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Occurrence and Identification of Bovine Trypanosomosis in Genji District, Western Ethiopia

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Abstract: A cross-sectional study was conducted between October and December 2011 to assess the-occurrence of bovine trypanosomiasisand identify species of trypanosomes affecting cattle as well as to assess host related risk factors in Genji district, West Wollega zone, Oromia region, western Ethiopia. A total of 384 cattle blood samples were collected at random and examined using Giemsa stained thin blood smears for parasite detection and identification. Of the cattle investigated, 38 (9.89%) were found to be infected with trypanosomes. The most trypanosome species identified were *T. brucei* (3.90%) followed by *T. congolense* (3.12%) *and T. vivax* (2.86%). The observed difference in the prevalence among the various species of trypanosomes was not statistically significant (P>0.05). The observed difference in the prevalence among the various species of trypanosomes was not statistically significant (P<0.05). The prevalence in trypanosome infection did not vary between sexes and peasant associations. Based on the observed distribution of trypanosomes in different study sites, *T. congolense* and *T. brucei* were not found in Lelisa Genji and MinjoImbiraro, respectively. Prevalence of trypanosome infection in male and female animals did not show significant difference (P>0.05) in prevalence. Even though the present study showed low prevalence of trypanosome infection in the study area, the impacts of the disease on cattle production should not be neglected. Therefore, prompt control strategy has to be designed and implemented in the area to minimize the distribution of tsetse as well as trypanosomiasis prevalence.

Key words: Prevalence · Cattle · Trypanosomiasis · Genji · Ethiopia

INTRODUCTION

Bovine trypanosomiasis is a chronic debilitating disease causing severe cachexia and anemia with associated intermittent fever, oedema and loss of condition [1]. The disease is frequently fatal and is a major constraint on livestock and agricultural production in Africa [2]. Accordingly, trypanosomiasis is ranked among the top 10 global cattle diseases impacting on the poor [3]. It has been estimated that the cost of the disease to livestock keepers and consumers exceeds US$ 1 million annually [4].

The effects of trypanosomiasis is not only due to the direct losses resulting-frommortality, morbidity, infertility of the infected animals and costs of treatment or controlling the disease but also due to indirect losses, which include exclusion of livestock and animal power from the huge fertile tsetse infected areas [5]. Trypanosomiasis is prevalent in two main regions of Ethiopia that is, the North West and the South West regions Getachew *et al*. [6]. 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*. Getachew *et al*. [7]. About 10 to 15% of the land believed to be suitable for livestock production is affected by one or two species of the tsetse -flies [8].

Ethiopia has acknowledged that trypanosomiasis is a major constraint for the reduction of poverty, improved food security and for sustainable agriculture and rural development with consequent implementation of a joint

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Ethiopian science and technology commission and International Atomic Energey Agency tsetse and trypanosomes eradication project through the introduction of a sterile insect technique (SIT) currently limited in the southern rift valley of Ethiopia [9, 10].

A number of studies have been so far undertaken in different parts of Ethiopia to determine the magnitude of this economically important disease [11-17]. Nevertheless, there is no information in the literature about the prevalence of bovine trypanosomiasis in Genji district, West Wollega Zone. Therefore, the objectives of the present study were to determine the prevalenceof bovine trypanosomiasis, to identify the *Trypanosoma* species responsible for the occurrence of bovine trypanosomiasisand to determine the associated risk factors on the prevalence of the disease.

MATERIALS AND METHODS

Study Area: The study was carried out in three selected peasant associations (PAs) of Genjidistrict, West Wollega zone, Oromia region, western Ethiopia from October to December 2011. The district is located at 459 km far from Addis Ababa. It covers an estimated area of 3, 7457km^2. The area has two climatic zones: midland, about 85% and lowland, 15%. The annual rainfall is about 900-1400 mm and the average temperature is 25°C. The livestock population of the district is cattle 38,062, sheep, 671 3, goat, 1835, equine, 5901, poultry 33,633 [18].

Study Animals: The study was conducted on 384 local breeds of cattle (zebu) traditionally managed under extensive m anagement system. The study animals were of different age groups and both sexes. The age of sampled animals was determined based on owners' information and were grouped as young (<3years of age) and adults (>3 years).

Study Design and Sample Size Determination: A cross-sectional study design was used to determine the prevalence of bovine trypanosomiasis and to identify the *Trypanosoma* species.Simple random sampling technique was applied to select each study animal. The sample size was determined following the formula given by Thrusfield [19], with a 95% confidence interval and an expected prevalence of 50% and at 5% absolute precision. Therefore, the total sample size was 384.

Sample Collection and Examination Procedures: Blood samples were collected from ear veins of 384 cattleusing microhaematocrit capillary tubes. These blood smears were air-driedand fixedin methyl alcohol for 2-3 minutes. The smears were stained with 10% Giemsa solution for 30-35 minutes, washed with tap water to remove excess stain and air-dried, then put one drop of cider oil. The slides were examined under oil immersion lens (100x) according to Coles [20]. For the positive smears, the trypanosomes were identified to species level using morphological appearances [21-22]. During sampling date and place of collection and sex of the animals were recorded.

Data Analysis: All Collected raw data and results of parasitological examination were entered in MS Excel database system and coded. Data were analyzed using SPSS version 17.0 computer program. Chi-square (χ^2) test was used to determine the variation in infection prevalence between sexes. P-value at 0.05 or less than (at 5% level of significance) was considered significant in all analysis.

RESULTS

Out of 384 cattle examined, 38 (9.89%) were positive for trypanosomes infection. The most trypanosome species identified were *T. brucei* (3.90%) followed by *T. congolense* (3.12%) *and T. vivax* (2.86%). The observed difference in the prevalence among the various species of trypanosomes was not statistically significant (P>0.05) (Table 1).

According to the sampled PAs of the district, the prevalence was 9.28, 10 and 10.93% in Lelisa Genji, Genji Baadiya and Minjo Imbiraro, respectively. There was no statistical significant difference (P>0.05) between them. Based on the observed distribution of trypanosomes in different study sites, *T. congolense* and *T. brucei* were not found in Lelisa Genji and MinjoImbiraro, respectively (Table 1).

Prevalence of trypanosome infection in males animalswas 9.34 and 10.58% in females There was no statistical significant difference (P>0.05) in prevalence between sex groups (Table 2).

Table 1: Prevalence of bovine trypanosomiasis and species composition based on study sites

		Trypanosoma spp. identified				
Study sites (PAs)	No. examined animals	*T. vivax*	*T. congolense*	*T. brucei*	Total	Prevalence (%)
GenjiBaadiya	180	1	8	9	18	10.00
LelisaGenji	140	7	-	6	13	9.28
MinjoImbiraro	64	3	4	-	7	10.93
0						
Total	384	11(2.86%)	12(3.12%)	15(3.90%)	38(9.89%)	9.89

χ^2= 0.139; Pvalue=0.933

Table 2: Prevalence of bovine trypanosomiasesis based on sex in cattle in the study area

Sex	No. examined animals	No. positives	Prevalence (%)
Male	214	20	9.34
Female	170	18	10.58
Total	384	38	9.89

χ^2=o.164; P = value=0.685

DISCUSSION

The overall prevalence of trypanosome infection in the study area is 9.98%. This result is similar with the reported prevalence of 10.1% from Awi zone [14] and 12.42% from Awi and Metekel zones, Northwest Ethiopia [10]. This similarity in prevalence might be due to the presence of similar agro-ecological conditions.

The present study result is lower than that of Ali and Bitew [23] with a prevalence of 24.7% from Mao-Komo district and Chernet *et al.* [11] with a prevalence of 25.7 and 20.9% from the tsetse infested and tsetse free zones of the Amhara region, respectively. Likewise, Mulaw *et al*. [24] reported a prevalence of 28.1% Asosa district of Benishangul Gumuz region, western Ethiopia. The lower prevalence recorded in the current study might be due to regular use of chemoprophylactic drugs. However, it is higher than the reports of Tadesse and Tsegaye [25] with a prevalence of 4.4% in Guraferda and Sheko districts of Benchi Maji zone, South Western Ethiopia. This difference in prevalence might be due to the presence of various agro-ecological conditions between study sites and the difference in the sensitivity of the diagnostic method used.

In the current study the trypanosome species identified were *T. brucei* (3.90%), *T. congolense* (3.12%) and *T. vivax* (2.86%). Rowlands *et al*. [26] reported a higher prevalence of 37% for *T. congolense* in South west Ethiopia. Abebe and Jobre [27] reported also an infection rate of 58.5% for *T. congolense*, 31.2% for *T. vivax* and 3.5% for *T. brucei* in Southwest Ethiopia. Likewise, Afewerk *et al.* [28] reported prevalence of 17.2% in Metekel district and the dominant species was *T. congolense*. The report of Tadesseand Tsegaye [25] showed also that *T. congolense* (36.36%) was the dominant trypanosome species followed by *T. vivax* (18.18%) and *T. brucei* (9.09%). Mekuria and Gadissa [10] reported the presence of *T. congolense* (77.6%) followed by *T. vivax* (14.9%), *T. brucei* (6.0%) and mixed infection of *T. congolense* and *T. vivax* (1.5%) as well in Metekel and Awi zones of Northwest Ethiopia. The findings of Mulaw *et al.* [24] indicated that *T. congolense* (66.7%) was the highest in prevalence followed by *T. vivax* (9.3%) and *T. brucei* (4.6%) in Asosa District of Benishangul Gumuz western Ethiopia. While Tesfahywet and-Abraham [29] found out *T. congolense* (61.4) and the least was *T. vivax* (14.2%) and mixed infection due to *T. congolense* and *T. vivax* (24.4%) in Arba Minch. All these differences in the prevalence of trypanosome species in different parts of the country may be due to the presence of different agro-ecological conditions for the breeding of vectors, the difference in sensitivity of the methods used for parasite detection, the sample size variation and management systems.

In this study, the prevalence of trypanosome infection was not found to differ with the sex of animals. Previous report also showed no statistical significant difference between sex of animals for trypanosome infection prevalence [10, 30]. Considering the lower sensitivity of the directparasitological technique used during the study period for the diagnosis of trypanosomiasis, the overall prevalence observed in this study can be considered high.

Deliberation of the ascertained impact of trypanosomiasis on productivity and the recorded high prevalence of bovine trypanosomiasis with

morepathogenic *T. congolense* as the dominant species in thestudy area should validate the need for application of integrated disease control through insecticide usage coupled with curative and prophylactic treatments of livestock with trypanocidal drugs.

CONCLUSION

The present study revealed that *T. brucei T. congolense* and *T. vivax* were the prevailing species of trypanosomes in the study area with more pathogenic characters. Even though the present study showed low prevalence of trypanosome infection in the study area, the impacts of the disease on cattle production should not be neglected. Bovine trypanosomiasis is an important disease and a potential threat affecting the health and productivity of cattle in the district. Hence, the necessary attention should be given to this disease so as to improve livestock production and agricultural development in the area.

Based on the above conclusion, the following recommendations were forwarded:

- Integrated control strategy has to be designed and implemented in the area to minimize the distribution of tsetse as well as trypanosomiasis prevalence.
- Awareness creation among livestock owners about the disease and control methods as well as the risk of trypanocidal drug resistance is required in the area.
- Further studies on the epidemiology of the disease, tsetse challenge and the economic impact of trypanosomiasis have essential roles for the overall control of tsetse transmitted trypanosomosis in the study area.

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