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STUDIES OF THE ENDEMICITY OF PATHOGENIC TRYPANOSOMES: AN IMPLICATION FOR HUMAN TRYPANOSOMIASIS CONTROL IN GWAGWALADA TOWN, FCT-ABUJA.

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Abstract

A total of 636 complrising of cattle, goats and sheep was investigated for the presence of Trypanosomes infection in Gwagwalada slaughter house, between the month of (July 2015 to November 2015) and the prevalence rates in cattle, goats and sheep were found to be 6.60%, 5.70% and 4.72% respectively. Wet, thin, thick films, animal inoculation, haematocrit centrifugation technique and buffy coat methods were used to detect trypanosomes in the blood of the animals. The packed cell volume (PCV) was also determined. Mean PCV of infected cattle was 6.60% against uninfected cattle 93.40%. In goats, the PCV was 5.70%, uninfected goats 94.30%; while that of sheep was 4.72% and uninfected 95.30%. Trypanosoma vivax infection accounted for 60%, T. brucei 26.7% and T. congolense 13.38% in cattle. In goats, T. vivax infection accounted for 50%, T. brucei 41.7% and T. congolense 8.3%. Also T. vivax infection accounted for 64%, T. brucei 26% and T. congolense 0% in sheep. Sex did not significantly (P>0.05) affect infection rates. Although the prevalence rate of trypanosomiasis in cattle, goats and sheep appeared to be reducing compared to the previous works, trypanosomiasis remains an economically important in susceptible animals despite the reduction in prevalence rates in Nigeria.

Key Words: A, Study, Pathogenic, Trypanosomes , Trypanosomiasis and Control

Introduction

Animal Trypanosomiasis still constitute a major threat to food security in several parts of sub-Saharan Africa (Adams, *et al,*. 2006). It is estimated that not less than 46 million cattle are at risk of becoming infected by tsetse-transmitted trypanosomiasis (Adams, *et al,*. 2006).

Animal trypanosomiasis has been known to cause not less than 3 million livestock deaths each year, 20%less in calving, 25% reduction in milk yields, 50% reduction in livestock numbers Desquesnes, *et al,* (2001) and reduces work efficiency of animals thus hindering crop production (Adams, *et al,*. 2006). African trypanosomiasis has also been known as a major factor in the depopulation of many parts of Africa since the beginning of last century (Ezebuiro, *et al,* 2009). Trypanosome species of major threat to

cattle, sheep and goats include *Trypanosoma vivax, T. congolense and T. brucei brucei* (Ezebuiro, *et al*, 2009 and Kalu, *et al,* 2015). Due to the absence of surveillance, the exact prevalence situation of the disease in many part of Africa is not well known. This has led to break down in the control strategy which has contributed to the current upsurge in both human and animal trypanosomiasis in several parts of Africa today (Kalu, *et al*, 2014). In Nigeria, Animal Trypanosomiasis currently ravages several parts of agro ecological zones of the country (Njiru, *et al*, 2005).

Animal trypanosomosis is one of the main pathological constraints on the development of animal production in sub-Saharan Africa (Gana, *et al,* 2015) and causes annual losses estimated at US$ 1 billion (Ezebuiro, *et al*, 2009). Tsetse flies are the main vectors in this part of Africa. In Nigeria, tsetse flies still infest 80% of the nation's land mass including the high lands of Jos, Mambilla and Obudu plateaux previously known to be tsetse free (Egbe-Nwiyi, *et al*, 2015). The risk of transmission is primarily linked to the intensity of the encounters between vectors and hosts (Gana, *et al,* 2015).

Although small ruminants may not often show clinical signs of disease and it is assumed to be rarely affected under natural conditions and that trypanosomiasis of sheep and goats is not a serious problem Takeet, *et al,* (2014), Several experimental studies have shown that small ruminants are fully susceptible to infection with pathogenic trypanosomes (Fajinmi, *et al* and Nimpaye, *et al.*, 2011). In addition, infection in sheep and goats is frequently reported from field surveys Gana, *et al,* and Awosanya, *et al,* (2015) and the economic impact of trypanosomiasis on small ruminants is substantial (Ejeh, *et al, 20*15).

In an attempt to facilitate treatment and/or control of trypanosomiasis, it is imperative that early diagnosis be made to ascertain the prevalence of the disease. This can only be possible through the use of reliable and sensitive diagnostic procedures. The epizootiology of the disease in Nigeria Saidu, *et al*, (2015) and other parts of Africa Ezebuiro, *et al.* (2009) indicate increases in infection rates and losses resulting from naturally acquired infections despite decades of attempt at control.

In this work, the epidemiological studies of pathogenic trypanosomes of cattle, goats and sheep slaughter

at Gwagwalada slaughter house is reported using the clinical manifestations and parasitological diagnostic procedures.

MATERIALS AND METHODS

Study Area

The study was undertaken in animal slaughter house in Gwagwalada, an Area Council in Abuja, Nigeria. Gwagwalada Area Council is located about 55km away from Federal Capital City. It lies on latitude 8 55. North and 9° 00'North and longitude 7° 00' east and 7°.05' east (Ishaya, 2013). The area covers a total of 65sq kilometer located at center of very fertile area with abundance of grasses. (Ishaya, 2013).

This study area falls in to the guinea savanna vegetation zone of the country which is the broadest of all the vegetation types, constituting about 50% of the land area of Nigeria. There are two seasons within this vegetational zone, dry season that lasts between four to seven months and a rainy season that lasts between four to five months. The rainfall ranges between 1016mm and 1524mm with relative humidity of between 60% and 80%. The *guinea savanna* is divided into two vegetation zones: - the northern and the southern guinea savanna.

This area is highly influenced by the Niger-Benue trough where heat is trapped. The highest diurnal temperature ranges between 27°° and 37^{oC} in the months of November-April (dry season). The rainy season comes between the months of April to October with temperature range of 23^{oC} and 36°°. It is pertinent to observe that, this area has a higher temperature than any other Area Council in the Federal Capital Territory throughout the year.

The study was conducted at the Gwagwalada slaughter house. A total of 212 cattle, 212 goats and 212 sheep making a total of 623 animals were sampled and examined during the 4 months (July, 2015 to November, 2015) period. 5mls of blood was collected at slaughter from the cattle, goats and sheep

into ethylene tetra-acetic acid bottle. Each sample was kept cool by placing in a box containing ice packs immediately after collection and transported to the laboratory for examinations.

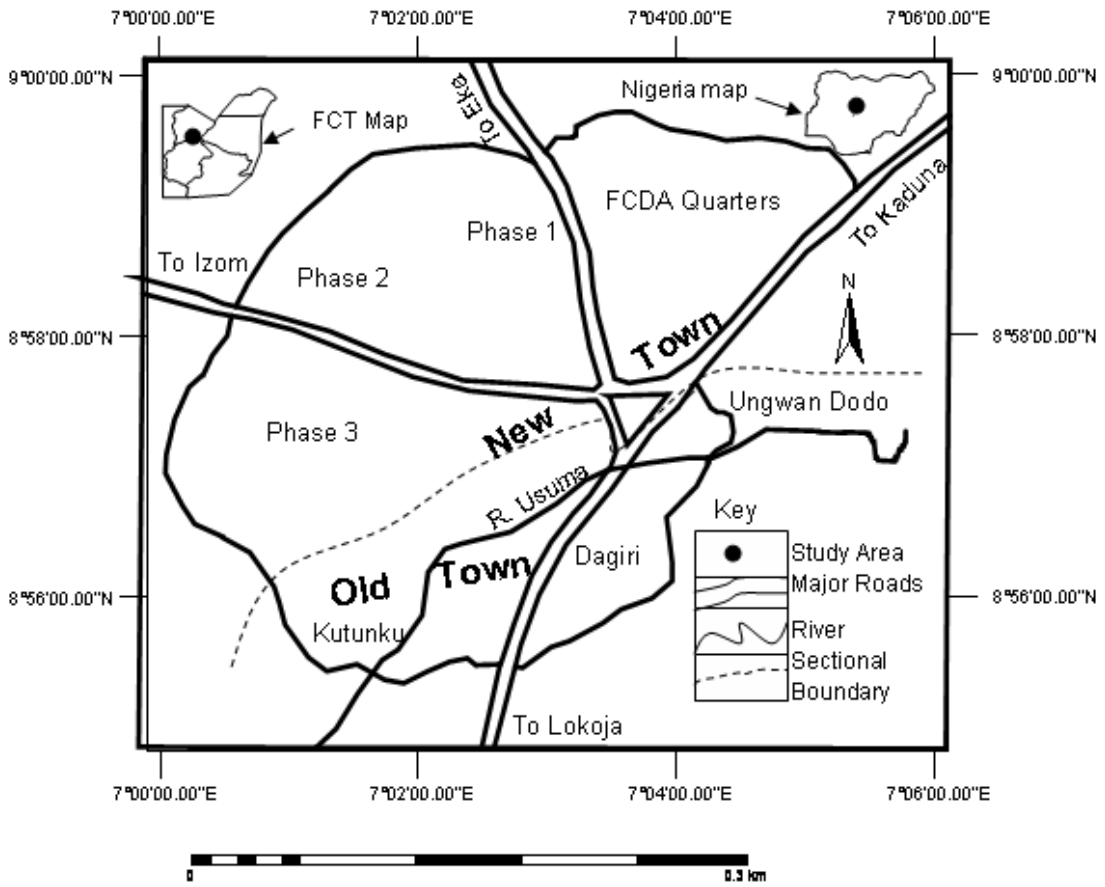

Fig. 1 Gwagwalada Town

Map of Gwagwalada Area Council, FCT-Abuja showing the Study Site.

Source: Ideal Cartographic Services, Bwari-Abuja [2002].

Clinical Diagnosis

The animals were examined physically for manifestation of clinical symptoms. The background of

animals was also taken to ascertain their source and passage through tsetse fly belts and general husbandry practice. Most of the animals were brought from the far Northern parts of Nigeria.

Parasitological Diagnosis

5ml of blood collected bottle were subjected to diagnostic techniques of the Standard Trypanosome detection methods i.e. wet film, Thin film, Thick film, Animal inoculation and concentration techniques Adams, *et al*, (2006) namely, Haematocrit Centrifugation Techniques and Buffy Coat Method.

Differential Morphological Characteristics of Trypanosoma Species

Any organism with a free flagellum, very well developed undulating membrane and a small sub-terminal kinetoplast was classified as *T. brucei*, (Fig. 2) while an organism with a medium sized marginal kinetoplast but without a free flagellum and inconspicuous undulating membrane was identified as *T. vivax* (Fig. 3) (Egbe-Nwiyi, *et al*, 2015). Also for *T. congolense* (Fig. 4) are absence of free flagellum, inconspicuous undulating membrane, and kinetoplast marginal and subterminal.

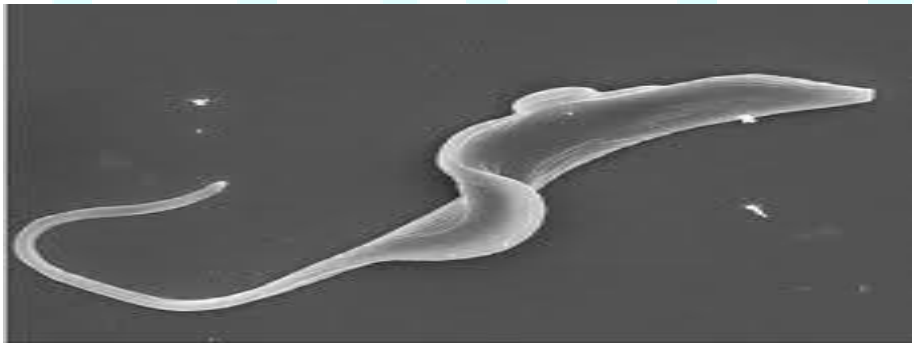

Figure 2: Image of *T. brucei*

Figure 3: Image of *T. vivax in the Blood*

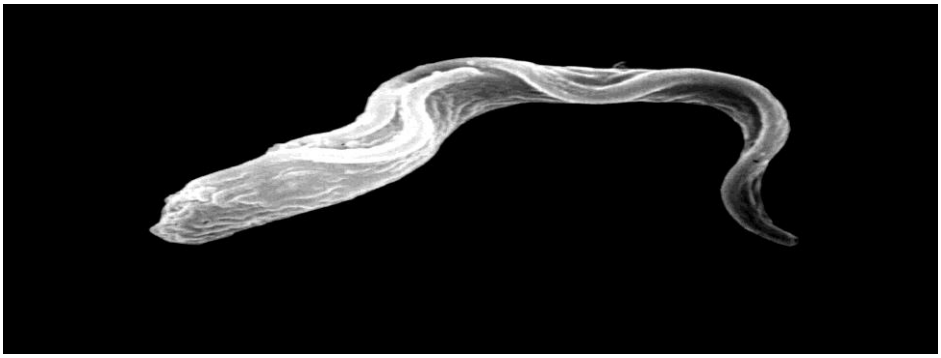

Figure 4: Image of *T. congolense*

Packed Cell Volume (PCV)

The packed cell volume was determined for all blood samples as a haematological index. This was carried out just like haematocrit centrifugation technique and after spinning for 5 minutes, the length of the columns of the fluid plus cells, can be taken as direct measurements of the relative amount of the solid and fluid portions of the sample since the diameter of the bore is constant. The column of packed red cells is stated as percentage of the whole and it expresses the proportion of red cells. It is used as a quantitative expression of anaemia, a most useful index in determining the progress of trypanosomial infection rates.

Results

Details of the epidemiological studies of pathogenic trypanosomes in animals slaughtered are shown in Tables 1-4. The overall infection rate revealed that 6.60% of cattle, 5.70% of goats and 4.92% of sheep sampled were infected (Table IV).

Trypanosome infection rates in the different sexes show that 8.33% of male and 6.57% of female cattle, 5.36% male and 7.69% of female goats as well as 6.25% of male and 6.10% of ewes sampled were infected (Table VI). The differences in the mean packed cell volume (PCV %) of trypanosome infected and those of non-infected animals are also shown on table vii. The mean packed cell volume of tryponosome infected was 20.31+3.31 while those not infected was

34.06+4.53.

In goats, the mean packed cell volume of infected animals was 20.279+2.38 and that of uninfected animals was 30.56+5.19. The packed cell volume of trypanosome infected sheep was 19.38+2.57 as against 31.75+2.56 of uninfected sheep. The above drop in the mean PCV of infected animals differed significantly from those of uninfected animals ($P<0.05$).

Table 1: Trypanosome Infection Rates in Different Breeds of Cattle Slaughtered at Gwagwalada Slaughter House

Breed	**No of Animal**	**No of Animal +ve**	***T. vivax***	***T. congolense***	***T. brucei***
White Fulani	180	12	2	6	2
Sokoto Gindali	20	2	2	3	-
Muturu	12	-	-	-	-
Total	**212**	**12**	**4**	**9**	**2**

Table 2: Trypanosome Infection Rates in Different Breeds of Goats Slaughtered at Gwagwalada Slaughter House

Breed	**No of Animal**	**No of Animal +ve**	***T.vivax***	***T. congolense***	***T.brucei***
West African Dwarf	40	2	2	1	-
Red Sokoto	150	8	4	-	4
Kano Brown	22	2	-	-	1
Total	**212**	**12**	**6**	**1**	**5**

Table 3: Trypanosome Infection Rates in Different Breeds of Sheep Slaughtered at Gwagwalada Slaughter House

Breed	**No of Animal**	**No of Animal +ve**	***T.vivax***	***T. congolense***	***T.brucei***
West African Dwarf	42	4	3	-	1
Yankasa	170	6	4	-	2
Total	**212**	**10**	**7**	**-**	**3**

Table 4: Overall Animal Sampled Both Infected and Uninfected Slaughtered at Gwagwalada Slaughter House

Animal	**Total Nos.**	**Infected**	**Uninfected**	**Percentage Infected %**	**Percentage Uninfected %**
Cattle	212	14	198	6.60%	93.4%
Goats	212	12	200	5.70%	94.3%
Sheep	212	10	202	4.92%	95.3%

Table 5: Overall Percentage (%) Infection Rate of Different Animals Slaughtered at Gwagwalada Slaughter House

Typanosomes	**Cattle (%) (15)**	**Goats (%) (12)**	**Sheep (%) (10)**
T.vivax	26.67	50.00	64.00%
T. brucei	60.00	41.67	36.00%
T. congolense	13.33	8.33	00.00%
Total	**100(15)**	**100(12)**	**100(10)**

Table 6: Sex Differences in Trypanosome Prevalence Percentage of Animals Slaughtered at Gwagwalada Slaughter House

Animal	**Sex**	**No of Samples Examined**	**No of Positive Samples**	**Percentage Positive (%)**
Cattle	Male	60	5	8.33
	Female	152	10	6.57
Goats	Male	56	3	5.36
	Female	156	12	7.69
Sheep	Male	48	3	6.25
	Female	164	10	6.10

Table 7: Mean Packed Cell Volume oif Different Animals Slaughtered at Gwagwalada Slaughter House

Animal	***Trypansome* Infected (PVC %) Mean S.E**	**Uninfected (PVC %) Mean S.E.**
Cattle	20.31+3.30	34.06+4.53
Goats	20.27+2.38	30.56+5.19
Sheep	19.38+2.57	31.75+2.56

Discussion

The trypanosome infection rate in different breed of animals for the past few years in ruminant ranged from 8.4% to 15.53% (Gana, *et al,* 2015). Our findings of low overall infection rate in cattle, goats and sheep in the study area suggest that difference in prevalence of trypanosomes among ruminants may be as a result of the use of chemotherapeutic and chemoprophylatic campaigns of Governments or herd

owners.

Since the majority of the animals sampled were brought from Northern part of Nigeria, its shows that the risk of bovine trypanosomiasis still exists, and the nomadic nature of husbandry practice is an important factor in the maintenance of transmission cycles of the disease (Ejeh, *et al,* 2015).

Sometimes ago, out of the cattle sampled in Kano, 7.6% were positive Saidu, *et al.* (2015), out of 39 goats blood samples examined at Ilorin abattoir, only two were found with trypanosome infection (Nimpaye, *et al,* 2011). On the other hand, out of 58 goats blood samples examined at Nsukka, eight (13.9%) were positive for trypanosome infection (Gana, *et al,* 2015). At the Jos abattoir, out of a total of 960 goats screened, a 5% infection was found (Awosanya, *et al,* (2015). This suggest that trypanosome infection rate in animals differ from one geo- epidemiological zone to the other.

From the number of male animals sampled, this probably indicates that sex does not influence their susceptibility to the infection (Takeet, *et al,* 2014). The combination of parasitological techniques employed reduced the chances of missed diagnosis Saidu, *et al,* (2015) even though few cases of false negatives by microscopic examination were later confirmed to be positive through mice inoculation. Every parasitological diagnostic technique is an important tool in the epidemiological study of trypanosomiasis. However, their sensitivity cannot be compared with modern techniques such as ELISA (Desquesnes, *et al,* 2001). However, the combination of both techniques are necessary for improvement in trypanosomiasis surveillance which is essential in the management of control strategy.

The findings in this study suggests that animal trypanosomiasis still constitutes a major threat to livestock and meat quality in Nigeria. Sustained surveillance of trypanosomiasis in cattle, goats and sheep is an important prerequisite for the enhancement of livestock production in Nigeria. The present effort to expand the animal industry in the country requires the knowledge of the disease problems that could be prevented and controlled. It will therefore be beneficial if the incidence and prevalence of trypanosomiasis in cattle, goats and sheep is investigated periodically. Also, free veterinary examinations are possible mass treatment of animals should be entrenched and implemented

in livestock management programme in FCT, Abuja.

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