Prevalence of Clinical Case Based Bovine Trypanosomosis in and around Bambasi Town of the Benishangul Gumuz Region, Western Ethiopia.

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Abstract: This study was conducted from November 2009 to March 2010 in and around Bambasi town to assess the prevalence of clinical case based bovine trypanosomosis. A total of 385 cattle were examined and an overall prevalence of 45.1% was recorded. The diagnostic techniques used to detect the parasites include PCV (Packed cell value), Hematocrit centrifugation technique (Buffy coat examination) and thin blood smear. The predominant species involved in the infection was *Trypanosoma congolense, Trypanosom vivax and* mixed infection with *Trypanosoma congolense* and *Trypanosoma vivax* accounting for 121(31.4%), 28(6.3%) and 24(6.2%) respectively. Prevalence of trpanosomosis was higher in female than male animals and the association was found statistical significant (P<0.001); similarly prevalence of trypanosomosis was higher in animals aged > 6 years than animals aged < 2 years and 2-6 years and there was statistically significant difference (P<0.001) among the age groups. The comparison of PCV values of parasiteamia and aparaisiteamic animals in the study area also indicated statistically significant difference (P<0.001) and 14% and 15% were minimal PCV values of infected cattle while 16% and 17% were examined as the minimal PCV value of non-infected animals. In conclusion the current finding revealed that trypanosomosis is one of the major economically important diseases of livestock in the study district which affects production, productivity and reproduction capacity of cattle implying the need for strategic approach to mitigate the impact of the disease.

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1. Introduction

Trypanosomosis is a widely spread unicellular flagellated protozoan disease which affects cattle, human and other wide range of hosts in sub-Saharan Africa (Brown and Lukins, 1990). The disease is frequently fatal and is a serious constraint to agricultural production in large parts of sub-Saharan Africa, exhibiting direct impacts on livestock productivity, livestock management and human settlement, and indirect impacts on crop agriculture and human welfare (Swallow, 2000). Especially tsetse transmitted animal trypanosomosis is an important constraint to livestock development in Africa. It occurs in around 10 million km^2 in 37 sub-Saharan countries (OUA/STRC, 2001) and constitutes a major threat to the survival and productivity of domestic livestock in sub-Saharan Africa (Oluwafemi *et al*., 2007).

African trypanosomosis is one of the most important animal diseases encountered in all agro-ecological zones of the country and hinders the efforts made for food self-sufficiency (Abebe and Jobre, 1996) and the disease causes about 3 million deaths every year in Africa and approximately 35 million doses of trypanocidal drugs are being administered every year to enable livestock to survive in tsetse-infested areas (Mattioli and Slingenbergh, 2013) and it directly affects the milk and meat productivity of animals, reduces birth rates, increases abortion as well as mortality rates; all of these reduce the herd size and herd composition. The indirect impact of the disease mostly lies on crop production through the availability and cost of animals that provide traction power (Swallow, 2000). Trypanosomosis reduces work efficiency of oxen and discourages the introduction of drought animals in to crop farming (Omotainse, 2004).

The course of the disease may run from a chronic long lasting to an acute and rapidly fatal depending on the vector-parasite-host interactions. The disease is mainly characterized by intermittent fever, progressive anemia, and loss of condition of susceptible hosts which if untreated leads to heavy mortalities (Bourn, 2001).

In Ethiopia, trypanosomosis is one of the most important diseases that limit livestock productivity and agricultural development due to its high prevalence in the most arable and fertile land of southwest and northwest part of the country following the greater

river basins of Abay, Omo, Ghibe, and Baro (Abebe and Jonre, 1996). Currently about 220,000 square kilometer areas of the above-mentioned regions are infested by five species of tsetse flies, namely, *G. pallidipes*, *G. morsitans*, *G. fuscipes*, *G. tachinoides*, and *G. longipennis* (NTTICC, 2004).

According to Food and Agricultural organization (FAO, 1998), trypanosomosis is probably the only that profoundly affects the settlement and economic development of the major part of Africa. This disease is also known as African *Trypanosomes*, because of its in African continent where the disease most prevalent (Wright, 1995). The African Animals Trypanosomosis (AAT) also called Nagana and it is one of the major threats for the livestock in Africa.

Trypanosomosis likely reduce the total production of livestock by 10-50% (ISCTRC, 1997). The majority of farmers in sub-Saharan Africa still farming with hand, mainly because of animal diseases, which is mostly trypanosomosis. Cross breed cattle cannot be introduced before tsetse is eradicated, because of the high risk of trypanosomosis (PAAT, 1990).

The severity of the disease depends on the species and strains of *Trypanosomes* involved. The ability of trypanosomosis to change their surface coat continuously leads to the exhaustion of the antibody production by the host, that cause immune-suppressant of the host (Brown, and Lukins, 1990). Sound knowledge of the basic features of *Trypanosomes* enables the identification of each species and so the exact cause of disease, once the basic features possessed, all *trypanosomes* are appreciated, the diagnostic difference can be recognized and the species identified (ESTC, 1997).

Therefore, the present study was conducted in Bambasi district of the Benishangul Gumuz Region, Western Ethiopa to determine prevalence of clinical case based bovine trypanosomosis and to identify the species of Trypanosomes present the study area.

2. Materials and Methods

2.1. Study area

This study was conducted from November 2009 to March 2010 in and around Bambasi town to assess the prevalence of clinical case based bovine trypanosomosis. Bambasi district is located $9^0$45' N and 34^0 45'east. The altitude of the area ranges from 1100-1450 m.a.l. bordering the Dabus river system to east direction. Topography of the area is marked by hill, sleep slopes and flat surface of the land. The district has a sub-humid climate with a moderate hot temperature with less variation in average temperature between day time and night. It receives high and reliable annual rain fall. The rain fall in the area is bimodal. The mean annual rain fall is recorded to be 1375 mm ranging from 1350-1400 mm. The long dry season lasts from December to May. The area experiences a mean annual temperature of about 32^0c. The highest average monthly temperature occurs in May (29-32^0c) month, where the mean maximum temperature is 35^0c. The coldest month is August when the average monthly minimum temperature 21^0c (NMSA, 2008). The livestock population of the district is 30,783 Cattle, 9322 Goats, 5670 Sheep, 2907 Equines & 20390 Poultry and the livelihood of the society largely depends on mixed livestock and crop production (BOAAR, 2008).

2.2. Study Design and Study Animals

The study design used was cross-sectional to determine the prevalence of clinical case based trypanosomosis in bovine. Zebu cattle (*Bos indicus*), that are usually kept under extensive husbandry system grazing the communally owned pasture land throughout the year were randomly sampled at veterinary clinic found in and around Bambasi town. They grazed together during the day time and returned to their individual owner's farmstead each evening. The body condition of the study animal was scored as good, medium and poor (Nicholson and Butterworth, 1986). Concurrently, their age was determined based on (De-Lahunta and Habel, 1986) principles as young (< 2 years old), matured (2-6 years old) and adult (> 6 years old).

2.3. Sampling Techniques and Sample Size Determination

Study animals were sampled randomly involving both sexes, all age groups, and all types of body conditions. The sample size was determined by the formula given by Thrusfield (2005) using 95% level of confidence interval and the expected prevalence of 50% of trypanosomosis with the desired absolute precision of 5% and simple sample random sampling method was used [29].

The formula used is shown below:

$n = 1.96^2 p_{exp} (1-p_{exp})/d^2$

Where: p_{exp} = expected prevalence

d = desired absolute precision

n = required sample size

As result a total of 385 cattle were calculated and these cattle were sampled at different veterinary clinics found in and around Bambasi town.

2.4. Parasitological Examination

Blood samples were collected from cattle brought to Bambasi veterinary clinic and was examined for the presence of the parasites by using different parasitological examination techniques such as stained thin blood smear and Wet blood smear techniques. The capillary tubes were loaded on microhematocrit centrifuge systematically and centrifuged at 12000 rpm for five minutes to decrease the chance of false negative during diagnosis of

parasites in case of mild infection where the parasites are very small in number (Murray,1997).

Wet Blood Films

A small drop of blood was placed on a clean glass slide, covered with cover slip to spread the blood as a monolayer of the cell. This was examined by light microscope (x40) objectives which was used detect any motile parasites, but this is not enough to identify the species of trypanosomes properly.

2.4.1. Thin Blood Smear

A drop of blood was placed on one end of a clean microscope slide and a thin film is drawn out in the usual way. The film was dried in air briefly, fixed in methyl alcohol for two minutes and allowed to dry. The smears were then stained by Giemsa and the stained slides must stand for 30 minutes. This techniques permits detailed morphological studies and identification of the Trypanosomes species. The same technique was used with the lymph nodes biopsies.

3. Data Analysis

During the study period the owner's name, address, sexes of the study animal, age (Snow, 199) were recorded using sample collection format developed by the researcher. Hematological and parasitological data were handled similarly. Data on individual animals and parasitological examination results were entered into MS-excel Microsoft wares. Then, the data entered in to the MS-excel Microsoft ware was transferred to SPSS software program as described in the protocol of (Thrusfield, 2005). Descriptive statistics to explain prevalence, student t-tests for comparison and p-value for decision making were used.

4. Result

4.1. Parasitological Findings

In the current study a total of 385 heads of cattle were examined out of which 173 animals were infected with various species of *Trypanosomes*. The overall prevalence of trypanosomosis was 45.1% (173 cases out of 385). Out of the total animals examined 121 cases (31.4%) were due to *Trypanosoma congolese*, 28 cases (7.3%) due *Trypanosoma vivax* and 24 cases (6.2%) were due to mixed infection by *Trypanosoma congolense and Trypanosoma* vivax as indicated in the table 1 below.

Table1: Prevalence of Clinical case based Trypanosomosis in and around Bambasi Town

District	Total examined	Positive cases	Prevalence (%) within species		
Bambasi	385	173(45.1%)	*T. congolense*	*T.vivax*	Mixed (T.congolense & T.vivax)
			121(31.4%)	28(7.3%)	24(6.2%)

Of the total 385 cattle examined 212 cattle were found to be aparasitaemic while 173(45.1%) were found to be the carriers of the disease. The above table indicated that *Trypanosoma congolense* accounted for 121 cases (31.4%) where as *Trypanosoma vivax accounted for* 28 cases (7.3%). Mixed infection was recorded in 24 cattle (6.2%) examined. The prevalence of *trypanosomosis* was higher in females 77 (49.7%) than male 48(21%) animals respectively and the association was statistically significant ($p < 0.05$).

Table 2: Prevalence of bovine trypanosomosis with regard to variables such as age and sex of study animals

Variables	Category.	Animas sampled	Infection prevalence (%)	F value	P value
Sex	Male	230	21	35.05	P<0.001
	Females	155	49.7		
Age	< 2 years	2	0	14.94	P<0.001
	2-6 years	331	29		
	> 6years	52	52		

Table 3: Effect of the disease on packed cell volume of study animals

Animal status		Animal sample (N)	Mean PCV (%)	X^2	P value
Parasitaemic	*T. congolense*	121	17.13	295.32	<0.001
	T. vivax	28	16.36	44.05	0.002
Aparasitaemic	mixed infection	24	16.42	35.78	0.001
	Total positive	173			
Total sampled	385				

Statistically significant difference ($p<0.05$) was seen between PCV values of parasitaemic and aparasitaemic cattle.

5. Discussion

The study revealed an overall prevalence of 45.1% trypanosomosis caused by different species of trypanosoma in and around Bambasi town in domesticated livestock specially cattle. Of the total prevalence obtained *Trypanosoma congolense* accounted for about 31.4%. The prevalence (45.1%) of trypanosomosis observed in the current study was in the line with the previous findings 39.8% by (NTTICC, 2004) that was reported in the neighboring district of Oromia region. Similarly, survey made by (Tewelde, 2001) showed that the prevalence of trypanosomosis was 33.3% in Megelle -36 kebelle and 27.8% in Village-9 of Assosa district. Studies made in Ghibe south west of Ethiopia by (Getinet, 1994) indicated prevalence of 41% in adult cattle. The relatively higher prevalence of trypanosomosis was related to nutritional deficiencies and suitability of the area for breeding of tsetse fly.

The finding showed that the prevalence of trypanosomosis in Bambasi district (45.1%) was slightly higher than the prevalence of other tsetse infested area of the country (31%) as reported by (Murray, 1997) in Kindo-Koysa district of Southern Ethiopia.

The presence of many drug venders and drug administration performed by unprofessional in the presence of *Trypanosoma congolense* in the current study may be indicative for high prevalence of *trypanosomosis*. In the current study higher proportion of *Trypanosoma congolense* (31.1%) was registered. This finding was in consistent with the findings of (Abebe and Jobre, 1996) who reported proportional prevalence of *Trypanosoma congolense to be* of 34.5% in Gibe district. In contrast to the current finding, different researchers reported relatively lower prevalence of *Trypanosoma congolense* in different regions of the country (Swallow, 2000; Ademe and Abebe, 2001; and Afework, 1998). They reported a prevalence of 17.2%, 21%, 23% and 17.5% of *Trypanosoma congolese* in metekel district, southern rift valley and upper Didessa valley of tsetse infested region respectively.

The development of anemia was the most reliable indicator of the progress of *trypanosomes* infection (Tewelde, 2001). The disease was assumed that numerous concurrent diseases and nutritional factors interfere with the anemia development and profoundly PCV is reliable indicator of anemia (OUA/STRC, 2001). Thus, significant difference in PCV of cattle due to *trypanosomosis* in ruminants was obtained in various studies done so far and that of *trypanosomes* infection (Abebe and Jobre, 1996; ILRAD, 1994 and Blood and Radostits, 2007).

During PCV determination a value of 24-46 % (Getinet, 1994) was considered to be normal range. In the study area *trypanosomes* infection resulted in a significant decline in PCV. A higher infection rate was observed in adult animals and animals above two years of age in the study area, but sucking calves are at low risk of the disease because they do not go out with their dam and grazing at home lands until they are weaned off (Getinet, 1994). Young animals are also naturally protected to some extent by maternal antibodies (Rawlands *et al.,* 2001). This could result in low prevalence of the t*rypanosomosis as* observed in the current study.

The difference between mean PCV value of parasitaemic and aparasitaemic animals indicated that trypanosomosis was involved adversely by lowering PCV value of infected animals to the level of 14% (Thrusfield, 2005) or may due to compound effects of poor nutrition and haematophagus helminthes infection (Ademe and Abebe, 2001).

6. Conclusion

The study revealed high prevalence (45%) of trypanosomosis in the study district indicating that trypanosomosis is the major disease of livestock that potentially threat and affect the health, production, reproduction and productivity of cattle. Infection with trypanosomes was found to negatively affect the PCV value and body condition of affected animals. Thereby it denoted that *trypanosomes* infection of cattle in the study area resulted in loss of body weight and decrease in growth rate. Hence, attention should be given to the implementation of trypanosomosis control strategies to minimize the risk of the disease and major concerns should be given to the identified species of trypanosomes and control measures should be targeted accordingly.

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