European Journal of Biological Sciences 11 (2): 50-55, 2019
ISSN 2079-2085

DOI: 10.5829/idosi.ejbs.2019.50.55

Prevalece of BovineTrypanosomosisi in Tembaro Woreda Kambata Tembaro Zone Southnation Nationalities and Peoples Region

Mulugeta Sosango

Hedero Tunto Zuria Woreda Livestock and Fishery Resource Office,
Kembeta Tembaro Zone, SNNPR, Hedero, Ethiopia

Abstract: Cross sectional study was conducted from November, 2013 to February 2014 in five selected kebale of Tembaroworeda, KambataTembaro Zone, South Nation, Nationalities and peoples' Region. The study was carried out on randomly selected cattle from five peasant association of the district. The objective of the study was to detect the prevalence of bovine trypanosomosis and to assess the disease management practices of the farmer on the study area fifty community members in group were interviewed using prepared questionnaires. The result of questionnaires indicated that trypanosomosis is the primary diseases of cattle in four PAS. Absence of tsetse control activity in the study area generally made settler dependnt on the use of chemotherapy for the diseases control. Most of the sick animals are treated by the owners. Blood samples were collected from selected cattle for parasitological and hematological examination. The overall infection rate was 8.3%. Parasitological examination revealed that the infection rate was caused by *T. congulence* (59.4%) being dominant over *T. vivax* (40.6%). The mean PCV values of parasitemic and parasitemic animals were 20.1 % and 27.1 % respectively. There was statistically significant differences ($p<0.05$) between these PCV values. Different infection rate were recorded in different ages and sex group but the differences were not statistically significant ($p>0.05$) 58.4% of infection rate was recorded animals with poor body condition scoring 3% and 1% infection rate were recorded in animals with good and medium body condition scoring, respectively. The difference in prevalence rates on body condition bases was statistically significant ($p<0.05$). Therefore, the result of the present study revealed that trypanosomosisis a major constraint for cattle production in the study area which deserves appropriate control measures.

Key words: Bovine Prevalence · Trypanosomosis · Tembaroworeda

INTRODUCTION

Trypanosomosis is a group of parasitic diseases of animals and humans, closed by flagellated protozoan parasite of genus trypanosome. It is one of the major constraint to live stock and mixed crop livestock production with direct and in direct economic losses [1].

The tsetse transmitted trypanosomosis is the main constraint to livestock production in Africa, preventing full utilization of land to feed rapidly increasing human population [2]. It affects 37 sub Saharan countries; extending over 10 million km^2 of land which is African 's greatest potential area [3]. Trypanosomosisisaseries constraint to livestock production and agricultural development in Ethiopia. A total of 14.8 million cattle, 6.12 million sheep and goats, one million camels and 1.23 million equines area at risk of contracting trypanosomosis [4]. About five species of tsetse identified in Ethiopia area cyclical vectors of animal trypanosomosis. The most important species of trypanosome found in Ethiopiaarea *T. vivax*, *T. congulence* and *T. brucei* of cattle, sheep and goat, *T. evansi* in camel and *T. equiperdum* of horses [5].

The epidemiology of trypanosomosis depends on the distribution of the vectors, the virulence of the parasite and the host response. The limits of the tsetse distribution are determined primarily by the climate and secondly by the vegetation, which can often migrate the severity of the climate. The tsetse fly belts in Ethiopia

Corresponding Author: Mulugeta Sosango, Hedero Tunto Zuria Woreda Livestock and Fishery Resource Office, Kembeta Tembaro Zone, SNNPR, Hedero, Ethiopia, College of Veterinary Medicine Jigijiga Univerisity, Univerrisity of Jigijiga, P.O. Box: 1020, Jigijiga, Ethiopia.

extend from the South west part of the rift valley, around the south western corner of the county and along the western low land and escarpment to the Abay.The flies are confinded to this region between longitude 33°E and 38°E and latitude 5° N and 12° N [6].

Trypanosomes area protozoan parasites that cause animal and human trypanosomosis. They move actively and progress by the movement of undulating membrane and the free flagellum when present [7]. The flagellum runs to the anterior end of the body and is attached along its length to the pellicle to form an undulating membrane.The motility of each species of parasite can be identified in fresh unfixed blood film [8]. The clinical sign of the parasite is manifested in animal as lethargy, anaemia, generalized enlargement of superficial lymph nodes and progressive loss of body condition [9]. The blood parasite are detected by the light microscope in fresh films or by the demonstration of circulating ant bodies against the parasite .The stained thin blood smears are the best means of species identification [10]. The control anduseoftrypanotolerant breeds [5].

Therefore, the objectives of this study was to detect prevalence of bovine trypanosomosis in Tembaroworade and asses disease management practices of the farmers in the study area.

MATERIALS AND METHODIS

Study Area: The study carried out in five selected kebale of Tembaro Wored; Kambata Tembaro Zone, South Nation Nationalities and Peoples Region (SNNPR). Tembaroworeda located 300 kilometers south to Addis Ababa. It has an altitude range of 800-2600 m and receives an average annual rain fall of 1421mm. The temperature range of the study area is 22-30°C, the annual average being 25°C. According to agricultural and rural development office of the woreda, the agroecological classification the district is given as 40% low land, 48% mild land and 12% of high altitude.

The local human population is principally engaged in mixed farming system. Cattle, sheep, goat, equine and poultry are often kept in study PAS. The total livestock population of the woredais 12, 7218 cattle, Goats 9366, Sheep 17940, Equine (1268 horses, 2883 donkeys and 1630 mules) and 48825 poultry. The animals in the area mainly depend up on communal grazing fields as feed source and watering point are tributaries of Omo River. Major crop growing in the area are maize, teff, ringer sweet potato, enset and others.

The woreda has 25 peasant Associations (PAS) from which five PAS are selected randomly. The five PAS are Waro, Osheto, Gaicha, Boheand Mudula. The major diseases of livestock in all PAXS of the Woreda are Trypanosomosis, anthrax, blackleg, endoparasitism, ectoparasitis and others.

Study Population: The TembaroWoreda has cattle population is 141492. From these, population of cattle in the selected peasant Association is give bellow:

Study Design

Sample Size and Sampling Method: Total of 384 samples were collected during the study period randomly using simple random sampling technique. The desired sample size was calculated according to the formula given by Thrustfield [11] with 50% expected prevalence, 95% confidence interval and 5% absolute precision. Therefore a total of 384 samples were collected for this study. The formula for sample size determination is give bellow:

$$n = \frac{1.96^2 x P_{\exp}(1 - P_{\exp})}{d^2}$$

where, n= required sample size
P_{exp} = expected prevalence
d = desire absolute precision

Therefore, using the given formula total of 384 sample size was calculated.

Cross Sectional Study: A cross sectional study was conducted on randomly sampled animals in different PAS of Tembaro Woreda of determined the prevalence of trypanosomosis. The study animals were classified in different age and sex groups 75-78 cattle of different age and sexare selected from each PAS for parasitological and hematological examinations.

Study Type

Questionnaire Survey: During the study period, 30 prepared question naires were administered to farmers. 10 farmers in group were interviewed in each PAS (Annex one). The following information were collected: history of tsetse and trypanosomosis, drug resistance problems, treatment frequency of trypanocidal drugs, farming system, seasonal abundance of animals feeds grazing and watering points, type of game animals, major constraints of livestock and agricultural activities.

Table 1: Elevations and agro ecology of selected peasant Associations

PAS	Altitude (mal)	Agro-ecology	GPS
Waro	1792	Mid land	N -0723811, E-03746370
Osheto	1445	Low land	N -0731633, E-03742035
Gaicha	1420	Low land	N-0727609, E-03738892
Bohe	1962	Mid land	N-0725075, E-03754210
Mudula	2114	High land	N-0727856, E-03754625

Source: Tembaroweda agricultural and rural development office, 2013.

Table 2: Cattle population of selected peasant Association in the study area

PAS	Cattle population
Waro	5079
Osheto	4083
Gaicha	72634
Bohe	2970
Mudula	8044

Source: TembaroWoreda agricultural and rural development office, 2013

Packed Cell Volume Determination: Microhaematocritcapillary tubes were filled with blood collected from sampled animals to ¾ of their height and sealed at one end with crystal sealer. The capillary tubes were loaded on the microheamatocrit centrifuge symmetrically and centrifuged at 12000rpm for 5 minutes [2]. Packed cell volume was measured using hematocrit PCV reader [12].

Buffy Coat Examination: Bloods samples were collected from the ear vein of the sampled animals by using sterile blood lancet and capillary tubes to ¾ of their height and sealed at one end with crystal sealer. The capillary tubes were loaded on the microhematocritcentrifuge symmetrically and centrifuged at 12000rpm for 5 minutes [13].

Packed cell volume was determined using hematocrit PCV reader [12]. The capillary tubes were broken about 1mm below the Buffy coat to include the red blood cells layer and the contents were expressed on microscopic slide and mixed and covered with 22 x 22mm cover slip. The slides were examined under x 40 objective (dark ground Buffy coat technique) [2].

Thin Smear Examination: From positive samples of Buffy coat technique, thin blood smears were made, fixed with methanol for 5 minutes and stained with Geimsa solution for 30 minutes. The smears were examined under x100 objective using oil emersion to identify the species of trypanosomes based on their morphological features.

Data Analysis: Collected data was entered in to Microsoft Excel data base and subjected to SPSS, 2002 software of the computer program for the statistical analysis. The prevalence is defined as the proportion of the number of positive animals to the total number of animals examined and expressed in percent. Chi-square (χ^2) test was used to compare the prevalence of trypanosomes infection in different variables (ages, sex and body condition). T-test was used to compare the mean PCV of the parasitemic animals with that of a parasitemic ones. A 5% significant level was used to determine whether there are significant differences between the parameters measured [14].

RESULTS

Parasitological Finding: Out of a total of 384 animals examined using Buffy Coat dark ground microscopic technique to determine the prevalence oftrypanosomosis in selected peasant associations (PAS), the overall prevalence rate was found to be 8.3% (Table 3). The highest prevalence among the PAS was recorded in Gaicha (11.8%), but in Waro zero prevalence was recorded. The variations in prevalence rate of PAS were statistically significant ($p<0.05$).

During the study, two species of trypanosomes were identified. These were Trypanosome congulense and *Trypanosome* vivax. Mixed infectionwas not recorded in this study. Out of 32 infested cattle, 19 (59.4%) were found to be infested with T. congulence but 13 (40.6%) were by *T. vivax* (Table 4).

Hematological Findings: To assess the impact of trypanosomosis, PCV value was determined all the samples collected. The mean PCV values were found to be 20.1% and 27.1% for trypanosomosis positive and negative animals respectively (Table 5). The difference in mean PCV values of the parasitemic and aparasitemic animals was found to be statistically significant ($p<0.05$).

In this study, there was significant statistical difference ($P = 0.00$) between the body condition and the PCV value of the studied animals. The highest mean PCV values was recorded in animals with good body condition scoring .From the total of 303 animals of medium body condition score and mean PCV value of 27% only three were infected.

Prevalence of Trypanosomes in Age and Sex Groups: From the total infected animals, 18 females with the infection rate 56.75% and 14 males (43.75%) infection rate. Even though there was variation between infection rates the males and females, there was no statistical significance in difference ($P = 0.442$).

Table 3: Prevalence of bovine trypanosomosis in Tembaro Woreda

Study PAS	No of samples	No of positive	Prevalence (%)
Osheto	75	8	10.7
Gaicha	76	9	11.8
Bohe	77	9	11.7
Waro	78	0	0
Mudula	78	6	70.7
Total	384	32	8.3

P = 0.04

Table 4: Relative proportion of trypanosomes species identified in the study area

	Number of positives prevalence (%)				
Name of PAS	Total No of positives	*T. congulence*	*T. vivax*	*T. congolense*	*T. vivax*
Osheto	8	7	1	87.5	12.5
Gaicha	9	5	4	55.6	44.4
Bohe	9	6	3	66.7	33.3
Waro	0	0	0	0	0
Mudula	6	1	5	16.7	83.3
Total	32	19	13	59.4	40.6

Table 5: Comparison of mean PCV values of parasitemic and parasitemic cattle

Group	No of animals	Mean PCV
Parasitemic	32	20.1
Aparasitemic	352	27.1

P = 0.062

Table 6: Association of body condition with mean PCV value

Body condition	Mean PCV	Number	Prevalence (%)
Good	27.52	33	3
Medium	27.00	303	1
Poor	22.71	48	58.4
Total	26.51	384	8.3

During the study, the selected animals were classified in age groups as under a year, between one to three years and above three years. 24 animals classified as under a year found free of the disease. From 110 animals of age category between one and three years, only the seven were infected with the prevalence of 6.4%. 250 animals were included in the 3rd age category from which 25 were infected with infection rateof 105. But these variations on the infection rates were not statistically significant (P = 0.16).

DISCUSSION

The result of the present study agreed with the report of *d'Iteren et al.* [15] in which he reported that trypanosomosisis the major constraint on animal production in the areas of Africa.

Similar results were reported by *Afeworek* [16] and *Tewelde* [17]. In the same report 48% and 40% of the treatment were give below the recommended dose while 52% and 605 did not have any idea. Most of the treatments are given for the clinical cases. The same result was reported by Tewelde [17] that about 85% of the treatments were given for clinical cases in upper Didessa valley of Ethiopia. The community respondents claimed that they face problem of purchasing the trypanocidal drugs so that they make delay on treatment of clinical cases.

The overall prevalence rate of trypanosomosis in this study was 8.3%. This result was slightly lower than the findings of *Habtewold* [18] at Humbo Larena of Wolayita Zone (9.3%) and at Konso worade(11.5%) which were infected only with *G. pallidipes*. The present prevalence was also slightly lower than the report of Amenuel *et al*. [19] which indicate prevalence rate of 10.7% at Kachabira woreda in Kambeta Tembaro Zone, South Ethiopia. The result is in agreement of the same report of Amenuel *et al.* [19] at Abeshgie in Guragie the prevalence rate was 8.5%. Report of *Getachew abebe* and *Terzu daya* [20] 59.4%. Prevalence of *T. congolence* over 40.6% of *T. vivax* as overall result of the Tembaro Worecda is in agreement with trypanosome species prevalence data from other tsetse infected regions of Ethiopia where *T. congolence* is the most prevalent species in cattle. This result agrees with prevalence rate of 58.5% for *T. congolense* and 31.2% for *T. vivax* [1]. This high ration of *T. congolense* may suggests that major clinical vectors are more efficient transmitters of *T. congolense* than *T. vivax* in East Africa [6], were as the transmission of *T. vivax* is more readily mechanically by the vectors other than tsetse flies. According to Abebe and Jobere [1], cited by Getachew [5], *T. congolense* and *T. vivax* are the most prevalence species of trypano some that infect cattle in tsetse infested and tsetse free areas Ethiopia respectively. Higher proportions of *T. congolense* infections were detected in areas such as GamuGofa, Ilubabor, Sidama and Ghibe valley [5].

In east Africa, *T. vivax* is generally less virulent than *T. congolense* and consequently cattle developed tolerance to the *T. vivax* more easily than *T. congolense* [6]. Therefore, the chance of detection of *T. congolense* in peripheral blood of infected animals in higher than the other groups. So, even if it is the technique to be applied in the field, microscopic examination of blood films for the detection of *T. vivax* group infection is very inaccurate [21].

As the result indicated, classified as under the age of a year were found free of the disease. This is associated with less contact of calves to the fly because they don't go down to the valley floor during the dry season in search of pasture. Animals in the age category of between one and three years were infected slightly less than (6.4%) that of more than three years (10%). There was no statistically significant difference in infection rate between the age groups of the examination.

The prevalence of trypanosomosis is also studied between the sexes of the animals. The prevalence of trypanosmosis was slightly greater in females than males but the obtained result indicated that there was no statistically significant difference in infection rates between males and females cattle. This may be associated with the movement of drought oxen between the females of peasant association's of the area.

In this study, difference between mean PCV values of both parasitemic and aparasitemic cattle was indicated. The mean PCV value of the total of parasitemic animals was 20.1 and that of aparasitemic was 27.1 .During the study period cattle with PC V value less than 26 were considered anaemic [22] which is the principal sign of trypanosomosis in cattle. Trypanosome infection and PCV values obtained in the present study parasitemic and aparasitemic cattle were negatively correlated and this result was in agreement with the result obtained by *Rowlands et al*. [22] at Ghibe valley in the South Western Ethiopia in which he indicated that as the proportion of samples detected parasitemic increased, PCV value decreased.

Therefore, the difference between mean PCV value of parasitemic and aparasitemic cattle indicates that trypanosomosisis involved in adversely by lowering the PCV value of the infected animals. On the other hand the appearance of negative animals with PCV value less than 26% may be due to the inadequacy of detection method used [2] or delayed recovery of anaemic situations after recent treatment with trypanocidal drugs or may be due to compound affects of poor nutrition and haematophagus infections such as haemonchosis [16].

CONCLUSION

The result of the present study demonstrate that trypanosomosis a major constraint to live stock development in Tembaro Woreda. According to the questionnaire most of the sick animals were treated by the animal owners. Aggregative drugs resistance problem in the study area was associated with lack of the knowledge of farmers on the proper dosage of the trypanocidal drugs and treatment interval. Shortage of veterinary personals and less availability of veterinary clinic in the study area made the farmers to treat the animals by themselves.

The overall prevalence of the study area was 8.3 %. Only two species of trypanosome were associated with this infection rate. From this species, *T. congolense* accounted for 59.4% in overall infection and *T. vivax* accounted for 40.6%. There was variation on prevalence of trypanosomes infection rate in different age and sex groups but this difference was not statistically significant. The mean PCV values of parasitemic and aparasitemic animal were 20.1%and 27.1% respectively. The trypanosome prevalence and PCV variations were statistically significant. The effect of trypanosomes was manifested by reduction in PCV value and body condition loss of cattle because of the parasitemia. The prevalence of trypanosomes higher in wet season due to increased density of the tsetse fly in this season. The present study was conducted on the dry period so that represent the information of this period only. Therefore, to have full picture of the disease problem and then to advise the strategic control the following points were recommended.

- Seasonal dynamic of tsetse fly and trypanosomosis distribution should be known.
- Priority should be given to tsetse and trypanosomosis control through integrated disease management strategies targeting vector and parasite.
- Regular strategic prophylactic treatment and establishment of veterinary clinics should be enhanced in the control of parasites to avoid drug resistance effects by sub-dosing of trypanocidal drugs and delayed in treatment by the animal owners.

ACKNOWLEDGEMENTS

I would like to acknowledge the Sodo Regional Veterinary Laboratory for their technical assistances throughout the work and my Adviser Dr .Hafez Abdella for his time to advice, indispensable suggestions and correcting my paper with un reserved time and potential.

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