

SOME BIOCHEMICAL AND HAEMATOLOGICAL ASPECTS ASSOCIATED WITH PYOMETRA AND ENDOMETRITIS IN FEMALE CAMELS (*Camelus dromedarius*)

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ABSTRACT

The study involved 67 animals suffered from endometritis, 61 animals suffered from pyometra and 28 normal fertile female dromedaries. The haematological analysis revealed that the haemoglobin (Hb) values were significantly ($P < 0.05$) higher in affected than normal animals. Mean corpuscular volume (MCV) and mean corpuscular haemoglobin concentration (MCHC) did not differ significantly among dromedaries of the 3 groups. The cellular components of blood did not vary significantly. The serum analysis of albumin, alanine aminotransferase (ALT), aspartate aminotransferase (AST), total bilirubin, blood urea nitrogen (BUN), calcium, cholesterol, creatine kinase N-acetylcysteine (CK-NAC), glucose, inorganic phosphorus, magnesium and total protein showed no significant difference. Uric acid decreased significantly ($P < 0.05$) in affected animals than control.

Key words: Biochemical, blood, dromedary, endometritis, haematology, pyometra

Dromedaries are reported to have low reproductive efficiency compared to other domestic species (Kaufmann, 2005; Skidmore, 2005). Pathological changes of the reproductive system are considered as the major cause of infertility in camels (El-wishy, 1987). Moreover, Tibary and Anouassi (1997b) recorded that the reproductive failure due to pathological lesions in the genital tract ranges between 15-35%. Uterine inflammation has been described as the most commonly encountered form of infertility in dromedary camels (Ali *et al*, 2010a; Tibary and Anouassi, 2000; Ghoneim *et al*, 2013a). Uterine infections can lead to irreversible damage of the salpinx, resulting in a total loss of fertility (Tibary and Anouassi, 2000). Furthermore, in cattle the subfertility associated with uterine infections involves suppression of hypothalamic GnRH and pituitary LH (Herath *et al*, 2006; Sheldon and Dobson, 2004). Blood constituents are good mirror for the general health of animals. Detection of a deviation of certain blood parameters from their normal limits could be an indication for diagnosis of a diseased condition (Dessouky, 1992).

The objective of this study was to assess some biochemical and haematologic aspects associated with

pyometra and endometritis in female camels (*Camelus dromedarius*).

Materials and Methods

The study was conducted during breeding season (From November to April; Arthur *et al*, 1985) in 128 infertile female dromedary camels aged from 5 to 20 years admitted to the Veterinary Teaching Hospital of King Faisal University, Saudi Arabia. Twenty eight fertile female dromedaries were considered as control group, belonging to Camel Research Centre, King Faisal University. Animals were subjected to breeding soundness examination. The investigation involved the breeding history (interval since last calving, number of services without conception, milking status, male fertility and herd fertility). All female camels were clinically examined by visual appraisal for any signs of abnormal vulvar discharge, rectal palpation of the reproductive tract and ovaries (Tibary and Anouassi, 1997a), vaginal examination (Tibary and Anouassi, 1997a; Tibary and Anouassi, 2000; Ali *et al*, 2010a), as well as trans-rectal ultrasound (Tibary and Anouassi, 1997a; Tibary and Anouassi, 2000; Tibary *et al*, 2001; Ali *et al*, 2010a) using linear-array 5 MHz transducer (UST-588U-5,

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SSD-500V, ALOKA, Co., Japan). Based on history, rectal, vaginal and ultrasound examination, 67 and 61 dromedaries were diagnosed as suffering from endometritis and pyometra, respectively. Two blood samples were collected by jugular venipuncture of each female dromedary at the time of clinical examination, one in EDTA and the other in plain tubes for serum harvesting. Blood serum was separated by 15-min centrifugation at 3000g and stored at -20°C until analysis. Within 30 minutes of collection, the whole blood samples with EDTA were used for haematological investigation. Using blood Analyser (UDIHEM I, France), Packed cell volume (PCV %), Haemoglobin (Hb, g/dL), Mean corpuscular volume (MCV, fL), Mean corpuscular haemoglobin (MCH, pg), Mean corpuscular haemoglobin concentration (MCHC, g/dL), Total red blood cell count (TRBC, $\times 10^6/\mu\text{l}$), Total white blood cell count (TWBC, $\times 10^3/\mu\text{l}$), Lymphocytes (%), Monocytes (%) and Neutrophils (%) were quantified according to Feldman *et al* (2000). Serum concentrations of albumin, alanine aminotransferase (ALT), Aspartate aminotransferase (AST), total bilirubin, blood urea nitrogen (BUN), calcium, cholesterol, creatine kinase N-acetylcysteine (CK-NAC), glucose, inorganic phosphorus, magnesium, total protein and uric acid were assayed on an automated clinical chemistry analyser (ELLIPSE machine, Italy).

Statistical analysis

Data were analysed using analysis of variance (ANOVA) with the aid of SPSS program, version 16.0 (SPSS, 2007).

Results

The results of the haematological values in animals suffered from endometritis, pyometra and normal animals are presented in table 1. The per cent of the PCV did not significantly change in the studied animals. The Hb values were significantly ($P < 0.05$) higher in animals suffered from pyometra than normal animals. Whereas, these values did not vary significantly in animals had endometritis. MCV and MCHC did not differ significantly among dromedaries of the 3 groups. The cellular components Total Erythrocyte Count (TEC), Total Leucocyte Count (TLC), lymphocytes, monocytes and neutrophils of blood did not vary significantly in the studied animals. The results of the serum biochemistry are presented in table 2. Albumin values were 4.11 ± 0.16 , 4.20 ± 0.12 and 3.97 ± 0.14 g/dL in pyometra, endometritis and control animals, respectively. The difference between values was non-significant. The

record level of ALT was 7.67 ± 0.84 , 7.94 ± 0.48 and 6.38 ± 1.02 IU/L in pyometra, endometritis and control animals, respectively. The difference was statistically non-significant. Biochemical serum analysis revealed that there was non-significant difference in AST concentration in animals had pyometra, endometritis and control (74.32 ± 3.54 , 70.14 ± 7.18 and 73.08 ± 4.91 IU/L, respectively). The study verified that the total bilirubin value were 0.12 ± 0.01 , 0.10 ± 0.00 and 0.17 ± 0.03 mg/dL in pyometra, endometritis and control animals, respectively. BUN value was 16.19 ± 1.86 , 15.74 ± 1.73 and 13.80 ± 2.08 mg/dL in pyometra, endometritis and control animals, respectively. The serum analysis of calcium showed no significant difference in the studied groups. Although, the cholesterol level in animals suffered from endometritis and pyometra (45.36 ± 3.92 and 42.29 ± 4.67 mg/dL, respectively) was lower than that of the control group (52.17 ± 4.25 mg/dL), the statistical analysis proved no significant difference. The level of CK-NAC was higher in control animals (180.28 ± 33.64 IU/L) than those suffered from endometritis and pyometra (IU/L) 154.31 ± 27.52 and 127.72 ± 20.35 IU/L, respectively), however, the difference was not significant. No significant decrease in the glucose level of the affected animals (122.83 ± 12.38 and 143.83 ± 9.13 mg/dL for endometritis and pyometra, respectively) than normal (193.77 ± 17.02 mg/dL) was reported. Minor non significant fluctuation was recorded in inorganic phosphorus, magnesium and total protein in the 3 studied groups. Significant ($P < 0.05$) drop in the level of uric acid was confirmed in the affected animal.

Discussion

Similar to other domestic animals, uterine affection is a common and important clinical theme in camels. Several studies on haematological and biochemical profile of dromedary concerned different physiological (Eltohamy *et al*, 1986; Ayoub *et al*, 2003; Muhammad *et al*, 2011; Ghoneim *et al*, 2013b; Omid *et al*, 2014) and pathological (Ali *et al*, 2010b) reproductive status were reported. The majority of the uterine lesions of the dromedary are inflammatory in nature (Hanafi *et al*, 1999; Hegazy *et al*, 1998; Ali *et al*, 2010a). Inflammation is the specific or nonspecific immune response of higher organisms to tissue injury or to the invasion of that tissue by foreign organisms (Tizard, 1996). Although the level of Hb decreased in concurrence with chronic inflammation (Michael, 2011), results of the present study was not in agreement with this trend. The current study revealed that the cellular components of blood did

Table 1. A comparison between haematological values in the infertile female camels (Mean \pm SEM).

Blood parameters	Pyometra (n= 61)	Endometritis (n= 67)	Normal (n= 28)
PCV (%)	41.45 \pm 1.13	39.55 \pm 1.18	40.27 \pm 1.36
Hb (g/dL)	15.38 ^a \pm 0.36	15.13 ^{ab} \pm 0.53	14.48 ^b \pm 0.36
MCV (fL)	33.35 \pm 1.08	34.25 \pm 2.20	34.28 \pm 1.42
MCH (pg)	12.64 \pm 0.62	13.23 \pm 0.90	12.36 \pm 0.46
MCHC (g/dl)	38.09 \pm 1.57	39.26 \pm 2.32	36.89 \pm 1.39
TRBC ($\times 10^6$ /ul)	12.74 \pm 0.46	12.02 \pm 0.55	12.00 \pm 0.40
TWBC ($\times 10^3$ /ul)	19.18 \pm 0.96	22.02 \pm 1.28	20.35 \pm 1.04
Lymphocytes (%)	30.16 \pm 1.39	27.57 \pm 1.91	28.53 \pm 1.63
Monocytes (%)	9.08 \pm 0.65	11.89 \pm 2.45	9.74 \pm 0.69
Neutrophils (%)	60.76 \pm 1.42	60.54 \pm 3.18	61.72 \pm 1.77

Means in the same row not sharing common superscript letters differ significantly (P<0.05).

Table 2. A comparison between serum biochemical values in the infertile female camels (Mean \pm SEM).

Biochemical values	Pyometra (n= 61)	Endometritis (n= 67)	Normal (n= 28)
Albumin (g/dL)	4.11 \pm 0.16	4.20 \pm 0.12	3.97 \pm 0.14
ALT (IU/L)	7.67 \pm 0.84	7.94 \pm 0.48	6.38 \pm 1.02
AST (IU/L)	74.32 \pm 3.54	70.14 \pm 7.18	73.08 \pm 4.91
Total bilirubin (mg/dL)	0.12 \pm 0.01	0.10 \pm 0.00	0.17 \pm 0.03
BUN (mg/dL)	16.19 \pm 1.86	15.74 \pm 1.73	13.80 \pm 2.08
Calcium (mg/dL)	8.74 \pm 0.18	8.89 \pm 0.22	8.62 \pm 0.19
Cholesterol (mg/dL)	45.36 \pm 3.92	42.29 \pm 4.67	52.17 \pm 4.25
CK-NAC (IU/L)	154.31 \pm 27.52	127.72 \pm 20.35	180.28 \pm 33.64
Glucose (mg/dL)	122.83 \pm 12.38	143.83 \pm 9.13	193.77 \pm 17.02
Inorganic Phosphorus (mg/dL)	5.33 \pm 0.68	5.77 \pm 0.93	4.48 \pm 0.58
Magnesium (mg/dL)	2.15 \pm 0.39	2.12 \pm 0.27	2.00 \pm 0.39
Total Protein (g/dL)	15.02 \pm 0.28	14.53 \pm 0.44	14.60 \pm 0.38
Uric acid (mg/dL)	0.21 ^a \pm 0.03	0.18 ^a \pm 0.02	0.27 ^b \pm 0.03

Means in the same row not sharing common superscripts letters differ significantly (P<0.05).

not vary significantly in the studied animals. On the other hand, Ali *et al* (2010b) reported significantly high neutrophils in all of reproductive disorders in dromedary camels. Significant drop in the level of uric acid was confirmed in the affected animals. Uric acid is non-enzymatic chain-breaking antioxidant

(Halliwell and Gutteridge, 1995; Ghiselli *et al*, 2000). Chronic inflammation like endometritis and pyometra exerts its cellular side effects mainly through excessive production of free radicals and depletion of antioxidants (Hold and El-Omar, 2008). We can conclude that, endometritis and pyometra have a limited feedback on biochemical and haematological aspect of dromedary camel.

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