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EFFECT OF SEX AND AGE ON BLOOD BIOCHEMICAL PROFILE IN CAMEL

A. Saeed, M.M. Hussain, I.A. Khan, G. Chand and R.A. El-Yousuf
Veterinary Research Centre, P.O.Box 72437, Abu Dhabi, United Arab Emirates

ABSTRACT

The various biochemical parameters viz. total proteins, albumin, globulin, urea, urea nitrogen, creatinine, iron, calcium, phosphorus, cholesterol and triglycerides were determined in one hundred sixty seven male and female camels of different age groups. The mean values were 6.1 ± 0.4 and 6.1 ± 0.4 g/dl; 3.9 ± 0.3 and 3.8 ± 0.3 g/dl; 2.3 ± 0.3 and 2.3 ± 0.3 g/dl; 30.6 ± 8.2 and 30.0 ± 8.2 mg/dl; 14.4 ± 3.8 and 14.1 ± 3.8 mg/dl; 1.7 ± 0.3 and 1.7 ± 0.3 mg/dl; 117.4 ± 19.7 and 121.7 ± 19.4 µg/dl; 10.7 ± 0.6 and 11.0 ± 0.4 mg/dl; 6.6 ± 0.9 and 6.6 ± 1.0 mg/dl; 34.4 ± 8.4 and 40.2 ± 8.8 mg/dl; and 23.4 ± 8.4 and 21.8 ± 7.6 mg/dl, respectively in male and female animals. Significant effect of sex was observed on calcium and cholesterol.

Key words: Calcium, cholesterol, creatinine, iron, phosphorous, proteins, triglycerides, urea

Measurements of the serum biochemical constituents is a part of comprehensive examination of the animals to diagnose the nature of a disease process (Coles, 1986). However, the variation in the values of these constituents can also occur due to climatic conditions, sex, age nutrition etc. Kowledge of these variations is imperative for a clinician to interpret the results for the thorough investigation of an animal. Various workers have reported the studies on adult camel blood irrespective of sex (Abdallah *et al*, 1988; Al-Ali *et al*, 1988; Sarwar *et al*, 1991; Haroun 1994; Nyang'ao *et al*, 1997; Rezakhani *et al*, 1997; Nazifi and Maleki, 1998; Dalvi *et al*, 1998 and Mohamed and Hussein, 1999). However, the reports showing variations according to tsex and age are countable few (Khadjeh *et al*, 1997). Therefore a comprehensive study of the serum biochemical parameters of camels in relation to sex and age in the United Arab Emirates was carried out.

Materials and Methods

The study was carried out on 167 apparently healthy camels of either sex belonging to different training camps. All female camels used in this study were non-pregnant and non-lactating. On the basis of age, the camels were divided into three groups.

Group A: 1½ to 2½ years of age (25 male and 22 female).

Group B: 2½ to 4 years of age (27 male and 27 female).

Group C: above 4 years of age (33 male and 33 female).

Blood samples were collected from jugular vein in plain vaccutainers for serum biochemistry. The blood samples were transported to laboratory and analyzed immediately. Serum biochemical parameters were measured on biochemistry auto-analyzer (Hitachi 704) using Roche/Hitachi kits. The parameters analysed were total protein, albumin, globulin, urea, urea nitrogen, creatinine, iron, calcium, phosphorous, cholesterol and triglycerides.

Mean values for each parameter were calculated and were subjected to 't' test to determine the effect of sex and age.

Results

The mean ± SD, values of serum biochemical parameters of healthy male and female camels at different ages are presented in table 1. Table 2 present sex and age interactions of biochemical parameters in camels.

The effect of sex was significant on the calcuium and cholesterol, mean values being higher in female animals than males. The data were distributed according to sex and then subgrouped as per age group to find out the changes. The effect of age was significant on globulin, urea nitrogen, ceratinine and phosphorus in male and on total proteins, globulins urea nitrogen, creatinine, calcium, phosphorus and

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Table 1. Serum biochemical parameters of (Mean ± SD) of male and female camels at different age.

S. No.	Effects	Tp	Ab	G	U	UN	Cr	Fe	Ca	P	Ch	Trig
1.	**Sex**											
	i) Male (85)	6.1 ± 0.4	3.9 ± 0.3	2.3 ± 0.3	30.6 ± 8.2	14.4 ± 3.8	1.7 ± 0.3	117.4 ± 19.7	10.7 ± 0.6[a]	6.6 ± 0.9	34.4 ± 8.4[a]	23.4 ± 8.4
	ii) Female (82)	6.1 ± 0.4	3.8 ± 0.3	2.3 ± 0.3	30.0 ± 8.2	14.1 ± 3.8	1.7 ± 0.3	121.7 ± 19.4	11.0 ± 0.4[a]	6.6 ± 1.0	40.2 ± 8.8[a]	21.8 ± 7.6
2.	**Sex and Age (male)**											
	i) Group A (22)	6.0 ± 0.4	3.9 ± 0.3	2.2 ± 0.2[a]	28.2 ± 6.4	13.2 ± 3.0[c]	1.5 ± 0.3[b]	119.0 ± 25.4	10.8 ± 0.4	7.2 ± 0.7[a]	33.6 ± 7.0	24.1 ± 5.2
	ii) Group B (27)	6.0 ± 0.5	3.9 ± 0.3	2.1 ± 0.2[a]	29.9 ± 8.9	14.0 ± 4.1[c]	1.7 ± 0.3[b]	112.4 ± 13.5	10.7 ± 0.4	6.7 ± 0.9[a]	32.3 ± 7.4	20.5 ± 6.1
	iii) Group C (33)	6.2 ± 0.4	3.8 ± 0.2	2.4 ± 0.3[a]	33.0 ± 8.5	15.7 ± 3.7[c]	1.8 ± 0.4[b]	120.3 ± 18.8	10.5 ± 0.7	6.1 ± 0.7[a]	36.7 ± 9.7	25.3 ± 11.1
3.	**Sex and Age (Female)**											
	i) Group A (22)	6.1 ± 05[c]	3.9 ± 0.4	2.2 ± 0.2[a]	26.4 ± 6.7	12.6 ± 3.2[a]	1.5 ± 0.3[b]	123.9 ± 22.3	10.7 ± 0.4[a]	7.2 ± 0.6[a]	38.3 ± 6.8	26.6 ± 8.2[a]
	ii) Group B (27)	6.0 ± 0.2[c]	3.7 ± 0.2	2.2 ± 0.2[a]	26.2 ± 6.0	12.2 ± 3.0[a]	1.5 ± 0.3[b]	126.6 ± 18.3	11.2 ± 0.3[a]	7.3 ± 0.9[a]	41.4 ± 6.8	19.0 ± 5.8[a]
	iii) Group C (33)	6.3 ± 0.4[c]	3.8 ± 0.3	2.5 ± 0.3[a]	35.5 ± 7.7	16.6 ± 3.6[a]	1.8 ± 0.3[b]	116.2 ± 17.4	10.9 ± 0.5[a]	5.8 ± 0.5[a]	40.5 ± 11.1	20.8 ± 7.3[a]
4.	**Age and Sex (Group A)**											
	i) Male (25)	6.0 ± 0.4	3.9 ± 0.3	2.2 ± 0.2	28.2 ± 6.4	13.2 ± 3.0	1.5 ± 0.3	119.0 ± 25.4	10.8 ± 0.4	7.2 ± 0.7	33.6 ± 7.0[c]	24.1 ± 5.2
	ii) Female (22)	6.1 ± 0.5	3.9 ± 0.4	2.2 ± 0.2	26.4 ± 6.7	12.6 ± 3.2	1.5 ± 0.3	123.9 ± 22.3	10.7 ± 0.4	7.2 ± 0.6	38.3 ± 6.8[c]	26.6 ± 8.2
5.	**Age and Sex (Group B)**											
	i) Male (27)	6.0 ± 0.5	3.9 ± 0.3	2.1 ± 0.2	29.9 ± 8.9	14.0 ± 4.1	1.7 ± 0.3[c]	112.4 ± 13.5[b]	10.7 ± 0.4[a]	6.7 ± 0.9[c]	32.3 ± 7.4[a]	20.5 ± 6.1
	ii) Female (27)	6.0 ± 0.2	3.7 ± 0.2	2.2 ± 0.2	26.2 ± 6.0	12.2 ± 3.0	1.5 ±0.3[c]	126.6 ± 18.3[b]	11.2 ± 0.3[a]	7.3 ±0.9[c]	41.4 ± 6.8[a]	19.0 ± 5.8
6.	**Age and Sex (Group C)**											
	i) Male (33)	6.2 ± 0.4	3.8 ± 0.2	2.4 ± 0.3	33.0 ± 8.5	15.7 ± 3.7	1.8 ± 0.4	120.3 ± 18.8	10.5 ± 0.7[c]	6.1 ± 0.7[c]	36.7 ± 9.7	25.3 ± 11.1
	ii) Female (33)	6.3 ± 0.4	3.8 ± 0.3	2.5 ± 0.3	35.5 ± 7.7	16.6 ± 3.6	1.8 ± 0.3	116.2 ± 17.4	10.9 ± 0.5[c]	5.8 ± 0.5[c]	40.5 ± 11.1	20.8 ± 7.3

Tp = Total Protein (g/dl); Ab = Albumin (g/dl); G = Globulin (g/dl); U = Urea (mg/dl); UN = Urea Nitrogen (mg/dl); Cr = Creatinine (mg/dl); Fe = Iron (ug/dl); Ca = Calcium (mg/dl); P = Phosphorus (mg/dl); Ch = Cholesterol (mg/dl); Trig = Triglycerides (mg/dl).

i) Means superscribed by letter 'a' for a given parameter and effect differ significnatly ($p \leq 0.001$ to $p \leq 0.0009$) from each other.

ii) Means superscribed by letter 'b' for a given parameter and effect differ significnatly ($p \leq 0.001$ to $p \leq 0.0005$) from each other.

iii) Means superscribed by letter 'c' for a given parameter and effect differ significnatly ($p \leq 0.001$ to $p \leq 0.0005$) from each other.

iv) Figures in parenthesis indicate number of animals.

v) Groups A, B and C denote the dimensions of animals according to age as 1½ to 2½ years of age, 2½ to 4 years of age and above 4 years of age, respectively.

vi) No superscription on the mean values indicate nonsignificant differences ($p > 0.05$).

triglycerides in females. The data were classified according to age groups and subdivided into males and females. In first group (A) significant sex effect was observed only on mean cholesterol value. In second group (B) the sex effect was significant on creatinine, iron, calcium, phosphorus and cholesterol mean values. All the mean values were higher in females except for creatinine. In group C the sex effect was significant on the mean values of calcium and phosphorus only.

Table 2. Sex and age intractions of biochemical parameters in male and female camels at different age group.

S.No.	Sex and age interaction	Tp	Ab	G	U	UN	Cr	Fe	Ca	P	Ch	Trig
1.	**i) Male x Age**											
	(a) Group A × B	NS	NS	NS	NS	NS	*	NS	NS	*	NS	*
	(b) Group B × C	NS	NS	***	NS	NS	NS	NS	NS	**	NS	*
	(c) Group A × C	NS	NS	**	*	**	**	NS	NS	***	NS	NS
2.	**Female × Age**											
	i) Group A × B	NS	*	NS	NS	NS	NS	NS	***	NS	NS	***
	ii) Group B × C	*	NS	***	***	***	***	*	*	***	NS	NS
	iii) Group A × C	***	NS	***	***	***	***	NS	NS	***	NS	**

* Significant ($p \leq 0.01$ to 0.05); ** Significant ($p \leq 0.001$ to 0.005); *** Significant ($p \leq 0.0001$); NS = Nonsignificant

Discussion

The overall mean values (male and female) of total proteins were found close to those reported values by Barakat and Fattah (1971) and lower than those reported by Sarwar *et al* (1991).

The overall mean value of albumin in males was found similar to reported by Abdelgadir *et al* (1984). The mean value of albumin in females was lower than earlier reportss on camel (Sarwar and Majied 1997). No significant difference in albumin values was seen between male and females across the different age groups.

In the present study mean value of globulin in males and females irrespective of age was found lower than Sarwar *et al* (1991) but it was in accordance to the findings of Abdelgadir *et al* (1984) in males.

The mean value of urea and UN in males and females irrespective of age was in good agreement with those reported by Barakat and Fattah (1971). Contrary to these findings, higher values were observed in Emirates camels than those reported by Sarwar *et al* (1991) in Pakistan and lower than values reported by Khadjeh *et al* (1997) in Iran.

According to sex no significant difference was seen in creatininbe values irrespective age but this was contrary to the findings of Khadjeh *et al* (1997) that sex affected the creatinine values. However, it was in accordance to findings of Sarwar *et al* (1991) that sex makes no significant effect on creatinine values. In present study, significantly low value was observed in males as compared to Barakat and Fattah (1971) but it was found close to the values reported by Abdelgadir *et al* (1984) in male camels of Sudani origin.

The difference in the level of iron in male and females irrespective of age was non significant. This was in good agreement with findings of Barakat and Fattah (1971). The values obtained in the present study were in accordance to values reported for male by Abdelgadir *et al* (1984) and for females by Khadjeh (1998).

In the present study serum calcium value irrespective of age was found some what lower than previously reported for males and females (Abdelgadir *et al,* 1984) but higher than those reported by Nazifi and Maleki (1998) for males. Significant difference was observed in calcium values between female camels of group A and B. Mean serum phosphorous values in males and females regardless of age did not show significant difference and values obtained were similar to the values reported by Abdelgadir *et al* (1984) and Khadjeh *et al* (1997) for males and females, respectively. However, statistically significant difference was observed in males and females values of age group B and C. The higher level of calcium and phosphorous in females and males may be due to the fact that there might be more mobilisation of minerals due to increased demand as they reached towards puberty.

The overall mean concentration of serum cholesterol in males and females corroborates the previous studies (Khadjeh *et al,* 1997; Abdelgadir *et al,* 1984). However, the values in males were than those obtained by Nazifi and Maleki (1998). Contrary to present study, Khadjeh *et al* (1997) have reported that sex regardless of age not affected the level of serum cholesterol. However, in present study it was observed that sex affected the values and significantly ($p<0.001$) higher value was obtained for females.

Sex irrespective of age did not affect the triglycerides level. However, slightly higher values

of serum triglycerides in males were observed as compared to females. This was in accordance to the findings of Khadjeh *et al* (1997).

Conclusion

The present study revealed that the sex and age affected few of the biochemical parameters only. The effect of sex, irrespective of age was significant only on the mean values of calcium and cholessterol, the values being higher in females. Thiss was probably to meen the tetabolic deamands in female animals. However, the valuation according to sex and age, and age sex showed different changes. Probably it was because of the interactions of two effects.

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