

Influence of Age on Some Serum Constituents in Racing Arabian Camels, (*Camelus dromedarius* L)

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ABSTRACT. Normal serum values were estimated for 15 clinically important biochemical variables and enzymes in the sera of healthy male and female adult racing Arabian camels, (*Camelus dromedarius* L.) and also in the sera of healthy male and female young Arabian camels, raised as potential racing camels. The results have indicated no significant differences in all analyses between male and female young Arabian camels. Similar results were also obtained from the corresponding adult camels except for small (12-17%), but statistically significant, variations in the activities of ALT, AST, CK and ALP, being higher in females than in males in the case of the three former enzymes, and the opposite for ALP activity. Moreover, age had a significant effect on some serum enzyme activities. ALT, AST, CK, LD and ALP activities were higher in young male and female camels compared to those of adults of the corresponding gender. However, the opposite was found with GGT.

Introduction

Biochemical analysis of plasma or serum provides valuable information concerning health and diseases in animals and man. The Arabian camel (*Camelus dromedarius* L.) is found in several areas of the world, and there are several previous reports of its plasma or serum constituents (Hassan *et al.* 1968, Barakat and Abdelfettah 1970, and Al-Ali and Power 1988). However, most of these reports have presented limited data and some have used only small numbers of animals (Hassan *et al.* 1983), while others have measured only a few parameters (Boyd *et al.* 1980, and Shaker 1989). Others did not take account of possible variations due to gender, but have reported pooled data from both males and females (Abdulla *et al.* 1988). Some authors have reported seasonal variations in certain blood constituents of normal camels, which are difficult to reconcile with reported "normal" physiological limits (Mehorta and Gupta, 1989). Moreover, the reports on camel plasma or serum constituents are often in poor agreement possibly due to variations brought about by age, breed, sex, nutritional status of the animals or to inherent differences in methods of analysis used.

In the Arab Gulf countries, camel racing is a popular sport and special camel husbandry practices have been rigidly practised by the Bedouins (Abdulla *et al.* 1988). During the racing season (October to March) racing camels are given restricted feed and water and are regularly exercised. Under such conditions, these camels may constitute a population that is quite different from camels reared for other purposes. It is, therefore, of interest to study several of the serum constituents of a relatively large number of both male and female adult racing camels (>4 years of age) in order to provide reference values and to compare these values with those of young camels (3-6 months old) raised as potential racing camels.

Materials and Methods

Animals

Male and female adult Arabian racing camels aged 4 to 7 years, and young camels aged 3 to 6 months were used. Each group had 108 animals housed in barns on a farm. The camels used were born and reared in the United Arab Emirates, and are known locally as Asayil or "originals". They are solely used for racing. The adults were each fed daily 1 kg of lucerne, 3 kg of a mixture of barley, maize and oats, 1 kg of dates (with pits), and 2-3 liters of fresh cow's milk containing honey. Water was available *ad libitum*. The young camels were each given about a quarter of the above nutrients. The ration was divided equally between a morning and an evening meal. Food and water are usually withheld two days before racing, but the animals are usually exercised daily for a distance of 25-30 km. (Abdulla *et al.* 1988). The camels were trotted over the first 10 km, while the rest of the distance was covered by a quick pace. The race distance is usually 8 km, and a fast camel can cover it in less than 15 min. To minimise any seasonal variation in the measurements, all blood collections were made in the month of December.

Collection Methods

Ten ml of jugular blood was collected in plain glass tubes from each camel at about 6:00 am 2 days after the race and before the morning meal. The blood was transported to the laboratory at ambient temperature within 1 hr and was then immediately centrifuged at 900 g for 10 min at room temperature (20°C)

Serum Analysis

The measurement of serum constituents was made in a DACOS autoanalyzer (Coulter Electronics Inc. Florida, USA) using Coulter kits except for iron which was analyzed using Sigma reagent kits. The parameters measured were: glucose, creatinine, urea nitrogen (BUN), total bilirubin, total protein, albumin, iron, calcium, phosphorus, alanine aminotransferase (ALT), gamma glutamyltranspeptidase (GGT), alkaline phosphatase (ALP), creatine kinase (CK), aspartate aminotransferase (AST) and lactate dehydrogenase (LD).

Statistical Analysis

Values obtained are means \pm standard error of the mean (s.e.m.). For each variable, differences between male and female animals or between young and old (from the same sex) were assessed by the student's t-test. P values higher than 0.05 were considered insignificant.

Results

There were no statistically significant differences between the values obtained from male and female adult camels, except for small (about 12-16%), but statistically significant ($P < 0.05$) variations in the activities of ALT, AST, CK and ALP. The activities of ALT, AST and CK were higher in females than in males but that of ALP was higher in males than in females (Table 1).

Comparison between the values of male adults and male young camels revealed that the young camels had slight, but statistically significant lower creatinine, BUN, total protein, and albumin concentrations, and significantly higher glucose, calcium and phosphorus. On the other hand, significant increases ($P < 0.05$) were observed in the activities of ALT, AST, CK, LD and ALP of young male camels compared to adult males. However, the GGT activity of young males was about half that of adult ones (Table 1).

There were no significant differences in all the analyses. between male and female young camels ($P < 0.01$), but differences between young and adult female camels were of the same magnitude as those between young and adult male camels (Table 1).

Table 1: Some serum constituents in adult and young race camels of both sexes.

Analyte	Adult (4-7 years old)		Young (3-6 months old)	
	Male	Female	Male	Female
Glucose (mg/dl)	106.19 ± 4.27	99.39 ± 1.66	118.06 ± 3.28	115.31 ± 3.92
Creatinine (mg/dl)	1.84 ± 0.06	1.77 ± 0.04	1.30 ± 0.02	1.30 ± 3.92
BUN (mg/dl)	18.80 ± 0.71	19.06 ± 0.53	11.14 ± 0.27	11.29 ± 0.28
Total bilirubin (mg/dl)	0.24 ± 0.01	0.25 ± 0.01	0.24 ± 0.01	0.25 ± 0.02
Total protein (g/dl)	6.55 ± 0.07	6.61 ± 0.07	5.39 ± 0.01	5.37 ± 0.03
Albumin (g/dl)	3.27 ± 0.03	3.36 ± 0.03	2.47 ± 0.02	2.50 ± 0.04
Iron (ug/dl)	110.70 ± 7.32	112.49 ± 2.69	107.84 ± 3.67	111.27 ± 4.37
Calcium (mg/dl)	10.65 ± 0.06	10.64 ± 0.06	11.31 ± 0.01	10.92 ± 0.03
Phosphorus (mg/dl)	6.52 ± 0.04	6.19 ± 0.09	10.80 ± 0.13	10.79 ± 0.21
ALT (u/L)	12.39 ± 0.36	14.76 ± 0.40*	16.17 ± 0.01	17.00 ± 0.02
AST (u/L)	76.60 ± 2.11	83.52 ± 3.10*	105.70 ± 1.80	101.78 ± 3.71
GGT (u/L)	20.33 ± 0.67	18.34 ± 0.63	11.45 ± 0.25	11.55 ± 0.27
CK (u/L)	93.92 ± 3.80	105.67 ± 4.9*	208.60 ± 6.25	210.93 ± 7.13
LD (u/L)	430.60 ± 8.01	419.8 ± 7.89*	663.40 ± 10.0	682.91 ± 11.21
ALP (u/L)	128.40 ± 4.30	106.5 ± 3.84*	438.30 ± 14.2	406.62 ± 23.30

Values are means ± s.e.m (n = 108 camels)

* = Significantly different from adult males at P < 0.05.

Discussion

The literature is replete with reports on serum /plasma constituents of camels. However, there are relatively few studies dealing with racing camels (Abdulla *et al.* 1988, Snow *et al.* 1988, and Wernery, 1995). The present results indicated that there are no significant differences due to gender in most of the analytes measured. However, significant variations do exist between young and old camels, especially the much higher activities of ALP, LD, CK, and AST in young camels compared to adults. Such age related differences in camels are reported for the first time in the present study. This finding may be of clinical importance, especially in the diagnosis of damage to vital organs such as the liver, muscles, heart and kidneys (Cole, 1980).

The only previous study on racing camels was that of Abdulla *et al.* (1988), who have pooled the data of both male and female racing camels and have not determined the serum bilirubin concentrations. However, they have reported similar BUN, TP, ALB and GGT values, but higher AST and CK activities, together with higher albumin/total protein ratio than in the present study. This could be due to the different methods of analysis employed by either study. However, some discrepancies can also be observed between the result of the present study and those carried out on non-racing camels, such as serum glucose concentration, which was higher in the findings of Al-Ali *et al.*(1988), but lower than in the present study. Similar discrepancies can be observed in the investigation of Higgins and Kock (1986). On the other hand, the serum bilirubin concentration reported in the present study (0.24 - 0.25 mg/dl) is very much higher than the mere 0.034 mg/dl reported by Hassan *et al* (1983) and than the 0.049 mg/dl reported by Al-Ali *et al.*(1988).

Hence, the present study is the first to provide extensive biochemical data of some of the major and clinically important serum constituents of racing Arabian camels, taking into account the possible variations in these constituents due to age and gender. It has proven that there some significant differences between such constituents of racing and non-racing camels.

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تأثير العمر على بعض مكونات المصل في الهجن العربية الأصيلة المربية للسباق

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المستخلص: تناولت هذه الدراسة ، تحديد تركيز بعض المكونات الكيميائية الحيوية في مصل الهجن العربية الأصيلة والتي تم تربيتها للسباق . تم في هذه الدراسة مقارنة مستويات هذه المكونات الكيميائية في ذكور وإناث الهجن الصغيرة والكبيرة العمر . أظهرت الدراسة ، أنه لا توجد فروق معنوية في مستويات هذه المكونات بين الذكور والإناث في الأعمار الصغيرة (3-6 شهور) . أما في الأعمار الكبيرة (4-7 سنوات) ، فلقد وجد فرق واضح ولكنه طفيف في مستوى إنزيمات CK h ALT h AST h ALP حيث لوحظ أن مستويات نشاط الإنزيمات الثلاثة الأولى أعلى في الإناث، بينما كان مستوى نشاط إنزيم (ALP) أعلى في الذكور .

أيضاً وجد أن للعمر أثر واضح على مستويات أغلب الإنزيمات المقاسة . حيث أنها كانت أعلى في صغار الهجن مقارنة مع الكبار من نفس النوع . بينما لوحظ أن نشاط إنزيم (GGT) أعلى في الهجن الأكبر عمراً .