Prevalence of Bovine Trypanosomiasis in Chora District in West Oromia, Ethiopia

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Abstract: The present study was conducted to determine the prevalence of bovine trypanosomosis in Chora district Illuabbabora zone of west Oromia region from December 2013 to march 2014. Blood samples were collected randomly from ear vein of randomly selected 278 Zebu cattle. The examination was done in clinic and Bedele regional veterinary diagnostic laboratory. Hematocrit centrifuge technique with hematocrit reader was used to measure PCV values and to judge if the animal is anemic or not. Furthermore, wet smear was done to detect the parasite and Giemisa staining technique was also employed for trypanosomes species differentiation. The result of this study shows that a total of 52 cattle were found to be infected with different species of trypanosomes. Meanwhile, species prevalence shows that 25 [8.99%] infected with T.cogonlense, 13 [5.52%] with T. Vivax and T.brucei 7[2.52%] and 7[2.52%] were found to be infected with mixed of T.congolense and T. vivax. The proportional prevalence of T. congolenseis significantly higher (P<0.001 ) than the other trypanosome species. Infection rate was statistically significantly higher in cattle with poor body condition. The mean PCV values recorded were 26.5% inaparasitaemic and 19.5% inparasitaemic animals with a statistical significant difference (P<0.05). The current study demonstrated that trypanosomosis is among the major health and productivity constraints warranting control intervention.

Key words: PCV • Prevalence • Trypanosomes • Anemic • Parasitaemic • Aparasitae

INTRODUCTION

Livestock in Ethiopia provides draft power in land cultivation. Income generating to farming communities means of investment and important source of import and export foreign exchange earing to the nation at direct and indirect commodities in the world market, more over live stock is important culture resource social safety net and means of saving, however the economic benefited derived from the livestock subsector does not commensurate with the potential. This is due to various factors such as traditional systems of husbandry and management, poor genetic potential as well as the presence of many diseases [1]. Among these trypanosomes; tsetse cyclical transmitted trypanosomosis is one of the most important constraints to livestock and agriculturaldevelopment in sub humid zones of Africa.

Trypanosomes is a protozoan disease of animal and human caused by flagellated parasite from the genus Trypanosoma, which are found in the blood plasma and various body tissues fluid. The disease is usually chronic extending over several months and characterized by intermittent fever, progressive emaciation, weakness, anemia, loss of condition and death [2]. The overall economic loss in the continent due to the disease was estimated betweenUS $1408 and 1540 million per annum. In Ethiopia at least 10 million heads of cattle already exposed to the disease and suffer from death. Hide and skin damage contributing in decreasing animal product and byproduct in the country [3]. Furthermore, livestock cannot be introduced in to sum 155,000- 220,000km of the most fertile land in the south west and western region. Most Africantrypanosomes are transmitted by tsetse flies, which inhabit many parts of the continent [4, 5].

Tsetse infests 10 million square kilometers between latitudes of 14°N and 29°S. Thirty eight African countries affected by the disease known as nagana [6]. In Ethiopia, about 240,000km² of land located in the Southern, South Western, Western and North Western parts is infested by tsetse flies and preclude farmers from rearing livestock [7].
The most important trypanosome species affecting livestock in Ethiopia are *T. congolense*, *T. vivax* and *T. brucei*, in cattle, sheep and goat, *T. evansi* in camel and *T. equiperdum* in horse [8, 9]. March 2014. The PA’s were selected based on their accessibility to transport and information from the district’s administrative body. Multistage sampling was used to sample animals, where, herds were selected from each PA’s by simple random sampling as primary sampling units. From the selected herds, individual animals to be sampled were selected by simple random sampling techniques as secondary sampling units.

**Study Methodology**

**Survey of Trypanosomosis:** For detection of trypanosome infection, blood samples were collected from marginal ear vein, it is accomplished by pricking the edges of the ear vein using lancet. One end of the capillary tube was sealed and centrifuged at 12,000rpm for 5 min to separate the blood cells and to concentrate trypanosomes using centrifugal forces as buffy coat. Then PCV was measured using haematocrit reader. The capillary tubes were broken just 1mm below buffy coat and expressed on microscopic slide, mixed and covered with 22x22mm cover slip. Then it was examined under 40x objective of a microscope using dark ground buffy coat technique to detect the presence of the parasite [14]. Buffy coat positive samples were stained by Giemsa’s in thin blood smears, fixed with methanol for 5 min and examined under oil immersion using 100x objectives to identify the species of trypanosomes [15].

**Trypanosome Infection and its Associated Risk Factors:** During collection of sample necessary information such as owners name, date, Name of Peasant association, Sex, age and Body conditions are correctly recorded. The body condition score were classified as poor, medium and good by observing the body condition of the animals in the field [16]. The ages of animals were also estimated by the dentition method Gatenby [17] and from owner information. The age of animals was categorized into three groups; less than two, between 2 and 4, and above four years old.

**Data Analysis:** Percentages (%) were calculated to determine prevalence and chi-square association. Categorical data were analyzed by using chi-square ($X^2$) test of independence where as t-test was used to examine the difference in mean PCV between the study variables. In all cases, Confidence level was held at 95% using stata 7.
RESULTS

Parasitological Findings: A total of 52 cattle (30) in Sololo, (14) in Chiirache and (8) in Semayero peasant associations were found to be infected with a prevalence rate of 31.5%, 14.5%, 9.3%. The majority of trypanosome infections in the study area were infection due to Trypanosoma conglonse. In all peasant associations T. conglonse was the main trypanosome species, followed by T. vivax, T. brucei and mixed infection of (T. vivax and T. brucei) with a prevalence of 8.99%, 5.52%, 2.52% and 2.52%, respectively as indicated in Table (1).

Trypanosome Infection and its Associated Risk Factors:
The prevalence of trypanosome infection between age categories of less than two years old, between 2 and 4 and above 4 years old was not significant (P>0.05) even if prevalence is higher in above four years old cattle. The prevalence of trypanosome infection was higher in female (36.1%) than male (9.34%) animals but it was not statistically significant (P>0.05). However statistical insignificant difference was recorded among body conditions of animals with good (7.3%), medium (16.24%) and with poor (27.34%) body conditions were positive for trypanosomosis as presented in Table (2).

The overall mean PCV values were significantly different between parasitaemic and aparasitaemic animals in the district. The mean PCV of infected animals was significantly lower (p<0.001) than the mean PCV of non infected animals (Table 3).

Discussion
Trypanosomosis: Bovine trypanosomosis is present in the current studied Districts with an overall prevalence of
18.71% and dominance of *T. congolense* over *T. vivax*. This result is much higher than with previous report (3.9%) recorded by Geremew *et al.* [18] from the neighboring district Yayo district, western Ethiopia. However, similar figures were reported from different parts of tsetse infested areas in Ethiopia: a prevalence of 15.1%, in West Ethiopia [19] 21% in Southern Rift valley areas of tsetse infested regions [20] 17.2% in Metekel [21, 22] and 17.5% in upper Didessa of tsetse infested regions. The dominant species in this area of tsetse infested regions was *T. congolense* [23] suggesting that exclusively tsetse transmitted trypanosomosis is the major problem in these areas. On the other hand, in the highland areas of Ethiopia, non-tsetse transmitted trypanosomosis is the major problem [24].

A higher prevalence was found in this study compared to the works of these authors elsewhere in west Oromia, Ethiopia. This disparity emanates from many factors that explain the higher prevalence of trypanosomosis observed in this study area. The explanation for the higher prevalence rate detected in this study could be related to distribution, challenges and density of parasite vector as well as vector control management practice [25].

Trypanosome infection as a cause of anaemia was evidenced by the decrease in packed cell volume of the infected animal [26, 27]. The mean PCV value recorded in this study was also significantly lower (P<0.001) in parasitaemic (19.5%) than in aparasitaemic (26.5%) animals. This is in agreement with previously reported mean PCV values in parasitaemic than in aparasitaemic animals of 21.16% than 25.4% [28] 22.1% than 29.1 [29] 24.6% than 29.16% [30] 21.1% than 26% [31].

The difference in mean PCV value between parasitaemic and aparasitaemic animals indicates that trypanosomosis involves in reducing the PCV values in infected animals [32]. The damage of tissue due to trypanosomosis is probably multi factorial in etiology, but the underlying feature is the progressive anemia throughout the cores of disease. The case of anemia is due to hemolysis caused primarily by erythrophagocytosis due to simulation and expansion of mononuclear phagocytosis system [33].

**Trypanosome Infection and its Associated Risk Factors:**

In this study, there was statistical significant difference between the prevalence of bovine trypanosome infection and among the three districts (P>0.05). Sololo district, 31.5%, whereas the lowest was recorded in Semayerodistrict, 9.3% during the study period. This might be due to the difference in management system, vector density, poor veterinary services, ecological difference, and lack of awareness of the animal owners about the disease.

In this study, age-wise analysis revealed that there wasn’t statistical significant difference between age groups and the disease (P>0.05) in which higher infection rate was recorded above 4 years. In this study age was not a risk factor for the prevalence of trypanosomosis in the study area. On the contrary, other reports show that *T. congolense* is a chronic disease increasing with age of animals and its infection is usually higher in adult animals than in young animals [34, 35] and they found that cows >9 years old had 1.2 times higher trypanocidal drug treatment than <3 years old animals.

A higher prevalence rate was recorded in female than male but was not statistically significant however, different works were also reported that higher infection rate was observed in male cattle than females [36, 37] and the possible suggestion to this finding could be that males are more used for drought purpose, travel long distances to an area of tsetse challenge for grazing, plough and stressed by draft power and become susceptible to trypanosomosis.

**CONCLUSION AND RECOMMENDATIONS**

In the district the overall prevalence of trypanosomosis was found to be 18.71%. The most widely distributed and dominant species of trypanosomes was *T. congolense*. Significant reduction in the level of PCV was observed due to the disease. Mechanical transmitters such as the genus *Stomoxys, Hematopota*, and tabanid have a secondary role net to a cyclical transmission of the disease with in a tsetse belt and area of bordering at the edge of tsetse belt. *T. vivax* appears is more easily infected animals [32]. The damage of tissue due to trypanosomosis is probably multi factorial in etiology, but the underlying feature is the progressive anemia throughout the cores of disease. The case of anemia is due to hemolysis caused primarily by erythrophagocytosis due to simulation and expansion of mononuclear phagocytosis system [33].

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