

SOME HAEMATOLOGICAL AND SERUM BIOCHEMICAL CHANGES IN CAMEL CALVES DURING FIRST 8 MONTHS OF AGE

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Abstract

This study was carried out on 15 clinically healthy dromedary camel calves. Blood samples were taken monthly till the 8th month. The results of this investigation showed that R.B.Cs count, haemoglobin and PCV % were increased with age till the 8th month. Also, results showed that alanine aminotransferase (ALT) levels in calves were the same as in adults, and they did not show significant variation with age. However, the levels of aspartate aminotransferase (AST) were higher than normally seen in adult camels. On the other hand, a significant decline in alkaline phosphatase levels from the 4th - 8th months of age was observed. No significant changes were observed in the concentration of creatinine during the first 8 months of age. Urea levels were significantly increased up to 5 months of age, then, they became constant during 5 - 8 months. Serum glucose levels were high initially, and then, significantly decreased from the 3rd to 8th months of age. No significant changes were observed in the concentration of calcium, potassium and chloride during the first 8 months of age. Phosphorus levels were elevated during the first four months of age, and decreased during the period from 5 - 8 months. Serum iron levels were significantly increased up to 5 months, and became constant during 5 - 8 months. Regarding serum vitamin C, its level was significantly increased with age till the 8th month of age. Serum beta carotene and vitamin A levels were declined from the 1st - 4th month, and it became nearly stable from 5 - 8 months of age.

INTRODUCTION

Camel support the survival of millions of people in arid and semi arid areas of the world. Camel has the ability to survive and produce milk for prolonged periods and under unfavourable conditions. The one humped bedouin camel, either alone or together with sheep and goat husbandry, offers one possibility to combat malnutrition in perennial drought areas. Data about haematological and biochemical parameters of camel in the early phase of life were lacked. Haematological and serum biochemical analysis are commonly used for monitoring health status and disease diagnosis in camels.

This work was conducted to study some of the haematological and biochemical changes in the blood of camel calves during the first 8 months of their life.

MATERIALS AND METHODS

Fifteen clinically healthy male dromedary camel calves at the age of one month old were available. They are belonged to Bani Adi Village, Assiut governorate. These calves were kept with their dams and allowed to suckle at will. Dams and calves grazed daily and were supplemented with green fodder and hay. Clean drinking water was available *ad-libitum*. Blood samples were taken monthly from calves till the 8th month of age. Two blood samples were collected from each animal. The first one was collected on heparin and used for counting red blood cells, estimation of haemoglobin and packed cell volume. The second one was used for separation of serum for estimation of alanine aminotransferase (ALT), aspartate aminotransferase (AST), alkaline phosphatase (ALP), creatinine, urea, glucose, calcium, phosphorus, sodium, potassium, chlorides, iron, Vitamin C, B-carotene and Vitamin A.

Red blood cells were counted according to Thompson (1980). Haemoglobin was estimated according to Cyanomethaemoglobin method by Crosby *et al.* (1954). Haematocrit was estimated according to Dacie and Lewis (1975).

ALT and AST were determined according to colorimetric method of Reitman and Frankel (1957). Serum ALP was determined according to Eastman and Bixler (1977) technique. Serum creatinine was determined as performed by Faulkner and King (1976). Serum urea was done by the method of Fawcett and Scott (1960). Serum glucose was determined according to Trinder (1969).

Serum calcium was determined as described by Barnett *et al.* (1973). Serum inorganic phosphorus was estimated by the method of Pasquinelli (1979).

Sodium and potassium were measured using flame photometer corning, 460, 1450 according to the method described by Oser (1979). Chloride was estimated according to the method described by Cotlove *et al.* (1958) using automatic chloride titration (Courtesy, Buchler Instruments, Inc).

Serum iron was estimated by using test-kit of BioMerieux, France and read by using spectrophotometer Shimadzu U.V. 240.

Serum Vitamin C was determined according to Henry (1964). Serum B-carotene and Vitamin A were estimated according to Neeld and Pearson (1963).

Statistical analysis of data was performed by using the methods of Milton and Tsokos (1983) to assess the significance of difference between means using T-test at each time point.

RESULTS AND DISCUSSION

Red blood cell counts, haemoglobin and P.C.V. values were increased with age till the 8th month, Table 1. These results agreed with those reported by Ibrahim *et al.* (1992). This is probably due to the low need for oxygen carrying capacity by the young one due to reduced physical activity (Higgins and Kock, 1986).

Table 1. Some haematological constituents of camel calves during first 8 months of age.

Time of sampling	R.B.Cs x 10 ⁶ /ul	Hb g/dl	PCV%
1 st month	5.2±0.25	10.1±0.36	24±0.94
2 nd month	5.04±0.36	10.0±0.41	23±0.83
3 rd month	5.1±0.48	10.2±0.32	26±0.96
4 th month	5.5±0.37	11.4±0.26*	28±1.448*
5 th month	5.9±0.34	12.3±0.3 ***	30±1.25**
6 th month	6.5±0.478*	12.8±0.4***	30.8±1.33***
7 th month	7±0.36***	13.3±0.38***	31.5±1.3***
8 th month	7.2±0.45***	14±0.55***	32±1.28***

Mean + SE * Significant at P<0.05 ** Significant at P<0.01
*** Significant at P<0.001.

Alanine aminotransferase (ALT) levels in calves were the same as in adults as it was 8.8±2.6 U/L as reported by Sarwar *et al.* (1992), and they did not show significant variation with age up to 8 months, Table 2. However, aspartate amino transferase (AST) showed higher values during the 8 months as compared with adult camels where it was 60±3.2 U/L for adults as reported by Sarwar *et al.* (1992), Table 2. The results of this study concurred with the findings reported by Sarwar (1992) and Afzal and Khan (1995). The higher levels of AST enzyme probably reflects the active

growth phase at this period (Afzal and Khan, 1995). The alkaline phosphatase levels were declined significantly from the fourth to the 8th months of age, as compared with their mean values at the 1st month, Table 2. The alkaline phosphatase levels at the 7th month were decreased nearly to about half their levels recorded at the first 3 months of age. These findings coincide with those observed by Coles (1986) and Afzal and Khan (1995). The higher values in alkaline phosphatase enzyme in young camel calves may be due to active bone formation at this period (Kaneko, 1989 and Afzal and Khan, 1995). No significant changes were observed in the concentration of creatinine, Table 2.

Urea levels were increased significantly from the 2nd to the 8th months of age, Table 2. The results of this study agreed with Sarwar *et al.* (1991) and Afzal and Khan (1995). The increase in urea levels may have resulted from excess dietary protein intake due to increase milk ingested by the calf, leading to increase deamination and rise in plasma urea concentration (Kaneko, 1989). Serum glucose levels were significantly decreased from the 3rd to the 8th months of age. This result agreed with the findings reported by Sarwar *et al.* (1991) and Afzal and Khan (1995). The elevated glucose levels in early age could be attributed to incomplete development of rumen at this stage. Also, the volatile fatty acids synthesized in rumen and normally used for energy in ruminants are not available (Afzal and Khan 1995).

There were no significant changes in the concentrations of calcium, potassium and chloride during the first 8 months of age, Table 3.

Inorganic phosphorus level was elevated during the first four months of calves life, and it became constant during the period from 5-8 months, Table 3. The hyperphosphataemia observed in this study was also noticed by Sarwar *et al.* (1991) and Afzal and Khan (1995). This hyperphosphataemia could be attributed to active bone formation which is predominant during the early phase of the calf life (Kaneko, 1989).

Serum iron was low initially and increased with age to stabilize after 5 month of age, Table 3. This result concurred with the findings reported by Sarwar *et al.* (1991) and Ibrahim *et al.* (1992) and it may be due to the low levels of iron in camel's milk.

Regarding serum vitamin C, its level was significantly increased from the 3rd to the 8th months of age, Table 4. This coincides with the observation reported by Yagil (1982) who mentioned that Vitamin C in camel's milk was increased as lactation progresses. He also mentioned that carotene concentration in camel's milk declined from 0.46 mg/kg after 1.5 months of lactation to 0.16 mg/kg after 4 months of

lactation. Those findings agreed with the results of this study as serum B-carotene levels in young calves were declined from $8.06 \pm 0.06 \mu\text{g/dl}$ at the first month to $2.18 \pm 0.2 \mu\text{g/dl}$ at the fourth month of lactation. They became nearly stable from the 5th to 8th months, Table 4.

Serum vitamin A behaved the same manner as observed for B-caroten, Table 4. These results concurred with the findings of Yagil (1982) who mentioned that vitamin A content in camel's milk declined with age as lactation progresses.

Generally, we can conclude that there are marked haematological and biochemical changes in the serum of camel calves during the first months of their life. The estimation of these parameters in the young camel calves will be helpful aid in early diagnosis of many problems e.g. rickets, and other nutritional deficiencies.

Parameter	1st month	2nd month	3rd month	4th month	5th month	6th month	7th month	8th month
B-carotene (µg/dl)	8.06 ± 0.06	5.12 ± 0.08	3.45 ± 0.05	2.18 ± 0.2	2.15 ± 0.1	2.10 ± 0.1	2.12 ± 0.1	2.15 ± 0.1
Vitamin A (µg/dl)	10.5 ± 1.0	6.8 ± 0.8	4.5 ± 0.5	2.8 ± 0.3	2.7 ± 0.3	2.6 ± 0.3	2.7 ± 0.3	2.8 ± 0.3
Calcium (mg/dl)	10.5 ± 1.0	10.5 ± 1.0	10.5 ± 1.0	10.5 ± 1.0	10.5 ± 1.0	10.5 ± 1.0	10.5 ± 1.0	10.5 ± 1.0
Phosphorus (mg/dl)	10.5 ± 1.0	10.5 ± 1.0	10.5 ± 1.0	10.5 ± 1.0	10.5 ± 1.0	10.5 ± 1.0	10.5 ± 1.0	10.5 ± 1.0
Iron (µg/dl)	10.5 ± 1.0	10.5 ± 1.0	10.5 ± 1.0	10.5 ± 1.0	10.5 ± 1.0	10.5 ± 1.0	10.5 ± 1.0	10.5 ± 1.0
Albumin (g/dl)	10.5 ± 1.0	10.5 ± 1.0	10.5 ± 1.0	10.5 ± 1.0	10.5 ± 1.0	10.5 ± 1.0	10.5 ± 1.0	10.5 ± 1.0
Glucose (mg/dl)	10.5 ± 1.0	10.5 ± 1.0	10.5 ± 1.0	10.5 ± 1.0	10.5 ± 1.0	10.5 ± 1.0	10.5 ± 1.0	10.5 ± 1.0
Urea (mg/dl)	10.5 ± 1.0	10.5 ± 1.0	10.5 ± 1.0	10.5 ± 1.0	10.5 ± 1.0	10.5 ± 1.0	10.5 ± 1.0	10.5 ± 1.0
Cholesterol (mg/dl)	10.5 ± 1.0	10.5 ± 1.0	10.5 ± 1.0	10.5 ± 1.0	10.5 ± 1.0	10.5 ± 1.0	10.5 ± 1.0	10.5 ± 1.0

Table 4. Serum B-carotene and vitamin A levels in camel calves during the first eight months of lactation.

Table 2. Some serum constituents (mean±SE) of camel calves during first 8 months of age.

Time of sampling	ALT U/L	AST U/L	A/P U/L	Creatinine mg/dl	Urea mg/dl	Glucose mg/dl
1 st month	8±3.1	124±2.5	200±6.1	1.18±0.04	25.75±0.26	158.62±3.53
2 nd month	9±4.3	122±1.9	220±7.2	1.19±0.05	33.9±0.42***	153.126±4.41
3 rd month	8.3±2.4	125±2.4	194±6.3	1.24±0.06	40.1±0.64***	13691±4.6**
4 th month	9±3.5	124±2.3	158±5.4***	1.26±0.07	47.6±0.43***	135.11±3.25***
5 th month	10±3.6	126±2.4	104±3.6***	1.27±0.06	51.08±0.57***	117.09±4.7***
6 th month	9.5±3.5	129±0.2	116±45***	1.25±0.08	52.35±0.45***	115.19±5.23***
7 th month	10.3±4.2	6	100±53***	1.27±50.07	52.57±0.56***	114.5±5.51***
8 th month	10±3.2	128±2.5	102±4.1***	1.28±0.1	52.65±0.65***	97.3±4.12***

Mean + SE * Significant at P<0.05 ** Significant at P<0.001. *** Significant at P<0.001.

Table 3. Some minerals and electrolytes level (mean±SE) of camel calves during first 8 months of age.

Time of sampling	Calcium mg/dl	Inorganic phosphorus mg/dl	Sodium m Eq/L	Potassium m Eq/L	Chloride m Eq/L	Iron ug/dl
1st month	11.74±0.65	13.67±0.82	153±5.1	5.5±0.2	100±2.4	69.7±3.2
2nd month	11.54±0.7	13.6±0.8	155±4.2	5.9±0.4	105±2.8	72.59±5
3rd month	11.42±0.45	13.48±0.61	154±5.4	6.5±0.5	107±3.2	97.71±4.1***
4th month	11.34±0.55	13.55±0.54	157±3.2	6.7±0.45	108±3.7	95.127±5.5
5th month	10.94±0.8	11.33±0.57***	159±4.4	6.6±0.39	106±3.1	122.84±4.2***
6th month	10.9±0.54	11.09±0.48***	156±6.4	6.8±0.48	107±3	121.69±3.4***
7th month	11.3±0.5	11.25±0.55***	158±5.5	6.6±0.5	110±3.3	119.25±4.5***
8th month	11.25±0.44	10.3±0.44***	160±6.2	6.7±0.59	108±3.6	123.5±5.2***

Mean + SE *** Significant at P<0.001.

Table 4. Serum B-carotene, Vit. A and Vit. C of camel calves during first 8 months of age.

	Vit. C mg/dl	B-carotene µg/dl	Vit. A µmg/dl
1 st month	1.01±0.06	8.06±0.61	56±1.6
2 nd month	1.35±0.08	5.37±0.43	53±1.5
3 rd month	1.69±0.1***	4.3±0.33***	48±0.8**
4 th month	2.5±0.25***	2.81±0.22***	45±0.31**
5 th month	2.4±0.3***	1.8±0.11***	43±0.45**
6 th month	2.3±0.2***	1.9±0.15***	42.8±0.4**
7 th month	2.42±0.3***	1.8±0.2***	43±0.33***
8 th month	2.39±0.26***	1.9±0.15***	43.3±0.35***

Mean + SE * Significant at P<0.05 ** Significant at P<0.01
*** Significant at P<0.001.

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بعض التغيرات في مكونات الدم وبيوكيميائية المصل في صغار الجمل أثناء الثمانية شهور الأولى من العمر

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أجريت هذه الدراسة علي عدد ١٥ من صغار الجمل السليمة اكلينيكيًا وقد اخذت عينات الدم منها شهريًا ولمدة ٨ شهور (سن العظام). وقد اظهرت نتائج هذا البحث أن عدد كرات الدم الحمراء ونسبة الهيموجلوبين وال PCV قد زادت بتقدم العمر حتي الشهر الثامن. ايضًا أظهرت النتائج أن مستوى الالانين امينوترانسيفيريز (ALT) في الصغار مثل مستواه في البالغين ولم تظهر فروق معنوية في مستواه بتقدم العمر. ومع ذلك فإن مستوى الاسبرتيت امينوترانسفيريز (AST) كان أعلى من مستواه في الجمل البالغة ومن الناحية الاخرى فقد قل مستوى الفوسفاتير القلوي من الشهر الرابع الي الشهر الثامن من العمر. ولم يظهر تغيير معنوي في مستوى الكرياتينين اثناء الشهور الثمانية الأولى من العمر. أما مستوى البولينا فقد زاد زيادة معنوية حتي الشهر الخامس من العمر ثم اصبح ثابتًا من الشهر الخامس حتي الشهر الثامن. وكان مستوى الجلوكوز في المصل عاليًا في البداية ثم اخذ يقل من الشهر الثالث وحتى الشهر الثامن من العمر. هذا ولم تلاحظ تغييرات معنوية في تركيز الكالسيوم والبوتاسيوم والكلورايد خلال الشهور الثمانية الأولى من العمر. أما مستوى الفسفور فقد ارتفع خلال الأربعة شهور الأولى من العمر ثم قل في الفترة من ٥ - ٨ شهور. وقد زاد مستوى الحديد في المصل زيادة معنوية حتي الشهر الخامس من العمر ثم أصبح مستقرًا من الشهر الخامس وحتى الشهر الثامن. وبالنسبة لمستوي فيتامين (ج) في المصل فإن مستواه قد زاد زيادة معنوية من الشهر الثالث وحتى الشهر الثامن من العمر. أما مستوى البتاكروتين وفيتامين (أ) في المصل فقد كان مرتفعًا في الشهر الأول ثم قل تدريجيا حتي الشهر الرابع ثم أصبح تقريبًا مستقرًا من الشهر الخامس وحتى الشهر الثامن.