Prevalence of Bovine Trypanosomosis in Harotatessa Settlement Area of Upper Dedessa Valley, Illubabor Zone, Southwestern Ethiopia

Zelalem Abera and Feyesa Regassa

Abstract: The study was carried out on November, 2007 to May, 2008 in Haro Tatessa, which was one of the settlement areas in Bedelle district of the Illubabor Zonal administration of Oromiya Region. The study was aimed to determine the prevalence rate of bovine trypanosomosis, the species and relative magnitude of different species of trypanosomes affecting bovine in the study area and PCV values in parasitaemic and non-parasitaemic animals. The methods followed during the study were parasitological (Buffy coat) and hematological (PCV) examination. A total of 732 cattle were randomly selected from the study population and out of the total cattle examined 39 (5.3%) cattle were positive for trypanosomes. The recorded trypanosomosis prevalence rates were varying from 2.1% to 9.3% in different localities of the study area and the overall prevalence rate was 5.3%. The percentages of identified trypanosome species were

Trypanosoma congolense (69.2%), T. vivax (15.4%) and T. brucei (12.8%) and mixed parasites (T.congolense and T.vivax) with 2.6%.

The results showed that, T.congolense was the most prevalent in all peasant association and followed by T. vivax. There was a statistically significant difference (p<0.05) in distribution between species of trypanosomes infection. The prevalence of disease recorded among ages groups was 0%, 4.5% and 6.0% calves (<3 years), youngs (3-9 years) and adults (>9 years), respectively. The results also showed the prevalence between sexes 5.32% and 5.34% male and female, respectively. The infection rates between different ages and sexes of animals showed no statistically significant difference. The mean PCV value of parasitaemic animals was 20.80%, of aparasitaemic animals was 25.65% and the overall mean PCV value was 25.4%. Analysis of the mean PCV values of parasitaemic and aparasitaemic animals showed statistically significant difference (p<0.05). The results of the study suggested that trypanosomosis in the area was somewhat decreasing. However, due to its impact on the livestock, an appropriate tsetse control methods should be expanded to reach tsetse infested area in a sustainable manner to alleviate the problem of trypanosomosis in the area.

Key words: Bovine • Harotatessa • Illubabor • Prevalence • Trypanosomosis • Upper Didessa Valley • Ethiopia

INTRODUCTION

Trypanosomosis is a complex disease of protozoa that is caused by different species of unicellular parasites flagellate belonging to the genus Trypanosome found in the blood and other tissues of vertebrates including livestock, wild life and people [1].

Trypanosomosis limit the extension of natural herds particularly in Africa where the presence of tsetse fly densities access to woodland and savannah areas with good grazing potential [2]. It is a serious constraint to agricultural production in extensive areas of the tsetse-infested Ethiopian low lands [3]. Over 10 million Km of the tropical Africa is infested by different species of tsetse flies and trypanosomosis [4].

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Trypanosomosis can be transmitted between the hosts mainly by tsetse flies cyclically, by other biting flies mechanically and by other means of transmission [1, 5]. Trypanosomosis transmitted by tsetse is widespread throughout of the African continent from the southern borders of the Sahara to approximately 20° south Latitude and is a major factor in holding back the development of these vast areas [6]. Trypanosomosis of domestic livestock covers a great area than that of human trypanosomosis. It has a major importance in cattle and, in some regions, in camels, pigs and other domestic animals. The reduced capacity for work animals is also a very important factor where 80% of the traction power in African Agriculture is provided by animals. Generally there is a great threat of trypanosomosis which is a major obstacle to the economic development of the African continent and also reasonable for the incalculable toll of human health [2].

The earliest history of trypanosomosis in Ethiopia is in accounts given by explorers and travelers telling of the losses of their transport animals when they had encountered tsetse fly belts. According to [7] who in this account of his journey through southern Ethiopia mention the ‘Gendi-fly’ (Tsetse) attacking his transport animals and causing a disease locally called ‘Gendi’ (Trypanosomosis) from which many animals died.

Six species of trypanosomes are recorded in Ethiopia and the most important trypanosomes, in terms of economic loss in domestic livestock are the tsetse transmitted species: T. congolense, T. vivax and T. brucei. The closely related T. brucei sub species, T. b. rhodensiense causes human sleeping sickness. The other trypanosome species of economic importance are T. evansi of camels and T. equiperdum of horses. T. congolense, T. brucei and T. rhodensiense are highly concentrated in Western, T. vivax in all part but sparse in Eastern part of the country, T. equiperdum in the central and T. evansi highly concentrated in the East, Northeast and Southeast of Ethiopia [2].

Tsetse flies in Ethiopia are confined to the Southern and Western regions between longitude 33° and 38°E and latitude 5° and 12°N. They infest areas which together amount to 220,000 km². Tsetse infested areas lie in the low lands and also in the river valleys of Abay (Blue Nile), Baro, Akobo, Didessa, Ghibe and Omo [8].

Consequently, new areas are being invaded and settled communities are being continually evicted by the advancing tsetse. These areas include the areas in Upper Didessa Valley, the Northern and Northeastern edges of Lake Abaya in the rift valley, the upper reaches of the Omo-Ghibe and its tributaries.

To date five species of Glossina (G. m. submoristans, G. pallidipes, G. tachinoides, G. f. fuscipes and G. longipennis) have been recorded from Ethiopia and except G. longipennis, all of them are widespread and significant economic importance [2].

It is prevalent in two main regions of Ethiopia i.e. the Northwest and the Southwest regions. In most low lying areas, especially in the south west are infested with trypanosomosis deter animal production [9]. Currently, National Tsetse and Trypanosomosis Investigation and Control Center (NTTICC) is working on updating tsetse and trypanosomosis distribution map in Ethiopia, thus wide range of tsetse and trypanosomosis survey were carried out in Abay or Didessa river system [10].

Mixed livestock and crop productions characterize the predominant farming system in the highlands. With livestock playing a vital role in agricultural activities, the provision of animal’s draft power is particularly crucial [5].

Tsetse transmitted animal trypanosomosis still remains as one of the largest causes of livestock production losses in Ethiopia [10]. Tsetse flies are estimated to infest over 220,000 KM² fertile lands in Western, Southwestern and Southern parts of the country. About 15-20% of the land believed to be suitable for livestock production is affected by one or two species of the tsetse flies [11]. 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 due to indirect losses, which include exclusion of livestock and animal power based crop production from the huge fertile tsetse infested areas [5].

Ethiopia has about 14 million heads of cattle which are exposed to the risk of trypanosomosis. It is not only the loss in meat and milk production of animals recovering from the disease but the great damage caused by the disease is that it has rendered thousands of hectors of land unfit for settlement and cultivation. In addition, some drugs are applied to treat the diseased animals, which are costly. In the same condition, the study area was virgin land and known by different species of tsetse flies infestation, which currently considered as one of settlement areas in the Zone [12]. However, there was no sufficient information on the problems stated above which needs study. Therefore, this study was aimed to determinethe prevalence rate of bovine trypanosomosis, species and relative magnitude of the different species of trypanosomes affecting bovine in the study area and PCV values in parasitaemic and non-parasitaemic animals.
MATERIALS AND METHODS

Study Area
Geographical Description of the Study Area: The study was conducted in Illubabor Zone from October 2007 to March 2008. The Zone is one of the Oromia Regional state at the Southwestern part of Ethiopia. The Didessa valley is part of the Oromia Regional State between Jimma, Illubabor and East Wollega Zonal Administration. The valley comprises areas from Goma, Limukosa and Limu seka woredas of Jimma zone, Bedelle Dabo, Didessa and Gecho Borecha woredas of Illubabor zone and Jimma-Arjo and Nunu Kumba of the East Wollega. One site which is disease controlled Settlement area (Haro Tatessa) was selected for the study. Chulul Arba, Konto, Chancho, Bayima, Dumuga, Birbirsa lafto, Ziway, Unke, Dodota sire, Ifu biflu, Medalle, Meda jalela, Guracha chisa PA’s were included in the study. Haro Tatessa Settlement area is located in Bedelle woreda of Illubabor zone and is an area in the Upper Didessa Valley. It is a rural community which composed of 5 peassant associations (PA’s) and is distant about 36km distance from the Bedelle town which is located at main road from Addis to Gambella Regional State via Jimma town and 120 kilometers distance East of Zonal capital Metu town. It is found near Didessa River, which is characterized by flat lowland plane area with decreasing altitude (1100-1335m.a.s.l.) along the course of the river. So the area is a part of the major tsetse and trypanosomes belts [13].

The Agro-climatic Condition: According the information gained from Agricultural Office of the district [14] the ago-climate condition of the area is falls within tropical sub humid climate as the area have 4 to 5 humid months and mean annual rainfall greater than 11500 mm and the altitudinal range from 1100 to 1400m.a.s.l.with daily temperature of 18.5°C to 27.5°C.

The vegetation type of the area is characterized by common savannah vegetations. The area has been a virgin land with reserved vegetations until the settlement program was practically applied and this is why tsetse flies especially G.tachinoides is found in abundance throughout the site. Due to this reason, tsetse flies are forced to be remained in and on the bank of the river until wet season where there comes restoration of vegetation that gives shelter to them [15, 16].

Distribution of Tsetse Flies (Glossina) in the Area: Out of the nine regions of Ethiopia, five of them like Amhara and Benishangul-Gumuz (Abay or Blue Nile river basin), Gambella (Baro or Akobo), Oromiya (Abay or Didessa, Upper Ghibe or Omo and Baro or Akobo river basin) and SNNPR (Ghibe or Omo and Rift-Valley) are infested with more than one species of these flies [2]. Consequently, new areas are being invaded and settled communities are being continually evicted by the advancing tsetse. These areas include the areas in Upper Didessa Valley, the Northern and Northwestern edges of Lake Abaya in the rift valley, the upper reaches of the Omo-Ghibe and its tributaries. Specific species of tsetse flies were surveyed in Upper Didessa Valley. Some of these species are G.tachinoides, which highly infests the area and G.m.submorsitans. Specially all of the settlement areas in Chewaka and Bedelle Dabo Woreda are highly infested with specific species of tsetse flies [15, 16].

According to the surveillance of tsetse flies by NTTICC in six settlement areas of both districts, other biting flies were also caught during this surveillance of
tsetse flies in both districts. Out of the species of tsetse flies found in the Illubabor Zone, there are only two species of the tsetse flies in the Haro Tatessa settlement area. These are: *G. morsitans* submorsitans and *G. tachinoides*. Therefore, *G. tachinoides* are the widespread species of tsetse with high infection rate which are highly important in economic aspects in the area of study [15].

**Study Population:** There is a total number of 59,233 bovine species in Bedelle district. From this total number of bovine species, there were a total of 6,689 zebu cattle in the study area (Haro Tatessa Settlement area). Out of this total, 3,603 of them were male and 3,086 of them were female. Cattle population in the study area were categorized according to their age and 3,399 (2,128 male and 1,271 female) adults, 2,234 (1,125 male and 1,109 female) young and 1,056 (350 male and 706 female) of them were calves [14].

**Study Design:** The cross-sectional type of study was designed to be used for the research with the assumption that it could help to get an understanding of the current state of problem by describing it in relation to the prevalence of bovine trypanosomosis in Upper Valley of Didessa.

**Sample Size and Sampling Method:** The simple random sampling technique was followed, to select the animals to be used for the study of the prevalence of bovine trypanosomosis in the study area. A sample size was determined by the expected prevalence of bovine trypanosomosis in the district was 32.25% [16] and the minimum sample size for this cross-sectional study was calculated using the formula by [17] with 95% confidence level and 5% absolute precision. Accordingly, 336 desired sample sizes for the study were calculated.

\[
    n = \frac{1.96^2 \cdot p \cdot (1-p)}{d^2}
\]

where:
- \(n\) = required sample size;
- \(p\) = expected prevalence and
- \(d\) = desired absolute precision.

Therefore, a total of 732 cattle were randomly sampled from five peasant associations to be involved in this study.

**Study Methodology (Diagnostic Method):** Parasitological and haematological techniques were applied for investigation of the parasites [1].

Of all current trypanosomes survey, buffy coat technique (Haematocrit centrifugation technique) is diagnostic technique used in the field and the most sensitive one. Blood samples were obtained by bleeding the marginal ear vein of cattle using a sterile lancet and blood from the ear vein drawn by a heparinized capillary tube at least its 3/4th of volume and sealed at one end with crystal seal. The collected blood centrifuged at 12000 rpm for 5 minutes.
The spinning process that separate the RBC from that of WBC or WBC + parasite and plasma according to the specific gravities takes 60,000 rotations (12,000 rpm x 5min.). When the centrifugation process gets an end, the PCV is red recorded in the survey format or notebook. Animals with PCV reading below 24 were considered as anemic [18, 19].

The trypanosomes infection was detected by the method of blood examination at the study site using Buffy-coat dark ground microscopic technique. To identify the species of trypanosomes morphologically, staining technique was used. For positive cases, in Giemsa stained blood smears, the morphology of the species can be distinguished by their size, shape, location and size of kinetoplast, position of nucleus and the attachment and length of flagellum [20, 21]. Total sample taken, total PCV and prevalence rate were recorded for each particular site, PA or district and finally the overall prevalence rate of the area was calculated as proportion of positives among sampled animals.

Statistical Analysis: The total prevalence rate was calculated based on the examination positive results by dividing the number of positive results of animals by the total number of animals tested in the area. Appropriate, descriptive and Chi square (X²) were calculated using SPSS software. And the pattern of mean packed cell volume (PCV) values were calculated by using t-test formula, the prevalence rates of bovine trypanosomosis between different ages and sexes of animals and distribution of species of trypanosomes in the areas was compared.

RESULTS

Parasitological Findings: Out the total 732 cattle examined 39 (5.3%) of them were positive for the parasite. The prevalence of the disease was varying from 2.1% in Birbirsa Lafto to 9.3% in Bayima site of the Chaffee Jalela peasant associations (PA). That means the highest prevalence rate was found in the Bayima site and the lowest prevalence rate was also recorded in the Chaffee Jalela PA (Table 1) and the overall prevalence rate of the area was 5.3 % (X²=6.4, p< 0.05 and CI=5.32-5.341). The result showed that there was statistical difference in the study area and Figure-3 indicates the infection rates of trypanosomosis in different localities of all peasant associations.

<table>
<thead>
<tr>
<th>Localities</th>
<th>Total of examined (% of animals)</th>
<th>N°. of positive</th>
<th>Infection Rates (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chulul Arba</td>
<td>96</td>
<td>4</td>
<td>4.2</td>
</tr>
<tr>
<td>Konto</td>
<td>72</td>
<td>4</td>
<td>5.6</td>
</tr>
<tr>
<td>Chancho</td>
<td>48</td>
<td>3</td>
<td>6.3</td>
</tr>
<tr>
<td>Bayima</td>
<td>54</td>
<td>5</td>
<td>9.3</td>
</tr>
<tr>
<td>Dumuga</td>
<td>66</td>
<td>4</td>
<td>6.1</td>
</tr>
<tr>
<td>Birbirsa lafto</td>
<td>48</td>
<td>1</td>
<td>2.1</td>
</tr>
<tr>
<td>Ziway</td>
<td>72</td>
<td>3</td>
<td>4.2</td>
</tr>
<tr>
<td>Uke</td>
<td>48</td>
<td>3</td>
<td>6.3</td>
</tr>
<tr>
<td>Dodota sire</td>
<td>36</td>
<td>1</td>
<td>2.8</td>
</tr>
<tr>
<td>Ifhu biftu</td>
<td>24</td>
<td>2</td>
<td>8.3</td>
</tr>
<tr>
<td>Medalle</td>
<td>48</td>
<td>3</td>
<td>6.3</td>
</tr>
<tr>
<td>Meda jalela</td>
<td>48</td>
<td>2</td>
<td>4.2</td>
</tr>
<tr>
<td>Guracha chiisa</td>
<td>72</td>
<td>4</td>
<td>5.6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>732</strong></td>
<td><strong>39</strong></td>
<td><strong>5.33</strong></td>
</tr>
</tbody>
</table>

Fig. 3: Result of Trypanosome’s Survey in Different Localities of Haro Tatesa Settlement Area
Fig. 4: Distribution of trypanosome species in the area.

Fig. 5: The mean PCV values of apparasitaemic and parasitaemic animals

Table 2: Distribution of trypanosome species in different localities of the area. Species of Trypanosomes

<table>
<thead>
<tr>
<th>Different sites (Localities) of the Study Area</th>
<th>T.congolense</th>
<th>T.vivax</th>
<th>T.brucei</th>
<th>Mixed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chulul Arba</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Kooto</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Chucho</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Bayimta</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Dumuga</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Birbirsa Lafto</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Ziway</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Unke</td>
<td>2</td>
<td>2</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Dodota Sire</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Ifubiftu</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Medalle</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Medalela</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Guracha Chisa</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>5</td>
</tr>
</tbody>
</table>

Distribution of the species of trypanosomes: During the study, T. congolense, T. vivax, T. brucei and some mixed parasites (T. congolense and T. vivax) were detected. Out of 39 infected animals 27 (69.2%) cattle were found to be infected by T. congolense, 6 (15.4%), T. vivax, 5 (12.8%), T. brucei and 1 (2.6%) mixed parasites (T. congolense and T. vivax) (Table 2). The results showed that, T. congolense was highly detected in all PAs followed by T. vivax (Figure 4) and there was a statistically significant difference (p< 0.05) in distribution between species of trypanosomes.

Hematological Findings: Out of the examined animals, 39 of them were positive and their mean PCV was 20.80% with an interval of 19.90% (Lower) to 21.63% (Higher) and 693 of them were free of disease and their mean PCV value was 25.65% with an interval of 25.02% to 26.29%. The overall mean PCV value of the study was also resulted in 25.4% with an interval of 24.79% to 25.99%. From the obtained results of mean PCV values, there was statistically significant difference between infected and non-infected animals, Figure-5 (X^2= 3.60, p<0.05 and CI=24.79-25.99).

Prevalence of Bovine Trypanosomes in Sex: The prevalence of bovine trypanosomosis between female and male animals was studied. From a total of 732 cattle randomly selected and examined in five PAs, 471 of them were male (64.34%), from which 25 animals were positives of trypanosomes (5.32%), while 261 of them were female (35.66%) in which 14 animals were positives of trypanosomes (5.34%) as indicated in
Table 3: Comparison of Prevalence of bovine trypanosomosis between different sexes

<table>
<thead>
<tr>
<th>Sex group</th>
<th>No. of examined animals</th>
<th>No. of positive</th>
<th>Prevalence rates (%)</th>
<th>P-value</th>
<th>X^2</th>
<th>95% CI Lower</th>
<th>95% CI Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>471</td>
<td>25</td>
<td>5.32</td>
<td>0.840</td>
<td>1.073</td>
<td>3.28</td>
<td>7.40</td>
</tr>
<tr>
<td>Female</td>
<td>261</td>
<td>14</td>
<td>5.34</td>
<td>-</td>
<td>-</td>
<td>2.61</td>
<td>8.12</td>
</tr>
<tr>
<td>Overall</td>
<td>732</td>
<td>39</td>
<td>5.33</td>
<td>-</td>
<td>-</td>
<td>3.70</td>
<td>6.97</td>
</tr>
</tbody>
</table>

The following Table 3. However, there was no statistically significant difference (p>0.05) between the two sexes of animals.

Prevalence of Bovine Trypanosomes among Age:

Prevalence of bovine trypanosomosis among age was studied at Haro Tatessa settlement area of Upper Didessa Valley. Out of the sampled animals, about 24 calves (<3 years) were examined and they were free of the disease (0%). From 202 examined young animals (3-9 years) about 9 (4.5%) animals were positive of the disease and among 506 examined adult animals (> 9 years), about 30 (6.0%) animals were positive of trypanosomes. Analysis of age wise prevalence of the disease indicated that the difference in prevalence among the age groups were relatively high in adult than in calves and young groups. Both young and adult animals were infected with *T.congolense*. But, the obtained result indicates that there was no statistically significant difference in prevalence of bovine trypanosomosis among age groups of animals (p>0.05) (Table 4).

Table 4: Comparison of Prevalence of bovine trypanosomosis between different ages of animals

<table>
<thead>
<tr>
<th>Age group</th>
<th>No. of examined animals</th>
<th>No. of Positive</th>
<th>Prevalence rates (%)</th>
<th>P-value</th>
<th>X^2</th>
<th>95% CI Lower</th>
<th>95% CI Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 3 years</td>
<td>24</td>
<td>0</td>
<td>0</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>3-9 years</td>
<td>202</td>
<td>9</td>
<td>4.5</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>&gt; 9 years</td>
<td>506</td>
<td>30</td>
<td>6.0</td>
<td>.438</td>
<td>1.359</td>
<td>1.626</td>
<td>2.954</td>
</tr>
</tbody>
</table>

During this study, over all of 5.33% prevalence of bovine trypanosomosis was determined in the study area. This study showed that, there was a great difference between the result obtained before tsetse control option was carried out and after control. In tsetse infested areas of Ethiopia, 20-30% of cattle were affected by the disease and in some high tsetse challenge areas the prevalence of the diseases reaches up 50% [2]. Results obtained from previous study in Haro Tatessa settlement area and other settlement areas in Upper Didessa Valley were severe when compared with the present study. According to the Annual report of NTTICC [11] the situation before control was very bad, for instance the prevalence rate of trypanosomosis in cattle was about 58% in and around of settlement area before tsetse control. [16] reported prevalence rate of 34.1% in Dame Settlement area and it was very high when compared with the present study.

The reduction in bovine trypanosomosis prevalence was due to the presence of strategic tsetse control measurement was carried out by National Tsetse and Trypanosomosis Investigation and Control Center and Bedelle Regional Veterinary Laboratory in the study area. Other studies on the disease were made in different areas and comparatively the present finding was smaller than the results of [23] at Humbo Larena of Wolayita zone, 9.3% and [24] at Konso district, 11.5% respectively. The 13.44% prevalence rate of the disease in Gawo Dale district was reported by [25] 17.2% in Metekel, by [26].

We have also made an effort to identify the species and relative magnitude of different species of trypanosomes affecting bovine in the study area. Thus, the study revealed that *T.congolense* (69.2%) was the predominant species in the study area. It was similar with the finding of same disease in which (19.01%) was recorded in Goro district of the south Ethiopia in which the positive cases were due to *T.congolense* (58.75%) [27].

DISCUSSION

Trypanosomosis is a major constraint to the utilization of large land resources and also affect livestock, particularly cattle which play a major role in the agricultural economy of Ethiopia. The introduction of draught oxen in to the resettlement areas in low land was severely constrained by the widespread presence of trypanosomosis[2].

In this study, the prevalence of bovine trypanosomosis exposure was investigated in the Haro Tatessa, which was one of the settlement areas in Bedelle district of the Illubabor Zonal administration of Oromiya Region.
According to [28] *T.congolense* and *T.vivax* are the most prevalent trypanosomes that infect cattle in the tsetse infested and tsetse free areas of the Ethiopia respectively. In the tsetse-infested areas of the country, though, the prevalence of *T. Congolense* was found to be high 58.5% and a considerable number of examined animals were also harboring *T.vivax* infection was 31.3%. Higher proportions of *T.congolense* infection were detected in areas such as Gamu Gofa, Illubabor, Sidamo and Ghibe Valley [2]. Similar findings were reported by [8] in which the indicated 60% *T.congolense* and 31% *T.vivax*; Mean while, 84% *T.congolense* and 14% *T.vivax* infection recorded by [29] in Southwest part of Ethiopia. The finding was also in agreement with the work of [30] who reported that *T. congolense* was dominant in tsetse endemic areas while *T. vivax* was more linked to tsetse free areas.

This high ratio of *T.congolense* may also suggest that the major cyclical vectors or Glossina species (*G.m.submorsitance,G.tachinoides* and others) are more efficient transmitters of *T.congoles* than *T.vivax* in East Africa [8]. The use of drugs may be another factor, which could depress the incidence of *T.vivax*. In east Africa, *T.vivax* is generally less virulent than *T. congolense* and consequently cattle developed tolerance to the former more easily than to the latter [7]. Therefore, the chance of detection of *T.congolense* in peripheral blood of infected animals is higher than the other group. Additionally, the predominance of *T. congolense* infection in cattle may be also due to the high number of serodems of *T. congolense* as compared to *T. vivax* and the development of better immune response to *T. vivax* in the infected animal [31].

So, the preclominance of *T.congolense* over *T.vivax* to prevalence of Glossina (*G.m.submorsitans* and *G.tachinoides*) in an area is similar to the previous study, since the transmission of *T.congolense* is mainly cyclical, requiring the prevalence of tsetse flies, where as the transmission of *T.vivax* more readily transmitted mechanically by vectors other than tsetse flies. So, infection rates of other species are very low as compared to the infection to *T.congolense* in Haro Tatessa settlement area. This indicates that the distribution of trypanosome parasites was statistically highly significant difference (p < 0.05) in infection rates.

However, in areas such as Wollega and Keffa, the respective ratios between *T.congolense* and *T.vivax* infections were found to be more or less similar [2]. Most of the results, including the present study, indicated the low prevalence rate due to *T.vivax*. The survey of trypanosomosis in Wolayita Awraja was yielded in infection rate of 6.4%, *T.vivax* being the most prevalent species [32]. This is due to the ecology of the parasite which found in the fluids of the body cavities or in lymph as the *T.brucei* more than *T.congolense* which was confined to the blood vessels particularly the capillaries [33]. So, even if it is the technique to be applied in the field, microscopical examination of blood films for the detection of *T.vivax* group infection, it is very inaccurate [34].

A mixed infection of trypanosomes due to *T.vivax* and *T.congoles* was detected during this study. It was in agreement with the finding of [22] who reported a relative proportion of 95% *T.vivax* and 5% *T.vivax*and *T. congolense* mixed infection was identified in and around Bahir Dar. Parasitemia caused by either of the two trypanosomes species was usually very scanty and there was no an occasion when both species were observed to occur in equal proportions in blood, hence, the few numbers of cattle were suffered with mixed infections [33, 34].

According to PCV the animals were classified as anemic and non-anemic (Normal) and animals with PCV less than 24% were considered to be anemic [19, 35, 36]. During this study an effort was also made to indicate the difference between mean PCV values of paraitsaemic and apparasitaemic cattle in the area. During this study, 39 of them were positive and their mean PCV value was 20.80% and 693 of them were free of disease and their mean PCV value was 25.65%. In cattle, the normal range of mean PCV value was 24-46 [37] and in Haro Tatessa settlement area about 84.6% (Having greater than 24% PCV value) were apparasitemic cattle and the only 14.4% cattle were parasitemic (Having less than 24% value) by using a microhematocrit centrifuge technique to recorded PCV value of animals. In line with this, the overall mean PCV value recorded during this study was 25.4%.

The highest individual PCV value of apparastric animals were detected in some localities (Iftu Biftu and Guracha Chisa) of Bekelchabiftu and ChilaloBildima PAs and of parasitaemic animals were also detected in localities (Konto and Dumuga) Kollo Siri and Chaffee Jalela PAs. Considering measuring the mean as one of the major signs of a herd infected with trypanosomosis, the anemic status of sampled animals assessed anemia PCV of the sample animal. The anemic condition of the animals in Bayima, where the lowest individual PCV level 14 was found in the herd with the highest prevalence rate (9.3%), of Chaffee Jalela PA was somewhat severe corresponding with the prevalence of the disease detected in the area. Both tsetse and non-tsetse transmitted trypanosomes
causes’ marked PCV reduction. According to [28] 60% of T. vivax infected cattle in the high land showed anemia below a PCV value of 20% compared to 50% of T. congolense and T. vivax infected cattle in the lowland.

It is known that the development of anemia was the most reliable indicator of the progress of the trypanosome infection [2, 38] but it can also be assumed that numerous concurrent diseases and nutritional factors interfere within anemia development. Even though it is assumed as such, PCV values are reliable indicator of anemia. Statistical analyses of the results showed that there was significant difference (p<0.05) in mean PCV values of infected and non-infected animals and distribution of trypanosome parasites in different localities of the study areas.

During this study incalculable effort has been made to compare the extent of prevalence of bovine trypanosomosis between sexes of animals. The obtained result of this study showed that there was no statistically significant difference (p>0.05) in infection rates between male and female cattle. As the result shows, 5.32% and 5.34% were recorded in male and female animals respectively. This shows almost both sexes of animals have equal chances to be affected by the disease. This result is in line with the previous results of [22, 39, 40, 41] who obtained no significant difference in susceptibility between the two sexes. But, different researchers were reported that higher prevalence was observed in male cattle than in female [26, 42]. This shows that, unlike female, the number of male animals is not constant due to the farmers sold the male animals at frequency of 2-3 months after purchased.

From the result of the study the prevalence of bovine trypanosomosis among age, the animals classified under less than 3 years were free of the disease (0%) and this is occurred due to the calves don’t go down to the valley floor during the dry season in search of pasture, where the tsetse occupies during this season. Some of the rest animals (Between 3-9 years and >9 years of age) were positive of trypanosomosis. Animals with greater 9 years of age were highly infected (6.0%) when compared with those between 3-9 years of age (4.5%). This finding is in agreement with the previous works in which higher prevalence of trypanosome infection was recorded in older animals [43].

This is thought, due to the cattle normally go down to the valley floor during the dry season in search of pasture and water, was they may come in to contact with tsetse. Prevalence of the disease was low as compared to that of older which may be due to restricted grazing of young animals near homestead where there are less number of tsetse flies [44]. So, the obtained result of the present study of prevalence of bovine trypanosomosis showed that there was no statistically significant difference in infection rates between different ages of animals. However, the exact reason for this is not clearly known and requires further investigation and finding.

**CONCLUSION**

However, the trypanosomosis is a very important disease that causes economic loss in the livestock, the result of the study shows that prevalence of the diseases in the area is somewhat decreased.

Even through tsetse control had been under taken before five years by National Tsetse and Trypanosomosis Investigation and Control Center [15] and Bedelle Regional Veterinary Laboratory [16] still the infection due to trypanosomosis is important in the area. This may be due to re-infection by tsetse flies specially G. tachinoides while they go lower down to the Didessa river to drink water. Therefore, a progressive control campion aimed at reducing the tsetse fly burden from the whole valley would be necessary to minimize the impact of trypanosomosis.

From the obtained result of the study, the following recommendations like enhancement of regular strategic prophylactic treatment and establishment of Veterinary clinic in the control of the parasite, re-establishment of the Veterinary clinic with human force (Vet. workers) and drugs to control the disease, educating the farmers in the area on how to control the vectors of the parasites and the disease properly, expanding an appropriate tsetse control methods (Spot-on and insecticide impregnated targets) to reach tsetse infested area in a sustainable manner, giving attention to reinvasion of the reclaimed area to effective utilizing the control efforts and advising people not to take their cattle to Didessa and the known main tributaries can be additional solution until the control program brings about desired result were forwarded.

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