A Survey of Trypanosome Species Circulating In Pigs In Three Selected Local Government District of Enugu State, Nigeria

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ABSTRACT

A cross sectional survey of trypanosomosis of pigs was carried out in three randomly selected Local Government Areas (Nsukka, Udenu and Igbo Eze South) out of the six local government areas in Enugu North Senatorial Zone. Blood samples were randomly collected from a total of 1800 pigs from abattoirs and farms and were examined for trypanosomes parasites using standard parasitological methods: wet film, buffy coat and Giemsa-stained thin smear preparations. A total of 93 (5.2%) pigs were positive overall. Among the positive samples, Trypanosoma brucei was the predominant species (86.0%), followed by T. congolense (13.9%). The different relative isolation rate for Nsukka, Igbo-Eze South and Udenu Local government areas were 14 (4.7%), 14 (4.7%), and 19 (4.0%) respectively in the dry season, and 17 (5.7%), 17 (5.7%) and 12 (6.3%) in the rainy season respectively. The trypanosome prevalence in males from Nsukka, Igbo-Eze South and Udenu local governments were 6.5%, 6.2% and 4.2% respectively, while report in female were 3.8%, 4.1% and 5.9% in the three local governments respectively. There was no significant variations ($p < 0.05$) with seasons, sex and age groups. It was therefore concluded that porcine trypanosomosis is still endemic in Enugu North Senatorial Zone with T. brucei being the most incriminated as the cause of the disease in the zone.

Key words: Prevalence, Trypanosomosis, Porcine, Seasonal, Enugu North

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INTRODUCTION

Pigs are considered as one of the principal livestock, and their good health, survival and development are necessary to ameliorate the increasing demand on the supply of animal protein. Trypanosomosis constitute a major constraint to pig production particularly in the tropics where it has high potential to boost meat production [1,2]. Demand for pork in Enugu North Senatorial area is high and there are no cultural or religious barrier affecting its consumption. Some of the factors that affect the prevalence of trypanosomosis in Nigeria include animal breed, type of management, season of the year and the type of vegetation [3]. Earlier research findings indicated a high prevalence of trypanosomosis among pigs kept in some tsetse infested and trypanosomosis endemic areas of Nigeria. In similar studies, [4] reported a prevalence of 30.7% in 150 local and exotic breeds of pigs in Nsukka area while [5] recorded an infection rate of 26.8% in 1,954 (abattoir slaughtered and field market) pigs in middle belt zone of Nigeria. In addition, [6] also reported 4% prevalence in 300 pigs screened for trypanosome in Nsukka abattoir.

Porcine trypanosomosis is not only of economic importance for pig rearing but also has public health significance. This is because pigs act as carriers of *Trypanosome brucei gambiense* and *Trypanosome brucei rhodesiense* and thus act as reservoir of trypanosome species that can infect man [7,8]. The unfolding importance of porcine trypanosomosis has called for regular monitoring of the pig stocks in order to determine the prevalence of trypanosome infection, enhance timely drug intervention and avoid huge economic losses [9].

This survey was conducted to determine the prevalence of trypanosome species in pigs in both abattoir-slaughtered pigs and piggery farms in Enugu North Senatorial zone of Enugu state, Nigeria.

MATERIALS AND METHODS

Study Area

The study was carried out in North Senatorial zone of Enugu State, Southeastern Nigeria. It is located in the derived savannah ecological zone at latitude 6° 51' 24"N and longitude 7° 23' 45"E at an elevation of 1,810 ft (550 m) above sea level [10]. The area experiences two discrete seasons; rainy and dry seasons with mean annual rain fall of 1500 - 2100mm [11]. The mean temperature varies between 16.6°C - 37.6°C. The zone has six local government areas (LGA). The indigenous people are involved in agriculture, basically crop and livestock farming activities [12].

Sample population

Purposive non-probability method was used to select three (3) LGAs within the Senatorial Zone. Samples were selected through simple random technique, and in each of the LGA, three (3) communities were selected for sampling, while purposive non-probability method was used to select farms for sampling. In each of the selected LGAs, one abattoir with the highest slaughter capacity was selected for sampling.

The farms visited practiced intensive management of the herd. The pigs were raised on concrete floors and mosquito nets put in place to wade off insects and flies. The herd structure comprised piglets, growers, gilts,

sows and boars; and in most of the farms visited the pigs were separated by age and weight. The pig farms comprised of genetically improved breeds (Large White, Landrace, Duroc and their crosses). None of the sampled farms had indigenous breed of pigs. During sampling; seasons (dry and wet), sex and age were recorded. The age was categorized into four (0-12 months, 13-24 months, 25- 36 months and greater than 36 months) groups.

Determination of sample size

For this study, three hundred (300) pigs were selected from each of the local government for each of the seasons. With an estimated prevalence of 20%, confidence interval of 95% and 5% precision: sample size was calculated according to the formula given by [13].

Collection of blood samples from Abattoirs

Systematic random sampling technique was used to select every second pigs slaughtered on the day of sampling. For each of the seasons, a total of 900 blood samples were collected from the 3 abattoirs sampled within 3 LGAs in the zone for the period of the study.

Abattoir blood samples were collected in ethylenediaminetetraacetic acid (EDTA) contained sample bottles at slaughter from the severed jugular

Collection of blood samples from farms

Animals were randomly selected from each farm as described by [14] and bled from the marginal ear vein and blood was collected into an anti-coagulant ethylenediaminetetracetic acid (EDTA) tubes. A total of 900 samples were collected from the 3 LGA for each of the seasons. All the samples were kept on ice and taken to the laboratory for examination.

Packed cell volume

The microhaematocrit centrifuge technique was used for the determination of PCV [15]. PCV was read using the PCV reader. The result was expressed in percentage (%).

Determination of parasitaemia

Wet mount

Using standard laboratory procedure, a drop of blood was made on a slide, covered with a cover slip and viewed under the microscope using x40 objective for flagellated movement of the *Trypanosome spp.*

Buffy coat

The buffy- coat used was obtained after the PCV reading. The capillary tube was cut a few millimeters bellow the buffy-coat level. The buffy-coat and some plasma were gently expressed on the slide, carefully mixed and covered with a cover slip and viewed under a microscope using x40 objective for trypanosomes [16,17]. The species of trypanosomes were identified by their morphological characteristics on Giemsa-stained thin blood film preparations [18].

Statistical analysis: Descriptive statistics, chi-square tests were used to express results and analysis of variables using SPSS (version 19).

RESULTS

The result of the survey shows that the overall prevalence of porcine trypanosomosis in Enugu North Senatorial Zone is 5.2%. The distribution of the trypanosome species demonstrated that *T. brucei* was the most prevalent with 84.9%, while *T. congolense* was 15.1%. No record of mixed infection was seen in the sampled pigs (Table 1). The study also revealed a dry season

trypanosome prevalence of 4.7%, 4.7%, and 4.0% while it was 5.7%, 5.7% and 6.3% in wet season in Nsukka, Igbo-Eze South and Udenu LGAs respectively (Table 2). There were no statistical differences ($p > 0.05$) between prevalence and seasons of the year.

The results of survey showed that the prevalence of trypanosome infection in male were 6.5%, 6.2% and 4.2% respectively, while that of the female were 3.8%, 4.1% and 5.9% for Nsukka, Igbo-Eze South and Udenu (Table 3). There was however, no statistical significant differences ($p > 0.05$) between prevalence and sex of the animals. The results of age group prevalence indicate that there were no statistical differences when the different age

groups were compared with the prevalence of infection (Table 4). The Mean PCV (%) for the trypanosome infected pigs slaughtered at the abattoir were 25.3 ± 4.5 , 24.8 ± 4.6 and 23.5 ± 3.6 for Nsukka, Igbo Eze and Udenu LGA, respectively, while, it was 35.4 ± 6.2 , 35.5 ± 7.0 and 35.4 ± 5.2 for uninfected pigs. Similarly, the Mean PCV for infected pigs sampled from the piggery farms were 26.7 ± 3.6 , 24.3 ± 3.4 and 21.1 ± 3.9 for Nsukka, Igbo-Eze and Udenu LGAs, respectively, while it was 35.7 ± 4.8 , 35.0 ± 5.2 and 34.2 ± 6.0 for uninfected pigs. There was significant difference ($p < 0.05$) in the Mean PCV between the infected and non-infected pigs (Table 5).

Table 1: Prevalence of *Trypanosome spp* in pigs in LGA of Enugu North Senatorial Zone

LGA	No of animal sampled in both dry and wet season	No positive	Prevalence (%)	Species of trypanosomes		
				<i>T. brucei</i>	<i>T. congo</i>	Mixed
Nsukka	600	31	5.2	25	6	0
Igboeze	600	31	5.2	29	3	0
Udenu	600	31	5.2	26	4	0
Total	1800	93	5.2	80	13	0

Table 2: Seasonal prevalence of *Trypanosome spp* in pigs in LGAs of Enugu North Senatorial Zone

LGA	Seasons	No sampled	No positive	Prevalence (%)
Nsukka	Dry	300	14	4.7
	Wet	300	17	5.7
Igboeze	Dry	300	14	4.7
	Wet	300	17	5.7
Udenu	Dry	300	12	4.0
	Wet	300	19	6.3

χ^2 value = 2.161, df = 5, P-value = 0.826

Table 3: Sex prevalence of *Trypanosome spp* in pigs in LGAs of Enugu North Senatorial Zone

LGA	Sample type	No sampled	Sex (count)		Sex (Prevalence)		Positives (%)
			Male	Female	Male	Female	
Nsukka	Abattoir	300	203	97	10(4.9%)	6(6.2%)	16(5.3%)
	Farm	300	107	193	10(9.3%)	5(2.6%)	15(5.0%)
Igboeze	Abattoir	300	174	126	15(8.6%)	5(4.0%)	20(6.7%)
	Farm	300	112	188	3(2.7%)	8(4.3%)	11(3.7%)
Udenu	Abattoir	300	176	124	9(5.1%)	9(7.3%)	18(6.0%)
	Farm	300	85	215	2(2.4%)	11(5.1%)	13(4.3%)
TOTAL		1800	857	943	49(5.7%)	44(4.7%)	93(5.2%)

χ^2 value = 1.02, df= 1, p-value =0.29

Table 4: Age prevalence of *Trypanosome spp* in pigs in LGAs in Enugu North Senatorial Zone

LGA	Source	Samples (n)	Age groups (months)				Positives (%)			
			Samples (n)				Positives (%)			
			0-12	13-24	25-36	>37	0-12	13-24	25-36	>37
Nsukka	Abattoir	300	30	130	115	25	1(3.3%)	9(6.9%)	5(4.3%)	1(4.0%)
	Farm	300	124	96	62	18	8(6.5%)	5(5.2%)	2(3.2%)	0(0.0)
Igboeze	Abattoir	300	63	139	89	9	1(1.6%)	13(9.4%)	6(6.7%)	0(0.0)
	Farm	300	80	125	88	7	3(3.8%)	4(3.2%)	3(3.4%)	1(14.3%)
Udenu	Abattoir	300	6	157	130	7	0(0.0)	9(5.7%)	9(6.9%)	0(0.0)
	Farm	300	103	122	72	3	4(3.9%)	5(4.1%)	4(5.6%)	0(0.0)

χ^2 value = 2.28, df= 3, p-value= 0.50

Table 5: Mean $\pm$ SEM PCV (%) of parasitaemia and aparasitaemic pigs in Enugu North**Senatorial Zone**

LGA		Infected	Uninfected	t-value	p-value
Nsukka	Abattoir	25.3 $\pm$ 4.5	35.4 $\pm$ 6.2	6.4	0.0000
	Farm	26.7 $\pm$ 3.6	35.7 $\pm$ 4.8	7.9	0.0000
Igboeze	Abattoir	24.8 $\pm$ 4.6	35.5 $\pm$ 6.9	6.8	0.0000
	Farm	24.3 $\pm$ 3.4	35.1 $\pm$ 5.2	6.8	0.0000
Udenu	Abattoir	23.5 $\pm$ 3.6	35.4 $\pm$ 5.2	9.7	0.0000
	Farm	21.1 $\pm$ 4.0	34.2 $\pm$ 6.0	7.9	0.0000

p < 0.05 shows significant difference**DISCUSSION**

The results of this study further confirm that trypanosomosis due mainly to *T. brucei brucei* still constitutes an important disease of pigs in Enugu North Senatorial Zone. This is in agreement with earlier report of [4,6,20] citing *T. brucei* as a major cause of porcine trypanosomosis in the study area. Taking into account the limitations of the parasitological diagnostic methods and the uncontrolled use of trypanocidal drugs [17]; the true prevalence of infection may probably be substantially higher than is reported in this study.

The high prevalence observed in this study for Nsukka, Igbo-Eze South and Udenu slaughtered pigs is in agreement with the record of 4.0% prevalence rate reported by [18] in pigs surveyed in Nsukka abattoir. However, the

prevalence is low when compared with the findings of earlier researchers [19]. They recorded a prevalence of 57% in 56 pigs examined, while [20] reported a prevalence of 30.7% in both exotic and local breeds in the Nsukka area. Similarly, [5] in his report on abattoir slaughtered pigs and field survey of 1,954 in the middle belt area of Nigeria recorded 26.8% prevalence. The observed lower prevalence could be attributed to the improvement in the animal husbandry and veterinary services within the zone.

The result also reflects a higher infection rate of slaughtered pigs in the abattoirs compared with piggeries in the zone. Though the differences are not statistically significant the higher infection rates in the abattoir-slaughtered pigs is in agreement with the findings of [5] who reported higher infection rate among abattoir

slaughtered pigs than farm pigs. The higher infection rate in the abattoir slaughtered pigs could be attributed to the fact that majority of the farmers prefer to sell off the chronic ailing animals for slaughter while retaining the healthier ones in the farms.

The present study also indicated significant difference between PCV of infected and non-infected pigs. The low PCV of the infected pigs which is indicative of anaemia is in agreement with previous findings of [21,22] that anemia is one of the most persistent features of animal trypanosomosis.

It can be concluded that *T. brucei* is mainly prevalent in Enugu North Senatorial Zone. It is also an important cause of anaemia in the area that poses potential threat to the health and productivity of pigs in the area. This finding emphasizes the need for effective and integral control of the parasite and the vectors in Enugu North Senatorial Zone.

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