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SOME BIOCHEMICAL CHANGES IN THE BLOOD SERUM CONSTITUENTS OF SHE-CAMEL IN RELATION TO DIFFERENT PHASES OF OVARIAN ACTIVITY

(With One Table)

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بعض التغيرات البيوكيميائية في مكونات مصل دم النوق بالنسبة للأطوار المختلفة لنشاط المبيض

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شمل البحث تقدير تركيزات بعض مكونات مصل دم النوق مثل الكالسيوم والفوسفور والماغنسيوم والحديد والجلوكوز والكوليسترول والدهون الكلية مقدرة بالمليجرام لكل ١٠٠ملليمتر من الدم ، وكذلك البروتينات الكلية والألبومين والجلوبيولين مقدرة بالجرام لكل ١٠٠ ملليتر من الدم لعدد ٢٦ ناقة ناضجة غير عشار من فصيلة الجمل وحيد السنام ، وذلك خلال الأطوار المختلفة لنشاط المبيض . وقد لوحظ وجود زيادة معنوية في مستوى الكالسيوم والفوسفور في مصل النوق التي وجد بمبايضها حويصلات ناضجة عن تلك التي لم يوجد بمبايضها آية علامات للنشاط . كما تبين وجود زيادة في مستوى الماغنسيوم في مصل النوق التي وجد بمبايضها حويصلات ناضجة أو أجسام صفراء عن ذات المبايض الخاملة ، إلا أن تلك الزيادة كانت معنوية في حالة الحويصلات الناضجة فقط . هذا بالإضافة إلى أنه قد إتضح وجود زيادة معنوية جداً في مستوى الكوليسترول أثناء مرحلة سكون المبايض مقارنة بمراحل نشاط المبايض الأخرى

SUMMARY

The concentrations of calcium, phosphorous, magnesium, iron, glucose, cholesterol, total lipids (mg/100 ml blood) and total proteins, albumin and globulin (g/100 ml blood) were estimated in the serum of 26 mature non-pregnant female one-humped camels (Camelus dromedarius) during the different phases of ovarian activity. A significant ($P/ 0.05$) increase of both calcium and phosphorous levels was observed in the serum of she-camels having mature follicles in their ovaries than those having smooth ovaries. Serum magnesium levels showed higher values among she-camels with mature follicles or corpora lutea than those with no structures in their ovaries. However, this increase was significant ($P/ 0.05$) only during the mature folliclar stage. Moreover, a significant ($P/ 0.001$) increase of serum cholesterol level was observed during non-follicular stage, when compared with the other two stages of ovarian activity.

INTRODUCTION

The estrus cycle of spontaneous-ovulator animals occurs in four distinct phases known as proestrus, estrus, met-estrus and diestrus. However, in she-camel, this classical terminology for these phases is not appropriate (WILSON, 1984), hence the cycle is generally named follicular wave. NAWITO, et al. (1967) classified the follicular wave of she-camel into mature follicular stage, atretic follicular stage, non-follicular stage and growing follicular stage.

The ovarian activity in she-camel was found to be mainly follicular rather than luteal (SHALASH and NAWITO, 1964 and MUSA and ABUSINEINA, 1978). However, corpora lutea may be occasionally present without pregnancy (ABDALLA, 1966; ABDO, et al. 1969; NAWAR, et al. 1978 and SHEHATA and ZAGHLOUL, 1988).

In other species, ovarian activity is greatly affected by the levels of circulating calcium, phosphorous, different trace elements,protein, glucose and cholesterol in the blood of the animal (OSMAN, et al. 1970; ROBERTS, 1971; Zintzen, 1972; HIDIROGLOU, 1979; LAING, 1979; ROWLANDS, et al. 1980 and SHEHATA, 1983). In she-camel, ovarian activity showed a great tendency to be seasonal (ASDELL, 1946; TAYEB, 1948; YASIN and WAHID, 1957 and WILSON, 1984). Moreover, SHEHATA and ZAGHLOUL (1988) recorded a significant increase in serum levels of calcium, phosphorous and total proteins during Spring in she-camel.

The present work was carried out to determine some serum biochemical constituents at different stages of ovarian activity in she-camel.

MATERIAL and METHODS

The material of the present work was collected from Beni-Adi slaughter - house (Assiut Governorate). Blood samples and ovaries of 26 non-pregnant mature female Egyptian one-humped camels (Camelus dromedarius) were collected. Blood samples were collected before slaughtering by jugular venipuncture into clean dry centrifuge tubes. Clear serum was obtained by centrifugation at 3000 r.p.m. for 15 minutes and was stored at -20°C until biochemical analysis was carried out. After evisceration, both ovaries of each animal were removed and stripped from the surrounding structures. The ovaries were examined grossly for the presence of ovarian cyclic structures to justfy the stage of ovarian activity of each animal.

The concentration of calcium phosphorous, magnesium, iron, glucose, cholesterol, total lipids (mg/100 ml blood) and total proteins, albumin and globulin (gm/100 ml blood) were estimated using test kits supplied by Biomerieux (Bains, France) and following the techniques described by GINDLER (1972); GOLDENBERG (1966); GINDLER (1971); PICCARDI, et al. (1972); SIEST, et al. (1981); RICHMOND (1973); SCHMIT (1964); PETERS (1968) and DRUPT (1974), respectively. Serum calcium/phosphorous ratio

(C/P) and albumin/globulin ratio (A/G) were calculated mathematically. The obtained results were statistically analysed according to the procedures of MINIUM and CLARKE (1982).

RESULTS

The different values of serum biochemical parameters in relation to the observed ovarian structures, are shown in table (1). Eleven (43.31%) she-camels were having mature follicles, 10 (38.46%) with corpora lutea and 5 (19.23%) with no structures in their ovaries. A significant ($P < 0.05$) increase of both calcium and phosphorous levels was observed in the serum of animals having mature follicles in their ovaries than those having smooth ovaries. An increase of both parameters was also observed in the serum of she-camels with corpora lutea than those with no structures, however, it was non-significant.

Calcium/phosphorous (C/P) ratio recorded a wide range in animals with mature follicles and corpora lutea than those with static ovaries. Statistically, there was no significant difference in (C/P) ratio between the three groups of animals. Serum magnesium showed higher values among she-camels having mature follicles or corpora lutea in comparison to those with no structures. This increase was significant ($P < 0.05$) during mature follicular growth only.

Non-significant differences were observed in the values of total proteins, albumin, globulin and A/G ratio between the examined animals at different phases of ovarian activity. Moreover, non-significant increase was noticed in glucose and total lipids values during mature follicular growth.

Serum cholesterol level showed a significant ($P < 0.001$) increase during non-follicular stage when compared with the other two stages of ovarian activity.

DISCUSSION

The results of the present work revealed the presence of a significant increase in calcium and phosphorous values during mature follicular stage of the cycle of the examined she-camels. Unfortunately, the available literature lacks any data concerning serum calcium and phosphorous levels at different stages of ovarian activity in she-camels. Therefore, comparison of the obtained values can not be carried out. However, they are taking the same trend of results previously recorded by several authors in cattle and buffaloes. FORD (1956); HIGNETT (1959); UNDERWOOD (1966); ROBERTS (1971); ZINTZEN (1972); FARRAG (1978) and SHEHATA (1983) concluded that calcium and phosphorous levels increased significantly in cyclic than acyclic animals. NOLLER, et al. (1977) and LAING (1979) pointed out that phosphorous is essential for many important physiological functions in the body. They added that reduced inorganic phosphorous in serum was accompanied by anoestrus and lower conception rate in females.

OSMAN, et al. (1970) recorded a significant increase in serum calsium and phosphorous values in fertile cows than infertile ones. Moreover, FARRAG (1978) was in agreement that calcium and phosphorous mean values were higher during estrus phase in buffaloes. However, these values decrease significantly during static ovarian condition.

Concerning serum magnesium, the obtained results showed a significant increase during mature follicular stage when compared with non-follicular stage. PATTLE, et al. (1966) and BRODAUF, et al. (1970) concluded that lower magnesium could only influence fertility through enzymatic reaction. OSMAN, et al. (1970) recorded that serum magnesium level was 6.76 mg% in normal cows and 2.87 mg% in those suffering from ovarian dysfunction. In buffaloes, RAGAB (1968); FARRAG (1978) and MIKHIL (1979) were in agreement that serum magnesium level was higher in cyclic than acyclic buffalo-cows.

A non-significant increase of serum total proteins was observed in the samples of she-camels with either mature follicles or corpora lutea in their ovaries than those in the non-follicular stage. These values are nearly similar to the mean values of total proteins in she-camels, previously recorded by EL-AMROUSI, et al. (1984). However, DHOBLE and GUPTA (1981) and FARRAG (1982) recorded a significant difference between cyclic and acyclic cows and this was due to protein deficiency in the latter animals.

The serum glucose levels in the present work recorded non-significant differences between different stages of ovarian activity. Similarly, BLOWEY, et al. (1973) and ROWLANDS, et al. (1980) found no significant relationship between blood glucose and fertility in cattle. Moreover, DOWINE and GELMAN (1976) and HUNTER (1977) found that conception has to be better when blood glucose concentration was increased at the time of mating.

Regarding serum cholesterol values, the obtained results revealed the presence of a significant increase during the non-follicular stage in comparison to the other both groups. This increase might be due to increased endogenous biosynthesis of cholesterol rather than due to a difference in the rate of catabolism (PUROHIT and KOHLI, 1977). SOMMER (1969) mentioned that about 25% of daily formed cholesterol are used in the synthesis of steroid hormones. Moreover, LOTTHAMMER, et al. (1971) and SOMMER (1975) revealed that fertility was better in cows with low cholesterol concentration.

Finally, it can be concluded that calcium, phosphorous magnesium and cholesterol levels in serum may vary at different stages of ovarian activity in she-camels and can be used as an important indicator.

Table (1)

Values of serum parameters at different stages of ovarian activity

Serum parameters	Stages of ovarian activity		
	Mature follicular stage (1)	Corpora lutea stage (2)	Non-follicular stage (3)
Calcium mg/100 ml	9.08± 0.95*	7.5 ± 0.7	5.3 ± 1.2
Phosphorous „ „	6.6 ± 0.4*	6.3 ± 0.9	5.1 ± 0.4
C/P ratio	1.37± 0.15	1.36± 0.17	1.04± 0.2
Magnesium „ „	9.95± 0.77	6.77± 1.4	5.96± 1.5
T.protein g/100 ml	6.7 ± 0.33	6.75± 0.3	6.5 ± 0.3
Albumin „ „	3.4 ± 0.24	3.04± 0.3	3.3 ± 0.2
Globulin „ „	3.3 ± 0.37	3.71± 0.3	3.2 ± 0.3
A/G ratio	1.26± 0.27	0.9 ± 0.13	1.1 ± 0.2
Glucose mg/100 ml	287.2 ±37.4	269.7 ±48.9	270.4 ±76.5
T. lipids „ „	167.8 ±30.9	155.1 ±23.52	142.6 ±19.8
Cholesterol „ „	126.8 ±48.3	64.1 ± 0.48	427.3 ±43.4***
Iron „ „	0.16± 0.30	0.14± 0.04	0.16± 0.05

(1): n = 11 (2): n = 10 (3): n = 5

* : Singificant (P/_ 0.05) *** : Significant (P/_ 0.001)

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