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Epidemiological Survey of Animal trypanosomiasis in Kaltungo Local Government Area Gombe State Nigeria.

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ABSTRACT

A total of 450 blood samples randomly collected from 218 (48.4%) cattle 66 (14.7%) sheep, 112 (24.9%) Goats, 4 (0.9%) donkeys and 50(11.1%) pigs from randomly selected herds from 8 villages in 4 districts (Bule – Kaltin, Tungo, Kaltungo-East and Kaltungo-West) of Kaltungo LGA were examined for haemoparasites. These total number of 450 animals comprises 115 (25.6%) males and 335 (74.4%) females. From the males, 76 (66.1%) are cattle, 10 (8.7%) goats, 0 (0.0%) donkeys and 10 (8.7%) boar. While female consist of cattle 142 (42.4%), sheep 56 (16.7%), goats 93 (27.8%) donkeys 4 (1.2%) and sow 40 (11.9%). The blood samples from these animals were analysed using a combination of thick and thin film technique and concentration methods; haematocrit centrifuge technique (HCT). 22 blood samples screened were found to be positive for haemoparasites: 3 (13.6%) were infected with *Trypanosoma vivax*, 1 (4.5%) *T. theileri*, 11 (50.0%) microfilariae, 4 (18.2%) *Babesia spp* and 3 (13.6%) *Anaplasma marginale*. *T. congolense* and *T. brucei* were not isolated. The average packed cell volume (PCV%) for infected and non-infected males were 26.2 ± 1.3 and 28.2 ± 0.5, while that of females was 24.1 ± 2.0 and 27.1 ± 2.1 respectively. *Microfilariae* is high in prevalence while *T. vivax* is low 3 (13.6%). However no single *Glossina* (Tsetse fly) was caught while few tabanids, *stomoxys*, *chrysops* and *simulium* were trapped. The findings reveals the area to be tsetse free and transmission of trypanosomiasis is mechanical due to presence of only *stomoxys*, tabanids and *chrysops*. Ticks were also picked from some of the herds.

Key words: Epidemiology; Animal trypanosomiasis; public health significance; Gombe State

INTRODUCTION

Trypanosomiasis are protozoan infection of zoonotic and economic importance caused by different species of trypanosomes *T. vivax, T. congolense, T. equiperdum, T. evansi, T. simiae, T. brucei* (Animals) and *T. brucei gambiense* and *T. b. rhodesiense* (man and animals). These parasites are either hematonics, (*T. vivax, T. congolense*) found in the plasma, or the tissue invading group (*T. b. gambiense, T. b. rhodesiense, T. equiperdum* and *T. evansi*) found extravascularly or intravascularly. (Losos and Ikede, 1972).

These protozoan parasites (e.g. *T. vivax, T. brucei, T. congolense*) are biologically transmitted by *Glossina* species (Tsetse fly), mechanically (*T. evansi, T. vivax*) by biting flies (tabanids and stomoxys) (Antony *et al.*, 2004) and sexually (*T. equiperdum*) in equidae.

The course of the disease (in man and animals) can be per acute, acute (febrile stage) and chronic depending on animal host and parasite virulence (Ikede, 1981).

The disease is clinically characterized by pyrexia, progressive anaemia, pale mucus membrane, emaciation, muscular atrophy, lacrimation, nasa discharge and either diarrhea or dark hard faeces *T. vivax* causes sudden tear and haemorrhage on the skin of the animal, this is mostly seen in cattle.

Other signs of the disease are oedematous swelling of the external genitalia, lower abdomen and thorax, ventral region of the neck, sometimes lymphadenitis in the supra orbital fossa and limbs in per acute cases, while lumbar paralysis is observed in chronic cases (Ikede, 1981) and death when untreated. The disease affect 36 countries in sub Saharan Africa and 18 countries in Latin America, central America and Mexico (*T. cruzi* affect most south American countries causing chagas disease). (Wellcome News, 2005).

In Africa, total areas of 10 million Km^2 covering almost 37 countries are infested with various species of the parasite. In man, 500,000 people are reported to be presently infected with sleeping sickness Trypanosomiasis) with annual death rate of 50,000 people while 65 million people are exposed to the risk. (Pan African Tsetse and trypanosomiasis eradication campaign – PATTEC, 2004).

Nigeria with a total landmass of 926,488 Km^2 has an infected area of 587,273 Km^2. (63.4%) (Kalejaiye *et al*., 2000; Omoogun *et al.*, 1991; Omotainse *et al*., 2001; Shamaki *et al.*, 2002; Balak *et al*., 2003; Yanan *et al*., 2004; Dede *et al*., 2005). Most of these reports are in the central area of Nigeria, hence the need for current surveys of other agro-economic area of the country.

MATERIALS AND METHODS

Study area

Kaltungo local government area of Gombe state Nigeria lies on latitude and $9^o47'N$ and longitude $11^o25'$ and $11^o30'E$ (No.1) it has an annual rainfall of 560 – 740 mm (July – October) and is 300 – 400 m above sea level. (Anon, 1987). Akko L.G.A forms its northern boundaries, Balanga LGA, the eastern frontier while it is bounded by Billiri and Shongom LGAs respectively in the west. Adamawa plains forms the southern boundary of the study area. The area falls within the sudan guinea savannah with sparse vegetation and enjoys mostly hot weather climate. A total of 8 villages in 4 districts areas (Bule-Kaltin, Tungo Kaltungo-East and Kaltungo-West) of the local government area was surveyed for six days in the month of August 2007 (Peak rainfall and a relative humidity of 78%).

Herds

The animals (of all age and both sexes) were from sedentary and nomadic herds, and they include, cattle, (white Fulani Zebu and Borno red breeds) Sheep (yankasa), goats (Sokoto red) and Donkeys all grazing along side the herds and pigs (in pigries within the villages) which usually goes out for semi-grazing at the outskirts of the villages. The herds were randomly selected. Clinical signs were observed and medical histories were obtained from herds owners prior to bleeding.

Blood Collection

2 – 3 ml of blood samples was collected from the jugular vein from ruminant and donkeys while caudal vena cavae was used for blood collection in pigs after restraining on dorsal recumbency using clean 5 ml syringe and needles (BD Discardit Tin II Spain) (21 G x 1 ½ ”-small ruminants, 18 and 19 G – large ruminant blood collected were kept in bijou bottles containing Ethelenediamine tetra acetic acid (EDTA) as anticoagulant to prevent coagulation. These bottles were labeled to indicate, sex, age, specie and were kept in a cooler to enhance survival of trypanosomes.

Vector

NITOR impregnated biconical traps (Fig. 1) were used to trap vectors of trypanosomes in the area. These were placed 100 m apart in dense vegetation on river and streams sides and left for 24 hours after which harvest was made and flies caught were identified immediately. (Dede *et. al*., 2005).

Fig. 1. A picture of biconical trap use in NITOR
For *tsetse* and biting fly trapping.

Diagnosis

This was achieved by standard trypanosome detection method (STDM); thin and thick films and concentration method using Haematocrit centrifugation method using Haematocrit centrifugation technique (HCT) (Woo and Kauffman, 1972).

Analysis

Blood samples were examined for blood parasites using STDM and HCT, while packed cell volume (PCV%) was read off PCV% meter reader (Hawksley Ltd England) after spinning blood samples in heparinized capillary tube (superior marienfield-Germany) in a centrifuge (Beyern GS Germany) at 1,000 G for 5 minutes. They were examined using microscope (ERNST LEITZ Wetzlar GMBH Germanary) at x 10 magnification while thin and thick films smears made on clean glass slides were dried, fixed with methanol for 2 minutes and stained using Giemsa, washed off with distilled water and examined under oil immersion at x 100 microscopic magnification at NITOR Vom Plateau state Nigeria.

RESULTS

There was no single *Glossina* species trapped within the study period, however, biting flies such as tabanids, stomoxys *simulium* were identified. *Chrysops* was also trapped, but these flies are small in number (Table 1). Ticks were also observed on some animal.

Trypanosoma vivax, T. theileri were the only species isolated. *T. congolense* and *T. brucei* were not isolated. (Table 2). Other haemoparasite found include, microfilaria, *Babesia* and *Anaplasma*, but all these parasites are low in occurrence (Table 2).

The PCV% of the infected animals compared to non infected animals showed no significant difference ($P > 0.05$) (Table 3).

The giemsa stained thick blood films is the most sensitive diagnostic method from the three methods applied (Table 4).

The result shows no sex preference of infection by the haemoparasites as shown (Table 5).

Table 1. Distribution of flies in Kaltungo LGA

	Species				
District	*Glossina*	*Stomoxys*	Tabanids	*Chrysops*	*Simulium*
Bule	-	-	1	-	1
Tungo	-	1	-	-	-
Kaltungo-East	-	1	1	1	-
Kaltingo – West	-	-	-	-	-

Table 2. Distribution of Trypanosomes species and other haemoparasites in Kaltungo LGA.

District	Total No. of Samples	Total No. of positives	Species						
			T. vivax	*T. congolense*	*T. brucei*	*T. theileri*	*Microfilariae*	*Babesia*	*Anaplasma*
Bule	140	8 (5.71%)	-	-	-	1 (12.5%)	5 (62,5%)	1 (12.5%)	1 (12.5%)
Tungo	150	8 (5.33%)	1 (12.5%)	-	-	-	3 (37.5%)	3 (37.5%)	1 (12.5%)
Kaltungo-East	110	6 (5.45%)	-	-	-	1 (16.7%)	3 (50.0%)	1 (16.7%)	1 (16.6%)
Kaltungo-West	50	0 (0.00%)	-	-	-	-	-	-	-
Total	450	22 (4.9%)	1 (4.5%)	-	-	2 (9.6%)	11 (50.0%)	5 (22.7%)	3 (13.6%)

Table 3. Mean PCV% of Infected and non infected animals in Kaltungo LGA.

PCV% Examined	Sex	No. of	Mean ± SD
Infected	Male	10	26.2 ± 1.3
	Female	12	24.1 ± 2.0
	Total	22	25.2 ± 1.5
Non infected	Male	105	28.2 ± 0.5
	Female	323	27.1 ± 2.1
	Total	428	27.1 ± 0.8

Table 4. Sensitivity of diagnostic technique

S/No	Diagnostic Method	Total No. of samples examined	No. of samples positive/% sensitivity	% of Total sample positive
1	Giemsa stained thin blood film	450	8 (36.4%)	1.8
2	Giemsa stained thick blood film		12 (54.5%)	2.6
3	Haematocrit centrifuge technique (HCT)		2 (9.1%)	0.4

Table 5. Distribution of haemoparasites in different sexes of animals in Kaltungo LGA.

Animals	Sex	Samples Size	No. positive	Species						
				T. vivax	*T. congolense*	*T. brucei*	*T. theileri*	*M/f*	*Babesia*	*Anaplasma*
Cattle	Male	76 (34.7%)	4 (26.7%)	1 (25.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (25.0%)	1 (25.0%)	1 (25.0%)
	Female	142 (65.14%)	11 (73.3%)	1 (9.1%)	0 (0.0%)	0 (0.0%)	1 (9.1%)	5 (45.5%)	3 (27.3%)	1 (9.1%)
	Total	218 (48.4%)	15 (6.9%)	2 (13.3%)	0 (0.0%)	0 (0.0%)	1 (6,7%)	6 (40%)	4 (26.7%)	2 (13.3%)
Sheep	Male	10 (15.2%)	1 (33.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (100%)	0 (0.0%)	0 (0.0%)
	Female	56 (84.8%)	2 (66.7%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (50.0%)	0 (0.0%)	1 (50.0%)
	Total	66 (14.7%)	3 (4.5%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (66.7%)	0 (0.0%)	1 (33.3%)
Goats	Male	19 (17.0%)	1 (33.5%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (50.0%)	0 (0.0%)	0 (0.0%)
	Female	93 (83.0%)	2 (66.7%)	1 (50.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (50.0%)	0 (0.0%)	0 (0.0%)
	Total	112 (24.9%)	3 (2.7%)	1 (33.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (66.7%)	0 (0.0%)	0 (0.0%)
Donkeys	Male	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
	Female	4 (100%)	1 (25.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (25.0%)	0 (0.0%)	0 (0.0%)
	Total	4 (0.9%)	1 (25.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (25.0%)	0 (0.0%)	0 (0.0%)
Pigs	Male	10 (20.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
	Female	40 (80.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
	Total	50 (11.1%)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Grand Total		450	22 (44%)	3 (13.6%)	0 (0.0)	0 (0.0%)	1 (45%)	11 (50.0%)	4 (18.2%)	3 (13.6%)

DISCUSSION

Animal trypanosomosis and tsetse flies are reported to be widely distributed in Nigeria from latitude 4°N to 13°N (Onyiah, 1997; Omotainse *et al*., 2004) an area within which falls the study area. This widespread is due to re-infestation of hitherto tsetse and trypanosome free zones (Adamawa, Borno and Taraba) after the last national fly eradication campaign were done in Nigeria in 1973. (NITR 1975). This corroborates with statements obtained from the inhabitants.

There was no single Glossina fly that was caught within the study period which suggest the absence of any cyclical transmission of the diseases, this suggest that the area is tsetse-free in wet season (FAO 1979).

However, few ticks stomoxys (two), tabanids (two) are caught and are known mechanical transmitters of *T. vivax* infection (Antony, *et al*., 2004) and these are mostly seen in cattle (Yanan *et al*., 2003). The rate of infection is low (13.6%) compared to the total number of animals screened and health due to the total number of fly catch. These herds are grazing herds and could equally have infection by traversing tsetse infested area in search of greener pasture especially the north central zone of Nigeria which is established tsetse and trypanosome areas (Shamaki *et al*., 2002; Omotainse *et al*., 2004; Yanan *et al*., 2004, 2005; Dede *et. al*., 2005). The closest report of trypanosomiasis in Gombe state was by works of Dede *et al*., (2005) in Yamaltu-Deba LGA which forms the eastern extension of the study area. The incidence of trypanosome in a sheep may suggest the potential danger to other herds in this animal; the parasite can undergo metamorphosis and change in virulence in this host. Therefore becoming a reservoir of infection to other animals since goats do not show immediate clinical manifestation of the disease. *T. congolense* and *T. brucei* were not isolated from the screened animals indicating possibilities of absence of zoonoses. Incidental *T. theileri* was low in occurrence (29.6%) and non pathogenic in west-Africa.

The high prevalence of microfilarial parasites (50.0%) in all the animals (except pigs) may explain the prevalence of river blindness in a neighbouring Dadiya community (Balanga LGA) which for long has been on community mectizan treatment.(WHO 1998), but the vector (*simulium*) of microfilarial worms was low in occurrence (one) haemoparasites such as *babesia* spp and *anaplasma* spps are transmitted by ticks which are common finding in all the agro ecological zones of the country (Dogo, 2002; Shamaki *et al*., 2007) especially in rainy seasons.

The diagnostic method used indicate that giemsa stained thick blood films is more sensitive however, recent finding using polymerase chain reaction method by Yanan *et al*.(unpublished) indicate presence of trypanosome antigens in cattle considered trypanosome free by other parasitological technique hence the need for advance diagnostic method. The result indicate Kaltungo LGA to be tsetse free and transmission of trypanosomiasis is mechanicals therefore a good environment for animal breeding.

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