

## **HEMATOLOGICAL AND BIOCHEMICAL CHANGES IN CAMELS AFFECTED BY TRYPANOSOMIASIS IN SAUDI ARABIA**

M.A. AL-MUJALLI

Dept. of Clinical Studies, College of Veterinary Medicine,  
King Faisal University, P.O. Box 55055 Al-Ahasa 31982.

Received: 1. 3. 2007

Accepted: 17. 3. 2007.

### **SUMMARY**

This study aimed to investigate hematological and biochemical changes associated with trypanosoma infection in camels. Eighteen blood samples were collected from camels at Veterinary Teaching Hospital, King Faisal University. Stained smears were prepared from all blood samples and examined microscopically to demonstrate trypanosome parasite ten (55.6%) animals were found positive while 8 (44.4%) were found negative. further more, the samples were examined, to determine RBCs, PCV, HB, WBCs, total protein, albumin, urea, glucose, Ca and Mg. Significant in RBCs, PCV, HB, total protein, albumin, globulin glucose and Ca values was found in positive animals compared to free trypanosoma ones. It is concluded that trypanosomainfection in camels could lead to some hematological and biochemical changes.

---

### **INTRODUCTION**

It Saudi Arabia, there are about 820 thousand camels (Ministry of Agriculture, 2004), most of which are used to provide meat and milk for a growing number of human population. High mortality rate is an important constraint in Saudi Arabian camels (Camels dromedaries). In Saudi Arabia camels are raised under natural grazing and/or browsing in arid areas.. Trypanosomiasis cause remarkable losses in production in all tropical and subtropical areas. Trypanosomiasis ranked first in economic importance, followed by mange and helminthiasis in morbidity and mortality (El-bihari, 1986 and Higgins, 1986). It is well known that trypanosomiasis in camels is caused by trypanosome evansi and is transmitted from camel to camel by a number of species of haematophagous biting flies including tabanus, stomoxys and haematobia (Rutter , 1967 and Chaudhary and I

bal, 2000). The disease has been reported in many countries where the camel inhabits an enzootic character in the majority of them and causing high morbidity and mortality (Lukins, 1992 and Singh et al., 2004). Trypanosomiasis has been reviewed by Boid et al. (1986). Singh et al. (2004), Schuster (2006) and Sehrawat and Singh (2006), they reported that, trypanosomiasis in camels may occur in both acute and chronic forms. However Singh et al. (2004) mentioned that the impact of the disease comes from the chronic form. The acute form is blamed for the high fatalities, while the chronic form resulted in huge production losses, abortion, premature birth, infertility, anaemia, emaciation and recurrent fever (Abdalla et al., 2006). In recent years several studies have been carried out on the blood chemistry of the camel, much of these studies have taken place in India, Egypt and Sudan, and to a lesser extent in Israel (Al-busadah and Homeida, 2006). Little work has been done on blood alterations induced by natural trypanosomiasis in camel. Therefore the present study was designed to find out the effect of trypanosomiasis on blood profile of adult camels in Alhassa region in Saudi Arabia.

## MATERIAL AND METHODS

### Animals:

Eighteen nomad camels (4-8 years age) presented to the Veterinary Teaching Hospital, King Faisal University were examined in this study. The ani-

mals were presented with prominent clinical signs of diarrhea, emaciation, anemia and high temperature.

### Samples

Five ml blood samples were taken by jugular vein puncture Smears were prepared from the blood samples stained with Giemsa stain and examined microscopically for the presence of trypanosoma parasite. Also plasma was obtained from the blood samples by centrifugation at 5000rpm for 5 minutes. All blood samples were examined for RBCs, PCV, HB and WBCs using Automatic Cell Counter (UDIHEM-1, Italy) (Coles, 1986). At the same time, plasma was analyzed to determine total protein, albumin, urea, glucose, Ca and Mg using Biochemical Analyzer (UDILIPSE, Italy). Globulin was calculated by subtracting the albumin from total protein value.

### Statistical Analysis

The statistical significance of the different hematological and chemical values was determined using t- test .

## RESULTS

From the 18 blood smears examined , 10 (55.6%) were trypanosoma positive and 8 (44.4%) samples were negative. The hematological and biochemical values of all camels are shown in table (1). The mean values of RBCs, Hb and PCV were significantly lower in camels with trpanosom

when compared with the values of free trypanosome camels. In contrast, WBCs were significantly higher in camels with trypanosome than in free trypanosoma camels. Biochemical blood analysis showed that both total protein, albumin, globulin, glucose and calcium were, significantly

lower in camels with trypanosome than free trypanosoma camels. Urea values were significantly higher in camels with trypanosoma than free trypanosoma camels. Magnesium showed no significant differences in the two groups.

**Table (1): Means  $\pm$  Sem of hematological & biochemical values in camels with positive and negative blood film examination to trypanosoma.**

Group	Camels trypanosoma	Camels -ve Trypanosoma
RBCS( $\times 10^6/\mu\text{l}$ )	9.8 $\pm$ 8.16 <sup>a</sup>	15.13 $\pm$ 6.33 <sup>b</sup>
WBCS( $\times 10^3/\mu\text{l}$ )	20.58 $\pm$ 10.2 <sup>a</sup>	10.76 $\pm$ 1.93 <sup>b</sup>
Hemoglobin (Hb/g/dl)	9.4 $\pm$ 4.39 <sup>a</sup>	12.9 $\pm$ 2.299 <sup>b</sup>
Packed cell volume (PCV%)	22.48 $\pm$ 3.57 <sup>a</sup>	34.267 $\pm$ 3.16 <sup>b</sup>
Total Protein (g/dl)	5.822 $\pm$ 7.23 <sup>a</sup>	7.946 $\pm$ 9.30 <sup>b</sup>
Albumin (g/dl)	2.8 $\pm$ 4.26 <sup>a</sup>	3.34 $\pm$ 4.56 <sup>b</sup>
Globulin (g/dl)	3.028 $\pm$ 2.44 <sup>a</sup>	4.05 $\pm$ 5.67 <sup>b</sup>
Calcium (Ca, mmol/L)	2.20 $\pm$ 1.25 <sup>a</sup>	3.24 $\pm$ 1.32 <sup>b</sup>
Magnesium (Mg, mmol/l)	1.48 $\pm$ 0.98 <sup>a</sup>	1.5 $\pm$ 0.85 <sup>a</sup>
Glucose (mmol/L)	4.2 $\pm$ 1.49 <sup>a</sup>	6.4 $\pm$ 2.95 <sup>b</sup>
Urea (mmol/L)	8.83 $\pm$ 2.42 <sup>a</sup>	5.52 $\pm$ 3.68 <sup>b</sup>

Mean ( $\pm$  Sem) having a different superscript within the row significantly different at ( $P > 0.05$ ).

## DISCUSSION

Trypanosomiasis is one of the important diseases affecting camel population in Saudi Arabia (Abdalla, 2006). No much data is available about the disease in the Kingdom. This study was carried out to investigate some hematological and biochemical changes associated with the disease in camels presented to the Veterinary Teaching Hospital, King Faisal University,

Saudi Arabia. The diagnosis of the disease in this study was based on microscopic examination using stained smears. This technique is quick and allows examination of a large number of animals in short time. Different techniques had been used for the diagnosis of trypanosomiasis. These include wet blood film, mercuric chloride and some serological tests (Di et al., 1997) which proved to have some limitations (Chaudhary and Iqbal, 2000 and Singj et al., 2004)

Affected camels in this study showed anemia and leukocytosis. Anemia eventually is due to RBCs destruction by the parasite and its toxins. This finding is in agreement with Carlos et al. (2006) and Dessouky (2006).

Clinical biochemistry in camels with trypanosome in the present study showed significant decrease in total protein, albumin, globulin, glucose and calcium. The concentrations of total protein depend largely on variations in albumin and globulin values. Hypergammaglobulinemia is common in camels suffer trypanosoma infection (Yagil, 1982). It has been reported that albumin is slightly decreased and globulin is slightly increased in acute stage of the disease (Carlos et al., 2006, Dessouky, 2006 and Abdallah et al., 2006). In addition, Dessouky 2006 mentioned that significant changes in serum protein during trypanosomiasis might be due to one or more of the following factors: the destructive effect of the parasite on the hepatocytes leading to inadequate albumin-globulin production, vascular escape of serum proteins or an immune reaction. It has been reported that hypoglycemia is also a common change that occur during trypanosoma infection which is mainly attributed to consumption of blood sugar by the parasite and depletion of body glycogen (Carlos et al., 2006, Dessouky, 2006 and Abdallah et al., 2006). The decrease of calcium found in this study is attributed to decreased of total serum protein as there is a component of this constituent in serum bound to proteins (Chaudhary and Iqbal, 2000 and Singh et al.,

2004). The increase of urea values which were observed in this study may be explained by the destruction of body proteins due to infestation of the parasite, poor bodily condition and the observed high body temperature.

## REFERENCES

- Abdalla, H.S., (2006): Camel studies and researches during the parting 25 years in Saudi Arabia. International scientific conference on camels, Part 3 Qassim Univ., PP, 1568-1575.
- Abdallah, H., Saad, A.M., Bakheit, M. and Elamin E. (2006): The interaction of Trypanosoma evansi and Haemonchus longestipes infections in camel., International Scientific Conference on camels. Part 3 Qassim Univ., PP, 577-589.
- Al-Busadah, K.A. and Homeida, A.M. (2006): Some biochemical and hematological indices in different breeds of camels in Saudi Arabia Scientific Journal, Volume, 7 \* King Faisal Univ.
- Blowey, R.W. (1972): Metabolic profiles: Some aspects of their interpretation and use in the field. In the Veterinary Annual, ed. Gransell, C.S. and Hill, F.W.G., John Wright & Sons, Bristol, 13, PP, 21-29.
- Boid., T.W. Jones and Luckins, A.G., (1986): Protozoal disease of camels. In the camel in health and disease. Higgins, A., Ed.: 41-59. Bailliere Tindall, London.
- Carlos, G. Juan. A.C. Maria. C.J. Doreste, F. and Morale I. (2006): Clinical hematological and biochemical findings in an outbreak of abortion and neonatal mortality associated with Trypanosoma evansi infection in domestic camels. Ann. N.Y. Acad.Sci. PP, 325-327.

- Chaudhary, Z.I. and Iqbal, J. (2000): Incidence, biochemical and haematological alterations induced by natural trypanosomosis in racing dromedary camels. *Acta Tropica* 77. PP, 209-213.
- Coles, E.H. (1986): *Veterinary Clinical Pathology*. W.B. Saunders Company, Fourth Ed.
- Dessouky, M.I. (2006): Haematologic and biochemical serum constituents of camels in health and disease. International Scientific conference on camels Part 3. Qassim University. PP, 1269-1276.
- Dia ML., Dieppe, Thiam, A.Aminetou, M. and Jacquet, P. (1997): Importance of camel trypanosomosis and its vectors in Mauritania. *Journal of Camel Practice and Research* 4: 271-276.
- El-Bihari, S. (1986): *The camel in health and disease*. Bailliere Tindall, London.
- Higgins, A. (1986): *The camel in health and disease*. Bailliere Tindall, London.
- Kabir, F. Vazir, B. (2006): Normal values in camel. International scientific conference on camels Part 3 Qassim University. PP, 1258-1268.
- Lukins AG, (1992): Protozoal diseases of camels in Allen, W.R. Higgins, A.J., Mayhew, I.G., Snow, D.H. and Wade, J.F. (eds): *proceedings of the 1st International camel conference*. R. and W. publication New Market. Ltd., Suffolk, U.K. PP. 23-27.
- Radostits, O.M., Gay, C.C. Blood D.C. and Hincheiff, K.W. (2006): *Veterinary Medicine* 9th Ed., Bailliere Tindall, London.
- Schuster, R.K. (2006): Parasites in camels in the UAE: An overview and own xperience. International scientific conference of camels Part 3 Qassim Univ., PP, 554-559.
- Sehrawat, S., and Singh, A. (2006): Sero-Surveillance of trypanosomosis in camel population of north-western regions of India by a sensitive indirect ELISA. International; scientific conference on camels Part 3 Qassim Univ., PP, 561-569.
- Singh, N. Pathak, K.M.L., Kumar, R. and Chhabra., M.B. (2004): Epidemiology and diagnosis of suua (trypanosome evansi) in camels. A review. *Journal of Camel Practice and Research*. 39-50.
- Rutter, T.E.G., (1967): Trypanosomiasis in camel. *Vet. Bull*, 37,611.
- Wernery, U. Fowler, M.E. and Wernery, R. (1999): *Color atlas of camelid hematology* . Blackwell Wissenschaft.
- Yagil, R. (1982): *FAO animal production and health paper No.26 Camels and camel milk*. Food and Agriculture Organisation of the United Nations, Rome, PP, 41.