



Effect of months on levels of some biochemical parameters in blood of Iraqi female one- humped camel (*Camelus dromedarius*)

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Abstract

Twelve Iraqi one-humped female camels (*Camelus dromedarius*) of 7- 8 years old presented in the Animal Farm, College of Veterinary Medicine, University of Anbar were used in this study during the period of 1/9/2012 to 1/1/2013. The study were designed to find out the effect of some months of year on the levels of some blood biochemical parameters. Results showed that there is no significant effects of months on globulin, urea and creatinine. Results also showed that glucose, ALT, Alkaline phosphatase activity and HDL were high during October ($P<0.05$) and low in other months. Total protein, albumin, AST, cholesterol and Triglycerides were high ($P<0.05$) during September ($P<0.05$) compared with other months. In Conclusion, there are few variation between the present findings and those from previous workers that may be attributed to the season or months assay.

Keywords: Camel, biochemical parameters, months

تأثير الأشهر على بعض مستويات معايير الدم الكيموحيوية في إناث الابل وحيدة السنام العراقية

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الخلاصة

استخدمت في هذه الدراسة اثنا عشر أنثى من الجمال العراقية وحيدة السنام بعمر 7-8 سنة تواجدت في حقل كلية الطب البيطري، جامعة الأنبار، خلال الفترة من الأول من أيلول 2012 إلى الأول من كانون الثاني 2013. صممت هذه التجربة لمعرفة تأثير بعض أشهر السنة على بعض مستويات معايير الدم الكيموحيوية. أظهرت النتائج عدم وجود تأثير معنوي للأشهر على الكلوبولين، اليوريا والكرياتين. أظهرت النتائج أيضاً أن الكلوكرز، ALT، APA، HDL كانت مرتفعة ($P<0.05$) خلال تشرين الأول وانخفضت خلال الأشهر المختلفة. البروتين الكلي، الألبومين، AST، الكولستيرول والكليسيريدات الثلاثية كانت مرتفعة ($P<0.05$) خلال أيلول مقارنة بالأشهر

الأخرى. نستنتج من الدراسة أن هنالك تباين قليل بين النتائج الحالية ونتائج الدراسات السابقة والذي يمكن أن يعزى إلى تأثير الموسم وأشهر التقييم. الكلمات المفتاحية: إبل، معايير الدم الكيموحيوية، الأشهر.

Introduction:

Camels (*Camelus dromedarius*) play a very important and vital role in the economy and social life of a large sector of pastoralists in arid and semi-arid regions in several localities in the world. Changes in the environmental factors were found to exert pronounced effects on the blood characteristics to maintain the animal health and help animal to survive the adverse conditions (1). Camels physiology was different in many aspects when compared to other mammals, which help them to survive and flourish under drastic conditions of harsh environments and fluctuating nutritional conditions where other species can not exist (2). Blood is an index for several metabolic processes of the body, so differential concentrations and periodic change of blood metabolites may determine the genetic potential of a species (3). Plasma biochemical parameters can provide valuable information regarding health, sex, age, nutritional and physiological status of the animals (4, 5).

The current study aimed to find out the effected of some months on the levels of some biochemical parameters of Iraqi female one- humped camel (*Camelus dromedarius*).

Materials and Methods:

This study was conducted at the Animal Farm, College of Veterinary Medicine, University of Anbar during the period from 1/9/2012 until 1/12/2012, and included 12 multiparous, non-lactating Iraqi one-humped female camels (*Camelus dromedarius*) of 7- 8 years old, not pregnant.

The blood sample (10 ml) were collected via jugular vein heparinized

vacutainer tubes. The blood plasma were separated and analyzed for Glucose (6), Total protein (7), Albumin (8) and Cholesterol (9) concentrations were quantitatively determined using the kit provided by Agappe Diagnostice Company, Switzerland. Globulin was calculated by taking the difference between total protein and albumin. Urea (10), Creatinine (11), Alanine aminotransferase activity (ALT), Aspartate aminotransferase activity (AST) (12), Alkaline phosphatase activity (ALP) (13), Triglycerides (14) and High density lipoproteins (HDL) (15). The kit was provided by Biomerieux Company, France.

Statistical analysis: The data were presented as means \pm S.E. and subjected to analysis by using one way of analysis (ANOVA) post hoc test was used LSD ($P < 0.05$), the software was used package IBM SPSS program, version 20. (16).

Result:

The results of this study are shown in table (1). The mean plasma glucose concentration was higher during October (137.58 ± 7.91 mg/dl) and during November, December and September (130.34 ± 3.30 , 128.25 ± 3.50 and 114.01 ± 6.78) mg/dl respectively, as depicted in table (1) the mean plasma total protein concentration was 6.49 ± 0.24 , 6.20 ± 0.13 and 6.33 ± 0.13 g/dl during October, November and December respectively. Where as the level increased significantly ($P < 0.05$) to (6.72 ± 0.14 g/dl) in September.

The mean plasma albumin level was higher during September (4.41 ± 0.12 g/dl), and decreased significantly to (4.09 ± 0.12 , 3.81 ± 0.78

and 3.95 ± 0.09 g/dl during October, November and December respectively.

There is no significant effects of different months on globulin, urea and creatinine.

The mean plasma ALT activity during September, October, November and December are (12.52 ± 0.27 , 18.34 ± 0.40 , 16.10 ± 0.21 and 14.99 ± 0.24) U/L respectively with significant ($P<0.05$) differences.

The results of the present study revealed that mean plasma AST activities of camels showed significant effect ($P<0.05$) during different months, the levels were (23.24 ± 0.58 , 20.65 ± 0.37 , 19.05 ± 0.27 and 17.03 ± 0.20) U/L during September, October, November and December respectively.

Results also showed that the high concentration of Alkaline phosphatase

activity in October (15.99 ± 3.10 U/L) and decreased significant during September, November and December (6.46 ± 0.26 , 8.39 ± 0.23 and 10.31 ± 0.67) U/L respectively.

The mean plasma cholesterol levels was higher in September (45.82 ± 4.20 mg/dl) decreased during October, November and December (39.36 ± 5.48 , 32.84 ± 4.71 and 29.25 ± 2.16) mg/dl respectively.

The highest Triglycerides levels was recorded during September (64.17 ± 6.33 mg/dl) and decreased during October, December and November (49.12 ± 3.67 , 31.50 ± 1.53 and 26.56 ± 1.36) mg/dl respectively.

The concentration of HDL was (9.73 ± 0.90 mg/dl) during October and decreased during November, September and December (5.90 ± 0.50 , 5.50 ± 0.67 and 5.43 ± 0.57) mg/dl respectively.

Table (1) The levels of some biochemical parameters in the one- humped camel during different months.

Seasons	Month	Glucose (mg/dl)	Total protein (g/dl)	Albumin (g/dl)	Globulin (g/dl)	Urea (mg/dl)	Creatinine (mg/dl)	ALT (U/L)	AST (U/L)	Alkaline phosphatase activity (U/L)	Cholesterol (mg/dl)	Trigly. (mg/dl)	HDL (mg/dl)	
Autumn	September	114.01 ± 6.78 B	6.72 ± 0.14 A	4.41 ± 0.12 A	2.30 ± 0.12 A	39.25 ± 2.00 A	1.24 ± 0.05 A	12.52 ± 0.27 D	23.24 ± 0.58 A	6.46 ± 0.26 B	45.82 ± 4.20 A	64.17 ± 6.33 A	5.50 ± 0.67 B	
		October	137.58 ± 7.91 A	6.49 ± 0.24 AB	4.09 ± 0.12 B	2.40 ± 0.18 A	44.47 ± 4.26 A	1.17 ± 0.10 A	18.34 ± 0.40 A	20.65 ± 0.37 B	15.99 ± 3.10 A	39.36 ± 5.48 AB	49.12 ± 3.67 B	9.73 ± 0.90 A
			November	130.34 ± 3.30 AB	6.20 ± 0.13 B	3.81 ± 0.78 B	2.38 ± 0.08 A	43.15 ± 2.11 A	1.20 ± 0.07 A	16.10 ± 0.21 B	19.05 ± 0.27 B	8.39 ± 0.23 B	32.84 ± 4.71 B	26.56 ± 1.36 C
Winter	December			128.25 ± 3.50 AB	6.33 ± 0.13 AB	3.95 ± 0.09 B	2.37 ± 0.08 A	42.35 ± 2.35 A	1.24 ± 0.80 A	14.99 ± 0.24 C	17.03 ± 0.20 C	10.31 ± 0.67 B	29.25 ± 2.16 B	31.50 ± 1.53 C

Mean ±S.E

Different superscripts within each column showed significantly difference (p <0.05).

Discussion:

Blood glucose appears to be an important metabolic factor affecting reproductive activity in farm animals (Ali, 2006).

The significant differences ($P < 0.05$) in plasma glucose concentration during autumn (October) compared with other months, these results of this study are similar to results obtained by (17, 18, 19), but not in agreement with those of (2, 20, 21).

The higher plasma glucose concentration could be due to the ability of camel to increase its blood glucose level during stress and dehydration by decreasing the renal glucose threshold. Under such conditions the glucose level in the camel blood can go up to 1300 mg/dl (22).

Similar values of plasma proteins in this study were obtained by other workers (2, 17, 19), and not in agreement with results obtained by (20, 21, 23). Proteins are complex nitrogen containing organic compounds found in all animals and vegetable cells, where they constitute a major part of living protoplasm. All enzymes and many hormones that regulate biochemical reactions are functional proteins (3). Serum proteins to have somewhat different electrophoretic mobility, which is probably a result of different physical characteristics and net electrical charges, originating from different amino acids composition (24).

The result of Albumin in this study are agreed with the results obtained by (2) and disagreed with those reported by (17, 21, 23, 25, 26) these revolutionize results could be due to dehydration and poor diet as mentioned by (27, 28) whom explained that High albumin levels may be caused by severe dehydration, Low albumin levels may be caused by a

poor diet (malnutrition). Albumin has the water attracting/holding property and higher value in camel probably indicate specific adaptation for the desert environment (25). (29) reported a reduction in albumin concentration during hot dry environment without any effect on mean total protein concentration in dromedary which contrasted with our results.

Globulin level did not showed a significant changes between seasons and months, these results are in agreement with those of (2, 23, 26) whom found that the globulin concentrations in camels did not show significant change between the seasons, and disagreed with those of (17, 21).

The results showed no significant differences between seasons and months in plasma urea. These results are similar of that results obtained by (2) but not in agreement with those of (17, 19, 25). The elevation of blood urea might be due to the combined pre-renal effects of reduced infusion with lower glomerular filtration and greatest load due to increased metabolic activity. As in the other ruminant species, camels can utilize urea for microbial synthesis of protein and are able to regulate its excretion on the renal tubular level as well as sheep. Also, variations in urea clearance were found to be independent of either plasma urea concentration or the glomular filtration rate in she-camels (30, 31).

Creatinine level did not show significant changes between seasons and months. These results are in agreement with those of (25) who found that the globulin concentrations in camels did not show significant change between the seasons, and disagreed with those of (2, 17, 18). The concentration of serum creatinine

increased during winter and autumn and this can be attributed to the higher intake of protein in the diet consumed by camels. Creatinine is filtered and entirely excreted by the kidney, it is neither secreted nor reabsorbed. The creatinine clearance to explore glomerular filtration. The decrease in glomerular filtration rate during dehydration causes a decrease in creatinine clearance. Water deprivation for 10 days results in an increase in serum creatinine of 60%, 147% creatinine and decreased creatinine clearance of 72% (32).

The result of ALT and AST values obtained from this study were in agreement with the previous studies of (2, 19), and disagreement with those of (21, 23) and this may be attributed to the availability of plants. (33) found that season and age did not affect enzymatic activities of ALT and AST, but noted variations especially in AST activity in dehydrated camels denoting that the reduction of plasma volume and consequently hemoconcentration causes an increase in serum AST, but ALT was not affected. (34) found an increase in serum transaminases activities in camels during summer and suggested that this might be indicative for cellular impairment in the liver due to rapid gluconeogenesis in response to different stresses. On the other hand, (35) suggested their possible involvement in liver function in particular globulin production. It was observed in the present study that activity of ALT is significantly affected by season of the year, while the globulin concentration was not affected. This indicated indicating that liver function was not extremely affected. Exposure to high heat load may result in oxidative stress and cellular damage, and when coupled with dehydration may also lead to

hepatic dysfunction, this may increase the plasma concentrations of AST and ALT (36). (37) reported an increase in AST and ALT in camels exposed to hot decrease when they exposed to and cold conditions, these results suggest that the camel may not be immune to heat stress-imposed cellular damage. AST lacks organ specificity but is present in skeletal muscle, cardiac muscle and liver of large animals and pathological changes in these organs elevate the activity of AST in the blood (38), While ALT activity is related to liver function and usually increases when there is damage to the liver cells (39).

There is a significant increase of Alkaline phosphatase activity during autumn (October), these results are similar to that results obtained by (23).

Normal blood contains alkaline phosphatase enzyme which catalyses the liberation of inorganic phosphates from phosphate esters such as glycerophosphate etc. Alkaline phosphatase is most active at optimum 9.0 pH. The enzymatic activity of serum or plasma with respect to this enzyme is established in terms of the rate of hydrolysis of suitable phosphate ester substrates buffered to the proper Ph (40). The plasma alkaline phosphatase levels may be increased during the diseases related to bone and liver while activity of acid phosphatase is related with some carcinoma (41). (37) found that ALP was significantly higher during extremely hot (May- June) than in extreme cold (December-January) conditions, in India. This suggests that liver function may be partially affected by heat stress (42).

The effects of different seasons of the year on cholesterol concentration of the female camels were significantly higher during autumn than winter. The highest value of cholesterol was

recorded during autumn and the lowest value during winter. These results are in agreement with those of (2, 21, 18) whom found that, the concentration of cholesterol was significantly higher ($p < 0.05$) in autumn than in winter months.

Similar observation have been made by (43) who reported that the increase in cholesterol under hot months could be attributed to the increased non-esterified fatty acids and fat catabolism occurring in heat-stressed animals. Cholesterol increased in the dehydrated camel after hypothyroidism (44). In camels dehydrated, liver fat content decreased, which indicates a strong mobilization of liver lipids (18). However, (45) reported that cholesterol concentrations were higher in winter than in summer in dromedary camels. It was suggested that the seasonal changes in blood lipids and proteins might be due to changes in the nutritional and energy balances and changes in environmental temperature, humidity and day length.

Triglycerides are the storage form of lipids and provide an energy source not only to the animals body. The camel is a draft animal and has the ability to restore its energy longer time than many other animal species (46). The physiological significance of this seasonal difference in serum triglycerides contents is not clear.

Results of triglycerides was in agreement with (17) and disagreed with those of (21,18). Triglycerides are known to provide the metabolic fuel for most tissues when the animal is in energy deficit (47). Moreover, it was reported that reduced glucose metabolism is reflected on the performance of free fatty acids (48). The effect of dehydration on lipid metabolism is not well studied in camels. The camel's hump has long

been considered a lipid reserve mobilized to release water during dehydration. However, the size of the hump is not affected by water deprivation. The decrease in basal metabolism inhibits lipolysis (32, 49).

Table (1) showed significant increase of HDL during autumn (October). Lipoproteins are macromolecular complexes of proteins, phospholipids, cholesterol, cholesterol ester and triglycerides and function to transport lipids through blood. High density lipoproteins (HDL) play an important role in the transport of cholesterol within the body (50).

It was concluded from this study that biochemical parameters of blood in Iraqi female one- humped camel that, There are high variations between the present findings and those from previous workers that may be attributed to the variation nutrition, husbandry or assay methodology, diseases or metabolic changes reflect the different physiology, genetics and environmental conditions.

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