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Influence of Pulmonary lesions on Some Haematological Parameters of Camels (*Camelus dromedarius*) in Northwestern Nigeria

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Abstract
Blood samples from external jugular vein of camels presented for slaughter at randomly selected slaughter houses in northwestern Nigeria were collected. This is to determine some haematological baseline data and to investigate the influence of pulmonary lesions on the blood parameters studied. Accordingly blood samples from 500 camels presented were collected and examined. Three hundred and twenty (320) camels sampled and examined showed one or more gross and microscopic pulmonary lesion(s) which include: acute pneumonia 232(46.4%), hydatid cyst 14(9.2%), pulmonary haemorrhage 3(0.6%), pulmonary abscess 13(2.6%) focal emphysema (12(2.4%) and pulmonary atelectasis 46(9.2%). while 180 camels sampled showed no detectable pulmonary lesion. There were relative increases in the PCV (p=0.422), RBC (p=0.411) and haemoglobin concentration (p=0.321) in camels with pulmonary lesions when compared to the values from camels with normal lungs. However, the differences were not statistically significant (p>0.05). The total WBC was significantly increased (p=0.011) in the camels that had lung lesions. Nevertheless, the differential white blood cell counts shows no statistical difference between the groups, except on the eosinophils count which were significantly higher (p=0.015) in camels with lung lesions. The calculated erythrocytes indices showed significantly higher MCH (p=0.02) and MCHC (p=0.048) in the camels with lung lesions (p<0.05), although the MCV was not significantly different between the groups. The total plasma protein was not significantly different between the groups (p=0.194). It was concluded that pneumonia or other lung lesions may have influence of the blood parameters observed in this environment.

Keywords: Camel, Haematology, Lung lesion, Northwestern Nigeria.

Introduction

Blood serves the purpose of supplying each cell with the required water, oxygen, electrolytes, nutrients and hormones, and the blood receives the waste products of metabolism for transport to the organ of excretion (Schalm *et al.*, 1975). Blood volume is important to the dynamics of circulation that it is kept remarkably constant despite, the periodic intake of water, the production of water of metabolism and the continuous water loss via the skin, lungs, kidneys, mammary glands and alimentary tract (Schalm *et al.*,1975). Pulmonary lesions have been reported to cause decreased productivity and huge economic loss to farmers (Zubair *et al.*, 2004; Kane *et al.*, 2005), because it can interfere with pulmonary functions especially oxygenation of blood and supply of oxygen. Blood evaluation has been known to be a reliable medium for assessing health status of animals (Anosa, 1983), and it provides basis for the clinical, prognostic and diagnostic decisions of various types of diseases in domestic animals (Oduye & Otesile, 1977; Obi & Anosa, 1980; Omotainse & Anosa, 1992; Egbe-Nwiyi, 1995; Egbe-Nwiyi *et al.*, 2000; Fatihu *et al.*, 2000). The dromedary camel (*Camelus dromedarius*, one-humped camel) is a multipurpose animal formerly strictly for transport, as beast of burden and used as draught animal for agriculture popularly "the desert ship" but today it is changing status to "food security" animal as it is used for milk, meat and hides (Schwartz & Dioli, 1992; Farah, 2004; Kane *et al.*, 2005; Kadim *et al.*, 2008). The change in status has presented new challenges to the health status of the camel in semi-arid zones of Nigeria. There is increase in camel rearing in the environment probably as a result drought-associated increase mortalities in other animals especially ruminants (Kadim *et al.*, 2008). The desert-like semi-arid environment of some parts of northwestern

Nigeria associated with dust and the likely exposure of the respiratory system and the lungs particularly to the frequent bombardment of dust particles in this environment prompted this study, in addition to the lack of comprehensive baseline haemotological data of camels in this environment.

Materials and methods

The study was carried out on camels presented for slaughter at the Kano and Sokoto main abattoirs in northwestern, Nigeria between May and October, 2008. Kano is located between latitudes 12^0 40 and 10^0 30 and longitude 7^0 40 and 9^0 30, while Sokoto covers latitude 12^0 N and 13^0 58 and longitude 4^0 8E and 6^0 54.

Blood samples

Blood samples from 500 hundred camels were collected from jugular vein using sterile 10ml syringe while in some cases directly from punctured jugular vein. The blood samples for each camel was placed in vacutainer tube with ethylene diamine tetraacetate (EDTA) as anticoagulant for haematological analysis. The following parameters were determined as described by Schalm *et al.* (1975): total red blood cell (RBC) counts, packed cell volume (PCV), total protein concentration, total white blood cell (WBC) counts with differential cell count and haemoglobin (Hb) concentration, while mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH) and mean corpuscular haemoglobin concentration (MCHC) were calculated using the standard techniques (Schalm *et al*., 1975; Coles, 1980).

Tissue samples

Samples were collected from a total of 500 one-humped adult camels of both sexes that were presented for slaughter at Kano and Sokoto main abattoirs, between May and October, 2008. Ante-mortem examination for evidence of diseases and postmortem examinations were carried out using the routine visual, palpate and incise method. Lungs were examined and samples were collected for processing. Samples were preserved in 10% neutral buffered formalin for at least 24 h prior to processing, using the routine parafiin embedded technique and stained with haematoxylin and eosin.

Data Analysis

Data obtained were summarized as mean with standard error of the mean and comparison of the means was done using student *t-test* described by Ogbeibu (2005).

Results

There were relative increases in the PCV (p=0.422), RBC (p=0.411) and haemoglobin concentration (p=0.321) in camels with pulmonary lesions (Table 1) when compared to the values from camels with normal lungs (Plate I). However, the differences were not statistically significant (p>0.05).

Table 1: Mean haematological values observed in apparently healthy camels without pulmonary lesions and camels with observable pulmonary lesions in Kano and Sokoto States, Nigeria (Mean ± SEM)

Haematological indices(Mean ± SEM)			
	Without pulmonary lesions (n =180)	with pulmonary lesions (n = 320)	p-Value
RBC (X 10^6/µl)	5.0± 0.1	5.1± 0.1	0.411
Haemoglobin (g/dL	9.9±0.2	10.1±0.1	0.321
PCV (%)	30.2±0.6	30.5±0.5	0.422
MCV (fl	60.1±0.4	60.6±0.2	0.081
MCH (pg)	19.9±0.0	20.3±0.1	0.020*
MCHC (g/dL)	33.2±0.1	33.5±0.2	0.048*
Total protein (g/dL)	7.4±0.1	7.5±0.06	0.194
WBC (X 10^3/µl)	9.8±0.3	10.7±0.2	0.011*
Neutrophils			
Segmented (%	43.5±1.3	41.1±0.9	0.066
Band (%)	0.6±0.1	0.8±0.1	0.179
Lymphocytes (%)	54.6±1.3	56.5±0.9	0.112
Monocytes (%)	0.7±0.1	0.7±0.1	0.456
Eosinophils (%)	0.6±0.1	0.8±0.1	0.015*
Basophils (%)	0.01±0.0	0.0±0.0	0.294

*P< 0.05 was considered statistically significant

Table 2: Distribution of camel with and without pulmonary lesions from Kano and Sokoto Abattoirs Nigeria (N = 500)

Lesion(s)	Kano Abattoir		Sokoto Abattoir		
	Male	Female	Male	Female	n (%)
Pneumonia	39	158	23	12	232(46.4)
Hydatid cyst	2	4	5	3	14(2.8)
Pulmonary abscess		2	8	3	13(2.6)
Pulmonary hemorrhage	-	3	-	-	3(0.6)
Pulmonary atelectasis	1	24	18	3	46(9.2)
Focal Emphysema	3	9	-	-	12(2.4)
Normal lungs	34	108	22	16	180(36.0)

N = Total camels sampled

The total WBC was significantly increased (p=0.011) in the camels that had lung lesions (Plate II-VII). Nevertheless, the differential white blood cell counts were no statistical difference between the groups, except on the eosinophils count which were significantly higher (p=0.015) in camels with lung lesions. The calculated erythrocytes indices showed significantly higher MCH and MCHC in the camels with lung lesions ($p<0.05$), although the MCV was not significantly different between the groups. The total plasma protein was not significantly different between the group ($p>0.05$) (Table 1). Distribution and types of pulmonary lesions observed are shown on Table 2 and Plate II-VII.

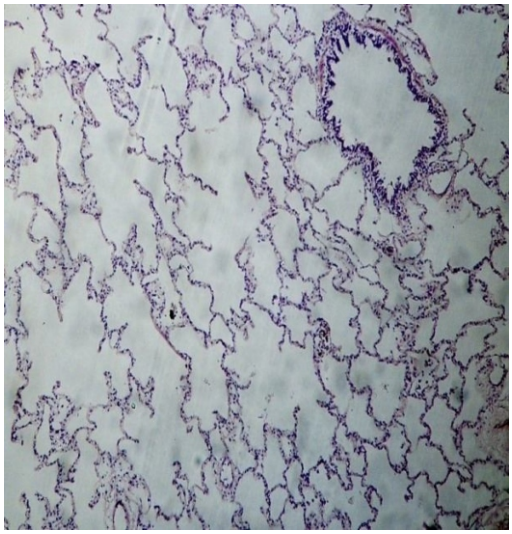

Plate I: Photomicrograph of a section of a normal camel lung (H & E X 84).

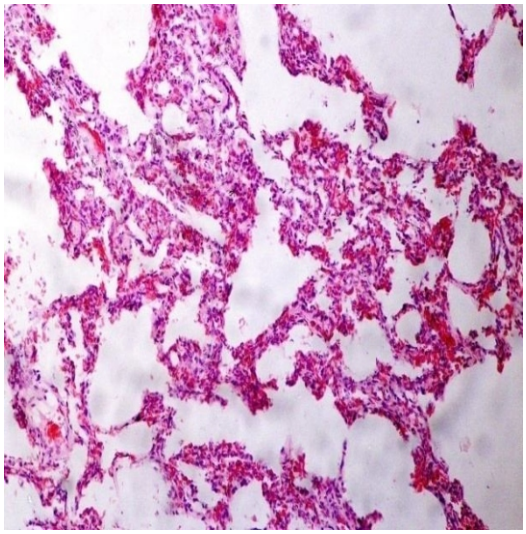

Plate II: Photomicrograph of a section of lung from camel. Note thickened interaveolar septae, congested capillaries, inflammatory exudates and cellular infiltration (H & E X 147).

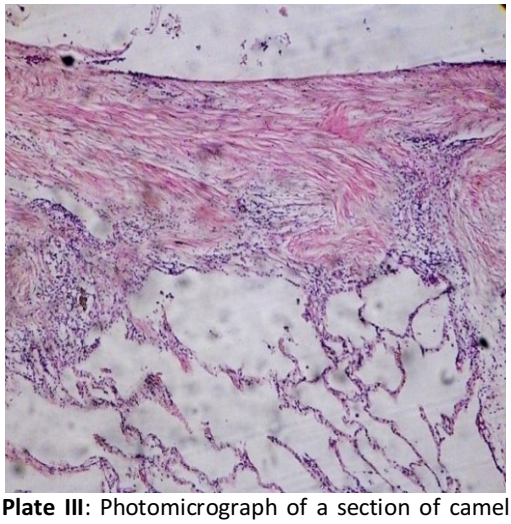

Plate III: Photomicrograph of a section of camel lung with hydatid cyst. Note the cyst wall capsule, lumen and inflammatory cellular infiltration (H&E X 84).

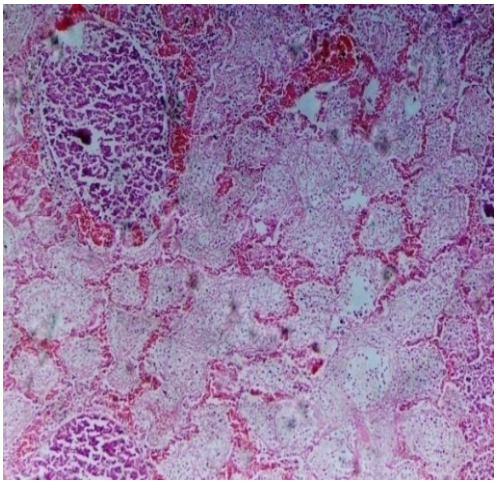

Plate IV: Photomicrograph of a section of lung from camel. Note microabscesses and purulent exudates in the alveoli. H & E X 84.

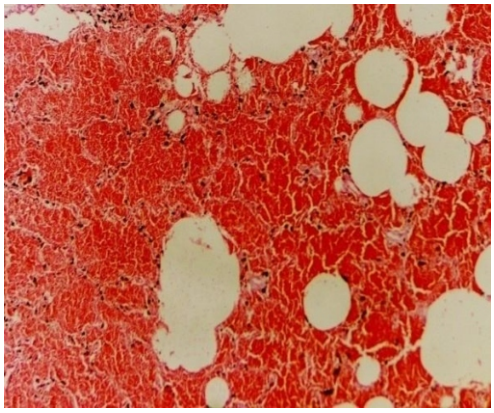

Plate V: Photomicrograph of a section of lung from the camel. Note diffuse haemorrhages in the alveolar spaces and congestion. (H & E X84).

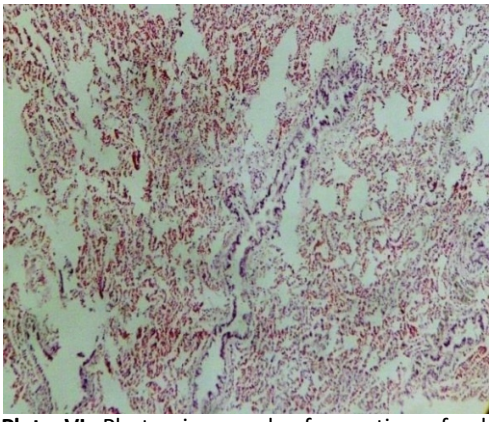

Plate VI: Photomicrograph of a section of a lung from camel. Note atelectasis and narrow respiratory bronchiole. (H & E X84).

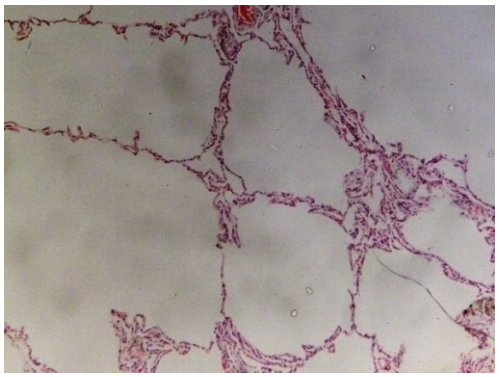

Plate VII: Photomicrograph of a section of a lung from the camel. Note the over distended alveolar spaces and emphysema with thin alveolar wall (H & E X 84)

Discussion

The haematological values obtained from apparently healthy camels in this study were comparable to the values obtained in apparently healthy camels by other workers in other parts of the world (Soni & Agarwala, 1961; Banerjee *et al.*, 1962; Higgins, 1983).

Although most of the haematological indices showed little or no significant difference statistically between camels with pulmonary lesions and without pulmonary lesions, there was significant increase in mean corpuscular haemoglobin and mean corpuscular haemoglobin concentration in camels with observed lung lesions, this findings may be associated with intravascular haemolysis mostly due to hemoparasitism as reported by Barger (2003) in dogs and other causes of intravascular haemolysis beyond the scope of this studies. The significant leucocytosis observed in camels with pulmonary lesions may be associated with inflammatory processes, especially as it is associated with regenerative left shift (Barger & Grindem, 2000; Barger, 2003; Stockham *et al*., 2003). Other factors such as excitement, fright, pain, exercise and anxiety were known causes of leucocytosis (Stockham & Scott, 2002) as these animals were walked or hurried to the abattoirs before slaughtered. The fact that there was statistically significant difference between camels with and without pulmonary lesions, it is likely that the leucocytosis observed in this study was as a result of inflammatory process. While the significant eosinophilia in camels with observable pulmonary lesions may be suggestive of hypersensivity reaction due to possibly the hydatid cyst observed in this study (Stockham *et al.*, 2003).

Conclusions

Lung lesions may have influence on some haematological parameters although, other extrapulmonary factors such stress, fright, fear (etc) or other factors which were not focused in this studies might have some contributory effect on the data obtained. However, the data obtained may be useful as baseline data for haematological parameters or probable feature of the blood parameters in respiratory disease especially pneumonia in camels in this environment. Furthermore, caution should be exercised to exclude other factors that may influence blood parameters studied, before final decision on altered haematological parameters is taken in this environment.

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