

Effect of some physical factors on serum levels of calcium, phosphorus and magnesium in camels in Upper Egypt

Abd-El-Salam, M. N., Mottelib, A.A., Ismail, M. N. and Mohammed, A. A.

Fac.Vet. Med., Assiut Univ., Assiut, Egypt

Abstract

Eight hundred and eighteen camels of both sex, having age of 2 – 14 years old are examined in Upper Egypt under different climate conditions, effect of stress of long trip and stress of heavy work. Blood serum calcium, phosphorus and magnesium were analyzed using spectrophotometer. The results of serum levels of calcium in Draw (group III) showed no significant changes between spring, summer and autumn, although there was a higher level in winter. This could be explained by presence of green fodder and temperate season. However this was lower than that obtained in camels inhabited in Sohage (group I), where there is a high care for the camels as they used as working animals, while only wheat straw is given for camels in Draw. In addition the reduced serum calcium level in camels in Abu-Simble (group II) could be explained by the effect of stress of long walking trip under hard conditions. The serum levels of phosphorus and magnesium followed the same pattern of calcium, meanwhile in winter they were slightly higher than in other seasons. The slightly lowered levels in groups II and III could be returned to dietary changes and reduced activity. The reduced values of serum magnesium level appeared to be associated with the reduction in calcium serum level. Although the changes in serum levels of calcium, phosphorus and magnesium between groups were most commonly significant, they are still in physiological ranges. Therefore it can say that the effect of the physical factors included seasons; heavy work and stress of long walking trip have no significant effect on serum levels of calcium, phosphorus and magnesium. It can be concluded that camels having a high adapting body system that enable them to overcome most physical stress factors exposed to it during its life under hard conditions.

Key words: Camels, Calcium, Phosphorus, Magnesium.

1. Introduction

Camels represent an important sector in the live stock in Egypt, specially in Upper Egypt and the desert parts of north Egypt. They are mainly used either as drought animals or as a source of meat, milk, hair and hide.

Calcium is an essential structural component of skeleton; in addition it has an important role in the maintaining of haemostasis in vertebrate, blood coagulation, enzyme activity, muscle contraction, neural excitability, hormone secretion and cell adhesion (Kaneko et al. 1997). Phosphorous is essential for the laying of adequately mineralized bones and teeth and a deficiency will lead to their abnormal development (Radostits, 1994). Inorganic phosphate, which may be ingested as such or liberated from esters during digestion or intermediary metabolism, is utilized in the formation

of proteins and tissue enzymes and is withdrawn from the plasma inorganic phosphate for this purpose (Radostits, 1994). Magnesium is an indispensable element for all living cells, its deficiency is marked with decalcification of the skeleton (Ayoub and Awad, 1959).

2. Materials and Methods

Eight hundred and eighteen camels of both sex, having age of 2 – 14 years old are examined in Upper Egypt under different climate conditions, effect of stress of long trip and stress of heavy work. The camels (n = 41) at Sohage Governorate (group I) are working daily for 10- 14 hours mainly for carrying sugar cane (10-12 tons/day) from the fields to the fabric. The camels (n = 150) at Abu Simble (Aswan Governorate) (group II) are coming from west Sudan (Kordofan and Darfor) in a long walking

trip (more than 600 kilometer). Camels (n = 627) at Draw (Aswan Governorate) (group III) are staying there for three days under hard condition especially in

summer season. Animal distribution, location and studied factors are summarized in table 1.

Table.1. Animal distribution, location and studied factors

Groups	Numbers	Location	Studied Factor
I	41	Sohage	Heavy work
II	150	Abu-Simble	Long walking trip
III	627	Draw	Climate
Total	818		

Clear non-haemolysed blood serum samples were obtained in dry clean Eppendorf capped tubes and stored in a deep freeze at -20 °C from all animals under investigation. Chemical serum analysis of calcium, phosphorous and magnesium was undertaken by spectrophotometer (CECIL-CE292), digital ultraviolet spectrophotometer using chemical kits. Calcium-free tubes were used for estimation of serum calcium. Serum calcium was estimated in calcium-free tubes by using chemical kits provided by EII-TECH diagnostics Co. Cat. No. CALO-O600, Serum magnesium Cat. No. MADN-0600, France. and serum phosphorus by using chemical kits provided by TECO diagnostics Co. Cat. No. 4925E, USA.

3. Results and Discussion

The results of serum levels of calcium in Draw (group III) showed no significant changes between spring, summer and autumn, although there was a higher level in winter (table 2). This could be explained by presence of green fodder and temperate season. A higher serum calcium level in camels in winter season than other seasons was observed (Holler and Hassan, 1966) and (Nagpal et al.,

1996). However this was lower than that obtained in camels inhabited in Sohage (group I), where there is a high care for the camels as they used as working animals, while only wheat straw is given for camels in Draw (table 3). In addition the reduced serum calcium level in camels in Abu-Simble (group II) (table 4) could be explained by the effect of stress of long walking trip under hard conditions. The serum levels of phosphorus and magnesium followed the same pattern of calcium, meanwhile in winter they were slightly higher than in other seasons. The slightly lowered levels in groups II and III could be returned to dietary changes and reduced activity. The reduced values of serum magnesium level appeared to be associated with the reduction in calcium serum level. Magnesium is being a metallic activator for many enzyme system and stress reduce the dynamic of enzyme activity in the tissues (Frank et al.,1998). Although the changes in serum levels of calcium, phosphorus and magnesium between groups were most commonly significant, they are still in physiological ranges. Therefore it can say that the effect of the physical factors included seasons; heavy work and stress of long walking trip have

no significant effect on serum levels of calcium, phosphorus and magnesium .A similar view was reported (Abdalla et al., 1988). Camel is a drought hardy animal with unique physiological system, which allow it to thrive under hard conditions

and to fill an important niche in desert E co-system (Higgings, 1986). Camels are able to maintain their appetite until 15 % of body weight loss (Guerouali et al., 1993).

Table 2: Effect of climate on serum level values (Mean \pm SE) of calcium, phosphorous, and magnesium in camels. * = P < 0.05 ** = P < 0.01 NS = Non-significant

Group	Macro-element	Winter	Spring	Summer	Autumn
I (Sohage) (n=41)	Ca	12.0 \pm 0.19 (11-14.31)	12.0 \pm 0.18 (11-14.25)	11.0 \pm 0.18 (10.2-13.5)	11.0 \pm 0.17 (10.4-13.4)
	P	5.8 \pm 0.08 (5.3-6.77)	5.7 \pm 0.09 (5.2-6.7)	5.7 \pm 0.42 (4.99-6.23)	5.7 \pm 0.07 (5.02-6.32)
	Mg	4.1 \pm 0.06 (3.7-4.75)	4.0 \pm 0.44 (3.6-4.85)	4.0 \pm 0.07 (3.35-4.58)	4.0 \pm 0.06 (3.41-4.57)
III (Daraw) (n=627)	Ca	10.4 \pm 0.04** (8.89-12.16)	9.24 \pm 0.03** (7.84-11.0)	9.17 \pm 0.03** (8.24-11.05)	9.15 \pm 0.03** (7.97-10.84)
	P	5.71 \pm 0.02NS (4.82-6.65)	5.43 \pm 0.02NS (4.53-6.66)	5.31 \pm 0.02NS (4.57-6.41)	5.29 \pm 0.02NS (4.59-6.30)
	Mg	3.43 \pm 0.01** (2.8-4.0)	3.31 \pm 0.01** (2.8-4.04)	3.25 \pm 0.01** (2.82-3.91)	3.23 \pm 0.01** (2.8-3.85)

Table 3: Effect of heavy work on the serum level values (Mean \pm SE) of calcium, phosphorous and magnesium in camels. P < 0.05 ** = P < 0.01 NS = Non-significant

Groups	Ca	P	Mg
I Sohage (n = 41)	12 \pm 0.19 (11-14.31)	5.8 \pm 0.08 (5.3-6.77)	4.1 \pm 0.06 (3.7-4.75)
III Daraw (n = 627)	10.4 \pm 0.04** (8.89-12.16)	5.71 \pm 0.02NS (4.82-6.65)	3.43 \pm 0.01** (2.8-4.0)

Table 4: Effect of long walking trip on the serum level values (Mean \pm SE) of calcium, phosphorous and magnesium in camels. P < 0.05 ** = P < 0.01 NS = Non-significant

Groups	Ca	P	Mg
I Sohage (n=41)	12 \pm 0.19 (11-14.31)	5.8 \pm 0.08 (5.3-6.77)	4.1 \pm 0.06 (3.7-4.75)
II Abu-Simbel (150)	9.14 \pm 0.06** (8.08-11.02)	5.3 \pm 0.03** (4.5-6.35)	3.23 \pm 0.02** (2.82-3.87)

4. Conclusion

The physical factors included seasons, heavy work and stress of long walking trip had no significant effect on serum calcium, phosphorus and magnesium . Therefore it can conclude that camels having a high adapting body system that enable them to overcome most physical stress factors exposed to it during its life under hard conditions.

5. References

- Abdalla, O.M., Wasfi, I.A. and Gadir, F.A. (1988): The Arabian race camel normal parameters-Haemogram, enzymes and minerals. *Comp. Biochem. Physiol.*, 90, 237 - 239.
- Ayoub, M.H. and Awad, Y.L. (1959): Serum inorganic phosphorus in Egyptian farm animals. *Arab. Vet. Med.Assoc.*, 21, 33-40.
- Frank, S., Abou-Goweder, S. and Dappagh, N. (1998): The concentration of minerals in serum of camel. *ACSAD*, 114, 47 – 53.
- Guerouali, A., Filali, R.Z., Flamant, J.C., Portugal, A.V., Costa, J.P., Nunes, A.F. and Boyazog, U.J. (1993): Metabolic adjustment of camel during heat stress and dehydration. Region proceeding of international symposium on animal production and rural tourism in Mediterranean Region. Portugal, 10 -13 October, 57 – 62.
- Higgins, A. (1986): "The Camel In Health and Disease". Baillere Tindall, London, Philadelphia , Toronto, pp. 33.
- Holler, H. and Hassan, Y.M. (1966): Determination of some blood constituents of camels in Sudan. *Deutch. Tieraerz. Wschr.*, 73, 553 – 556.
- Kaneko, J.J., Harvey, J.W. and Bruss, M.L. (1997): "Clinical Biochemistry of Domestic Animals". Academic press, San Diego, London, New York and Sydney.
- Nagpal, A.K., Rai, A.K. and Khanna, N.D. (1996): Nutrient utilization and serum electrolytes in pack Safari camels. *Indian J. Anim. Scie.*, 66, 1166-1169.
- Radostits O. M.; Blood, D. C.; Gay and C. C (1994): " Veterinary Medicine, A textbook of the diseases of Cattle, Sheep, Pigs, Goats and Horses. 8th. Ed, Bailliere Tindall, London, Philadelphia, Sydney, Tokyo, pp. 1431.