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Survey of Animal Trypanosomosis and Biting Flies in Parts of Alkaleri Local Government Area of Bauchi State, Nigeria

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Abstract
A survey of tsetse and animal trypanosomosis was carried out in five settlements: Lim, Birim, Yuli, Kungibar and Yankari game reserve of Alkaleri Local Government Area of Bauchi state, Nigeria. A total of 448 blood samples were collected between February and March, 2008. Blood samples were examined for trypanosomes using Giemsa stained thick and thin smear method and the Haematocrit Centrifugation Techique (HCT). The results obtained showed that the overall prevalence of trypanosomosis and other haemoparasites in the study area was 51%. Trypanosoma vivax was the most predominant trypanosome species found (39.1%) and is statistically significant in male than in female ($p< 0.05$). Vector investigation in the study areas showed, that a total of 77 biting flies were caught using Biconical and Nitse traps.Glossina tachinoides was the most abundant vector with a catch of 60(78.8%);Glossina palpalis 10(13.0%); Tabanids 3(4.0%); Stomoxys 3(4.0%) and Chrysop 1(1.0%).The parasites have no significant difference ($p>0.05$) between different settlements where samples were collected. The public health importance of this survey is discussed.
Keywords: Tsetse, Trypanosomosis, Game reserve, Public health importance.

1. Introduction:

Trypanosomosis has become an age long disease affecting both man and livestock. It is caused by several species of blood parasites of the genius *Trypanosoma* (Barret *et al.,* 2003; Harriegtor, 2011). These trypanosomes are transmitted by the bite of an infected *Glossina* species (tsetse fly) cyclically, and through other biting flies (*Tabanids* etc) mechanically. In Nigeria, the most important *Trypanosoma* species are *Trypanosoma brucei* (*T. brucei*), *Trypanosoma congolense* (*T. congolense*), *Trypanosoma vivax* (*T. vivax*) and *Trypanosoma evansi* (*T. evansi*) in livestock, while *Trypanosoma gambiense* infects man. Due to the zoonotic nature of the infection, animals (mostly wild animals) have been found to harbor human infective trypanosomes (Simo *et al.,* 2000; Abenga and Lawal, 2005). Animal trypanosomosis is estimated to cost African agriculture US $4.5 billion per year (Reinhardt, 2002), while economic loss in cattle due to the infection is estimated to be US $70 million annually in six Northern states of Nigeria (Mariam, 2006). In addition, about 60 million people are continually exposed to the risk of the disease while 4 million are under surveillance and only 10% of the cases are treated (Cattand *et al.,* 2001; WHO, 1998).

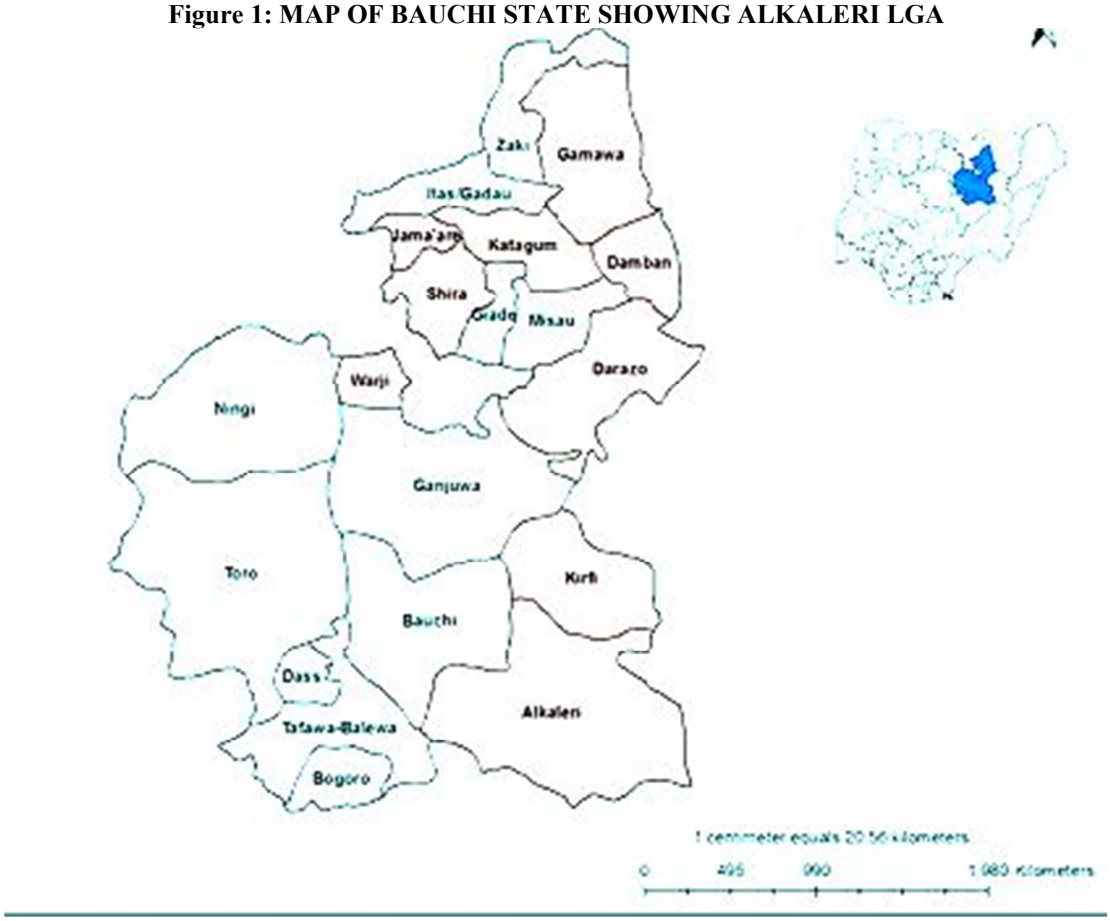
The distributions of tsetse flies are determined by the types of vegetation, temperature, relative humidity and presence of host. However, in Nigeria, eleven of the twenty- three species of tsetse flies are known to infest over 80% of the 928, 300km^2 of the landmass, and are widely distributed from latitude 4^{o}N and 13^{o}N (Onyiah, 1977). Imna *et al*. (2011) in an epidemiological survey, observed a very high density of tsetse flies at game reserves which are a potential foci of trypanosomosis. Nigeria has great tourism potentials; one of the sites is the Yankari Game Reserve Bauchi state which harbors wild life. This survey is aimed at assessing the status of trypanosomosis in settlements around the game reserve.

2. Material and Methods:

2.1 Study area

Alkaleri Local Government Area (LGA) is found in the South-East of Bauchi State, Nigeria (Figure 1). It is a Sahel Savanna zone which lies on longitude 10^o-11^o North and latitude 9^{o}10'-9^{o}30' East. It enjoys an annual rainfall of 600-900mm^3 per year with peaks between July-August. Yankari Game Reserve (a tourist centre) falls within the area sampled. Four settlements around the game reserve –Lim, Birim, Yuli and Kugibar were surveyed for trypanosomiasis.

Figure 1: MAP OF BAUCHI STATE SHOWING ALKALERI LGA



2.2 Herd

The animals sampled were Zebu cattle (white Fulani), Yankassa sheep and Sahel goats. They belong to Fulani herdsmen around the grazing reserve. The animals were of different ages and sex, and graze together. Selection was done purposively as described by Putt *et al*. (1987).

2.3 Vector catch

Flies were trapped using both NITR biconical Nitse traps impregnated with fly attractant (acetone). They were placed 100 meters apart along river banks, thickets and animal pathways. Harvest was done 48 hours later and identification carried out at species level (Murray *et al*., 1983) at the Nigerian Institute for Trypanosomiasis Research (NITR) Vom, Plateau State, Nigeria.

2.4 Blood collection

Three (3) mls of blood was collected from the jugular vein of the selected animals in all the settlements except in the game reserve and instilled into Ethylene Diamine Tetra-acetic Acid (EDTA) bottles. These were transported in ice-packed boxes to the laboratory for analysis.

2.5 Blood analysis

Infection was diagnosed by the standard trypanosome detection method (Wilson, 1969) and Concentration Method (Woo and Kobayashi, 1975). Parasite species were differentiated using Giemsa Staining technique and observed using oil immersion under x100 microscopic magnification.

2.6 Statistical analysis

The data obtained from this study were analysed using simple percentages and chi-square test. A p-value of <0.05 was considered significant.

3. Results

Investigations in five settlements (Yankari game reserve, Lim, Birim, Yuli and Kungibar) of Dugari district in Alkaleri Local Government Area revealed a total catch of 77 biting flies. *Glossina tachinoides* accounts for 60

(78.8%) of the total catch, while *Glossina palpalis* accounts for 10(13.0%), Tabanids 3(4.0%), stomoxys 3(4.0%) and chrysop 1(1.0%).Yankari game reserve – a tourist centre in Nigeria recorded the highest catch of tsetse (Table 1).

A total of 448 blood samples were collected from the study areas (Table 2) except for Yankari game reserve due to administrative/logistic bottle necks in the game reserve. Of the four villages surveyed 23 (51.3%) were positive for trypanosome and other haemoparasites. The parasites encountered include *Trypanosoma brucei* 1(4.3%), *Trypanosoma congolense* 1(4.3%) *Trypanosoma vivax* 9(39.1%) and *Babesia* spp. 12(52.2%) *T. vivax* accounted for 39.1% of all positive cases and is stastiscally significant in male animals than female animals ($P<0.05$) (Table 3). There is no statistical significant difference ($P>0.05$) in infection rate as related to different settlements where samples were collected (Table 2).

Table 1: Distribution of biting flies in the villages of Duguri district in Alkaleri L.G.A Bauchi State under investigation.

District	Villages	Total (%) Catch	Species of Flies				
			G. tachinoides	*G.palpalis*	Tabanids	Stomoxys	Chrysops
Duguri	Lim	4(5.2)	0	0	1(25.0%)	2(50.0%)	1(25.0%)
	Yankari	60(78.0)	50(83.3%)	9(15.0%)	0	1(2.0%)	0
	Birim	1(1.3)	0	0	1(100%)	0	0
	Yuli	10(13.0)	9(90.0%)	1(10.0%)	0	0	0
	Kungibar	2(3.0)	1(50.0%)	0	1(50.0%)	0	0
Total		**77**	**60(78.0%)**	**10(13.0%)**	**3(4.0%)**	**3(4.0%)**	**1(1.0%)**

Table 2: Trypanosome distribution in the Villages of Duguri district of Alkaleri L.G.A. of Bauchi State under investigation.

District	Villages	Total(% Samples collected	Samples (%) Positive	Species of Flies			
				Trypanosoma brucei	*T. vivax*	T. *congolense*	*Babesia spp*
Danguri	Yankari	- (ND)*	-	-	-	-	-
	Lim	150	4(4.7)	0	1	0	3
	Birim	170	6(6.5)	0	2	1	3
	Yuli	100	8(8.9)	1	4	0	3
	Kungibar	28	5(17.9)	0	2	0	3
Total		**448**	**23(51.3)**	**1(4.3)**	**9(39.1)**	**1(4.3)**	**12(52.2)**

(ND)* = Not done, due to administrative/ logistic bottle necks in the game reserve.

Table 3: Distribution of Parasites in relation to animal sex in parts Duguri District of Alkaleri L.G.A Bauchi State under investigation.

District	Breed	Sex	Samples size	Samples positive (%)	Species of Parasite Identified			
					Trypanosoma brucei	*T. vivax*	*T. Congolense*	*Babesia spp*
Duguri	Cow	Male Female	30 190	8(26.7) 5(3.6)	1 0	2 2	1 0	4 2
	Goat	Male Female	23 58	0(0.0) 1(1.7)	0 0	0 0	0 0	0 0
	Sheep	Male Female	6 84	0(0.0) 2(2.4)	0 0	0 1	0 0	0 0
	Calf	Male Female	13 44	3(23.1) 4(4.1	0 0	2 2	0 0	3 3
Total			**448**	**23(51.3)**	**1(4.3)**	**9(39.1)**	**1(4.3)**	**12(52.2)**

4. Discussion

The present study area shows prevalence of *Glossina* infestation in the Yankari game reserve, a tourist centre in Nigeria recording the highest catch of tsetse (78%) of the total catch in this study. This may be due to the favorable conditions such as temperature, relative humidity, vegetation, and also the abundant wild animals in the reserve. *Glossina tachinoides,* a vector of public health importance was observed to be highest catch in the game reserve (83.3%).

Although, none of the wild life was bled for trypanosomosis, findings from the sedentary Fulani herds grazing around the game reserve shows positive result for trypanosomosis which agrees with Mbaya *et al*. (2008) that there is cross transmission from one wild animal to another in the game reserve on the one hand and from wild animal to sedentary cattle located in close proximity to the game reserve

Trypanosoma vivax infection is the most prevalent species of trypanosome found in the study area. This may be due to its short developmental cycle in the vector (probocis) and mechanical transfer by biting flies (ILRAD, 1988). The *T. vivax* infection was more predominant in male animals than in female which is in agreement with the findings of Ohaeri (2010).

The presence of *Babesia* infection is associated with tick infestation at the beginning of raining season in this area (Shamaki *et al*., 2007). There was no distinct parasite preference for any settlement in the study area. However, recommendation is made for more sensitive method of diagnosis – Polymerase Chain reaction technique (PCR) can be adopted for further epidemiological investigation.

5. Conclusion

Workers and human population in or around the game reserve should be screened for Human African Trypanosomiasis (HAT), and biological control using the Sterile Insect Technique (SIT) is recommended for the control and prevention of the tsetse fly population.

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