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RESEARCH ARTICLE

MIXED OCCURRENCE OF TRYPANOSOMES IN TRADE CATTLE SLAUGHTERED AT KANO ABATTOIR, NORTHWESTERN NIGERIA

***,[1]Maigari, Ahmad Kabir, [2]Liman, Samira Bello, [2]Musa, Amina Muhammad, [2]Sani, Amina, [2]Jarmai, Kabiru Yakubu, [2]Abubakar, Salamatu, [3]Jega, Zainab Hassan, [2]Abubakar, Ahmed Tijjani, [2]Salawu, Mohammed Jatto and [1]Galadima, Umar Sunusi**

[1]NorthWest Zonal Headquarter, Nigerian Institute for Trypanosomiasis Research, PMB 1147, BirninKebbi, Kebbi State, Nigeria
[2]Trypanosomiasis Research Department, Nigerian Institute for Trypanosomiasis Research, No. 1 Surame Road, UnguwanRimi GRA, Kaduna, Nigeria
[3]Epidemiology Unit, Nigerian Institute for Trypanosomiasis Research, Suleja, Niger State, Nigeria

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ABSTRACT

The study assesses mixed occurrence of trypanosomes in trade cattle brought for slaughter at Kano Abattoir, Northwestern Nigeria. Standard trypanosome detection methods were used to screen blood samples collected from 242 cattle of different breeds and sexes. Overall infection rates of 1.24% was obtained. Infection rates in cows (3.17%; $p<0.05$) exceeded that of bulls (0.56%; $p<0.05$) with White Fulani cows having the highest infection rates (5.13%; $p<0.05$) followed by White Fulani bulls (1.08%; $p<0.05$) while no trypanosomal infection was detected in all the Sokoto Gudali cattle examined. Mean packed cell volume (PCV) of non-infected cattle (33±0.2; $p<0.05$) appears higher than the mean PCV of infected cattle (24±0.3; $p<0.05$). Prevalence due to Trypanosoma vivax was higher (0.83%; $p<0.05$) than the one encountered as a result of mixed infection due to T. congolense and T. vivax (0.41%; $p<0.05$). Conclusively, the result shows mixed occurrence of T. congolense and T. vivax in trade cattle examined. We therefore recommend further comprehensive survey to determine more accurately the current status of Animal trypanosomosis in trade cattle at Kano Abattoir.

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INTRODUCTION

African Animal Trypanosomosis is still one of the most important parasitic diseases of livestock in tropical Africa. In Nigeria, cattle are considered as one of the principal livestock (Ezeani *et al*, 2008) regarding their role in the supply of animals' protein. However, about 6.3 million cattle are in tsetse fly infested areas with an average of 15% infection rate, equivalent to 1.8 million cattle are estimated to be infected in the country (Anonymous, 2010). Although several advances have been made on the study of the disease, the exact factors responsible for the pathogenesis of trypanosomosis in cattle are yet to be fully understood (Omotainse *et al.*, 2004; Onyiah *et al*., 1997). Moreover, impact of trypanosomosis arising from mixed infections has not been fully investigated and according To Nantulya *et al.* (1992), majority of natural trypanosomosis in animals arise from mixed infections. Mixed infections due to *Trypanosoma brucei, T. congolense* and *T. vivax* occur commonly in the field and in cattle in particular. Clair (2011), lamented that, problem areas in animal trypanosomosis include how multiple *T. vivax* and *T. congolense* infections in cattle interract? Similarly, how can *T. brucei brucei* and *T. brucei gambiense* be differentiated in cattle? Both parasites differ in their primary tissue parasitization and cause of disease, making it burdensome to conclude a particular clinical outcome and its causative agents. This has resulted in misdiagnosis that could lead to wrong treatment regime. For instance, anemia encountered in mixed infections was more severe than the one from single infection (Abenga *et al.*, 2006). Therefore, there is the likelihood that the impact of the disease on cattle has greatly been underestimated. Hence, the present study was aimed at assessing mixed occurrence of trypanosomes in cattle brought for slaughter at Kano central abattoir from June through December, 2012.

****Corresponding author: Maigari, Ahmad Kabir***
NorthWest zonal Headquarter, Nigerian Institute for Trypanosomiasis Research, PMB 1147, BirninKebbi, Kebbi State, Nigeria.

MATERIALS AND METHODS

Sample Size and sample collection

The sample size was identified according to Cochran (1963) as an unknown random proportion with expected prevalence of 50% at 5% desired absolute precision and 95% confidence level. Two hundred and forty two cattle (242) were assessed randomly at the point of slaughter by scoring their body conditions. From each animal, 5ml of blood was collected into sample bottles containing Ethylene Diamine Tetra acetic Acid (EDTA) dispensed as 1mg powder per ml of blood (Murray *et al.*, 1977; Paris *et al.*, 1982).

Parasitological Analysis

Standard trypanosome detection methods were carried out, including; Haematocrit Centrifugation Techniques, HCT (Woo, 1971), Buffy Coat Method, BCM (Woo, 1971), and Animal inoculation. Slides containing blood smear were Giemsa stained and examined at high power (×40) and oil immersion (×100) objectives.

Identification of Trypanosomes

Trypanosome species were identified based on their motility using the BCM and morphological features from Giemsa-stained thin films (Woo, 1971). Differential parameters including locomotion, presence/absence of free flagellum, size and position of kinetoplast, degree of development of undulating membrane and shape of the parasites posterior part were observed (FAO, 2007).

Determination of Mixed Infections

Mixed infection was identified by observing the presence or absence of trypanosomes of different appearance in wet mount and stained preparations.

If individuals of trypanosomes are distinctly different, the infection is either polymorphic (single species of different forms) or mixed infection of different species (FAO, 2007). *T. congolense* lacks free flagellum with centralized nucleus and marginal-sub terminal kinetoplast of medium size plus inconspicuos undulating membrane. *T. vivax*on the other hand, is large and very active in wet-mount which traverses the whole field quickly. This is because of their free flagellum with large and terminal kinetoplast, inconspicuos undulating membrane and a swollen, blunt exteremity. *T. brucei* is polymorphic, existing as long slender with free flagellum, intermediate forms that are usually flagellated and, short stumpy without free flagellum and sub-terminal kinetoplast.

RESULTS AND DISCUSSION

The results obtained are presented in Tables 1 to 4. The values are stratified according to sex and breeds. The result shows mixed infection due to *T. congolense* and *T. vivax* with single infection due to *T. vivax* as most prevalent. This agrees with the findings of Dipeolu (1975) but disagrees with the work of Ezeani *et al.* (2008) who reported that *T. brucei*, *T.congolense* and *T. vivax* were the prevalent infections in a similar study. The result also depicts a contrary view to that found by Omotainse *et al*. (2004) who reported mixed infection due to *T. brucei* and *T. congolense* as most prevalent in cattle. However, the inability to detect *T. brucei* by microscopy could be due to chronic enzootic nature of the parasites in which the level of parasitaemia is usually below the level of detection microscopically (Salim *et al.*, 2011). Similarly, failure to detect mixed infections of the three species by the parasitological method might be due to fluctuating parasitaemic behavior of trypanosomes. It is reported that, the trypanosome species with highest proportions are likely to be diagnosed and infection attributed to these parasites only, whereas the species which are low in numbers might not be identified (Ezeani *et al.*, 2008).

Table 1. Overall infection rates of cattle brought to Kano Abattoir (June – Dec., 2012)

Cattle	No. Examined	No. And % Infection	T.vivax	T. congolense	Mixed Infection
SokotoGudali	110	0(0.00)	0	0	0
White Fulani	132	3(2.30)	2	1	1
Overall	242	3(1.24)	2	1	1

Table 2. Distribution of Trypanosomosis in Cattle at Kano Abattoir by Sex (June – Dec., 2015)

Cattle	No. Examined	No. Infected	Infection rates
Cows	63	2	3.17
Bulls	178	1	0.56

Table 3. Distribution of Trypanosomosis among breeds of cattle at Kano Abattoir (June – Dec., 2012)

Breeds and sex	No. Examined	No. Positive	Infection rates (%)
SokotoGudali cows	24	0	0.00
SokotoGudali bulls	86	0	0.00
White Fulani cows	39	2	5.13
White Fulani bulls	93	1	1.08

Table 4. Mean PCV of Infected and Non-infected Cattle at the Kano Abattoir (June – December, 2012)

Cattle	No. Examined	Mean PCV of Normal ± STD	Mean PCV of Infected ± STD
SokotoGudali	110	34 ± 0.5	0.00
White Fulani	132	33 ± 0.2	24 ± 0.3

The prevalent infection due to *T. vivax* recorded in this study is in agreement with the works of Ezebuiro *et al.* (2009) and Esuruoso (1973). Moreover, the result differs from the observations of Samdi *et al.* (2011). This contrary observations could be attributed to differences in diagnostic methods used. The higher prevalence recorded in White Fulani cattle is in accord with the work of Adama *et al.* (2010) and Roelents *et al.* (1987) which could be due to large number of White Fulani cattle brought for slaughter during the period of sampling. Similarly, it might also be due to the nomadic habits of herdsmen where herders exposed their cattle to tsetse bites through transhumant activities (Opasina and Ekwuruke, 1988). The generally low prevalence recorded, might be associated to an increased awareness and application of preventive practices against trypanosomosis (Gumel *et al.*, 2011). However, alterations in vector populations as a result of intensive tsetse eradication program which has been implemented in the past and ecological changes in northern Nigeria (Jawonisi, 1986) might also be the reason for the low prevalence encountered. Changes in the method of transporting cattle to market could also be the reason for the low prevalence. This is evident as cattle are recently transported by roads, whereas formerly, they are trekked on land and are thus made more vulnerable to tsetse challenges.

Conclusion and Recommendation

The results confirmed the occurrence of mixed infection of trypanosomes in trade cattle. We therefore recommend further comprehensive survey to determine more accurately the current status of Animal trypanosomosis among trade cattle in Kano, Northwestern Nigeria.

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