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Research Article

Haemoparasitic Infections of Camels (Camelus dromedarius) Brought-In For Slaughter at the Maiduguri Central Abattoir, Nigeria

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Abstract

A total of 200 blood samples were collected at Maiduguri abattoir within a period of five months (March-July, 2001). Out of these, 76 were males and 124 females. The overall prevalence of haemoparasitc infection was found to be 8% (16), with 2.5% *Anaplasma* specie; *Babesia spp* constituted 10.5% and *Trypanosoma* sp 0.5%. Females were found to be more infected (4.5%) than their males (3.5%) counterparts. The infection rates were highest in the months of July (3%) and April (2.5%) while it was low in the rest of the months. It is important to note that other methods of blood screening like molecular and serological techniques other than thick and thin blood smears should be adopted for more sensitivity and specificity. This study highlighted the significance of camels in transmitting ticks and tick-borne diseases among livestock and might stimulate the government to include camels in disease prevention and control surveillance.

INTRODUCTION

The haemoparasites of camel are principally *Trypanosoma spp*, *Babesia spp*, *Eperythrozoon* and *Anaplasma spp* [1-4]. Camel is a hardy long-necked animal that is either single humped (dromedary) or double humped (Bactrian) species. The bactrian camel is adapted to cold climate while dromedary is found mostly in arid or semi arid desert of Africa, Asia, and Austria [5,6].

Camels served their owners for the production of milk, meat, reproduction and in some areas, transport and agricultural purposes [1,7]. They are also used as racing animals and for other recreational activities in the Arab world, Australia and elsewhere [4]. Their hides are being used for a long period of time to make various useful items like grain bags, water bags, oil bags and vessels because their hides is light, durable and relatively thin but somewhat transparent making it more suitable for art work like table lamp shades, decanters or goblets, jewellery, penstand, table ware etc. than hides of other species of domestic animal [7].

Camels are one of the hardy beasts known to be capable of withstanding harsh weather condition of semi-arid and arid regions because of their peculiar morphological and physiological features. They have been known to survive under scarce water condition and on limited quantity of coarse forage comprising of thorny, salty and bitter plant species which are otherwise unpalatable to other species of livestock without reduction in their productivity [6,7].

As a result of natural selection and particular mode of living in the desert, they are protected far more effectively against parasitic and bacterial infections and diseases than other domestic animals [8]. The highly extensive system of production in the hot zones where camels usually exist might be the major reason for this fact. However, camels are susceptible to many diseases and parasites which might cause great losses [9,10]. The haemoparasites of camels are transmitted by four main genera of ticks; they were *Rhipicephalus, Hyalomma, Boophilus and Amhlyomma spp;* and also fly belonging to the genus Glossina. The parasites they transmit include Trypanomosma, Babesia, *Anaplasma* and *Eperythrozoon* specie [10,11].

African *trypanosomosis* and *babesiosis* are probably the most important diseases of camels in the continent [12], The risk of infection in humans as well as in other domestic animals has greatly affected social, economic and agricultural development

of communities within Tseste infested areas. Affected animals are economically unproductive in terms of milk, meat, manure and traction [13]. In camel, trypanosomosis is caused by various species of trypanosomes; these include *Trypanosoma evansi*, *T. rhodensiense* and *T. eiquiperdum* [8] Trypanosomosis cause by *T. evansi* is quite common and is found practically all over the world [13]. The disease adversely affects the growth, reproduction as well as draught potential of camel [8].

Despite their adaptation to harsh conditions, the camel has been known to be affected by wide range of diseases, some of which are of zoonotic importance [3]. In Nigeria, because of herd health programme targeted at the camels, disease monitoring activities in this species is not common and investigators may have to rely on abattoir findings from those camels presented for slaughter [12,14]. Camel is affected by many pathogenic organisms ranging from viruses, bacteria, fungi, chlamydia, and rickettsia to other parasites like the protozoa [15].

This research was aimed at determining the common haemoparasites of camels encountered at the abattoir in order to provide adequate information on the abattoir situation and prepare future researchers on their prevalence in the entire northeastern region.

METHODOLOGY

Ethics statement

This research was carried out following the guidelines and approval of the Animal Care and Use Committee, Faculty of Veterinary Medicine, University of Maiduguri, Nigeria. Informed consent was obtained from the Abattoir management and the animal owners at the abattoir where sampling was conducted and assurance of anonymity, prior to sampling.

Study area

Maiduguri is the capital city of the former Northeastern Nigeria and the capital city of Borno State which is located within the Sahel savannah zone. Borno State occupies the greater part of the Chad Basin and is located at 11050I-11.830 North Latitude and 13009I-13.150 East Longitude. It shares border with Republics of Niger to the North, Chad to the Northeast, Cameroon to the East and Yobe State to the West. The climate is hot and dry for a greater part of the year with rainy season from June to September in the Northern part and May to October in the Southern part and has mean annual rainfall and temperature of about 650mm and 32^{0}C respectively.

Sample collection and preservation

The project was carried out through a random screening of blood samples being collected from camels in Maiduguri abattoir during slaughter. A total of 200 blood samples were collected in the abattoir with 76 males and 124 females. The camels were made to sit on sternal recumbence with both the fore and hind limbs tied together. The heads and necks were restrained by pulling the necks laterally (on their sides) with a rope tied to the heads. The external jugular veins were pierced with a sharp edge of a long knife and blood samples were collected into well labelled Ethylene Diamine Tetra-Acetate Acid (EDTA) bottles and transported to the laboratory on ice.

Thin smear preparation and sample examination

A drop of blood was placed at about 1/3 of the length of clean, grease free glass slides. A cover slip was placed at an angle of 45° and drawn backward to make contact with the blood and allowed to spread along the edges of the cover slip and then drawn forward to make a thin smear. The smear was allowed to air dry and fixed with methyl alcohol for 2 minutes. A Giemsa's stain diluted with buffered distilled water of ph 7.2 at the ratio of 1.9 was used for staining the dried smear for 30 minutes [16]. The slides was then drained or washed with tap water and dried. A thin layer of oil immersion was placed on the slide and viewed under an immersion objective (x 100) as described by Soulsby [11].

Sex determination

The sex of the camels was determined by observation of external genitalia in which male dromedary has a protrusable soil palate called Dulaa or xula, which is an organ peculiar to male dromedary [6].

Statistical analysis: was employed to determine the relationships between categorical variables using chi-square.

RESULTS

The results of this investigation revealed that out of the 200 blood samples examined in this studies, 16 (8%) were positive for haemoparasitic infections, while 184 (92%) were negative for the various haemoparasites under investigation (Figure 1).

The infectivity status for the various hemoparasites showed 5 (2.5%) were positive for *Anaplasma*spp and 10 (5%) positive for *Babesia spp* while only 1 (0.5%) sample was positive for *Trypanosoma spp* (Figure 2).

Distribution of haemoparasites based on sex showed that in males, 3 (1.5%) were significantly ($p < 0.05$) positive for *Anaplasma* spp, 4 (2%) were positive for *Babesia spp* and none positive for *Trypanosoma spp*. While in females, 2 (1%) were positive for *Anaplasma*spp, 6 (3%) were positive for *Babesia spp* and 1 (0.5%) positive for *Trypanosoma spp* (Table 1).

The monthly distribution of haemoparasitic infections in camels slaughtered at Maiduguri Abattoir between March to July 2001 revealed that the prevalence of *Anaplasma* sp for the month

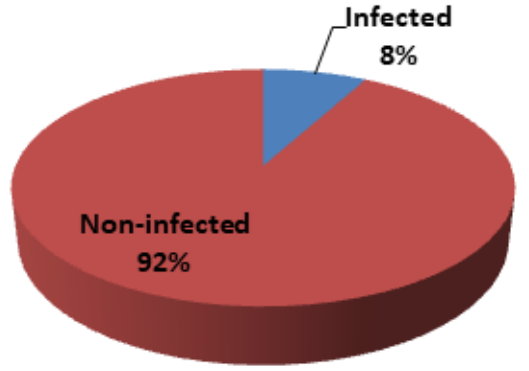

Figure 1 Paracitic infectivity status for the 200 camels examined.

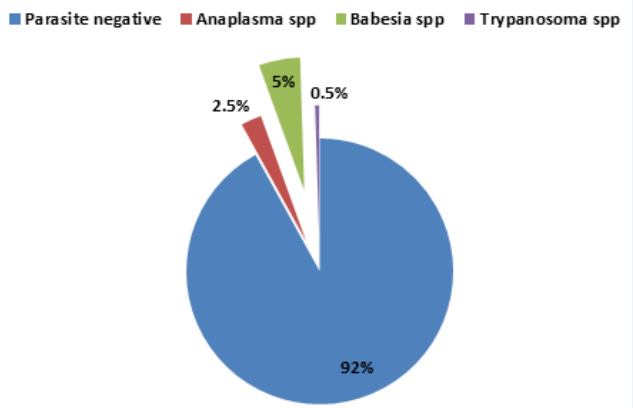

Figure 2 Infectivity status for the various hemoparasites.

Table 1: Sex-wise distribution of the various haemoparasites found on camels in Maiduguri.

Sex	Number examined (n=200)	Number positive (100%)			Total (%)
		Anaplasma spp	*Babesia* spp	*Trypanosoma* spp	
Male	76	3 (1.5)[a]	4 (2)	0 (0)	7 (3.5)
Female	124	2 (1)	6 (3)	1 (0.5)	9 (4.5)
Total	200	5 (2.5)	10 (5)	1 (0.5)	16 (8)

Note: Column value with superscript is statistically significant at the 0.05 level. n=sample size.

of March is significantly ($p < 0.05$) higher than those of *Babesia spp* and *Trypanosoma spp*. Similarly, *Babesia spp* collected in the month of April appeared to have the highest prevalence throughout the study (Table 2).

However, monthly prevalence for general haemoparasitic infections for all the 3 parasites in camels slaughtered at the abattoir between March through July revealed that the month of July appeared to predominated with the highest prevalence of 3%; while the month of June has the least prevalence of 1% (Figure 3).

DISCUSSION

Camel meat is without any doubt one of the safest and cheap source of meat in Maiduguri due to its low infectivity status and other non-infectious diseases when compared with other animals' meat. The low prevalence of 8% for general parasitic infection as seen in this study is in concordance with earlier report [17].

Babesia sp being the most prevalent haemoparasites in camels in the study area may not be unconnected with the abundance of its tick vector [18]. Although, trypanasomes have been reported to be one of the most important haemoparasites of camels as reported in an article "the one-humped earner" Boid et al., [8] and contrary to the early reports in Nigeria by Ajayi et al., [19] and Garba and Maigandi [12]; *Trypanosoma spp* infections were found to be lower in this study. This might be due to the fact that the principal vectors for the spread and onward transmission of trypanasomes (*Glossina spp*) were more abundant in the sub-humid vegetation zone of the country as compared to semi-arid zone of Maiduguri. Other important factors that determine the frequency of the parasites are rainfall and stocking density [13]. Contrary to our finding in this study, it has been established that there was positive correlation between trypanasomes infections with rainy season [13]; and that might still be due to the absence or less abundance of the parasite in the study area due to unfavourable climate for the growth and proliferation of its vector (Glossina).

One may also see that the general parasitic infection was more prevalent in females than in males (as seen in table 1). But, comparative prevalence in terms of individual haemoparasites indicates a significantly ($p < 0.05$) higher infection in males than their female counter part. However, at this point, there is no scientific justification on what makes male camels appeared to be more prone to *Babesia* infection than females in the study area.

However, looking at the monthly distribution of the various haemoparasites and the general prevalence for haemoparasites portrayed by the blood smears, the expected increase in the infection with increase in rainfall was not well established. This may be mostly due to the fact that the parasitized red blood cells (RBCs) were rapidly removed by the mononuclear phagocytes

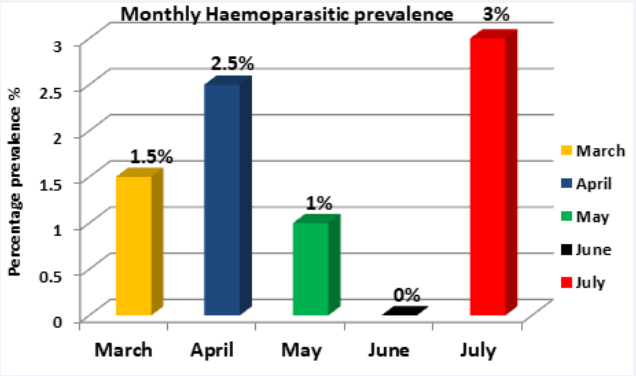

Figure 3 Monthly prevalence for general haemoparasitic infections in camels slaughtered at Maiduguri Abattoir between March to July 2001.

Table 2: Monthly distribution of the various haemoparasites in camels slaughtered at Maiduguri Abattoir between March to July 2001.

Month	Total number of samples collected per month (n=200)	Number positive (100%)			Total (%)
		Anaplasma spp	*Babesia* spp	*Trypanosoma* spp	
March	50	2 (1)[a]	0 (0)	1 (0.5)	3 (1.5)
April	34	0 (0)	5 (2.5)	0 (0)	5 (2.5)
May	46	0 (0)	2 (1)	0 (0)	2 (1)
June	40	0 (0)	0 (0)	0 (0)	0 (0)
July	30	3 (1.5)	3 (1.5)	0 (0)	6 (3)
Total	200	5 (2.5)	10 (5)	1 (0.5)	16 (8)

Note: Row value with superscript is statistically significant at the 0.05 level. n=sample size

and failure to demonstrate infected RBCs does not preclude a diagnosis [20].

CONCLUSION

This study revealed the presence of *Anaplasma*, *Babesia* and Trypanosoma species among slaughtered camels in Maiduguri. Sex and seasonality does not play significant role in infection rate among different sexes and gender. It is important to note that other methods of blood screening other than thick and thin blood smears should be adopted, for example serological methods and or Molecular techniques are more sensitive and reliable than the former conventional parasitological techniques in order to stimulate the government to include camels in disease prevention and control.

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