Indian Vet. J., August 2011; 88 (8) : 72 - 73

Mineral Status of Blood and Semen of Dromedary Camels

Gorakh Mal[1], Sumant Vyas, Nirmala Saini, D. Suchitra Sena, Nand Kishore and N.V. Patil

National Research Centre on Camel (ICAR), PB No. 07, Bikaner 334 001. Rajasthan

(Received : 14-08-2010; Accepted : 25-10-2010)

Dromedary camel semen has thick viscid consistency immediately after collection (Bravo *et al.,* 2000 and Agarwal *et al.,* 2004). Seminal plasma proteins partly originate from the blood by exudation through the lumen of the male genital tract and are involved in the regulation of osmotic pressure and pH of the seminal plasma, transport of ions, lipids and hormones (Kulkarni, 2003). Till now, biochemical studies on camel semen are limited. The present study was intended to know the comparative status of minerals in the blood serum and seminal plasma of Jaisalmeri camels and their role in liquefaction of semen.

Materials and Methods

The study was conducted on 8 adult male Jaisalmeri camels belonging to the National Research Centre on Camel, Bikaner. Blood and semen samples were collected simultaneously thrice at weekly intervals from each camel during rutting season (December to March). Semen was collected using artificial vagina as per Vyas *et al.,* (1998). The blood samples collected were kept at room temperature and afterwards centrifuged at 2500 rpm for 10 min. for serum separation. Semen samples were centrifuged at 6000 rpm for 30 min. and stored at -20°C till further analysis. Ca and P levels were estimated by using kits (SPINREACT, Ark Diagnostics Pvt. Ltd. Mumbai). Na and K were analyzed by flame photometer (Systronic Mediflame, 127). Equal amounts of blood serum/seminal plasma and conc. nitric acid were mixed in digestion tubes and kept overnight at room temperature. The samples were digested at 30°C until the volume reduced to 0.5 ml. After cooling the samples, 5 ml tri-acid mixture (70% perchloric, sulphuric and nitric acids, 4:1:9) was added and again digested till volume reduced to 1/4th of the total volume. The digested colourless samples were diluted (1:20 dilution) with triple glass distilled water and were used for the estimation of Mg, Cu, Zn, Fe and Mn by Atomic Absorption Spectro photometer (4141 ECIL, Hyderabad, India). The means were tested for significance by using t-test (Snedecor and Cochran, 1994). Time course study was carried out to identify the minerals, if any involved in the process of coagulation and liquefaction. Fresh seminal plasma samples (Oh) and aliquots were taken at different time intervals (6h, 12h, 18h, 24h, 30h, 42h, 48h, 96h, 124h and 136h) and digested as per schedule described above. Time course study was carried out in 8 semen ejaculates having thick consistency.

Results and Discussion

The concentration of Ca, P and Mg were 2.40±0.19, 1.53±0.10, 2.80±0.19 and 4.56±0.07, 1.58±0.08 and 2.49±0.11 mmol/l in blood serum and seminal plasma respectively. Ca levels in blood and seminal plasma differed significantly ($P< 0.01$). The concentration of Ca was 1.9 folds higher in seminal plasma as compared to blood serum. Mal *et al.,* (2001) reported the concentration of Ca, P and Mg to be 2.43±0.28, 1.79±0.17 and 1.17±0.12 mmol/l respectively in the serum of dromedary camels. Again, Singh *et al.,* (2001) reported the values of Ca, P and Mg ranging between 2.25-3.50, 0.90-1.19 and 0.82-1.23 mmol/l, respectively in the seminal plasma of Bikaneri breed of camels. The levels of Na and K were recorded as 153.40±2.78, 8.35±0.18 and

[1]Corresponding author : E-mail : gorakh14@yahoo.com

155.70±1.12, 9.82±0.79 mmol/l in blood serum and seminal plasma respectively. Mal *et al.,* (2002) estimated the levels for Na and K in the serum of dromedary camels to be 129.29±2.59 and 5.48±0.22 mmol/l respectively. Similarly, Agarwal *et al.,* (*loc. cit*) reported Na and K content as 153-168 and 15-20 mmol/l, respectively in the seminal plasma of Bikaneri camels and the values for the same were recorded to be ranging between 315.68-455.40 and 34.12-78.92 mmol/l by Singh *et al.,* (*loc. cit*). The concentration of micro-minerals viz. Cu, Zn, Fe and Mn were 1.48±0.11, 1.59±0.14, 2.81±0.25, 1.84±0.23 and 1.47±0.14, 9.72±0.92, 56.62±3.51, 1.78±0.19 ppm in blood serum and seminal plasma respectively. The differences in the levels of Cu and Zn in blood serum and seminal plasma were found to be significant ($P < 0.01$). Zn and Fe levels in the seminal plasma were found to be 6.11 and 20.14 folds higher than those of blood serum. Mal *et al.,* (*loc. cit*) reported the values for Cu, Zn, Fe and Mn to be 1.23±0.05, 1.14±0.10, 1.18±0.04 and 0.18±0.02 ppm, respectively in the serum of dromedary camels. No information is available on the trace minerals levels in camel seminal plasma to compare with the present findings. However, Dhami *et al.,* (2001) reported the values for Cu, Zn, Fe and Mn to be 0.61±0.08, 16.88±2.53, 5.35±0.49 and 0.23±0.04 ppm, respectively in the seminal plasma of breeding buffalo bulls.

The present findings will provide baseline data for future studies. As electrolytes decide the constituents of the dilutor, the data will be useful during camel semen dilution and preservation for A.I. to enhance reproductive efficiency of camel.

Results of this study showed that the concentrations of Ca, Zn and Fe were higher in seminal plasma as compared to blood serum. Almost same levels of P, Mg, Na, K, Cu and Mn were found in blood serum and seminal plasma samples. Higher levels of Ca, Zn and Fe might play an important role in the process of coagulation and liquefaction of camel semen. The levels of Ca remained almost stable up to 18h of storage and then it started to decline up to 48h. Further reduction was observed and the reduced levels were maintained up to 136h. The levels of Fe remained stable up to 48h and then gradually reduced up to 136h. The level of Zn remained stable during the period of study without any trend. This study indicated that Ca and Fe might be playing role in coagulation/liquefaction of camel semen. Interactions between proteins and minerals might be responsible for coagulum formation in camel semen. However, it needs further study.

Summary

This study was carried out on blood serum and seminal plasma samples collected from Jaisalmeri camels to determine the concentrations of minerals in the seminal plasma and their probable role in liquefaction of semen. The concentrations of Ca, Zn and Fe were 1.9, 6.11 and 20.14 times higher in seminal plasma as compared to blood serum. This study indicated that Ca and Fe might play an important role in coagulation/liquefaction of camel semen. Ca starts to act after 18h and Fe after 48h of storage. Interactions between proteins and minerals might be responsible for coagulum formation in camel semen.

References

Agarwal, V. K., Ram, L., Rai, A. K., Khanna, N. D. and Agarwal, S. P. (2004). *J. Camel Science* **1** : 25.

Bravo, P.W., Skidmore, J.A. and Zhao, X.X. (2000). *Animal Reproduction Science* **62** : 173.

Dhami, A. J., Shelke, V. B., Patel, K. P., Paradva, J. P. and Kavani, F. S. (2001). *Indian J. Animal Science* **71** : 761.

Kulkarni, B. A. (2003). *Indian J. Animal Reproduction* **24** : 1.

Mal, G., Sena, D.S., Kumar, R. and Sahani, M.S. (2001). *Indian J: Animal Science* **71** :1162.

Mat, G., Kumar, R., Sena, D.S. and Sahani, M.S. (2002). *Indian Vet. J.* **79** : 1026.

Singh, J., Purohit, G. N. and Pareek, P. K. (2001). *Indian J. Animal Science* **71** : 782.

Snedecor, G.W. and Cochran, W.R. (1994). Statistical Methods, 8th edn. Iowa State Univ. Press, Ames, Iowa.

Vyas, S., Goswami, P., Rai, A. K. and Khanna, N. D. (1998). *Indian Vet. J.* **75** : 810.