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# Prevalence of Bovine Trypanosomosis in Guduru District, Guduru, Horo Guduru Wollega, Ethiopia

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**Abstract:** A Cross-sectional study was conducted on a total of 384 Zebu cattle in selected kebeles of Guduru District from June 2013 to September 2013. The purpose of the study were to determine the prevalence and species of *Trypanosomes* infecting cattle using Buffy Coat(dark ground phase contrast) technique and thin blood smear and to assess the associations of common complaints observed by cattle owners with detected *Tryapanosomiasis.* Out of 384 blood samples16.93% of cattle were positive for *Trypanosomosis*.The majority of infections were caused by *Trypanosomavivax,* 43(66.15%) followed by *Trypanosoma congolense, 22*(33.85%) and Trypanosoma infection rate based on different age groups,kebeles and sexes were not found statistically significant ($p>0.05$).But, the prevalence was significantly higher ($P<0.05$) in cattle which were in poor body condition. Sex wise prevalence of 33(50.8%) and 32(49.2%) were recorded in female and male cattle respectively. Up on case history assessment the likely hood of cattle with poor body condition to be trypanosome positive was higher when compared to good body condition. The result of this survey indicated that bovine Trypanosomosis is potentially a major constraint to the livestock production and vector control should be strengthened to improve livestock production and agricultural development in the study area.

**Key words:** Cattle · Clinical Signs · Guduru District · Ethiopia · Prevalence · Trypanosomosis

## INTRODUCTION

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

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 Donaldson [2], who in this account of his journey through southern Ethiopia mentions the 'Gendi-fly' (tsetse) attacking his transport animals and causing a disease locally called 'Gendi' (trypanosomosis) from which many animals died.According to Getachew[3], 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: *TrypanosomaCongolese, T.viax and T.brucei.* The closely related *T.brucei* sub species, *T.rhodensiense causes* human sleeping sickness. The other trypanosome species of economic importance are *T.evansi* of camels and *T.equiperdum* of horses.

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 $km^2$s. Tsetse infested areas lie in the low lands and also in the river valleys of Abay (Blue Nile), Baro, Akobo, Didessa, Ghibe and Omo[4].

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 [3].

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Trypanosomosis 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 [5]. 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 [6]. Therefore the objectives of the present study were to determine the prevalence of bovine trypanosomiasis, to identify trypanosome species responsible for the bovine trypanosomiasis and to determine associated risk factors on the prevalence of diseases.

## MATERIALS AND METHODS

**Study Area:** The present study was carried out in selected villages of GuduruWoreda which is found in Oromia National Regional state, western Ethiopia. The woreda is located at 288km away from Addis Abeba and has total population Of 130,889 and land area of about 140,689,069 hectares. Theworeda was bounded by Jimma rare woreda at south,Abbaychomanworeda at east HababoGuduruworeda at north,westshoa at west [7].

**Geographical Description of the Study Area:** The study area has an altitude range of 1,316 to 2,430 above sea level and receives an average annual rain fall of 1,350 mm. The temperature range is 20°C to 30°C and the annual average is 25°C according to the Guduru Woreda Agriculture and rural development office [7].

**The Agro-Climatic Condition:** Agro-climatic classification of the woreda is low land 21% mid altitude 79% and high land 0 % coverage. The farming practice in the area is mixed were a crop production and all classes livestock except camels are found, population of cattle 17129, sheep 19501, goats 19133,horses 3734, donkey 11875, mules 818 and poultry 81431 [7].

**Study Population:** The study was conducted on local zebu cattle. These animals were raised in different villages of Guduru district. The animals are examined in this particular study were representing different kebeles, sex, body condition and age groups(young and adult) and reared in extensive management system.

**Study Design:** Across sectional study was conducted from June2013 to September 2013 by selecting 3 kebelesof 37 kebeles found in the woreda purposively based on their accessibility and environmental variations.

A total of 384 animals were sampled, the number of animals sampled from each village was based on age, body condition, sex and animals were selected by simple random sampling using lottery method.

**Sample Size and Sampling Method:** The sample was obtained randomly by using simple random sampling method. The sample size was determined to be 384 by using the simple random sampling formula (Thrusfield, 1995).

$$n = 1.96^2 xp\ (1-p)/d^2$$

Where,
n = The sample size
P = The expected prevalence
d = The desired absolute precision

**Sample Collection and Parasitological Examination**
**Sample Collection:** Blood samples were collected after properly securing the animal and aseptically preparing around the vein. In the present study a small quantity of paired blood samples were obtained from the marginal ear vein after pricking the vein with the tip of sterile lancet. The lancet must be cleaned with cotton after bleeding each animal to prevent cross contamination of the sample.

**Parasitological Examination:**
**Buffy Coat/dark Ground Technique:** Buffy coat technique is used for diagnosing low parasitemia, to identify trypanosome species and its quantification.

**Procedure:** Blood was collected by two heparinized microhematocrit capillary tubes up to $3/4^{th}$ of its volume from each animal for thin smear preparation. One end of the tube was sealed with crystal sealant. The tube was placed in the microhematocrit centrifuge ensuring that the sealant is at the outer end.

The blood in capillary tube was centrifuged at 12,000 rpm for 5 minutes. As the centrifugation process gets an end, the tubes were taken from the hematocrit centrifuge and the capillary tubes were cut using diamond pencil

1mm below the Buffy coat including the top layer of the RBC[8]. To identify the species of the trypanosomes morphologically, staining technique was used [9].

Thin blood smears and Giemsa staining: For positive cases, in Giemsa stained blood smears, the morphology of the species can be distinguished by their size, location and size of kinetoplast, position of the nucleus and the attachment and length of the flagellum [10].Excess stain was drained and washed off by using distilled water. Allowed to be dried and examined under microscope at x100 objectives.

**Data Management and Analysis:** Raw data generated for this study were entered into Microsoft Excel and the prevalence of bovine trypanosomosis in different age groups and sexes were analyzed by using SPSS 20 version Software. Chi-square was used to compare the prevalence of trypanosome infection in different variables and to determine association between variables and the disease. In all cases differences between parameters were tested for significance at probability levels of 0.05 or less.

## RESULTS

**Parasitological Findings:** A Cross-Sectional study was conducted on 384 randomly selected cattle in Guduru district from June 2013 to September 2013 and an overall prevalence 16.93% was recorded. The lowest prevalence of infection observed in Hula Guto and the highest prevalence was recorded in GutoAbey villages in the study area as presented (Table 1). But, there was no statistically significant difference between the study areas (p >0.05).

**Prevalence of Trypanosome Infection in Both Sexes:** During the present survey, from total of 384 cattle examined, 168 where females and 216 of them where male animals. Of the female animals examined were 33(50.7%) positive for trypanosome infection while 32(49.3%) of the male animals where found infected as summarized in Table 2. The trypanosome infection in female animals is slightly higher than in the male animals. However, statistically there is no significant difference in the infection rate between both sexes (Chi square=p>0.05%).

**Prevalence of Trypanosome Infection in Different Age Groups:** The animals examined where categorized in different age groups as young (1-3) and adults greater than 3 years old.

The trypanosome infection found was in young group 24 (36.9%) and in the adult group is41 (63.1%) in indicated in Table 3. There is no statistically significant between infection rate among the different age groups (Chi square =0.232' p>0.05%).

The prevalence of Trypanomosis under different body condition groups was indicated. The infection rate of animals with poor condition was higher than that of animals with good body condition.As a whole,prevalence of Trypanosomosis in good body condition animal was lower when compared with poor body condition animal.This may indicate that other factors such as:nutrition,disease and management system have contributed for poor body condition animals to be more susceptible.

## DISCUSSION

In the present study on 384 local zebu cattle, an overall prevalence of 16.92% bovine trypanosomosis was recorded and the species indentified were *T. vivax and T; congolense*. Similary, Getachew Abebe and Yilma Jobre [11] reported that *T. congolense* and *T. vivax*were the most prevalent trypanosomes that infect cattle in the tsetse infested and tsetse free areas of Ethiopia. But, according to the previous survey, a prevalence of 22% was documented for bovine trypanosomosis in Agamsa Belakebele [12].

Table 1: Prevalence of trypanosome infection in different village of GuduruWoreda,western Ethiopia.

| Area | Total animal examined | No. of positive (%) | Prevalence (%) | $x^2$ (p=value) |
|---|---|---|---|---|
| Hula Guto | 71(44.5%) | 27(41.5) | 15.84 | 6.069(0.048) |
| Guto Abe | 81 (21.1%) | 15(23.1) | 18.5 | 0.32(0.85) |
| Gudane Sirba | 132(34.4) | 23(35.4) | 17.4 | 0.906(0.341) |
| Total | 384 (100%) | 65(100) | 16.93 | |

Table 2: Sex Wise Prevalence of Trypanosome infection

| Area | Total animal examined | No. of positive (%) | Prevalence (%) | x2(p=value) |
|---|---|---|---|---|
| Hula Guto | 171(44.5%) | 27(41.5) | 15.84 | 6.069(0.048) |
| Guto Abe | 81 (21.1%) | 15(23.1) | 18.5 | 0.32(0.85) |
| Gudane Sirba | 132(34.4) | 23(35.4) | 17.4 | 0.906(0.341) |
| Total | 384 (100%) | 65(100) | 16.93 | |

Table 3: Trypanosome infection in different age groups.

| Age group animals examined | Number of examined | Number of animal infected | Prevalence | $x^2$(p -value) |
|---|---|---|---|---|
| Young (1-3) | 152 | 24(36.9%) | 15.8% | |
| Adult ( > 3 ) | 232 | 41(63.1%) | 17.7% | |
| | | 0.232(0.632) | | |
| Total | 384 | 65(100%) | 16.93% | |

Table 4: Trypanosome infection in different body condition

| BodyCondition | Total animalexamined | No. of animalinfected | Prevalence (%) | $X^2$(p=value) |
|---|---|---|---|---|
| Good | 248 | 27 | 10.9 | 4.385(0.112) |
| Poor | 136 | 38 | 27.9 | 18.16(0.001) |
| Total | 384 | 65 | 16.9 | |

A range of prevalence were also documented from multiple previous studies conducted in the country as 17.20% at Pawe, North West Ethiopia [13], 18% in Bunno[4], 17.20% in Metekel district [15], 19.01% in Goro district [16]. The present finding is relatively low prevalence may be attributed to the frequent use of chemotherapeutic drugs, an increase in agricultural investment and decreased tsetse challenge in the area.

The prevalence of bovine trypanosomosis in both sexes was assessed where 50.8% and 49.2% infection rates were detected in female and male animals respectively. Although slightly higher infection was depicted in female animals, there was statistically no significant difference between both sexes (Chi square =1.567, p>0.05). This observation coincides with the findings of Getachew[17] in Tow districts of western Gojjam, Tefera[18] in Arba Minch districts, Adane[19] in and around Bahir Dar and Welde[20] in different areas of Ethiopia who reported no significant difference in susceptibility between the two sexes.

The prevalence study in different age groups in the area showed that the trypanosome infection rate in the age group was recorded to be 36.9% and 63.1% (in the young and adult age categories respectively. However, there is no statistically significant difference among the various age groups (Chi square = p>0.05). This result supports the result of the previous work by Alekaw [21] who concluded that there is no significant difference in infection rate between the age group. In the present work, youngare appeared less affected and the possible explanation is that young animals are naturally protected to some extent by maternal antibodies. Whereas the older age groups might have faced the vector challenge during grazing in the field and at watering points. The infection rate animals with poor body condition was slightly higher than good body condition.This indicate that other factors such as diseases,nutrition factors as well as management systems may havecontributed for the poor condition of cattle [22]. Low level of Trypanosoma infection in the good body condition animals might be related to those well-nourished animals have good level of immunity and are in a better position to resist infection.

In the present study *T. vivax* is the predominant species in the study area as compared to the other species of trypanosomes. The prevalence of *T. vivax*is (66.15%) and *T. congolese* is (33.84%). The present study is agreement with the previous results of an area of East Wollega Zone (Sibu Sire) the respective rationsbetween *T. congolense* (36%) and *T. vivax (*64%) infections were reported [23].

This study was revealed, the presence of *T. vivax* is an indicator of the importance of mechanically transmitted *Trypanosoma in an* area where tsetse control program is under taken. The moderately low prevalence of trypanomosis recorded in the present study might be attributed to the reduction of tsetse population and other biting flies due to bush clearing However, the results of Tewelde[24] at Kone (75%) and Village I (93%) settlement areas of west Ethiopia, Woldeyes and Aboset[25] at Arbaminchzuria districts (85.2%) and Rowland [26] in Ghibe valley, south west Ethiopia (84%) had shown higher results of *T. congolense* than the present findings. These high ratios of *T. congolense* suggest that the major cyclical vectors or *Glossina* species are more efficient transmitters of *T. congolense* than *T. vivax* in east Africa [4].

According to Abebeand Jobre [11], cited by Getachew [3], *T. congolense* and *T. vivax* are the most prevalent trypanosomes that infect cattle in tsetse infested and tsetse free areas of the Ethiopia respectively. In the tsetse-infested areas of the country, though the prevalence of *T. congolense* is found to be high; a considerable number of examined animals were also harboring *T. vivax* infection, which coincides with the result of the present study. While, Langridge[4] reported a prevalence of 60% *Trypanosoma congolense* and 31% *T. vivax.*

## CONCLUSION AND RECOMMENDATIONS

Bovine *Trypanosomosis* is potentially a constraint to the livestock production was common with loss of body conditions and anemia in the study area. These signs could be used as an important in put in creating

awareness in the area of treatment, control and prevention of bovine trypanosomosis. Therefore; Strategic control of bovine Trypanosomosis including vector control should be strengthened to improve livestock production and agricultural development in the study area.

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