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Short Communication

Prevalence of trypanosomes in large and small ruminants in Abia state and Rivers States Nigeria

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ABSTRACT

This study investigated the prevalence of trypanosomes in ruminants in Abia and Rivers states, Nigeria by evaluating the trypanosomes parasitaemic profiles of the cattle, sheep and goats studied. Fifty adult cattle (N'dama, Muturu, Red Bororo and White Fulani breeds), twenty five adult sheep (WAD and Yankasa) and twenty five adult goats (WAD and Sokoto red) of both sexes were sampled in each of the two states. Wet mount films and micro-haematocrit Buffy coat methods of trypanosome diagnosis were used. The study was conducted between the months of July and October, 2018. A total of 100 cattle, 50 sheep and 50 goats were sampled in the two states (Abia and Rivers), Use of wet mount and buffy coat screening method gave zero prevalence of trypanosome in both Rivers state and Abia state during the period. The result of this study could indicate absence of trypanosomes in the two states studied. Therefore additional research using molecular methods of trypanosome diagnosis, which are more sensitive in parasite detection, is recommended.

Keywords: Abia State, Prevalence, Rivers State, Ruminants, Trypanosomes.

INTRODUCTION

African animal trypanosomosis is a debilitating disease of man and domestic animals. It is caused by haemoflagellate of the genus –Trypanosome, family- Trypanosomatidae and transmitted by tsetse (*Glossina spp)* (WHO, 1998). African animal trypanosomosis is caused by *Trypanosoma congolense*, *Trypanosoma vivax* and *Trypanosoma brucei* species. Concurrent infections can occur with more than one species of trypanosome (IICAB, 2009; Ezeokonkwo *et al*., 2010).

Most species of Trypanosome are transmitted by tsetse flies present in Africa only. Therefore, the spread of the disease follows the distribution of the vector (except for *Trypanosoma vivax*, which can be transmitted mechanically) and covers an area of 10 million Km^2, between latitude 14°N and 29°S, approximately one third of Africa's total land area (NITR Annual Report, 1989; Swallow, 2000; Barret *et al*., 2003; Steverding, 2008; OIE, 2013).

Trypanosomosis in domestic livestock negatively impacts on food production and economic growth in many parts of the world, particularly in sub-Saharan Africa (Taylor, 1998). The disease is characterized by anaemia, parasitaemia, fever, loss of condition, reduced productivity and frequently high mortality which among other factors limit the pace of rural development in tropical Africa (Abenga *et al*., 2002; Swallow, 2000; Fajinmi *et al*., 2011). Apart from causing disease, trypanosomes are also responsible for producing a state of severe immunosuppression, which renders the infected host more susceptible to secondary infections and produces poor immune response to bacterial and viral vaccines (Gómez-Rodríguez *et al*., 2009).

Determination of trypanosome prevalence in vector flies by dissection of tsetse under the microscope has been commonly employed; though it is labour intensive and not often conducted (Abdi *et al*., 2017; Adams *et al*, 2010). Serological and molecular techniques have been reported to

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be more sensitive in detecting trypanosome infections in host animals (Adams *et al*, 2010; Majekodunmi *et al*, 2013).

Prevalence of trypanosomes in animals could be affected by several factors such as availability of reservoir hosts, seasonal factors, altitude, fly density and behavior, sensitivity of diagnostic technique, stage of infection, method of sampling, conflict and other human activities (Majekodunmi *et al*, 2013; Karshima *et al*., 2016; Albert *et al*., 2015).

There are many reports indicating high prevalence of trypanosomes in both vectors and animal hosts in Nigeria (Odeniran & Ademola, 2018; Daniel *et al*., 1994) while others reported a general decrease in prevalence particularly after control programmes in Northern Nigeria (Onyia, 1997). There is paucity of information on prevalence of trypanosomosis in the southern part of Nigeria, as majority of studies on trypanosome prevalence were conducted in the northern and central part of Nigeria (Kalu and Lawani, 1996; Kalu *et al*., 2001). Hence, this study was aimed at investigating the current prevalence of trypanosomosis in cattle, sheep and goat in Rivers (South South) and Abia (South East) states, Nigeria.

MATERIALS AND METHODS

STUDY AREA

The study was conducted in Mbiama (Ahoada West LGA), Ahoada (Ahoada East LGA) and Elele (Ikwere LGA) cities of Rivers State as well as Lokpanta (Umunneochi LGA), Ariam and Umudike (Ikwuano LGA) of Abia State. Most of the places accessed are farms belonging to individuals and few market places.

Geographically, Abia State occupies about 6,320 square kilometers land area, with population of about 4,112,230 and population density of 650/km^2. It lies between latitude 5.251^{o}N – 5.417^{o}N and longitude 7.30^{o}E –7.500^{o}E, altitude of 244-305 m above sea level. It is a low-lying tropical rain forest; the southern portion gets heavy rainfall of about 2,400mm per year and is especially intense between the months of April through October

Rivers state occupies a total land area of 11,077 square kilometers with a population of about 5,198,716 and population density of 635.89 per square kilometer. It lies between latitude 4^{0}45^{1}N $^-$ 4.750^{o}N and longitude 6^{o}50^{1}E – 6.833^{o}E. Annual mean temperature ranges from 25^{0}C to 28^{0}C. Total annual rainfall decreases from about 4,700 mm on the coast to about 1,700 mm in the extreme north.

STUDY POPULATION

The study was conducted between July and October, 2018 on two hundred (200) animals comprising 100 adult cattle (N'dama and Muturu and Red Bororo breeds), 50 adult sheep (West African Dwarf - WAD and Yankasa) and 50 adult goats (WAD and Sokoto red) of both sexes from three cities in each of the states. The sample size was determined as outlined by Mahajan (1997) using expected/anticipated prevalence of 3.7% for cattle; 1.1% for sheep and 1.2% for goat (Ohaeri 2010).

$N = (Z^2pq)/ L^2$

Where:

p = anticipated/expected prevalence from similar study = [3.7% for cattle; 1.1% for sheep and 1.2% for goat: Ohaeri (2010)]

Z = 1.96; q = 1-p; N = sample size; L = allowable error (5%)

Substituting,

N = 77.55(cattle); 18.38 (sheep) and 20.04 (goat).

SAMPLE COLLECTION

Blood samples were collected from the jugular vein of each sampled animal (cattle, sheep and goat). Two (2) ml of sample blood was put into container with EDTA. The containers were gently rocked to homogenously mix the blood with anticoagulant (EDTA) in order to prevent clotting. The blood samples were kept cool in flask containing ice packs and examined parasitologically for trypanosomes within 4 hours.

Parasitological examination

Parasitological examination was done in the laboratory using the wet blood film (Woo, 1970) and micro hematocrit buffy-coat methods (Murray *et al*, 1977).

Wet Blood Film Examination

The parasites were detected by wet blood film (Woo, 1970). A blood film was made by placing a drop of blood on a clean glass slide which is then covered carefully with a clean cover slip so that the blood spreads evenly. The slide was placed on a microscope and the film viewed systematically for the movement of trypanosomes with ×40 objective lens (Woo, 1970).

MICRO-HAEMATOCRIT BUFFY COAT MICROSCOPY (MBC)

A capillary tube was nearly filled (about ¾) with blood sample and centrifuged at 2000 G for 5 mins. The capillary tube was cut about 1 mm below (to include the uppermost layer of RBC) and 3 mm above (to include some plasma) the buffy coat layer. The content was gently expressed onto a slide using a micro-hematocrit capillary tube holder, mixed and covered with a cover slip. The preparation was then examined under a microscope with a ×40 objective lens (Murray *et al*, 1977).

RESULTS AND DISCUSSION

The result of this survey seems to indicate absence of trypanosome infection or zero prevalence of trypanosome infection in the studied areas. This is in agreement with the report of Idahor *et al*. (2019) in which N'dama and Muturu breeds among other breeds of cattle investigated in Keffi, Nassarawa State were not infested with trypanosomes. The

result of this survey is, also, in line with the report of Idehen *et al*., 2018 in which none of the tsetse dissected in his work in Bassa, Plateau State was positive for trypanosomes, which explained the low prevalence of trypanosomes in ruminants in that area. Ohaeri (2010) also reported low prevalence of ruminant trypanosomosis in some parts of Abia State. There is dearth of information on ruminant trypanosomosis carried out around the areas studied in this work, hence lack of materials for comparative study,

(Spickler, 2018). Reports have it that *Morsitans* and *Palpalis* groups of *Glossina* are most prevalent in the Savannah zones (covering mainly the northern parts of Nigeria) and are found along the drainage lines and riverine vegetation (Bourn *et al*., 2001).

Low prevalence or absence of infection may relate to the reported resistance of indigenous ruminants to trypanosomes infections (Kalu, 1996). There are reports of trypanotolerance involving N'dama and Muturu breeds of cattle (Usman *et al*., 2008; Ogunsami *et al*., 2000), though some samples in this study were gotten from Red Bororo

Table I: Prevalence of trypanosomes in small and large ruminants

	Female				**Female**			
Cattle	N'Dama 22	Muturu 30	White Fulani 11	Red Bororo 10	N'Dama 7	Muturu 12	White Fulani 6	Red Bororo 2
Sheep	WAD 20	Yankasa 11	-	-	WAD 12	Yankasa 7	-	-
Goat	WAD 20	Red Sokoto 8	-	-	WAD 16	Red Sokoto 6	-	-

The absence of infection or zero prevalence as observed in this study could be attributed to decrease in both tsetse and other biting flies' population as a result of environmental, weather and anthropological changes. As a result of rise in human population and consequent increase in human activities, significant changes in the availability of suitable habitat and hosts that potentially ensure tsetse survival and sustenance in a given location may have occurred with time (Dede *et al*., 2007).Since the survey was conducted during late rainy season, it is possible that as a result of increase in the population of flies, farmers injected their animals with trypanocidal drugs and also used insecticide sprays to minimize the population of biting flies. In addition, expansion of veterinary services up to peasant association and deforestation for crop cultivation and settlement might be a reason.

The zero prevalence observed in this study could also be due to inadequacy of parasite detection methods used. The micro-haematocrit-buffy coat method used for diagnosis is still regarded as a good parasitological technique for quick detection of parasite, allowing for quick and clear visualization (Chappuis *et al*., 2005), though it has been reported to be relatively insensitive as it fails to detect 66% of infected animals compared to molecular diagnostic techniques and serological diagnostic methods (Marcotty *et al*., 2008). More so, trypanosome organisms are most likely to be found in the blood during the initial stages of the infection, they are less likely to be detected in chronically ill animals, and are almost never seen in healthy carriers

breed. The zero trypanosomes in Red Bororo observed in this study also agrees with the report of Idehen *et al*, 2018 in Bassa LGA of Plateau State. This trypanotolerance could be largely due to innate resistance potency and natural genetic manipulation overtime, to adapt to tsetse bites and partly due to their coat colour that may serve as camouflage. It might also be due to their hairy tail end used in warding off tsetse. Extensive management of livestock has been reported to be a risk factor in trypanosomoses with prevalence in extensively managed animals being almost double those reported in intensively managed animals in Nigeria (Kalu, 1996).

The result of this survey is in agreement with the report of Idahor *et al*., 2019 in which N'dama and Muturu breeds among other breeds of cattle investigated were not infested with trypanosomes.

Report of Idehen *et al*., 2018 in which none of the trypanosomes dissected in his work in Bassa, Plateau State was positive for trypanosomes explained the low prevalence of trypanosomes in ruminants in that area, corroborating the findings of Ohaeri (2010) in Abia State which is one of the states studied in this work.

CONCLUSION

The zero prevalence observed in this work could imply absence of infective vector flies or infective/reservoir hosts in the areas studied. Moreover, significant number of the animals studied might be trypanotolerant. Additional study using molecular methods of trypanosome diagnosis, which are more sensitive in parasite detection, is, therefore, recommended.

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CONFLICT OF INTEREST

The authors declare that they have no conflicts of interest.

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