bush. The livestock populations that are found in Kindo

Koisha district include cattle, sheep, goat, horses, mule, donkey and poultry. Among these animals, cattle are the dominant species raised in the area. The cattle population in the district is estimated to be about 174,346 (CSA, 2009). The body condition of sampled animals was done according to Nicholson and Butterworth (1986) from 1 to 9 scales. Their age, breed and sex was also documented during sampling.

### Study design, sample size and sampling method

Cross sectional survey was conducted to determine the prevalence of bovine trypanosomosis. Simple random sampling method was used to select the study animals. 95% confidence interval and 5% precision was considered to calculate the sample size and 16.6% expected prevalence in the area after previous study (Mesfin and Getachew, 2001). The sample size was determined by using the formula (Thrusfield, 2005). Even though the sample size was calculated to be 212, a total of 268 animals were included in the current study to increase precision.

## STUDY METHODOLOGY AND PROCEDURES

### Buffy coat technique

Blood was collected from an ear vein using heparinized micro-haematocrit capillary tube and the tube was sealed. A heparinized capillary tube containing blood was centrifuged for 5 min at 12,000 rpm. After the centrifugation, trypanosomes were

**Table 1.** Prevalence of bovine trypanosomosis in Wolaita Zone Kindo Koish District of Ethiopia.

Area	Total sample	No positive	Over all prevalence (%)	<i>T. congolense</i> (%)	<i>T. vivax</i> (%)	Mixed (%)	$\chi^2$	P -value
Low vegetation cover	142	8	5.6 (8/142)	75 (6/8)	12.5 (1/8)	12.5 (1/8)	0.25	0.61
High vegetation cover	126	9	7.1(9/126)	44.4(4/9)	44.4(4/9)	11.1(1/9)		
<b>Total</b>	<b>268</b>	<b>17</b>	<b>6.3(17/268)</b>	<b>58.8(10/17)</b>	<b>29.4(5/17)</b>	<b>11.8(2/17)</b>		

usually found in or just above the buffy coat layer. The capillary tube was cut using a diamond tipped pen 1 mm the buffy coat to include the upper most layers of the red blood cells and 3 mm above to include the plasma. The content of the capillary tube was expressed on to slide, homogenized on to a clean glass slide and covered with cover slip. The slide was examined under  $\times 40$  objective and  $\times 10$  eye pieces for the movement of parasite (Paris et al., 1982).

#### Thin blood smear

A small drop of blood from a microhaematocrit capillary tube to the slide was applied to a clean slide and spread by using another clean slide at an angle of  $45^\circ$ , air dried and fixed for 2 min in methyl alcohol, then immersed in Giemasa stain (1:10 solution) for 50 min. Drain and wash of excess stain using distilled water, allowed to dry by standing up right on the rack and examined under the microscope with oil immersion objective lens.

#### Measuring of packed cell volume (PCV)

Blood samples were obtained by puncturing the marginal ear vein with a lancet and collected directly into a capillary tube. The capillary tubes were placed in micro haematocrit centrifuge with sealed end outer most. The tube was loaded symmetrically to ensure good balance. After screwing the rotary cover and closing the centrifuge lid, the specimens were allowed to centrifuge at 12,000 rpm for 5 min. Tubes were then placed in haematocrit and the readings were expressed as a percentage of packed red cells to the total volume of whole blood. Animals with PCV

< 24% were considered to be anemic.

#### Data analysis

Raw data on individual animals and parasitological examination results were stored in MS excel spread sheets to create data base and transferred to SPSS version 17 software programs for data analysis. Chi square was used to compare the prevalence of trypanosome infection in different variables like areas, age, sex and body condition, while student-t test was utilized to compare the mean PCV of the infected animals and that of non-infected animals. Significance difference was set at  $p < 0.05$  and 95% confidence level.

## RESULTS

Out of the total 268 cattle examined, 17(6.3%) were found positive to trypanosomosis. The prevalence varied between different study areas; 5.6% in areas of low vegetation cover including (Henza, Chalenche and Moundena) to 7.2% in areas of high vegetation cover (Moliticho and Fejena mata) (Table 3). However, the difference is statistically insignificant ( $p > 0.05$ ). The most prevalent trypanosome species in the study area was *T. Congolense* (75%) followed by *T. vivax* and mixed infection from *T. vivax* and *T. congolense* was also recorded in 12.5% of the tasted animals (Table 1). The prevalence of trypanosome infection was higher in female than

male animals; however there was no statistically significant ( $p > 0.05$ ) differences observed between the two sexes. A higher infection rate was observed in adult animals (animals above three years of age) in the study area but the variation was not statistically significant ( $p > 0.05$ ). Cattle infected with trypanosome have lower body condition score than the non infected animal. There was a statistically significant ( $p < 0.05$ ) difference among the prevalence of trypanosomes in different body conditions (Table 2). Out of the observed animals, 17 of them had mean PCV value of 23.8% and the overall mean PCV value of the study also resulted in 25.6%. Statistically significant difference ( $P < 0.05$ ) in mean PCV was observed between infected and non infected animals (Table 3).

## DISCUSSION

The study revealed that the prevalence of bovine trypanosomosis in the area was 6.3% (17/268) which was in agreement with the previous findings by Habtewold (1995) at Humbo arena of wolaita zone (9.3%) Shimelis et al. (2005) and Bitew et al. (2011) (11.7%) but much lower than the report of Terzu (2004), Mesfin and Getachaw (2001), and Amare (1995) who found 15, 15.8, 37, 35.5

**Table 2.** Prevalence of trypanosomes with body condition score, age and sex.

Variable	Total sample	No positive	Over all prevalence (%)	$\chi^2$	P – value
Sex					
Female	176	12	6.8(12/176)	0.19	0.66
Male	92	5	5.5(5/92)		
Age					
< 3 year	108	6	5.6(6/108)	0.18	0.66
>3 year	160	11	6.9(11/160)		
Body condition					
Poor	159	7	4.4 (/159)	15.85	< 0.001
Good	109	10	9.2 (10/109)		

**Table 3.** Mean PCV of infected and non-infected cattle in Wolaita Zone Kindo Koish District of Ethiopia.

Status of the animal	Number	Mean PCV (%)	$\pm$ std. deviation	std error	t- test	P-value
Infected	17	23.8	1.89	0.45	5.06	< 0.01
None infected	251	25.6	1.38	0.08		
Total	268	25.5	1.48	0.09		

and 21% prevalence of bovine trypanosomosis respectively at Omo river basin of south western Ethiopia. The discrepancy between reports might be due to the presence of large study time gap, application of relatively well designed methods of tsetse control and treatment, expansion of cultivation in the area which indirectly affects flies distribution, expansion of veterinary clinic, and awareness of people towards the control and treatment of the disease.

The findings of the infection rate with *Trypanosome congolense* in the present study which is 58% is in line with Abebe and Jobre (1996) for tsetse infested areas of Ethiopia (58.5%), Muturi (1999) at southern rift valley of Ethiopia (66.1%) Afework et al. (2001) at Pawe, North west Ethiopia (60.9%), Terzu (2004) in selected sites of southern region (63.4%) and Bitew et al. (2011) in West Gojam (54.3%). The increased proportion of infection with *T. congolense* in the study area may be due to the major cyclical vectors of the savannah tsetse flies, (*G. moristans* and *G. palidpes*) which are effective in transmitting *T. congolense* than *T. vivax* (Langrigde, 1976; Solomon, 1997) since the study area is located in the tsetse belt of Ethiopia.

Infection rate in poor body conditioned animals were significantly higher than good body condition animals ( $p < 0.05$ ) and was in agreement with Mussa (2002) and Bitew et al. (2011) although higher infection rate was observed in animals of < 3 years of age and animals above three years of age, in the present study

no statistically significant ( $p > 0.05$ ) difference was observed in both age and sex as risk factor. This result is in agreement with the previous results reported by Mussa (2002), Sinshaw (2004) and Bitew et al. (2011). This could be due to the fact that all animals graze and used as draft as well as harvesting of crops to the same tsetse challenged areas. This may be different with other works with respect to age of the animals as Rowlands et al. (1995) in Ghibe valley indicated that suckling calves do not go out with their dams but graze at homesteads until they are weaned off. Young animals are also naturally protected to some extent by maternal antibodies (Fimmen et al., 1999). This could result in low prevalence of trypanosome in calves.

The mean PCV value of studied animals was significantly ( $p < 0.05$ ) varying between parasitaemic (23.8%) and aparasitaemic (25.6%) animals. This result was in agreement with the previous results reported by Sinshaw (2004) as (21.6%) and Bitew et al. (2011) as (20.3%). Anemia is one of the most indicators of trypanosomosis in cattle (Stephen, 1986). The level of anemia or PCV usually gives a reliable indication of the disease states and reduces performance of infected animals (Trail et al., 1993).

From this study it is possible to conclude that trypanosomosis is an important disease and a potential threat affecting the health and productivity of cattle in the study area. The major species of trypanosomes in the study area were *T. congolense* followed by *T. vivax* and

mixed infection of the two species. Infection with trypanosomosis negatively affected PCV and body condition. This indicated that trypanosome infection of cattle cause's loss of body weight and production. Further study on the occurrence of tsetse and trypanosomosis at different season of the year, at different altitude and different species of animals should be conducted. Trypanosomosis control measures which are practical to Ethiopia such as tsetse control methods should be applied unless it will be devastating for cattle in the study area.

## ACKNOWLEDGEMENTS

The authors would like to thank Wollo University School of Veterinary Medicine for financial support to execute this research work. It is also our pleasure to extend our gratitude to Wolayta Sodo Veterinary Diagnostic and Investigation Center for its technical, financial and material support in the realization of this study.

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