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PREVALENCE OF HAEMOPARASITES AND THEIR EFFECTS ON HAEMATOLOGICAL VALUES OF INFECTED ONE HUMPED CAMEL (*CAMELUS DROMEDARIUS*) IN THE SEMI- ARID REGION OF SOKOTO STATE, NIGERIA

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ABSTRACT

The objective of this study was to determine the prevalence of haemoparasites and their effects on the haematological profiles of dromedary camels in semi- arid region of northern Nigeria (12 ^{0} N, 700 to 800mm

annual rainfall). The study included apparently healthy 208 camels made up of 116 (55.8%) males and 92 (44.2%) females of varying age groups from seventy three 73 herds in seven Local Government Areas which were further categorized into border (Illela, Gada and Tangaza) and non-border (Gwadabawa, Kware and Goronyo) to Niger Republic and a municipal abattoir (Sokoto North) from Sokoto State. Blood samples were taken through jugular venipuncture and examined for haemoparasites and their effects on blood profiles. The overall prevalence of haemoparasitic infections was 9.1%. The two species of haemoparasites detected were Trypanosoma evansi (n= 15 or 78.9%) and Anaplasma marginale (n= 4 or 21.1%) and there was no multiple infections seen. There were significant increases (P < 0.05) in values of WBC, Neutrophils, Monocytes, Eosinophils and Basophils while the values of PCV, Hb, MCV, MCH and MCHC decreased significantly (P < 0.05) in infected camels. However, the decrease and increase in the values of RBC and basophils were not significant (P> 0.05) only in camels infected with Trypanosoma evansi. This study gives an indication of some of the common animal health challenges usually encountered under the extensive camel production system in a semi- arid zone of Nigeria and the need for effective animal health care.

Key words: camels, haemoparasite, prevalence, blood profiles, Sokoto State.

INTRODUCTION

Hemoparasites are known to affect the health of camels leading to Anaemia, abortion and death when burden is high. There are several reports of prevalence of hemoparasites of camels from some parts of Nigeria, Africa and Middle East (Argungu *et al*., 2014 and El-naga *et al.,* 2016). Camel meat is presently becoming table meat in many parts of the world including Sokoto- Nigeria (where an average of 5 camels are slaughtered daily in Sokoto central abattoir) (Khalid *et al.,* 2015 and Abdullahi *et al.,* 2018). Presently, there is an increase in the use of camel for farm work because of greater tractive efficiency when compared with work bulls and donkeys (Mohammed and Mansoor, 2013). The four genetic strains of camels available in the Nigeria-Niger corridor include; Ja, baki, bule and kurri (Abdussamad,*et al.,* 2015). This study was conducted to determine the prevalence of haemoparasites and their effects on the haematological profiles of dromedary camels from herds and those slaughtered in Sokoto State (semi- arid region of northern Nigeria).

MATERIALS AND METHODS

Purposive sampling method was used to sample 208 apparently healthy camels. Ten milliliters (10 ml) of blood was aseptically collected from jugular vein using a 16 gauge needle on a 20 ml syringe. Five milliliters each was transferred into two separate sample bottles containing disodium salt of ethylene diamine tetra-acetic acid (EDTA) as anticoagulant for haematological and haemo-parasitological analyses respectively. Thin and thick blood smears were carried out using methods described by Charles, (2002) for the examination and identification of haemoparasites. The obtained data was analyzed using statistical package for social science (SPSS IBM, 2011) version 20.0 as follows: Chi square test: To test for association between variables and infections. Probability values of less than 0.05 ($P < 0.05$) were considered statistically significant.

RESULTS

The overall prevalence of haemoparasitic infections was 9.1%. Two haemoparasites detected were *Trypanosoma evansi* (n= 15 or 78.9%) and *Anaplasma marginale* (n= 4 or 21.1%) and there was no multiple infections seen. There was no significant difference in the prevalence of hemoparasites between camel sexes ($P = 0.845$) and age groups ($P = 0.09$) (Table 1). The values of PCV, Hb, MCV, MCH and MCHC decreased significantly ($P < 0.05$) in infected camels compared to non-infected (Table 2 and Table 4) while there were significant increases ($P < 0.05$) in values of WBC, Neutrophils, Monocytes, Eosinophils and Basophils compared to non-infected (Table 3 and Table 5)

Table 1: Red blood cells values for infected and non- infected camels with *Trypanosoma evansi* in study areas in Sokoto State, Nigeria.

Parameter	Infected Mean± SEM	Non infected Mean± SEM	P- value	Significance
PCV(%)	21.333 ± 0.333	28.881 ± 0.295	0.0000	S
Hb(g/dl)	5.933 ± 0.228	11.706 ± 0.402	0.0000	S
RBC ($\times 10^6$ /mm^3)	6.066 ±1.857	7.868 ± 0.333	0.3550	NS
MCV(fl)	13.066±1.452	41.782 ± 0.438	0.0000	S
MCH(pg)	13.866 ± 0.767	19.041 ± 0.161	0.0000	S
MCHC(g/dl)	21.666 ± 0.622	33.673 ± 0.555	0.0000	S

Significant at P< 0.05

Table 2: Differential leucocyte values for infected and non - infected camels with *Trypanosoma evansi* in study areas in Sokoto State, Nigeria.

Parameter	Infected Mean± SEM	Non infected Mean± SEM	P- value	Significance
WBC ($\times 10^6$ /mm^3)	20.866 ± 2.159	13.803 ± 0.153	0.0060	S
Neutrophils (%)	50.933 ± 1.062	31.958 ± 0.614	0.0000	S
Lymphocytes (%)	55.400 ± 3.353	47.404 ± 0.452	0.0330	S
Monocytes (%)	11.066 ± 0.686	5.575 ± 0.175	0.0000	S
Eosinophils (%)	13.142 ± 0.824	6.507 ± 0.321	0.0000	S
Basophils (%)	1.666 ± 0.303	1.103 ± 0.081	0.0920	NS

Significant at P< 0.05

DISCUSSION

These findings (Table 1 and Table 2) agreed with the findings of Ayoub *et al.,* (2015) who reported a decrease in PCV, Hb concentration, RBC counts, MCV and MCHC values in infected camels, while WBC counts increased in *T. evansi*-positive sample, which indicates an increase in antibodies. It was also in agreement with the finding of Sattar *et al* (2009) who reported that, affected dromedaries showed a marked eosinophilia with three eosinophils per field of observation; that is a natural defense mechanism against parasites. These findings were similar with the results reported by Arugungu *et al.,* (2014), Fatihu *et al.,*(2014) and Alsa'ad *et al.,*(2009).

Table 3: Mean erythrocytic parameters and indices in *Anaplasma marginale*- infected and non- infected camels in study areas in Sokoto State, Nigeria

Parameter	Infected Mean± SEM	Non infected Mean± SEM	P- value	Significance
PCV (%)	22.500 ± 0.500	28.451 ± 0.307	0.0000	S
Hb(g/dl)	6.250 ± 0.250	11.389 ± 0.392	0.0000	S

RBC ($\times 10^6$ /mm^3)	4.250 ± 0.478	7.806 ± 0.341	0.0010	S
MCV(fl)	31.000±1.080	41.205 ± 0.459	0.0010	S
MCH(pg)	13.250 ± 0.478	8.774 ± 0.179	0.0000	S
MCHC(g/dl)	21.750 ± 0.478	33.024 ± 0.560	0.0000	S

Significant at P< 0.05

Table 4: Mean total differential white blood cells in *Anaplasma marginale*- infected and non - infected camels in study areas in Sokoto State, Nigeria

Parameter	Infected Mean± SEM	Non infected Mean± SEM	P- value	Significance
WBC($\times 10^6$ /mm^3)	18.500 ± 1.040	14.230 ± 0.244	0.0230	S
Neutrophils ($\times 10^9$)	9.435 ± 1.870	4.693 ± 0.658	0.0010	S
Lymphocytes ($\times 10^9$)	10.730 ± 0.912	6.799 ± 0.501	0.0000	S
Monocytes ($\times 10^9$)	2.457 ± 2.629	0.828 ± 0.179	0.0610	S
Eosinophils ($\times 10^9$)	2.497 ± 2.101	0.971 ± 0.324	0.0490	S
Basophils ($\times 10^9$)	0.786 ± 0.946	0.154 ± 0.724	0.0440	S

Significant at P< 0.05

These findings for *Anaplasma marginale* with decrease in the values of PCV, HB, RBC, MCV, MCH, MCHC agreed with the findings of Alsa' ad *et al* (2009) who reported a significant decrease in the haemogram (TRBCs, HB and PCV) reflecting macrocytic normochromic type of anemia, while a significant increase in MCV was encountered in infected camels. Similar results were reported by Njiru *et al*. (2012) and Ngaira *et al*., (2014). The significant increase in WBC (leukopaenia) indicates an increase in antibodies (Argungu *et al.,* 2014).

CONCLUSION

The haemoparasites that affect camels in Sokoto State were; *Trypanosoma evansi* (n= 15 or 78.9%) and *Anaplasma marginale* (n= 4 or 21.1%)

RECOMMENDATION

Other basic research on haemoparasitic infections of camels in the study area is recommended.

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