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PREVALENCE OF BOVINE TRYPANOSOMOSIS IN LIMU SEKA DISTRICT OF JIMA ZONE, OROMIA REGIONAL STATE, ETHIOPIA

Aliyu Nesru [1], Samson Takele [2] , Abel Tafesse [3]
[1,2], National Tsetse and Trypanosomosis Investigation and Control Branch, Jimma , Ethiopia
[3] Sokoru District Livestock and Fishery Development Office

ABSTRACT: *A Cross sectional study was carried out to determine the prevalence of Bovine Trypanosomosis in five Peasant associations of Limu Seka District of Jimma Zone, Oromia Ethiopia from January 2019 to March 2019. From five peasant association, 409 Cattle were randomly selected and examined for Trypanosomosis. The overall prevalence of Bovine Trypanosomosis was 8.5% of which Trypanosoma congolense infection was 17.15%, Trypanosoma vivax infection was 82.85% with statistically significant difference (P=0.00). A significant association was observed (P<0.05) between the disease positivity and body condition score. When the mean packed cell volume of Trypanosome infected Animals was compared with that of non- infected Animals, it was significantly lower (P<0.05) in the infected Animals. In conclusion, Trypanosomosis caused by T. congolense, T. vivax with more prevalence of T.vivax remained the main constraint to Animal production and Agricultural development in the study area.*

KEYWORDS: Bovine, Limu Seka, PCV, prevalence Trypanosome.

INTRODUCTION

African Animal Trypanasomosis (AAT) is a Parasitic disease that causes serious Economic losses in Livestock from anemia, loss of condition and emaciation. Many untreated cases are fatal. AAT is found mainly in those regions of Africa where its biological vector (tsetse fly) exists (CFSPH, 2009). Bovine Trypanosomosis continued to be the major constraints of Livestock production in Sub-Saharan Africa, jeopardizing the lives of 55 million people. The risk of infection in humans as well as in domestic Animals has greatly affected social, Economical and Agricultural development of communities within tsetse infested areas which roughly constitutes more than a third (10 million km2) of Africa between 14°N and 29°S of the continent (FAO, 2002). In Ethiopia, Trypanosomosis is widespread in domestic Livestock in the North western, Western, South and Southwestern lowland regions and the associated river systems (i.e. Abay, Ghibe, Omo and Baro/Akobo) (Lelisa et al, 2018). Trypanosomosis in Cattle locally referred, as Gendi" is a serious constraint to Livestock production in areas of the north and southwest Ethiopia at an altitude of below 2000 meters above sea level (masl) (Dano et al, 2014). Currently about 220,000 Km2 areas of the above mentioned regions are infested with five species of tsetse flies namely Glossina pallidipes, G .morsitans, G. fuscipes, G. tachinoides and G. longipennis (NTTIC, 2004). The disease is also found outside the tsetse belt areas transmitted mechanically by biting flies of the genus Tabanus, Hematopota, Chrysops, and Stomxys. A number of Trypanosome species are important in bovine Trypanosomosis (T. brucei brucei, T. congolense and T. vivax) that differ from those causing the human form of the disease, sleeping sickness (T. b. gambiense,

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T.b.rhodesiense) Dano et al, 2014. Economically the Tsetse-transmitted Trypanosomes (Trypanosoma congolense, T. vivax, and T. brucei) are most important in cattle with 14 million heads at risk in Ethiopia (Getachew , 2005). In Ethiopia, five species of Trypanosomes are recorded and the most important Trypanosomes in terms of economic loss in domestic Livestock are Tsetse transmitted species: T.congolense, T.vivax and T. brucei (Lelisa et al, 2018). Trypanosomosis control is a long-term fight and therefore requires the involvement of decision makers, researchers and farmers. Even though Tsetse fly and Trypanosomosis control measures are under taken by NTTIC in some districts, the use of trypanocidal drugs to treat or to prevent susceptible Livestock against Trypanosomosis remains the most control measure for most of the farmers. Very limited trypanocidal compounds are available and they have been used for many years. This long-term use of the same molecules selected drug resistant strains of Trypanosomes in many African countries (Geerts et al., 2001).

In order to improve the welfare and security of rural Communities, particularly Ethiopia, rapid method for assessing risk and diagnosing urgent problems are needed for the control of Animal diseases. Although bovine Trypanosomosis is considered an important Livestock disease in Limu Seka District of Jima Zone, there is no information in the literature about the disease situation in the study area. The present study was, therefore, conducted in the district with objective of determining the prevalence of the disease, identifying the species of Trypanosome and assessing of risk factors of the disease.

MATERIAL AND METHODS

Study Area

The study was conducted in of Limu Seka District of Jima Zone, Oromia Regional State, Ethiopia. Limu Seka woreda is located at 455 Km South West of Addis Ababa. It is situated at latitude and longitude of 8°14 ′N 36°49 and at an altitude of 1356- 2200 meters above sea level (Masl). The climatic condition of the area was highland (dega) (2.13%), midland (woyna dega) (55%) and lowland (bereha) (32%) with the average annual rainfall is 1800mm from March to October The people practice mixed framing system that is crop production and Livestock rearing and own large number of Livestock. The Cattle population in the area is 309,253 (Limu Seka woreda Livestock and Fishery production office report, 2017).

Study Animals

The study Animals were indigenous zebu Cattle of all age group (Bos indicus). Animals were allowed to graze freely during the day and housed at night (extensively managed). The age of Animals was determined by dentition (Delahunta and Hable, 1986) and categorized into two age groups. The body condition of Animals was also grouped based on criteria described by (Nicholson and Butterworth, 1986) grouped in to three groups good (G, M and P).

Sampling method and Sample size

Random and purposive sampling methods were followed to select the study Animals and study sites respectively. Since there was no previous study conducted in Limu Seka District to establish the prevalence, the sample size was determined by taking 50% expected prevalence of Trypanosomosis using the formula given by (Thrusfield, 1995).

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n = (1.96)2.Pexp (1- Pexp) d2
Where: n = required sample size
Pexp = expected prevalence = 50%
d = desired absolute precision = 5%

Study Design
A cross sectional study was carried out to determine the prevalence of Bovine Trypanosomosis in
five Peasant association in Limu Seka District of Jima Zone, South Western Ethiopia from January 2019 to March 2019.

Parasitological survey and methodology

STUDY METHODOLOGY

Survey of trypanosomosis: Blood samples were collected into heparanized microhaematocrit tubes (Deltalab S.L, Bercelona, Spain) after piercing the ear vein using lancet. Then one end of the capillary tube was sealed with sealant (Hawksley Ltd, Lancing, UK) and centrifuged at 12,000 revolutions per minute (rpm) for five minutes to separate the blood cells and to concentrate trypanosomes using centrifugal force as buffy coat. Then packed cell volume (Pcv) was determined using haematocrit reader and recorded. The capillary tubes were then broken just below buffy coat and expressed on microscopic slide, mixed and covered with a 22x22mm cover slip. Then it was examined under x40 objective of microscope using dark ground Buffy coat technique to detect the presence of motile Trypanosomes and for positive samples Geimsa stain of thin blood smears were made, fixed with methanol for 5 minutes, and examined under oil immersion using x100 0bjective to identify the species of Trypanosomes following the standard procedure described by (Murray et al., 1977).

Data Analysis and Management
Data collected were entered into Microsoft Excel spread sheet and descriptive statistics was applied to calculate the prevalence of Trypanosomosis using SPSS version 16. ANOVA was used to determine the mean values of Pcv and variation in the mean Pcv between infected and non-infected Animals was determined. The Percentages (%) were used to measure prevalence and chi-square (x2) to measure significance of association among variables considered in this study. In all analysis, confidence level was held at 95% and $P < 0.05$ was set for significance.

RESULTS

Parasitological Findings
From the total of 409 Cattle examined with a Buffy coat technique, 35 were Positive for Trypanosomes giving an overall prevalence of 8.5%. The prevalence of Bovine Trypanosomosis between different Peasant associations (PA) was 17.5% in Maro chisa, 9.3% in Omokaka, 2.25% in Gejib, 6.25% in Dame and 8.62% in Danaba with no statistically significant difference ($p>0.05$) (Table 1). Trypnosoma vivax and Trypnosoma congolense , were the Trypnosome Species identified by Giemsa stained thin blood smear examination. Among the total of 35 cases of Trypanosome infections detected, 29(82.85%) were due to T.

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Vivax while 6 (17.15%) infections were due to T. Congolese with statistical significance difference (Table 2).

Sex wise

prevalence of Trypanosome infection was slightly higher for Male (9.1%) than for Female (8.1%) animals (Table 3). However, statistical significant difference (P > 0.05) was not observed between sexes. With respect to body condition score, the prevalence was 2.1% in good, 7.5% in medium and 26.5% in poor body condition score with a significant variation (P < 0.05) between them (Table 3). Age based prevalence was 5.66% in youngs and 8.98% in Adults. Although adult cattle have higher infection rate statistical significant difference (P > 0.05) was not observed between age group (Table 3).

Hematological Findings

The PCV of individual Animals was measured for the assessment of degree of anemia. A mean Pcv of 22.7% and 27.04% was found for infected Animals and non-infected Animals respectively (Table 4). The difference was statistically Significant (P = 0.000).

Table 1 Origin based Prevalence of Bovine Trypanosomosis

PA	No Ani Exa	No of Animal positive	T.Congo	T.Vivax	X2	P Value
Gejib	89	2	0	2	4.2	0.802
Maro Chisa	80	14	3	11		
Omokaka	86	8	0	8		
Dame	96	6	2	4		
Danaba	58	5	1	4		
Total	409	35	6	29		

Table 2. Species Based Prevalence of Bovine Trypanosomosis

Species	No of positive Animals	Prevalence	X2	P- value
T.Congolense	6	17.15%	409	0.00
T.Vivax	29	82.85%		
Total	35	100		

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Table 3 Prevalence of Trypanosomosis infection with different potential risk factors

Potential risk factors	No. of Animals examined	Infected Animals	prevalence	X2	p-value
Age					
Adult	356	32	8.98%	6	.199
Young	53	3	5.66%		
Sex					
Male	175	16	9.1%	6	.199
Female	234	19	8.1%		
BCS					
Good	94	2	2.1%	6	0.00
Medium	266	20	7.5%		
Poor	49	13	26.5%		
Total	409	35	8.5%		

Table 4 : Mean PCV of infected and non – infected Animals in the study sites

Animal	No. of Animals	Mean PCV (%)	X2	p-value
Infected	35	22.7	5	0.00
Non-infected	374	27.04		
Total	409	26.66		

DISCUSSION

The distribution of the most common species of Trypanosomes infesting Cattle in Ethiopia varies greatly from one area to another. Considering this the present study revealed the overall prevalence of 8.5% in the study area, this prevalence of Trypanosomes concord with prevalence of 8.55% of Sasiga and Diga district of East Wellega (Tefese et al., 2012) and 7.8%, in Guto Gida Diga District of Eastern Wollega (Dano et.,2014). The similarity of prevalence between these studies might be due to similarity in altitude. In contrast, the result is low when compared

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with previous reports, 40% in the Wolyta and Dawero zones of southern Ethiopia (Miruk etal., 2008), (24.7%) in Maokomo special district of Benshangul Gumz regional state (Daud and Molalegn, 2011) and 25.7% in the tsetse-infested zones of the Amhara region of northwestern Ethiopia (Cherenet et al.,2006). The associations of the disease with different peasant associations were also assessed. No significance association was observed between prevalence of the disease among the different peasant associations (Table1). This may be due to the result of uncontrolled Animal movements between the areas. The sex wise prevalence of trypanosome infection was 9.1% in male and 8.1% in female. Though prevalence is a slightly higher among the males, statistically there was no significant difference. Daya and Abebe, (2008), Tefese et al. (2012) report similar results where they observed no significant difference in trypanosome infection between males and females. Onyiah, (1997) and Quadeer et al. (2008), in separate studies added that no statistically significant difference in the prevalence bovine trypanosomosis between sex groups. Therefore, they have equal chance of coming in contact with the flies and allowed in the same ecology having comparable degree to acquire infection.

T.vivax and T. congolense were the species detected from infected Animal with statistically significant difference in the prevalence of trypanosome species (P=0.00) (Table 2) which is similar with the report of Lelisa., (2018).Shimelis and Sisay.,(2011) also reported in areas of East Wollega Zone (Sibu Sire) the respective ratios between T.congolense (36%) and T.vivax (64%) infections were reported (Shimelis and Sisay, 2011), this could be due to the abundance of mechanical vectors also known to be effective transmitters of T. vivax (Desquesnes and Dia, 2004). The association of the disease with age was also assessed. No significance difference was observed with respect to age.

This can be associated to the fact that adult Animal travel long distance for feed and water as well as for drought to tsetse high challenge areas. According to (Torr et al., 2000), tsetse flies are attracted significantly more by odor of large Animal. Rowlands et al., (2001) in Ghibe valley indicated that suckling calves did not go out with their dams but graze at home until weaned off. Additionally young Animal are naturally protected to some extent by maternal antibodies (Fimmen et al., 1982). These could be the reason for lower prevalence of trypanosomosis that was observed in calves. We also tried to assess the relationship of infection with body condition score of sampled Animal (Table 3). In this study, there was a significant difference in the prevalence of trypanosomosis between Animal with good, medium and poor body conditions. This is in agreement with (Molalegne et al., 2010). This may be related to the debilitating nature of the disease (Radostits et al., 2007). The disease itself results in progressive emaciation of the infected Animal; nevertheless, non–infected Animals under good body condition have well developed immune status that can respond to any foreign protein better than those non–infected cattle with poor body condition which can be immune compromised due to other diseases or malnutrition, since malnutrition and concurrent infections depress the immune responsiveness in some cases (Collins, 1994). A significant decrease in PCV was observed in the trypanosome infected Animal signifying anemia to be one of the important consequence of infection (Table 4) It was in agreement to the work done by Tafese et al., (2012) mean PCV value of infected Animal (21.45%) was significantly lower ($P < 0.05$) than that of non-infected Animal (26.6%). Daud and Molalegne, (2011); Molalegne et al. (2010) also reported lower mean PCV value in infected Animals than the non-infected Animals. Rowlands et al. (2001) in also reported in an increase in PCV value, the proportion

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of positivity decreases and hence mean PCV was a good indicator for the health status of herds in an endemic area.

CONCLUSION

Trypanosomosis caused by T. congolense, and T.vivax with more prevalence of T. vivax remains the main constraint to Animal production and Agricultural development in Limu Seka woreda. This dominance of T.vivax suggest the effectiveness of control actions taken against Tsetse flies and Trypanosomosis in the study area. The observed association between reduction in PCV and body condition with infection showed the impact of the disease on productivity of infected Animals.

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