HAEMATO-BIOCHEMICAL STUDIES OF ACIDOSIS IN CAMELS (*CAMELUS DROMEDARIUS*)#

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ABSTRACT

Blood and serum parameters of 10 camels (*Camelus dromedarius*) suffering from acidosis were investigated from in and around Bikaner district of Rajasthan. Twenty apparently healthy camels were used as control for the present study. The overall mean value of haematological parameters *i.e.*haemoglobin, PCV, TEC, MCV, MCH, MCHC, TLC, neutrophils, monocytes, lymphocytes, eosinophils and basophils were184.21± 2.317 g/L, 45.50±1.922%, 15.30±1.188 x10^{12}/L, 31.24±2.647fl, 12.53±0.719 pg, 41.20±1.977 g/dL, 13.14±1.047 x10^{9}/L, 53.40±1.343%, 3.10±0.233 %, 38.90±1.441%, 4.20±0.359% and 0.40±0.163%, respectively, which were obtained from 10 diseased camels suffering from acidosis.The overall mean value of haemoglobin, PCV and TEC was significantly ($P \leq 0.01$) higher in animals affected with acidosis as compared to the overall mean values of the apparently healthy camels. The overall mean value of MCV, TLC and neutrophils was nonsignificantly higher whereas the overall mean value of MCH, MCHC, monocytes, lymphocytes, eosinophils and basophils were non significantly lower in camels affected with acidosis as compared to the overall mean values of the apparently healthy camels. The overall mean value of biochemical parameters *i.e.,* AST, ALT, total protein, albumin, globulin and A/G ratio were 86.18±1.868 U/L, 23.18±0.717 U/L, 5.56±0.141 g/dl, 2.06±0.072 g/dl, 3.50±0.093 g/dl and 0.59±0.02, respectively, which were obtained from 10 diseased camels suffering from acidosis. The overall mean value of ALT was significantly ($P \leq 0.01$) higher whereas total protein, albumin and globulin were significantly ($P \leq 0.01$) lower in camels affected with acidosis as compared to the overall mean values of the apparently healthy camels. The overall mean value of AST and A/G ratio was nonsignificantly higher in camels affected with acidosis as compared to the overall mean values of the apparently healthy camels.

Key words: Acidosis, blood, serum, camel

Introduction

The camel is an important component of the desert ecosystem and is adapted to desert areas (Dhawal *et al*., 2020).The ability of the camel to survive in harsh areas of the world, its endurance in prolonged drought, and above all its high potential to convert the scanty resources of the desert into milk makes them more important to the pastoralists.

Camel plays an important socio-economic role within the pastoral and agricultural system in the dry and semidry zones of Asia and Africa (Asopa *et al*., 2019). Mehta *et al*. (2012) reported maximum mortality (41.39%) in camel due to involvement of digestive system. The causes were mainly pathogenic infections and feeding faults. Various clinical conditions like oesophageal obstruction, ruminal acidosis, impaction have important consequences as various pathological lesions like acute congestion of the wall of the organ, proceeding necrosis and ultimately rupture may occur (Jubb *et al*., 2007).

Acidosis is a pathological condition associated with the accumulation of acid or depletion of alkaline reserves in blood and body tissues and reflects a decrease in pH in the fore stomach of camels. It mainly occurs in working camels due to overfeeding of concentrates.In last few years, this condition has emerged as one of the most common digestive disorders in camels.Camels with acidosis exhibit anorexia, tympany, doughy rumen, dehydration and recumbency.Haemato-biochemical study has been found to be important and reliable indicator for assessing an animal's health status and might give an assessment of the degree of damage to host tissue(Otesile *et al*., 1991). Keeping in view of these facts the present investigation was undertaken to study the haematological and biochemical parameters associated with acidosis in camel.

Materials and Methods

To carry out the study, blood samples were collected from 10 camels suffering from acidosis in and around Bikaner district of Rajasthan on the basis of history and clinical symptoms of anorexia, tympany, doughy rumen, dehydration and recumbency with rumen liquor pH below 6. Blood samples were also collected from twenty apparently healthy camels and were used as control. Blood samples were collected by jugular venipuncture and collected in two vials, one with EDTA and another without EDTA for serum separation. Serum samples were separated by making blood slant and incubated for 1 hr at 37°C. Blood clots were broken and tubes were centrifuged at 2500 rpm for 30 minutes. Serum samples were pipetted out in small Pyrex tube and were kept immediately in deep freeze. Haemoglobin concentration (Hb), packed cell volume (PCV), total erythrocyte count (TEC), Totalleucocyte count (TLC) and differential leucocyte count (DLC) were obtained as per the methods described by Jain (1986).Mean Corpuscular Volume (MCV), Mean Corpuscular Haemoglobin (MCH) and Mean Corpuscular Haemoglobin Concentration (MCHC) were obtained as per the methods described by Coles (1986). Serum samples were analyzed for different biochemical parameters *viz*. Total serum protein (TSP), serum albumin (SA), Serum globulin (SG), Serum Alanine amino transferase (ALT) and Aspartate amino transferase (AST) by using IDEXX Kit Method.

The data obtained from both apparently healthy and

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diseased camels were analyzed by using Software Package for Social Sciences (SPSS) Version 17.0 (2008) and one way analysis of variance (Snedecor and Cochran, 1994) with comparison among means by Duncan's multiple range test (Duncan, 1955) with significance level of $P \leq 0.05$.

Results and Discussion

Mean± SEM values of haematological parameters *i.e.*haemoglobin, PCV, TEC, MCV, MCH, MCHC, TLC, neutrophils, monocytes, lymphocytes, eosinophils and basophils of diseased and apparently healthy camels has been presented in Table 1.

A high significant ($P \leq 0.01$) effect was found in haemoglobin, PCV and TEC in camels affected with acidosis. The overall mean value of haemoglobin, PCV and TEC was significantly ($P \leq 0.01$) higher in animals affected with acidosis as compared to the overall mean values of the apparently healthy camels.The overall mean value of MCV, TLC and neutrophils was nonsignificantly higher whereas the overall mean value of MCH, MCHC, monocytes, lymphocytes, eosinophils and basophils werenonsignificantly lower in camels affected with acidosis as compared to the overall mean values of the apparently healthy camels.

Table 1: Mean ± SEM values of haematological parameters of apparently healthy and diseased camels

S. No.	Parameters	Healthy (n=20)	Acidosis (n=10)
1.	Hb (g/L)	132.52^{a} ±1.789	184.21^{c} ± 2.317
2.	PCV (%)	29.00^{a} ±1.469	45.50^{c}±1.922
3.	TEC (10^{12}/L)	10.31^{a}±0.572	15.30^{c}±1.188
4.	MCV (fl)	29.52^{a}±2.142	31.24^{ab}±2.647
5.	MCH (pg)	13.50^{b}±0.70	12.53^{ab}±0.719
6.	MCHC (g/dl)	48.28± 2.941	41.20±1.977
7.	TLC (10^{9}/L)	11.46±0.592	13.14±1.047
8.	Neutrophils (%)	47.70^{a}±1.047	53.40^{ab}±1.343
9.	Monocytes (%)	3.45±0.266	3.10±0.233
10.	Lymphocytes (%)	43.15^{c}±1.182	38.90^{bc}±1.441
11.	Eosinophils (%)	5.05^{a}±0.366	4.20^{a}±0.359
12.	Basophils (%)	0.65^{b}±0.167	0.40^{ab}±0.163

Mean value bearing different superscripts in a row differ significantly (P<0.05)

The increase in Hb in acidosis in present study was in agreement with earlier observations of Baraka *et al.* (2000), Kamal (2008), Gupta *et al.* (2012) and Chavelikar *et al.*(2017). This elevation may be accounted for dehydration, induced intraruminal pressure and resultant outpouring of extracellular fluid.

The increase in PCV in acidosis was in agreement with earlier observations ofMishra *et al.* (2006), Mali *et al.* (2008), Ismail *et al.* (2010), Gupta *et al.* (2012), Poonia *et al.* (2016) and Chavelikar *et al.* (2017). The increase in PCV in acidotic camels was apparently due to hemoconcentration associated with dehydration.

An increase in the total white cell counts, a marked neutrophilia accompanied by decreased lymphocytes in present study was in agreement with earlier observations of Mishra *et al.*(2006), Kamal (2008), Ismail *et al.* (2010), Gupta *et al.* (2012), Poonia *et al.* (2016) and Chavelikar *et al.*(2017). This could be well-explained in terms of mobilization of neutrophils due to severe inflammation and damage in the wall of forestomach.

Mean± SEM values of biochemical parameters *i.e.* AST, ALT, total protein, albumin, globulin and A/G ratio of diseased and apparently healthy camels are presented in Table 2.

A high significant ($P \leq 0.01$) effect was found in ALT, total protein, albumin and globulin in camels affected with acidosis. The overall mean value of ALT was significantly ($P \leq 0.01$) higher whereas total protein, albumin and globulin were significantly ($P \leq 0.01$) lower in camels affected with acidosis as compared to the overall mean values of the apparently healthy camels.The overall mean value of AST and A/G ratio was nonsignificantly higher in camels affected with acidosis as compared to the overall mean values of the apparently healthy camels.

Table 2: Mean ± SEM values of serum biochemical parameters of apparently healthy and diseased camels

S. No.	Parameters	Healthy (n=20)	Acidosis (n=10)
1.	AST (U/L)	82.858^{a}±3.345	86.18^{ab}±1.868
2.	ALT (U/L)	19.718^{a}±0.051	23.18^{b}±0.717
3.	Total Protein (g/dl)	7.808^{c}±0.115	5.56^{ab}±0.141
4.	Albumin (g/dl)	2.837^{c}±0.098	2.06^{ab}±0.072
5.	Globulin (g/dl)	4.971^{d}±0.126	3.50^{b}±0.093
6.	A/G ratio	0.583^{b}±0.032	0.59^{b}±0.02

Mean value bearing different superscripts in a row differ significantly (P<0.05)

The mean value of ALT significantly increased in camels with acid indigestion, which was almost similar to the findings of Bengoumi *et al.* (1998) and Gupta *et al.* (2012). Bengoumi *et al.* (1998) suggested that ALT activity increased in camels during dehydration and not affected by the hemoconcentration. On the contrary, Poonia *et al.* (2016) reported the mean values of ALT showed no significant increase in camels with acid indigestion.

High activity of AST enzyme in serum of acidotic camels were found during the present study which was similar to some earlier observations of Gupta *et al.* (2012) and Poonia *et al.* (2016). Increased AST activity could be due to hepatic damage as a result of absorption of toxic products from rumen or alimentary tracts. These findings are in accordance with those of previous workers(Prasad *et al.*, 1997 and Baraka *et al.*, 2000).

It was concluded that ruminal acidosis induced due to accidental heavy ingestion of readily fermentable carbohydrate rich grains and food waste significantly altered the haemato-biochemical profile concurrent with clinical manifestations and hence can be used to assess the severity of the disease.

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