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Prevalence of Piroplasmosis amongst local horses in Northeastern Nigeria.

[1]Turaki, U.A., [1]Kumsha, H.A., [2]Biu, A.A. and [3]Bokko, P.B.
[1] (Department of Veterinary Medicine, University of Maiduguri, Nigeria).
[2](Department of Veterinary Microbiology and Parasitology, University of Maiduguri).
[3](Department of Veterinary Surgery and Theriogenology, University of Maiduguri).

Abstract: *Equine piroplasmosis, is a tick borne protozoan disease of horses caused by intraerythrocytic Babasia caballi and Theileria equi. This study was conducted to determine its prevalence amongst local hoses in the study area. Giemsa stained blood smears from 240 hoses examined revealed an overall prevalence of 100 (41.7%) due to Theleria equi 94 (94%) and Babesia caballi 6 (6%) represented as Male with 62 (62.0%) and Female 38 (38.0%) (P<0.05). Based on age, horses ≤ 4 years had a prevalence of 27 (27.0%) and those > 4 years had 73 (73.0%) (P<0.05).The results showed that Borno has a higher prevalence of 39 (48.8%) than Gombe and Taraba with 33 (41.3%) and 28 (35.0) respectively (P<0.05). The mean ± standard deviation of packed cell (PCV) volume indicated 34.3 ± 5.2 for infected horses which was significantly higher compared with apparently healthy horses with 40.5 ± 4.2 (P<0.05).Infected male and female horses had significantly lower (P<0.05) (34.3 ± 5.2 and 34.2 ± 5.1) PCV values respectively and un infected male and female horses with 40.4 ± 4.1 and 40.1 ± 3.2 respectively. Also infected young and adult horses had a significantly (P<0.05) lower 34.2(3.3) and 33.2 ± 3.0 respectively PCV values also un infected young and adult horses has 39.3 ± 3.2 and 40.1 ± 2.1 respectively. There was a positive correlation between infection and reduced PCV. Observed signs were fever, pale mucous membranes, weight loss, ocular discharge,and weakness and anaemia.*

Key words: *Clinical manifestations, local horses, Nigeria, Piroplasmosis, Prevalence.*

I. Introduction

Horses belong to the family equidae, genus equus, species E. Ferus, subspecies E.F caballus[1]. The global equine population is estimated at 58 million [2], with Nigeria having about 240, 000 horses [3].

Horses are afflicted by several diseases that hamper their productivity[4], with equine piroplasmosis, also called biliary fever caused by the intraerythrocytic protozoans of Babesia caballi and Theileria equi, manifesting as an acute, subacute or chronic hemolytic disease[5];[6]; [7] and is characterized by intermittent fever, progressive anaemia, icterus, hepatomagaly, splenomegaly, billirubinuria and haemoglobinuria, and abortion[8]; [9].

The occurrence of equine piroplasmmosis has been tied closely with the geographic distribution and seasonal activity of its biological vectors; Dermacentor, Rhipicephalus and Hyalomma species of ticks [10]. It is also an OIE listed disease,[11] and is enzootic in most tropical and subtropical areas[12], usually with high ambient temperature, humidity and rainfall, conducive for tick development [13], [14].

In northern Nigeria, the weather is conducive for the developmental stages of the vectors of Babesia Caballi and Theileria equi[15], however, there is a dearth of information on the prevalence of equine piroplasmosis in this study area, hence this study was conducted to provide such data.

II. Materials And Methods

Study areas: This was conducted on horses from Borno, Gombe and Taraba states of North Eastern Nigeria. This region lies between longitude 120^0 8E and Latitude 10^0 23N and the climate, ecology and vegetation is Sahelian, Semi arid and Savannah with flooded pastures towards Lake Chad and mountainous areas in the Southeast. Annual Rainfall can be as low as 300mm toward the Niger border, and more than 700mm towards the Cameroun border, and the relative humidity can be as low as 13% during the dry season and up to 80% in the rainy months [16].

Sample and data Collection: Two hundred and forty horses 80 from each state of Borno, Gombe and Taraba were examined for this study. The sample size was determined using the formula of thrushfield, [17].

Three millimeters of blood samples were collected from each horse using the jugular vein puncture technique, and put into di-sodium ethylene diamine tetra acetic acid (EDTA) tubes for parasitic and haematological examinations as described by [18] and [19]. Babesia parasites were demonstrated from their blood smears stained with Giemsa, and the Packed cell volume (PCV) read using haemotocrit method.
The sex and age as well as the clinical signs of apparently sick horses were recorded.

Statistical analysis: Data collected were analyzed using the statistical package for Social Sciences [20]. The normality test was used to establish relationship between risk factors and positivity (at $P \leq 0.05$) of infection. PCV values were expressed as mean ± standard deviation.

III. Results

Table 1 shows the prevalence and equine piroplasmosis based on the sex and age of horses examined and positive species isolated in this study. One hundred (41.7% of the horses were infected out of the 240 examined, with infected male and female as 62% and 38% ($P< 0.05$) and infected young (≤ 4 years) and adult (> 4 years) as 27% and 73% ($P< 0.05$) respectively. Babesia caballi had 06% and Theileria equi 94% ($P< 0.05$).

State wise prevalence has indicated an overall of 39 (48.8%), 33 (41.3%) and 28 (35.05) for Borno, Gombe and Taraba ($P< 0.05$), (Table 2) male adult horses were significantly ($P< 0.05$) more infected in all the stages compared with female young horses.

Table 2 shows the mean ± SD (range) volume of infected and apparently normal horses. Infected horses had a mean ± SD (range) PCV of 34.3 ± 5.2 (20 – 49) which was significantly lower than apparently healthy horses with 40.5 ± 4.2 (34 – 54).

Infected male and female horses had 34.3 ± 5.2 (29 – 49) and 34.2 ± 5.1 (20 – 49) respectively. These were significantly lower ($P< 0.05$) than for apparently healthy horses.

Infected young and adult horses had mean ± SD (range) PCV of 34.2 ± 3.3 (26 – 42) and 33.2 ± 3.0 (27 – 40) respectively. These were also significantly lower ($P < 0.05$) compared with the 39.3 ± 3.2 (32 – 54) and 40.1 ± 2.1 (30 – 54) for uninfected young and adult horses respectively.

Table 1: Prevalence based on sex and age of horses and the species of Babesia

S/NO	SEX	NO(%) Infected
		(N=100)
1	Male	62 (62)
		P < 0.05
2	Female	38 (38)
	Age	
	Young (<4yrs)	27 (27)
		P <0.05
	Adult (> 4yrs)	73 (73)
	Babesia species	
	Theileria equi	94 (94)
		P <0.05
	Babesia caballi	06 (06)

Table 2: State wise prevalence of equine Babesiosis in North eastern Nigeria

	NO (%) infected		
	Borno	Gombe	Taraba
Overall	39 (48.8)	33 (41.3)	28(35.0)
Sex:			
Male	23(58.9)	22 (66.7)	17 (60.7)
Female	16 (41.1)	11 (33.3)	11 (39.3)
Age:			
Young	09 (23.1)	09 (27.3)	09 (32.1)
Adult	30 (76.9)	24 (72.7)	19 (67.9)

NB: No. of horses sampled per state = 80

Table 3: Mean ± SD (range) of packed cell volume based on sex and age of horses examined.

	Mean ± SD (range) PCV of	
	Babesia infected	Uninfected
Overall	34.3 ± 5.2 (20 – 49)	40.5 ± 4.2 (34 54)
Sex:		
Male	34.3 ± 5.2 (29 – 49)	40.4 ± 4.1 (34 –54)
Female	34.2 ± 5.1 (20 – 49)	40.4 ± 3.2 (34 – 54)
Age:		
Young	34.2 ± 3.3 (26 – 42)	39.3 ± 3.2 (32 – 54)
Adult	33.2 ± 3.0 (27 – 40)	40.1 ± 2.1 (30 – 4)

There was a positive correlation between infected horses and how packed cell volume (r = 0.75). figures 1 & 2 shows the appearance of B. caballi and T. equi on Giemsa stained blood smears (x 100).

IV. Discussion

The results of this study has revealed an overall prevalence of 41.7% for equine piroplasmosis due to Theileria equi 94% and Babesia caballi 6%. This though higher than the prevalence rates observed by [15] in Nigerian royal horses, confirms the assertion that equine piroplasmosis is endemic in Africa [10], and that it is duly linked to rainfall, gender, age and management systems, and is more pronounced when animals undergo nutritional stress during drought or semi drought conditions common with arid climates [21]; [22].

The finding of a higher prevalence for T. equi than B. caballi agrees with the findings by[23],[24] ;[25]; [26] that it is more pathogenic than B. caballi and causes a more persistent fever and anaemia. Theileria equi is one of the small species that appears as an oval circle amoeboid or as double pears, with occasional tetrad or "maltese cross" arrangement of merozoites while B caballi is the larger species that appears amoeboid, oval, circular and mainly in single or double pears [27] ; [28].

Also, more male adults were infected than females adults which though contradicts [12] who found a higher few positivity in female donkeys than males; but agrees with [29], who observed a higher prevalence in males and female horses, and explained that it could be due to systems of breeding and work activity, whence most female adults are used for breeding, more exposed to stress and immune suppression.

Amongst the states examined in this north eastern sub-region of Nigeria, Borno state had a higher prevalence compared with Gombe and Taraba states. Though, equine piroplasmosis can occur in any region or environment where horses are exposed to vector ticks especially of the genera Boophilus, Dermacentor, Hyelomma and Rhipicephalin [30], several factors responsible for the spread of equine piroplasmosis are the relocation of infected horses and ticks through natural and international movement (Borno state shares borders with Cameroun, Chad and Niger Republics), together with the geographic expansion of the tick vectors due to climate warming and respective creation of new areas, which are ecologically permissive of vectors EP has been considered as an emerging disease. There was a positive correlation between infected horses and reduced packed cell volume (PCV) (r=0.75) in this study, which also observed clinical signs of fever, Pale mucous membrane, weight loss, Lacrimation, depraved appetite and weakness. This conforms with the findings by [31];[14] and that decreased PCV reflect normocytic normo chromic aneamia which is of the non regenerative type, especially in the acute phase, and in due to expensive erythrocytic hemolysis and the role of auto immunity and the anti-erythrocytic auto antibodies enhancing more erythrophagocytosis and bone marrow depression[31].

Three mechanism of hemolysis have been associated to EP viz, mechanical mechanism by trophoziote intraerythrocytic binary fission; immuno-medialed mechanism by auto antibodies directed against components of the membranes of infected and uninfected erythrocytes, and the toxic mechanism by hemolytic factor produced by the parasite [31];[32].

V. Conclusion

EP is endemic in North- eastern Nigeria and more research using sensitive diagnostic tests should be conducted, and control should be geared towards effective vector control and treatment of infected and carrier horses.

VI. Recommendation

The fact that EP is endemic in the area of study, efforts should be geared towards controlling the vectors and the knowledge of the disease be used to produce vaccines for the disease.

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