

THE PREVALENCE OF TRYPANOSOME INFECTIONS AMONG TRADE CATTLE IN SUBHUMID AND HUMID ZONES OF NIGERIA

A.U. KALU¹ and M. UDUEBHO²

¹ Department of Veterinary Public Health and Preventive Medicine, University of Maiduguri, P.M.B. 1069, Maiduguri, Borno State, Nigeria.

² Nigerian Institute for Trypanosomiasis Research, P.M.B. 03, Vom, Plateau State, Nigeria.

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ABSTRACT

The prevalence of trypanosome infections among trade cattle in the sub-humid and humid zones of Nigeria was investigated during a twelve-month period. The infections were prevalent throughout the year and a mean infection rate of 11.04% was recorded in both zones, among 1,775 selected cattle. In the more northern area of sub-humid zone (Kaduna), mean prevalence was 12.16% in 989 cattle and monthly figures ranged from 2.10% to 19.62%. *Trypanosoma vivax* and *T. congolense* contributed almost equally to the infections being responsible for 36.6% and 35.0%, respectively of all positive cases. The importance of *T. vivax*, however, increased in Gboko (in the humid zone) where it was responsible for 50% of the parasitaemia encountered. Monthly prevalence in Gboko averaged 9.46% and ranged between 4.17% and 16.88%. Peak infections were common at the beginning of the dry season. The difference in PCV between infected and non-infected cattle was significant ($P < 0.05$) only in Kaduna where higher prevalence was also associated with increased differences in mean monthly PCV. *T. brucei* subspecies isolated from Gboko did not exhibit potentials for human infectivity: they were all *T. brucei brucei*, an animal pathogen.

Key Words: Trypanosome; Trade cattle, Humid, sub-humid

INTRODUCTION

The African trypanosomiasis are serious diseases caused by protozoan parasites of the genus *Trypanosoma* and mainly transmitted by the vector--tsetse fly, which occurs only in tropical Africa. Human trypanosomiasis is caused by *T. brucei gambiense*, *T. b.*

rhodesiense and is commonly known as sleeping sickness. Livestock trypanosomiasis, caused by *T. brucei*, *T. congolense* and *T. vivax* is a major obstacle to the development of the livestock industry in thirty six countries of tropical Africa. The efforts being undertaken to control the diseases in various parts of the continent include the elimination of the tsetse fly, the administration of curative drugs (chemotherapy) in clinically affected cattle and chemoprophylaxis among cattle at risk as well as the use of trypanotolerant breeds of cattle in tsetse-infested areas (FAO, 1979; Jordan, 1986).

Despite these efforts, high infection rates are still being reported (Agu *et al.*, 1989; Kalu *et al.*, 1991; Opasina and Ekwuruike, 1985).

In consequence of human impact on tsetse habitat and treatment of the disease in animals, periodic surveillance of bovine trypanosome infection is necessary for the purpose of planning modern cattle production and justifying investments in the tsetse-belts of Nigeria. This investigation was carried out among trade cattle in the humid and sub-humid zones in order to determine the effects of previous control efforts on the prevalence of infection in these areas since the two zones, together, support the majority of the national herd on account of abundance of fodder and water (Leeflang, 1978).

MATERIALS AND METHODS

The animals examined were cattle arriving for slaughter at the Kaduna municipal abattoir, Kaduna State (sub-humid zone) and Gboko Local Government Area (LGA) abattoir in Benue State (humid zone). For every animal, 5ml of blood were collected into bijou bottles containing the sodium salt of EDTA as anticoagulant. Sample number and sex of the

animals were marked on the bottle using grease pencil or adhesive labels. Samples were conveyed to the laboratory in Kaduna and in Gboko (Nigerian Institute for Trypanosomiasis Research (NITR), Epidemiology Unit) in appropriate ice boxes. Samples from each zone were collected randomly after Thrusfield (1986). A total of 1775 specimens were obtained from the zones. They consisted of 987 from Kaduna and 788 from Gboko, between the months of October 1989 and September 1990.

Diagnosis of infection was by wet and thin film methods, microhaematocrit centrifugation (Woo, 1970) and the buffy coat examination (Kalu, *et al.*, 1986). Species identification was by examination of Giemsa-stained thin films and morphological differentiation (Hoare, 1972). The packed cell volume (PCV) for each specimen was estimated using haematocrit centrifuge and reader as previously described by Kalu *et al.* (1986).

Blood Incubation Infectivity Test (BIIT).

Blood samples which were positive for *Trypanosoma brucei* subspecies from the Gboko area - a sleeping sickness endemic zone

(Kalu *et al.*, 1991) were stabilised in liquid nitrogen (-196°C). They were tested for human infectivity according to Hawking (1976).

RESULTS

The prevalence rate in both zones was 11.04%. Tables 1 and 2 show prevalence rates among the different zones. Trypanosome infections were prevalent throughout the year and were due to *T. vivax* (4.62%), *T. congolense* (3.60%), *T. brucei* subspecies (2.54%) and mixed trypanosome populations (0.28%). Infection was higher in cows (22.3% 0.0223; confidence interval, 0.189, 0.257) than in bulls (5.91%, 0.059; CI, 0.046, 0.072) despite the fact that 68.6% of the samples (1219) were from male stock. In Kaduna, an infection rate of 4.29% was found among 606 bulls and 24.62% in 381 cows. *T. vivax* accounted for 4.46% of the infections while the corresponding figures for *T. congolense* and *T. brucei* were 4.26% and 3.14%, respectively (Figure 1).

Mean PCV values of infected cattle was significantly lower than those of healthy stock

TABLE 1: PREVALENCE OF TRYPANOSOME INFECTIONS IN TWO ZONES OF NIGERIA.

Zone	No. of samples	No. of positive	Prevalence rate (%)
Gboko (Humid)	788	76	9.6
Kaduna (Sub-humid)	987	120	12.2
Total	1,775	196	11.0

TABLE 2: PREVALENCE OF TRYPANOSOME SPECIES DURING THE 12 MONTH PERIOD.

Species	Gboko (Humid)	Kaduna (Sub-humid)	Total	Isolation rate
<i>T. vivax</i>	38	44	82	41.8
<i>T. congolense</i>	22	42	64	32.6
<i>T. brucei</i>	14	31	45	23.0
Mixed	2	3	5	2.6
TOTAL	76	120	196	100.0

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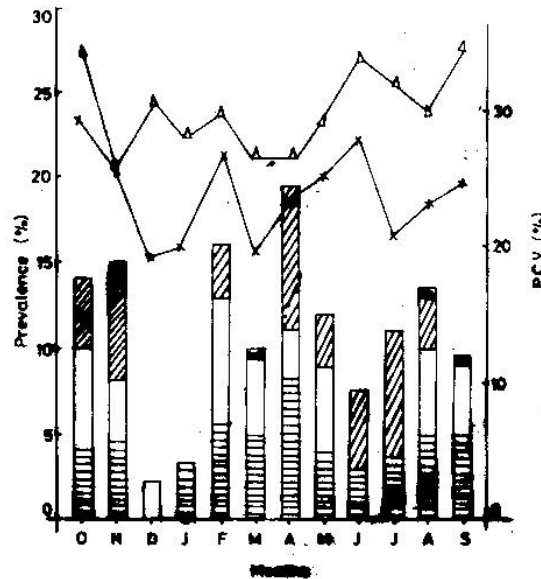


Fig 1: Monthly prevalence of trypanosome infections due to *Trypanosoma vivax* (▨), *T. congolense* (▤), *T. brucei brucei* (▥) and variations in PCV values (×—×, infected; △—△, non-infected) of trade cattle in Kaduna subhumid zone of Nigeria.

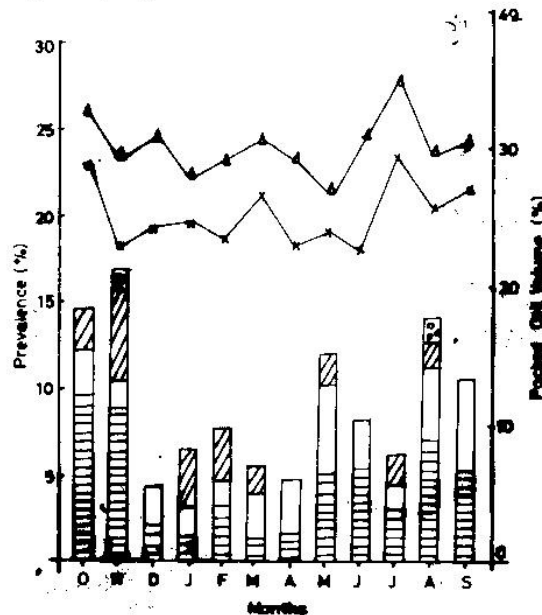


Fig. 2: Monthly prevalence of trypanosome infection due to *Trypanosoma vivax* (▨), *T. congolense* (▤), *T. brucei brucei* (▥) and variations in PCV values (×—×, infected; △—△, non-infected) of trade cattle in Gboko humid zone of Nigeria.

($P < 0.05$; $t = 2.49$).

T. vivax was predominant (4.82%) in Gboko while mixed infections (0.25%) were least encountered (Fig. 2). Table 2 shows that *T. congolense* infections were 56% higher than those for *T. brucei*. Also, as observed in Kaduna, the infections were higher among females (17.24%) than in males (7.49%). The peaks of infections also differed; they were recorded at the end of the rains (October) and beginning of the dry season (November) in (Fig.

2) and at the beginning of the rainy season (April) in Kaduna (Fig. 1). Fourteen isolates of *T. brucei* subsp. from Gboko were stabilized in liquid nitrogen. Eight of these did not show viable parasites on recovery on account of low parasite concentration during initial isolation. The results of four tests per stabulate of the six viable stocks showed that all were sensitive to (inhibited by) normal human serum as tested by BIIT. These were therefore *Trypanosoma brucei brucei* - an animal pathogen.

DISCUSSION

The present prevalence figures obtained from each of the zones though similar to recent figures which previous investigators such as Joshua and Shantikumar (1989), Agu *et al.* (1989), Kilgour and Godfrey (1978) reported in identical zones yet they are much lower than those recorded during investigations undertaken two or more decades ago by Macleanan (1956) who found 30%, Godfrey *et al.* (1965) (42%) and Yesufu and Mshelbwala (1973) (70%) in same ecological circumstances.

Many factors probably brought about the observed differences. Among these are extensive control measures (FAO, 1979), vehicular mode of transportation of cattle (Kilgour and Godfrey, 1978; Opasina and Ekwuruike, 1985, Jordan, 1986) which have reduced infection in tsetse vector and its subsequent transmission to cattle.

It is safe to assume that the mean prevalence of bovine *trypanosome* infection is higher than expected (between 8-10%) despite the control programmes of the past decades. The level of infections may be due to re-invasion of cleared land by the tsetse fly (Jordan, 1986). But the higher prevalence in Kaduna could have resulted from inadequate nutrition associated with the dry season, stress factors and by the presence of woodland tsetse species (especially *Glossina morstans submorsistans*) which has high vectoral capacity (Macleanan, 1956; Esuruoso, 1973; Leeftang 1978, Jordan 1986), and to the butchers habit of selecting more lean cattle for slaughter in the north than in the southern parts of the Country. Male cattle which are not required for breeding are expendable. Therefore more males are usually sent for slaughter than females. However, their lower rate of infection reflect shorter time male cattle have to acquire infections. The females, on the other hand, live longer and have greater chance for exposure to infections. Among females culled for low productivity are those with chronic trypanosome infections. These explanation account for the observed sex

differences in the prevalence of infections.

Generally the results show that the prevalence of trypanosome infections appears to have remained within 9-11 per cent in trade cattle up to the last decade (Opasina and Ekwuruike, 1985). Further reduction of infections would required efforts beyond one conventional strategy and tactics. It is hoped that molecular Veterinary medicine and biological control of tsetse fly would add more impetus to the current efforts to achieve decline in the prevalence or elimination of trypanosome infections of cattle in Nigeria. The relative abundance of the three trypanosome species encountered and the time of maximum infections agree with what is currently known of the epidemiology of bovine trypanosomiasis in Nigeria. (Ferguson, 1964; Opasina and Ekwuruike, 1985). High rate of *T. brucei* in the northern guinea zone suggests foci of infection similar to the survey report on the Kainji National Park (Akinboade *et al.*, 1983) which is situated in the same area.

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