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Prevalence of Trypanosomiasis among Zebu Cattle in Mulanda, Tororo District, Eastern Uganda

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Abstract: Trypanosomiasis remains a major constraint to the development of livestock in Sub-Saharan Africa and a big part of Africa is rendered unsuitable for the production of livestock due to the presence of tsetse flies. A cross sectional study was conducted to estimate the prevalence of trypanosomosis in Mulanda Sub County, Tororo district in Eastern Uganda during the month of April 2014. Whole blood samples were collected from 300 animals and examined for trypanosomes using micro-haemotocrit centrifugation and microscopic examination. The results showed an overall point prevalence of trypanosome infection at 5% with the highest prevalence observed in animals aged 7-9 years (10.7%). The prevalence of *T.vivax* was higher than that of *T. congolense* and other species. In conclusion, point prevalence of trypanosomiasis in the study area was generally low and there existed no significant association between disease prevalence and age but PCVs. Hence it can be recommended that the farmers should continue using long acting drugs for treatment of their cattle. In addition, the integrated trypanosomiasis control approaches should be extended to the traditionally tsetse free zones.
Keywords: Prevalence, Trypanosomiasis, Cattle, Mulanda sub-county, Tororo district, Uganda

INTRODUCTION

African Animal Trypanosomiasis (AAT) is a zoonotic vector borne disease caused by trypanosomes and transmitted by tsetse flies and probably other parasitic flies. It is closely associated with the Human African Trypanosomiasis (HAT) and major trypanosome species affecting cattle are *T. congolense*, *T.vivax* and *T. brucei brucei* [1]. Livestock show various symptoms including emaciation, anemia, and fever [2]. Infection with T.vivax is known to cause infertility by disrupting the maintenance of pregnancy [3-4]. Affected animals have their value and supply of their products as well as their contribution to the growing of crops compromised[5]. Trypanosomiasis remains a major constraint to the development of livestock in Sub-Saharan Africa and a big part of Africa is rendered unsuitable for the production of livestock due to the presence of tsetse flies [6, 7]. Estimates show that about 50 million cattle in Africa are exposed to the disease[8].

Tsetse fly infestation covers 70% of the whole surface area of Uganda and of the 5.4 million cattle; 2.2 million head are at risk of trypanosomosis [9-10]. Nearly 100 years have passed since tsetse and trypanosomosis control efforts in Uganda came into play and yet tsetse fly distribution has remained the same in some areas and in the others, the tsetse fly belt has stretched to new areas [11-12]. South Eastern Uganda is one of the zones where a lot of interventions have been done against tsetse and trypanosomes among livestock in form of prophylaxis and curative treatments. However prevalence of trypanosomes among cattle in this zone and effectiveness of the various interventions has not been estimated resulting into various arguments and probably misinformation [13-14].

The aim of this study was therefore to estimate prevalence of bovine trypanosomosis among the Zebu cattle in Mulanda sub-county, Tororo district of Eastern Uganda.

MATERIALS AND METHODS

Study area and sampling strategies

Mulanda Sub County is found in Tororo district, eastern Uganda north of Lake Victoria. The area has a sub humid climate with a bimodal rainfall with peaks during months of May and October. The total rainfall is between1130mm and 1720mm with temperature ranging from 16.2^0C to 28.7^0C. The relative humidity ranges from 52% to 89%. The vegetation is mainly composed of savannah grassland interspersed with *Lantana camara* shrubs, thick forests

and swamps are found along rivers and streams which form suitable habitats for *Glossina fuscipes*, a riverine tsetse fly species. The Sub-county has three parishes and forty five villages. Using prevalence of 8.9% in the neighboring district of Butaleja[15] at a 95% confidence interval and desired absolute precision of 5%, 300 cattle were randomly sampled from the parishes of Mulanda, Lwala and Mwelo (Cochran, 1963). To enable comparison of infection among the different age groups, ages of 6 months to 3 years, 4-6 years, 7-9 years and above 9 years were considered. Age was determined by checking the teeth of the animals.

Data collection and statistical analysis

Blood samples were antiseptically drawn from the jugular vein into vacutainers for proper storage before laboratory examination. Trypanosomes were detected in blood by micro-haemotocrit centrifugation as described by OIE[16]. Quantitative data for the prevalence of trypanosome species was captured and analyzed using SPSS to obtain the prevalence of the trypanosome infection among cattle in the sub county. Chi square was used to compare prevalence of the three trypanosome species.

RESULTS

Prevalence of trypanosome infection in Mulanda Sub-county

The overall prevalence of trypanosomes in Mulanda Sub-county was 5% with individual parish prevalence of 4%, 5% and 6% in Mulanda, Lwala and Mwelo respectively. Animals aged between 7-9 years had the highest percentage of infection (10.7%) and those between 6 months-3 years had the least infection rate (3.6%). Animals aged above nine years showed no infection. There was no significant relationship (*p=0.174, df= 3*) between the age of the cows and the status of infection. Trypanosome-infected cattle had significantly (*p=0.000, df=16*) lower average Packed cell volume (PCV) (18.6) than non-infected ones (24.8) (Table 1).

Table 1: Prevalence of trypanosome infection with parishes, age and PCV

		Infected or uninfected			Prevalence%	p-value
		infected	uninfected	C. EX		
Parish	Mulanda	4	96	100	4	0.810
	Lwala	5	95	100	5	
	Mwelo	6	94	100	6	
Total		15	285	300	5	
Age	6 months-3years	4	107	111	3.6	0.174
	4-6 years	5	115	120	4.2	
	7-9years	6	50	56	10.7	
	> 9 years	0	13	13	0	
Total		15	285	300	5	
Packed Cell Volume (PCV)	16	0	4	4	0	0.000
	17	3	1	4	75	
	18	5	8	13	38.5	
	19	4	4	8	50	
	20	0	33	33	0	
	21	0	9	9	0	
	22	0	18	18	0	
	23	0	25	25	0	
	24	0	28	28	0	
	25	1	45	46	2.2	
	26	0	22	22	00	
	27	0	21	21	0	
	28	1	26	27	3.7	
	29	0	9	9	0	
	30	1	21	22	4.5	
	33	0	8	8	0	
	34	0	3	3	0	
Total		15	285	300		

Where, C.EX =cattle examined

Prevalence of *Trypanosomes species* with age and parishes

T. *vivax* and *T. congolense* were identified in present study. Overall, *T. vivax* was the most predominant species encountered (60%) as compared to T. *congolense* (40%) (Table 2). No *T. brucei brucei* or mixed trypanosome infections were. Mwelo had more trypanosome infection caused by *T.vivax* followed and Lwala had the least. Lwala had the highest infections caused by *T. congolense* Mulanda had least. There was no significant association between the prevalence of *Trypanosome spp* and the various parishes of Mulanda sub-county (*Cl =95, P= 0.793, df=2*). The highest *T. vivax* infection (4) (44.5%) were observed in animals aged 7-9years followed by (3)33.3% and (2)22.2% in animals aged 4-6 years and 0-3 years respectively. There was no significant association between the prevalence of *Trypanosome vivax* and age (*Cl=95, P=0.479, df=3*) (Table 2).

Table 2: Prevalence of *Trypanosomes species* with age and parishes

Parish	Infected or infected cattle			Total	Prevalence %	p-value
	Infected with TC	Infected with TV	Uninfected			
Mulanda	1	3	96	100	4	Cl =95 P= 0.793
Lwala	3	2	95	100	5	
Mwelo	2	4	94	100	6	
Total	**6(40%)**	**9(60%)**	**285**	**300**	**5**	
Age of cattle						
6 months-3years	2 (33.3%)	2(22.2%)	107	111	3.6	Cl=95 P=0.479 df=3
4-6 years	2 (33.3%)	3(33.3%)	115	120	4.2	
7-9years	2 (33.3%)	4(44.5%)	50	56	10.7	
> 9 years	0	0	13	13	0	
Total	**6**	**9**	**285**	**300**	**15**	

T.c.= *Trypanosoma congolense*; T.v. = *T. vivax*

DISCUSSION

The overall point prevalence of trypanosome infection among cattle in present study was found to be 5%. This was lower than 8.9% observed in neighboring Butaleja district[15]. Although the study was carried out during the dry season when tsetse populations are usually low, it generally means that the disease burden is better than the 45% observed in Bolivia for example [17]. This could be attributed to the fact that farmers have embraced the treatment of their animals with long acting drugs like Isometamidium chloride [18]. People in Mulanda understand the challenge of trypanosomosis and are willing to fight it[19]. This has enabled the farmers to control the vectors and also treat the disease early enough. The government extension programme of NAADs could have equipped farmers with information about the disease. It is can also likely that the integral government measures against trypanosomes through stamp out sleeping sickness campaign could have had an impact as observed in the rural Northern KwaZulu-Natal [20]. The observed prevalence was lower than the 5.56% in Southwestern Uganda[21]. This finding implies that the originally non tsetse zones such as Southwestern Uganda are having higher trypanosomosis prevalences than South Eastern Uganda. This could be attributed to laxity and stereotypes that tsetse are majorly in the east.

Trypanosoma vivax was the most prevalent trypanosome species encountered in the present study. This agrees with the previous observations in tsetse free areas [22-25]. The predominance of T.*vivax* followed by T.*congolense* was also observed among the domestic cattle in Nigeria [26-29], Bolivia Burkina Faso [30-31]. The high prevalence of *T. vivax* over the other species in this study could be associated with its ability to be transmitted both cyclically by tsetse flies and mechanically by biting flies like (Stomoxes and tabanids) and thus may be transmitted across distances from known tsetse foci [32-33]. In contrast to the present finding, several studies carried out in tsetse infested areas of Ethopia have reported *T.congolense* as the predominant species [34-38]. The significance of this disparity is probably uncertain. Highest trypanosomosis prevalence was observed in animals aged 7-9 years. This could be attributed to the fact that these animals have been exposed to trypanosome vectors for a long period of time during grazing and some have been treated of the disease repeatedly using the same drug and as a result the trypanosomes could have become resistant to the drugs. However there was no significant variation (P > 0.05) observed in the prevalence of trypanosome infection between animals of different age groups. This could be due to the fact that all the animals sampled were above six months of age and so had equal chances of getting in contact with the vectors during grazing and travelling in search for water. This is similar to previous studies [24,25, 38].

Assessment of the PCV of the study animals showed that trypanosome-infected cattle had significantly ($P < 0.05$) lower PCV than non-infected ones. This observation is in agreement with other studies of bovine trypanosomoses in the country [23, 24, 25, 34, 36] and in other countries [39]. However, some infected animals had a PCV value higher than twenty (20). This could be because of the effects of antigenic variations; possibly a stage of reduced parasitaemia. Despite the fact that the proportion of animals infected were very small (5%), the analysis between infection status and PCV show very low coefficient of variation (<100%) and small standard errors implied that the association between infection status and PCV could be used to provide reliable estimates on the two variables. Taking the PCV range 16–20 as a normal [40], all the trypanosome infected and the non-infected animals in that range were found to be anemic. The low PCV value could be due to the fact that trypanosomosis causes anemia [41] and other factors that cause anemia (malnutrition, helminthosis or other haemoparasitoses) in infected and non infected animals respectively since study was conducted in dry season where there was extreme shortage of feed for livestock and moreover, the studied animals were not screened for gastrointestinal parasites or other haemoparasites. In conclusion, point prevalence of trypanosomiasis was generally low. *T. vivax* was more predominant and there existed no significant association between disease prevalence and age but PCVs.

Conflict of interest

We declare that the authors did not have any conflict of interest whatsoever in this study.

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