

## Prevalence of Bovine Trypanosomosis in Selected Areas of Jabi Tehenan District, West Gojjam Of Amhara Regional State, Northwestern Ethiopia

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**Abstract:** Cross sectional study was conducted in Jabi Tehenan district of West Gojjam administrative zone from October 2008 to April 2009 to determine the current prevalence rate of bovine trypanosomosis. In the parasitological survey, blood samples of 300 cattle were examined using a buffy coat technique. The PCV value of each animal was also measured using hematocrit reader. The overall prevalence of trypanosomosis was found to be 11.7% and it consists of 16, 10 and 9% in Regeb Kebero Meda, Weyenema Workema and around Finote Selam peasant associations, respectively. The most positive cases were due to *T. congolense* (54.3%) followed by *T. vivax* (45.7%). The mean PCV value (%) of parasitaemic and a parasitaemic animals during the study period were  $20.3 \pm 4.1$  SD and  $25.29 \pm 4.67$  SD with a significance difference ( $P < 0.05$ ). The study also demonstrated variations in prevalence among different age groups and between both sexes which were statistically insignificant. Infection rate in poor body condition animals were significantly higher than good body condition animals ( $P < 0.05$ ). The present prevalent study generated valuable information on the epidemiology of bovine trypanosomosis in the study area and revealed that trypanosomosis is an important disease in the study area.

**Key words:** Amhara • Bovine • Ethiopia • Jabi Tehenan • Prevalence • Trypanosomosis

### INTRODUCTION

Trypanosomosis is a serious disease in domestic livestock causes a significant negative impact in food production and economic growth in many part of the world, particularly in Sub-Saharan Africa [1-3]. African animal trypanosomosis and its vectors occur in vast areas of Sub-Saharan Africa with devastating impact on livestock productivity [4]. Its epidemiology and impact on livestock, especially cattle production are determined largely by the prevalence and distribution of the disease and its vectors in the affected area [5].

Tsetse flies (*Glossina*) inhabit wide range of habitats covering over 10 million km<sup>2</sup>, representing 37% of the African continent and affecting 37 countries [6] including Ethiopia. Approximately 30% of the total cattle population in the African continent and about 50 million people are exposed to animal trypanosomosis and human sleeping sickness, respectively [7].

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 *G. pallidipes*, *G. morsitans*, *G. fuscipes*, *G. tachinoides* and *G. longipennis* [8]. 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 *T. equiperdum* in horse [9]. In the Amhara region of north-west Ethiopia, trypanosomosis is considered an important disease of cattle [10], but systemic studies haven't yet made on the epidemiology, prevalence and economic significance of bovine trypanosomosis in this site. Therefore the objectives of thus study were to assess the prevalence of bovine trypanosomes, to identify and determine the dominant trypanosome species in the study sites and to compute different parameters such as PCV in relation with trypanosomosis.

## MATERIALS AND METHODS

**Study Area:** The study was conducted in Jabi Tehenane district of west Gojjam administrative zone of Amhara regional state. The district covers an area of 112, 772.1 hectare and bordered by Quarit and Dega Damot in East, Burie in West, Sekela in North and Dembecha and Abay River in the South. The annual mean temperature for most part of the district is 14-32°C and the elevation varies from 1500-2300 meter above sea level (m.a.s.l) with mean annual rain fall of 1250mm. The livestock populations that are found in Jabi Tehenan 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 187,481[11].

**Study Design:** Cross sectional survey was conducted to determine the prevalence of bovine trypanosomosis.

**Sample Size and Sampling Method:** Simple random sampling technique was followed, to select the study animal and the desire sample size was calculated according to the formula given by Thrusfield [12].

### Study method and procedures

#### Parasite Survey

**Measuring of Packed Cell Volume (PCV):** Blood samples were obtained by puncturing of 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. Load the tube 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 five minutes. Tubes were then placed in haematocrit and expressed the reading as a percentage of packed red cells to the total volume of whole blood. Animals with PCV<24% were considered to be anemic.

**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 minutes at 12,000 rpm. After the centrifugation, trypanosomes were usually found in or just above the Buffy coat layer. The capillary tube was cut using a diamond tipped pen 1mm below the buffy coat to include the upper most layers of the red blood cells and 3mm 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 X 40 objective and X 10 eye piece for movement of parasite [13].

**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 angle of 45 degree, air dried and fixed for 2 minutes in methyl alcohol then, immersed in Giemasa stain (1:10 solution) for 50 minutes. Drain and wash of excess stain using distilled water and allowed to dry by standing up right on the rock and examined under the microscope with oil immersion objective lens.

**Data Analysis:** Row data on individual animals and parasitological examination results were inserted in to MS excel spread sheets to create a data base and transferred to SPPSS version 16.0 soft ware program for data analysis. Chi-square was used to compare the prevalence of trypanosome infection in different variables, districts, peasant associations, age and sex and Student-t test was utilized to compare the mean PCV of the infected animals with that of non-infected animal.

## RESULTS

**Prevalence:** Out of the total 300 cattle examined, 35 (11.7%) were found positive to trypanosomosis. The prevalence was varying between different study areas; 9% in around Finote Selam to 16% in Regeb Kebero Meda peasant association (Table 1). However, the difference was statistically insignificant. The most prevalent trypanosome species in the study area was *T.congolense* (54.3%) followed by *T.vivax* (45.7%) (Table 1).

**Hematological Findings:** Out of the observed animals, 35 of them had mean PCV value was 20.31% and the overall mean PCV value of the study was also resulted in 24.71%. There is statistically significant difference ( $P < 0.05$ ) observed between infected and non infected animals in mean PCV (Table 2).

**Prevalence of Trypanosomes Based on Body Condition Score, Age and Sex:** Cattle infected with trypanosome have lower body condition score than the non infected animal (Table 3). This difference is statistically significant ( $P < 0.05$ ). A higher infection rate was observed in adult animals and animals above two years of age in the study

Table 1: Trypanosoma Species Prevalence in the Study Area

| Area                | Total examine | <i>T.vivax</i> | <i>T.congolense</i> | Prevalence (%) |
|---------------------|---------------|----------------|---------------------|----------------|
| Around Finite Selam | 100           | 7(77.8%)       | 2 (22.2%)           | 9              |
| Weyenma Workema     | 100           | 4 (40 %)       | 6 (60 %)            | 10             |
| Regeb Kebero Meda   | 100           | 5(31.25 %)     | 11 (68.75%)         | 16             |
| Total               | 300           | 16 (45.7%)     | 19 (54.3 %)         | 11.7           |

$\chi^2 = 2.782$ , P = 0.249

Table 2: Mean PCV and SD of Infected and Non-Infected Animals

| Condition    | Number | Mean PCV (%)±Std. Deviation | T-test | P-value |
|--------------|--------|-----------------------------|--------|---------|
| Infected     | 35     | 20.31± 4.10                 | 6.0116 | 0.000   |
| Non-infected | 265    | 25.29± 4.67                 |        |         |
| Total        | 300    | 24.71± 4.87                 |        |         |

Table 3: Prevalence of Trypanosomes with Body Condition Score, Age and sex

| Variables             | Number | Infected (Prevalence) | $\chi^2$ | P-value |
|-----------------------|--------|-----------------------|----------|---------|
| <b>Body condition</b> |        |                       |          |         |
| Good                  | 155    | 9 (5.8)               | 10.687   | 0.001   |
| Poor                  | 145    | 26 (17.9)             |          |         |
| <b>Age</b>            |        |                       |          |         |
| 1-2 year              | 36     | 3 (8.3)               | 0.486    | 0.784   |
| 3-5 year              | 110    | 14 (12.6)             |          |         |
| >5 year               | 154    | 18 (11.8)             |          |         |
| <b>Sex</b>            |        |                       |          |         |
| Male                  | 153    | 17 (11.1)             | 0.094    | 0.760   |
| Female                | 147    | 18 (12.2)             |          |         |

area, but the variation was not statistically significant ( $p > 0.05$ ). The prevalence of trypanosome infection was higher in female than male animals; however, there was no statistically significant differences observed between two sexes (Table 3).

## DISCUSSION

The study revealed that the prevalence of bovine trypanosomosis in the area was 11.7% (35/300 which was in agreement with the previous findings by Shimelis *et al.* [14]. but lower than the previous work reported by Solomon [15]. The discrepancy between reports might be due to the presence of large study time gap in which relatively application of well strategic method of tsetse control and treatment, expansion of cultivation which affect flies distribution, expansion of veterinary clinic and awareness of people towards the control and treatment of disease were improved. The probability of animal to be positive is varied with season, high in wet season and low in dry season [16,17]. While the present study conducted in the dry season. Significantly high rate of infection following months (season) with high rain fall is due to emergency of high fly population in the wet season as reflected by the high number of biting fly collected [17].

The higher proportion of *T.congolense* infection in the study area is in agreement with trypanosome species prevalence data from other tsetse infested region of Ethiopia where *T. congolense* is the most prevalent species in cattle [18]. *Trypanosoma vivax* was the dominant species in around Finite Selam peasant association. This is due to the location of the study site which was located on the edge of a fly belt. Jordan [19] and ILRAD [20] have reported that as the distance from recognized edge of tsetse belt areas increase, the species of trypanosome most encountered and diagnosed is *T. vivax* because *T. vivax* has the ability to adopt and establish itself in the absence of tsetse flies and is transmitted by other biting flies.

The mean PCV value of studied animals was significantly varied between parasitaemic (20.31%) and aparasitaemic (25.29%) animals. This result was in agreement with the previous result reported by Sinshaw [17]. The mean PCV of cattle trypanosome positive was 21.6% and statistically significant difference between affected and non affected animals were observed. Anemia is one of the most indicators of trypanosomosis in cattle [21]. The level of anemia or PCV usually gives a reliable indication of the disease states and reduces performance of infected animals [22].

Infection rate in poor body condition animals were significantly higher than good body condition animals was in agreement with Mussa [23]. Although higher infection rate was observed in adult animals and animals above two years of age in the present study there is no statistical significance difference was observed in both age and sex. This result was in agreement with the previous research result reported by Sinshaw [17]. This could be associated to the fact adult animals travel long distance for grazing and draft as well as harvesting crops to tsetse challenge areas. Mussa [24] in Ghibe valley indicated that suckling calves do not go out with their dams but graze at home stead's until they are weaned off. Young animal are also naturally protected to some extent by maternal antibodies [25]. This could result in low prevalence of trypanosome that was observed in calves.

From this study it is possible to conclude that trypanosomosis is an important disease and a potential threat in affecting the health and productivity of cattle in fertile area of Jabi Tehenane district of west Gojjam administrative zone. The major species of trypanosomes in the study area were *T.congolense* followed by *T.vivax*. The prevalence of the disease varies from site to site. Infection with trypanosomosis negatively affects PCV and body condition. This indicated that trypanosome infection of cattle in the study areas causes 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 animal should be conducted.

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