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SHORT COMMUNICATION

Serum Urea and Creatinine Levels in Nigerian Local Horses Naturally Infected with *Babesia*

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ABSTRACT

To study the effects of *Babesia* infection on urea and creatinine serum samples were randomly collected from 253 Nigerian local (Arewa) breed of Royal stallions and their Arabian and Sudanese crosses from five towns in Niger state, Nigeria. These horses were categorized into 5 groups based on their infection status. Urea and creatinine was assayed using spectrophotometer. Collected fecal samples were analyzed using simple floatation method. The result showed non significant difference in serum levels of urea and creatinine in the various categories of horses namely *Babesia* infected horses, mixed *Babesia* + gastro-intestinal parasites infected horses, gastrointestinal parasites infected horses, negative apparently healthy and negative apparently sick horses. It can be concluded that natural *Babesia* infection in Nigerian local horses does not alter serum urea and creatinine levels.

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INTRODUCTION

The urea and creatinine clearance is the primary function of glomerulous. These biochemical substances are endogenously produced at a constant rate and cleared steadily by healthy kidneys, thereby, maintaining a stable plasma level. Raised plasma levels of urea and creatinine in kidney diseases in humans (Saba *et al.,* 2007), dogs with *Theileria annae* (Camacho *et al.,* 2004), Wister rat with dehydration-induced oxidative stress (Das *et al.,* 2010) and even in equine piroplasmosis (Camacho *et al.,* 2005) have been reported indicating severe involvement of kidneys. In acute piroplasmosis with severe hemolytic anemia, there is hemoglobinuric nephrosis (Guimarães *et al.,* 1997). This will significantly lead to raised plasma levels of urea and creatinine in acute piroplasmosis-affected horses (Alsaad *et al.,* 2010). Assessing renal function by determining blood levels of urea and creatinine, help in the early identification of renal disease in horses, therefore, allow veterinarians the option to treat renal disease before renal failure occurs (Kohn and Chew, 1987). This work seeks to determine the effect of natural *Babesia* infection on serum levels of urea and creatinine as information on serum chemistry of horses with babesiosis in Nigeria is scanty.

MATERIALS AND METHODS

This study was carried out on randomly selected 253 horses of Nigerian local (Arewa) breed and its crosses with Sudanese and Arabian breeds. Their ages ranged between $4^1/_2$ and 14 years which was determined using dental features. The horses were maintained in Royal stables in five (Agaie, Bida, Minna, Suleja and Borgu) towns in Niger state, Nigeria. The horses were physically examined and body conditions scored. The categorization of horses was based on location and their infection status. Breed was not considered in the categorization because there is no controlled breeding among horses population in Nigeria. Based on infection status of the horses and physical examination findings, they were categorized into 5 groups namely; *Babesia* infected horses (BI), Mixed *Babesia* + gastro-intestinal parasites infected horses (B-gip), Gastrointestinal parasites infected horses(Gip), Negative Apparently healthy; control group (NAh), Negative Apparently sick horses (NAs).

Thin blood smears were prepared directly from each horse under study. These smears were stained with Giemsa's stain and examined for parasites and levels of parasitemia were scored as described by Lumsden *et al.* (1973). About 6ml blood collected without anticoagulant was used for serum harvest. About 3g of fecal sample was collected manually *per rectum*. Serum and feces were stored at 4 and –20ºC, respectively till analysis. Serum urea and creatinine were assayed using manual colorimetric method (Spectrophotometer-Beckman coulter Du 520" model). Fecal samples were analyzed using floatation technique for eggs of gastrointestinal parasites. Data were analyzed by using one way analysis of variance

(Duncan's procedure). The Statistical Package for Social Scientists (SPSS) version 11.0 (SPSS Inc. 2001). Confidence interval was 95%.

RESULTS AND DISCUSSION

Theileria equi 41(80.4%) and *Babesia caballi* 10(19.6%) caused the infections in this population of horses as single infections. More horses had *Babesia* infection uncomplicated with gastrointestinal parasites infection (BI) 29(11.5%) than cases of concurrent *Babesia* and gastrointestinal parasites infection (B-gip) 22(8.7%) may be due to routine de-worming which reduces gastro-intestinal parasites burden in the horses (Table 1).

Horses in Agaie town suffered most from babesiosis recording the highest total percentage of horses with BI and B-gip infection status (Table 1). Records in ministry of Agriculture and natural resources in the state showed that as at the time of this study, Agaie was one of the towns without certified veterinary surgeon in its veterinary clinic, thereby making accessibility to efficient veterinary service difficult. Borgu had the least total percentage of horses with the two forms of infection due, perhaps to low population of horses in the area.

In the present study, out of blood smears of 253 horses examined, 202(79.9%) were found negative for any blood parasite, whereas 20(7.9%) and 31(12.2%) blood samples were found positive for very few (Vf) and plus + parasites. Ueti *et al.* (2005) found that in the acute phase of *Babesia equi* infection, parasitemia level is high, resulting in hemolytic crisis while in the chronic phase, the level is low. It means, the chances that hypoxaemia, hemoglobinuric nephrosis and glomerulonephritis will occur in this population of horses is low since it occurs mainly in acute babesiosis (Guimarães *et al.,* 1997; Máthé *et al.,* 2007). *Babesia*- infected erythrocytes are reported to clog capillaries in the kidney, liver and pancreas to reduce blood flow which may cause tissue ischemic injury (Máthé *et al.,* 2007) to such vital organs. This means that the higher the parasitemia, the greater the likelihood of ischemic injury occurring due to parasite clogging and intravascular hemolysis which may lead to kidney dysfunction.

Blood urea generated from protein catabolism and creatinine from irreversible breakdown of creatine and creatinine phosphate in muscles, are excreted through glomerular membrane of healthy kidneys into urine to maintain a normal blood level of the substances. Thus failure in their excretion will raise their blood levels to signify existing kidney disorder. The blood levels of these metabolic products are, therefore, reliable parameters for evaluating renal function (Camacho *et al.,* 2005).

In this study, there was no statistically significant difference in the mean values of serum urea and creatinine levels (P>0.05) (Table 2) of the various categories of animals. This suggests that natural *Babesia* infection in Nigerian local horses do not cause significant changes in the serum levels of urea and creatinine, no renal disorder is associated and the infection is more likely to be chronic in nature.

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Table 1: Distribution of Royal horses in Niger state by infection status

Town	BI	B-gip	Gip	NAh	NAs	Total
Agaie	6 (14.6)	5 (12.2)	11 (26.8)	3 (7.3)	16 (39)	41 (16.2)
Bida	10 (12.7)	8 (10.1)	18 (22.8)	15 (9.0)	28 (35.4)	79 (31.2)
Minna	11 (12.6)	4 (4.6)	24 (27.6)	10 11.5)	38 (43.7)	87 (34.4)
Suleja	1 (4.2)	3 (12.5)	12 (50)	5 (20.8)	4 (16.7)	24 (9.5)
Borgu	1 (4.5)	2 (9.1)	13 (59.1)	3 (13.6)	3 ((13.6)	22 (8.7)
Total	29 (11.5)	22 (8.7)	77 (30.4)	36 (14.2)	89 (35.2)	253 (100)

Figures in parenthesis indicate percentage. BI=*Babesia* infected horses, B-gip= Mixed *Babesia* + gastro-intestinal parasites infected horses, Gip = Gastrointestinal parasites infected horses, NAh= Negative Apparently healthy, NAs= Negative Apparently sick horses.

Table 2: Urea and creatinine levels (mean+SE) in horses in Niger state by their Babesia infection status (n=253)

Infection Status	Samples analyzed	Urea (mmol/L)	Creatinine (µmol/L)
BI	29	3.9±0.5	75.9±4.7
Gip	77	4.3±0.3	83.5±3.5
B-gip	22	4.3±0.3	76.1±6.6
Nah	36	3.8±0.4	78.3±3.9
NAs	89	4.0±0.2	79.6±2.7

All the values of urea and creatinine in various categories of horses differed non-significantly (P>0.05).

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