Vol 12 No 2, p 141-143

COMPARATIVE STUDY ON SOME BIOCHEMICAL CONSTITUENTS OF PLASMA IN MALE CAMELS AND GOATS

Badryyah, R. Al-Suwaigh, Ebtesam and A. Al-Suhaimi
Department of Zoology, Physiology, Girls Faculty of Science,
Dammam, Kingdom of Saudi Arabia

ABSTRACT

Blood samples were collected from 36 and 14 male camels and goats, respectively aged 2 years. The concentration of glucose, total cholesterol (CH), triglyceride (TG), high density lipoprotein (HDL), low density lipoprotein (LDL), very low density lipoprotein (VLDL), total protein, aspartate transaminase (AST) and alanine transaminase (ALT) were measured. The results revealed that plasma glucose level in camels was significantly higher than that of goats ($P < 0.001$), no significant difference was observed in lipoprotein concentrations of the two species. Also, both species showed lower concentration when compared with other species. Total protein showed no significant difference between both species. The activities of AST and ALT, in camel plasma was significantly lower than those in goats at $p < 0.001$. A significant positive correlation was found between glucose and cholesterol and significant negative correlation between enzymes and both of glucose and cholesterol.

Key-words: Biochemical constituents, camel, goat, plasma

The determination of the concentration of various blood constituents may be of great help in diagnosis of many diseases (Haroun, 1994). The normal value of blood constituents in camels are affected by age, sex, breed, season, nutritional status and other factors (El Dirdiri *et al*, 1987 and Abdulla *et al*, 1988).

Studies on cholesterol, triglycerides and lipoproteins in domestic animals showed that species variations exist, and that significant differences occur. The normal concentrations of serum lipids and lipoproteins of the cat, dog, cow, horse, goats and reindeer calf have been reported (Barrie *et al*, 1993; Duncan *et al*, 1994; Hugi and Blum, 1997; Gueorguieva and Gueorguiev, 1997). There is little information about the serum lipids in dromedary camels, however, serum cholesterol and triglycerides in normal camels have been studied by Al Ani *et al* (1992).

Values for total proteins, and the activities of AST and ALT were reported by Haroun (1994), Nazifi *et al* (1998), Mohammed and Hussein (1999) and Mohammed (2001) in camels.

Camels are not classified as ruminant although, we consider it as ruminating animals (Schwartz, 1992). Therefore, a comparison of blood values of camels with those of true ruminants (goats) seems to be important. The present study was therefore, conducted to measure the concentration of plasma glucose, cholesterol, triglycerides(TG), high density lipoproteins (HDL),low density lipoprotien (LDL), very low density lipoproteins (VLDL), total proteins, and the activities of AST and ALT in normal healthy male camels and goats.

Materials and Methods

In this study 36 healthy male camels and 14 male goats aged 2 years were used. Blood samples were taken from jugular vein in heparinised tubes and plasma was separated by centrifugation at 3000 rpm for 15 min, and stored at - 18°C till analysed. Glucose and total proteins were determined enzymatically according to method of Siest *et al* (1981) using Behcman Du. 65 spectrophotometer at a wave length 505 nm. Cholesterol, HDL and triglycerides were analysed using both Reflotron® manual system (Carsteinsen *et al*, 1985 and Thomas, 2000). LDL was calculated as the difference between the cholesterol concentration and HDL, while VLDL was calculated as one fifth of the triglycerides concentration (Friede- wald *et al,* 1972).

Data were analysed by student 't' test (Snedecor and Cochran, 1980). All values were expressed as mean ± standard error.

SEND REPRINT REQUEST TO BADRYYAH

Results

The concentration of plasma glucose was significantly higher ($p<0.001$) in camel (132.20 ± 4.45) mg /dl than in goats (36.74 ± 4.48) mg/dl as shown in table 1. Plasma level of cholesterol in camels (<100 ± 0.00 mg/dl) was higher to goats (30.76 ± 3.67 mg/dl). No significant differences were found in HDL, LDL, TG and VLDL between camel and goat. The AST and ALT values differed significantly ($p< 0.001$) between camels and goats.

A positive significant correlation was observed between glucose and cholesterol and a negative significant correlation between glucose and both enzymes and cholesterol and both enzymes in these species.

Discussion

The present study revealed that plasma glucose concentration in goat was very low (36.74 ± 4.48 mg/dl), as it is absorbed in small amount by the intestine. These results are in agreement with those of Ashmawy (2000). The significantly higher plasma glucose in camels than that in goats was in agreement with findings of Zaid and Mubark (1996) and Nazifi *et al* (1998) who reported glucose level between 47-140 mg/dl in adult camels. The increase in plasma glucose level could be attributed to elevated glucagon concentration in camel (Abdel-Fattah *et al*, 1999) or to poor insulin response and/or reduced tissue sensitivity to insulin (El Mahdi *et al*, 1997) in comparison with other ruminants and man.

The concentration of cholesterol, in both goats and camels were less than 100 ± 0.00 mg/dl. Also, HDL and LDL were very low and relatively close to each other. It was in agreement with Nazifi *et al* (2000) who showed that the lipoproteins values were lower at 3 years old or younger than other ages.

In this study plasma values of VLDL changed in parallel with TG, although there is no more previous information about VLDL of camels, and this is in agreement with the parallel changes in rats observed by Smith and Welch (1976). These researchers found that VLDL was chiefly responsible for the transport of TG in the blood. Ovine and caprine serum did not show such changes.

This study showed insignificant lower total protein levels in camels than goats. Similar results were reported by Gareeb (1986) who found that total protein in ruminants was about 7.27 gm/dl.

Haroun (1994), Nazifi *et al* (1998) and Damanhouri and Tayeb (1994) found that protein concentration in camels was lower when compared to sheep, goats, rats and guinea pigs which explains the ability of camels to restore plasma volume especially in the excessive thirsty situations where plasma decreases about 5%. Total protein in camels was found to be more particularly, albumin percentage which increases the colloidal osmotic pressure which plays an important role in saving water. In the present study, camels of less than 2 years age were used therefore the values of total protein were characteristically lower than adults which is in consonence to the findings of Chaudhary *et al* (2003).

The mean value of ALT activity in young male camels was very low when compared with the values reported by Nazifi *et al* (1998) and EL Dirdiri *et al* (1987) which were 33.65-16.11 and 20.7 IU/l, respectively for adult camels, and also was lower than the mean value (9.4 IU/l) as reported by Haroun (1994) for young male Najdi camels.

Our results showed significantly lower activities for both plasma ALT and AST in camel when compared with those in goats. The lower levels of enzymes in plasma of any animal reflects the health status of the organ that secretes these enzymes, while elevation of their levels points to tissue damage (Murry *et al*, 1999).

The results were in agreement with those of Ali and El Sheikh (1992) who reported that camels had significantly lower enzyme activities when compared with sheep and goats born and reared in the same tropical area.

Table 1. Plasma biochemical constituents in male goats and camels (values given as mean ± SE).

S. No.	Species	Glucose (mg/dl)	Total Protein (g/dl)	AST (IU/l)	ALT (IU/l)	Cholesterol (mg/dl)	HDL (mg/dl)	LDL (mg/dl)	TG (mg/dl)	LDL (mg/dl)
1.	Goat	36.74 ± 4.48 (14)	8.29 ± 0.70 (14)	53.00 ± 3.96 (14)	52.00 ± 2.24 (14)	30.76 ± 3.67 (13)	17.12 ± 1.11 (14)	19.00 ± 3.60 (14)	70.00 ± 0.00 (14)	14.00± 0.00 (14)
2.	Camel	132.20± 4.45* (31)	6.92± 0.12 (20)	20.96± 2.31* (22)	4.03 ± 0.30* (14)	<100.0± 0.00 (17)	18.96± 1.80 (20)	<30.0± 0.00 (20)	70.00 ± 0.00 (20)	14.00± 0.00 (20)

N - animal numbers (given in parentheses)

* highly significant difference between the values of the two species in the same row

There were high and significant correlations between glucose, cholesterol and AST, ALT which reflects some of liver functions. Although, Kerr (1989) did not find AST and ALT values as specific for liver disease especially in large animals and ascribed SDH, GLDH as specific liver enzyme for large animals.

Acknowledgements

Thanks are due to Dr. Khalifa AL-Saad the Manager of Dammam slaughter house for his help.

References

Abdulla OM, Wasfi IA and Gadir FA (1988). the Arabian race camel normal parameters – Haemogram, enzymes and minerals. Comparative Biochemistry and Physiology 90A:237-239.

Abdel-Fattah M, Amer H, Ghoneim MA, Warda M and Megahed Y (1999). Response of one-humped camel (*Camelus dromedarius*) to intravenous glucagon injection and to infusion of glucose and volatile fatty acids, and the kinetics of glucagon disappearance from the blood. Zentralbl Veterinarmed 46(8):473-81.

Al-Ani FK, Al-Azzawi WA RA, Jenmukly MS and Razzaq KK, (1992). Studies on some haematological parameters of camel and Llama in Iraq. Bulletin of Animal Health and Production in Africa 40:103-106.

Ali BH and El-Sheikh H H (1992). Drug Metablism in Camels. Proceedings of First International Camel Symposium, February 2-6, Dubai (UAE). p 110.

Ashmawy NA (2000). Effect of exposure to environmental heat stress on physiological response and some blood constituents of ossimi ewes and Egyptian buffalo heifers. Annals of Agric. Sc. Moshtohor 38(2):727-736.

Barrie J, Watson TDG, Stear MJ and Nash AS (1993). Plasma cholesterol and lipoprotein concentration in the dog : the effects of age, breed, gender and endocrine disease. Journal of Small Animal Practice 34:507-512.

Carsteinsen CA, Murawski R and Koller PU (1985). J Clin Chem Clin Biochem 30:608.

Chaudhary ZI, Iqbal J and Rashi J (2003). Serum protein electrophoretic pattern in young and adult camels. Australian Veterinary Journal 81(10):625-6.

Damanhouri ZA and Tayeb OS (1994). Comparison of cytochrome p-450 content and conjugative enzymes in livers of *Camelus dromedarius*, guinea- pigs (*Cavia porcellus*) and rats (*Rattshorvegicus*). Comparative Biochemistry and Physiology B-Biochemistry & Molecular Biology 108(3):349-55.

Duncan JR, Prasse KW and Mahaffey EA (1994). Veterinary Laboratory Medicine Clinical Pathology, 3rd edn. (Iowa State University Press, Ames, IA) 118-122.

El Dirdiri NI, Suliman HB and Shommein AM (1987). Normal serum activities of some diagnostic enzymes in dromedary camel in Sudan. Ruminant. The University of New England Pub. Unit, Armidale

El Mahdi B, Sallmann HP, Fuhrmann H, Von Engelhardt W and Kaske M (1997). Comparative aspects of glucose tolerance in camels, sheep and ponies. Comparative Biochemistry & Physiology A 118(1):147-51.

Friedewald WT, Levy RJ and Fredrickson DS (1972). Estimation of the concentration of low density lipoprotein cholesterol without the use of the preparative ultracentrifuge. Clinical Chemistry 18:499.

Gareeb HF (1986). Digestion Physiology and Nutrition. Ruminants (2nd ed).

Gueorguieva TM and Gueorguiev IP (1997). Serum cholesterol concentration around parturition and in early lactation in dairy cows. Revue de Médicine Vétérinary 148 : 241-244.

Haroun EM (1994). Normal Concentrations of some blood constituents in young Najdi camels (*Camelus dromedarius*). Comparative Biochemistry & Physiology 108 A (4):619-622.

Hugi D and Blum JW (1997). Change of blood metabolites and hormones in breeding calves associated with weaning, Journal of Veterinary Medicine series A, 44:99-108.

Kerr MG (1989). Veterinary Laboratory Medicine Clinical Biochemistry and Haematology Oxford, Blackwell Scientific Publications.

Mohammed TM (2001). Purification and characterisation of aspartate aminotransferase from developing embryos of the camel tick *Hyalomma dromedarii*. Experimental & Applied Acarology 25(3):231-44.

Mohammed HA and Hussein AN (1999). Studies on normal haematological and serum biochemical values of the Hijin racing camels (*Camelus dromedarius*) in Kuwait. Veterinary Research Communications 23(4)241-8.

Murry RR, Granner DK, Mayes PA and Rodwell VW (1999). Harpers Biochemistry (22 ed) Appleton and Lang.

Nazifi S, Rezakhani A and Gheisari R (1998). Physical, Biochemcial and cytologic properties of blood and synovial fluid in clnically normal adult camel (*Camelus dromedarius*). Journal of Veterinary Medicine A 45:155-106.

Nazifi S, Gheisari HR, Abbasali Poorkabir and Saadatfar S (2000). Serum lipids and lipoproteins in clinically Healthy male camels (*Camelus dromedarius*). Veterinary Research Communications 24:527-531.

Schwartz HJ (1992). The biology of the camel. In the One-Humped Camel in Eastern Africa (Edited by Schwartz H.J. and Dioli M.). pp 10-29.

Siest G, Hennry J and Schiele F (1981). Inter Predation desexamens de laboratoire. Karger ed. 206-223.

Snedecor GM and Cochran WG (1980). Statistical Methods (7th edition). JBH Publishing Com., Oxford.

Smith RW and Welch VA (1976). Effect of pregnancy and lactation on triglycerides of very-low-density lipoproteins of rat plasma. Journal of Dairy Science 59(5):876-9.

Thomas (Hrsg) Labor and Diagnose S (2000). Auflage, Frankfurt Th-Books Verlags – gesellschaft mbH,

Zaid AA and Mubark AK (1996). Physiology. EL-Muktar University, EL-Baida.