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EFFECTS OF FOLLICLES SIZE ON SOME BLOOD PARAMETERS IN SHE CAMELS SUFFERING FROM LONG CALVING INTERVAL

By

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ABSTRACT

The present study aimed to evaluated the effect of follicular size on some biochemical and hormonal profiles in serum of non pregnant dromedary she camels. During breeding season a total of 15 apparently healthy dromedaries she camels suffering from long calving interval extended to more than two years. Ultrasound examination of these animals were classified the animals into two groups according to follicular size, group 1 (n=10) with small sized follicle (2-4mm), group 2 (n= 5) with large sized follicles (10-20 mm).The blood was collected separately from each she camels with small and large follicles to estimate the changes in metabolic (glucose; cholesterol), hormonal (estradiol, progesterone, thyroid hormones) and ionic (ionic calcium; selenium). The result of this study revealed significant ($p<0.05$) increase in glucose, cholesterol,ionic calcium (Ca^{+2}) and selenium with increasing follicle size. Camels with small follicles had lower ($p<0.05$)serum progesterone,17 β estradiol and triiodothyronine (T3) than those with large follicles. Follicular size had non significant effect on serum T4 levels.

Keywords:

She Camel-Follicular Sizes-Serum-Biochemical- Hormones-Ultrasonoghraphic

INTRODUCTION

The breeding of the local camelids is seasonal that start at autumn and increase drastically until the end of winter,meanwhile,itdecreasessignificantlyatspringandsummer **(El-Harairy *et al.*,2010).**The follicular wave is a term replaces the estrous cycle.

It reflexes the physiological, structural and behavior changes that occur during identified period between one ovulation and another because camels are induced ovulation **(Padalino *et al.* 2016).**

The ovarian cells produce soluble substance like steroids hormone, growth factors **(Fortune *et al.*,2004)** inhibition factors **(Aruna kumari *et al.*, 2007),** ionic and fat substances **(Nandi *et al.*,2008),** as well as some of minerals and salts **(Sharma and Vasta, 1998).** All these substances play an important role in the metabolic activities of the ovarian cells.

The metabolic activities and characteristic of follicular cell wall during its growth and development are changeable, and variations in its biochemical compositions and size are expected **(Ali *et al.*, 2011).** Ultrasound is being used in she-camel for detecting ovarian follicular sizes **(Skidmore *et al.*, 1995; Tibary and Anouassi, 1996).**

The present study aimed to evaluated the effect of follicular size on some biochemical and hormonal profiles in serum of non pregnant dromedary she camels

MATERIAL AND METHODES

Animals:

The present study was conducted during the breeding season (from October - November) in Animal Production Research Institute (APRI), camel farm at Mattrouh governorate and some special camel farms in Mattrouh. A total of 15 apparently healthy with history of long calving interval over 2 years and free from parasitic infestation were used. She camels age was between 5 and 11 years old and weighing about 500 kg. According to ultrasound examination, she camels were classified into two groups. Group 1 (n=10) with small sized follicle (2-4mm) and group 2 (n= 5) with large sized follicles (10-20mm). The camels were housed in an open yard with shelter.

Feeding:

She camels were fed diet composed mainly of commercial concentrates mixture (12% crude protein and 70% TDN; 4.5kg/ head/day) in addition to a good quality roughage materials that were alfalfa hay in summer and Egyptian green alfalfa in winter (16kg/head/day). All animals had a free access to drinking water.

Blood sampling:

Blood samples were collected on plain vacutainer tubes. Serum was harvested after centrifugation of tubes plain vacutainer at 3000 rpm for 10 minutes, and then stored at -20^{o}C until analysis.

Estimation of some biochemical constituents in serum:

Blood samples were analyzed calorimetrically using commercial kits for: glucose, cholesterol and ionic calcium according to **Trinder, (1969); Richmond, (1973) and Gindler and king,**

(1972) respectively using Biodiagnostic and research reagents.The serum Se concentrations were measured using a graphite furnace atomic absorption spectrophotometer with Zeeman correction (Z-5000; Hitachi High-Technologies, Tokyo, Japan).

Estimation of some hormonal constituents in serum:

Progesterone (P4) **(Tietz, 1995),** estradiol (E17β**) (Wisdom, 1976),** total triiodothyronine **(Braverman,1996)** and total thyroxin **(Muzzaffari and Gharib,1998)** were assayed using ELISA micro wells kits (Monobind Inc. Lakeforest, CA92630.USA).

Statistical analysis:

Data were presented as mean ± SEM. Independent-samples T test was carried out for the obtained data using **SPSS,(2007**) program version 16.0 and $P \leq 0.05$ was considered as statistically significant.

RESULTS

Results revealed significant ($p<0.05$) increase in the concentration of serum glucose and serum cholesterol in large follicles than in small ones. Also, significant ($p<0.05$) increase was recorded in the concentration of serum Ca^{+2} and selenium in relation to the size of follicles. The concentration of estradiol -17 β, progesterone and triiodothyronine (T3) hormones were significantly ($p<0.05$) increased in large follicles compared to small ones of non pregnant she camels. However, follicular size had non significant effect on serum T4 levels.

Table (1): Concentration of some biochemical and hormones in serum of non pregnant dromedary she camels with small and large size follicles during breeding season mean values (± SE).

Parameters	Small follicles (2 - 4 mm)	Large follicles (10 - 20 mm)
Glucose(mg/dl)	**43.64±3.2^{b}**	**71.32±6.1^{a}**
Cholesterol(mg/dl)	**139.8±1.2^{b}**	**172.6±4.3^{a}**
Calcium (ca^{+2})(mg/dl)	**12.25±0.09^{b}**	**23.45±1.0^{a}**
Selenium(mg/dl)	**3.34±1.04^{b}**	**6.17±1.37^{a}**
Progesterone(ng/ml)	**0.37±0.07^{b}**	**0.97±0.06^{a}**
Estradiol 17β(pg/ml)	**27.42±5.6^{b}**	**39.03±3.7^{a}**
Thyroxine(µg/dl)	**7.4±0.3^{a}**	**6.29±1.1^{a}**
Tri-iodothyronine(ng/ml)	**11.52±0.14^{b}**	**18.06±2.04^{a}**

Mean values with different letters within the same row for each biochemical and hormones differed significantly ($p<0.05$).

DISSCUSION

The present study revealed that, serum glucose concentrations were significantly ($p<0.05$) higher in large follicles than in small ones. Results of the current study are compatible with previous studies in camels **(El-Shahat *et al.*, 2013;Padalino *et al.*,2016; Hassan *et al.*, 2018; Shehab-El-Din *et al.*, 2019).** Glucose metabolism is less intensive in large follicles compared to small ones **(Ying *et al.*, 2011).** In contrast to these results, **Rahman *et al.*, (2008)** observed higher glucose levels in small follicles than in large ones in dromedary camels**.** However, non-significant differences in the serum concentrations of glucose among the different follicle sizes similar findings were recorded by **Ghoneim *et al.*,(2013) and El- Bahr *et al.*, (2015).** The present study reported a significant ($p<0.05$) increase in the concentration of cholesterol with increase in the follicle size. The result of the current study is agreed with that previously recorded by **Albomohsen *et al.*,(2011) and Hassan *et al.*, (2018).** The granular cells need cholesterol during its growth and multiplication. Therefore it's withdrawn from follicular fluid led to decrease its concentration in the small sized follicles **(Endresen *et al.*,1990**). Nonetheless, when the size of follicles enlarged, its cell multiplication is decreased and leads to release cholesterol into the follicular fluid that used in the formation of sex steroids **(Su *et al.*, 2008).**The results of the current study are incompatible with previous reports in she camels that done by **Rahman *et al.*, (2008)** who found that, the lower level of cholesterol in the large follicles indicates the biotransformation of cholesterol to sex steroids. However, non significant difference in the serum cholesterol has been reported by **Ali *et al.*,(2008) and El -Bahr *et al.*, (2015)** in she camels.

The level of calcium ion concentration is significantly ($P<0.05$) increased with increase the follicular size. The results of the current study are agreed with previous studies in camels **(Hassan *et al.*, 2018).** Calcium plays an important role in the production of lipid hormones of the developing follicles and it regulates the secretion of breeding hormones necessary for ovaries and ovulation **(Iwata *et al.*, 2004).** Moreover, calcium ions are involved in the formations of estrogen; this hormone is increased during follicular development and consequently requires large quantities of calcium ions that withdraw from blood inside the follicular fluid, then raising its calcium concentration **(Nandi *et al.*, 2007).**

Growth of granulosa cells is considered an important feature during the developmental process of follicles; i.e., the folliculogenesis. The proliferation of small primary follicles (with fewer granulosa cells) to maturing pre-ovulatory follicles (with many strata of cells) is

the characteristic event in folliculogenesis **(Basini and Tamanini, 2000).**Selenium regulates the growth of the granulosa cells and 17β-estradiol bio-synthesis in adult ovaries **(Qazi *et al.*, 2018).** Also, Se levels are increased in large healthy follicles and might perform a vital antioxidant function during later growth and the proliferation of follicles**(Ceko *et al.*, 2015).** Regarding hormonal profiles, the result showed that in non - pregnant groups, there was a positive correlation between estradiol 17 β concentrations and follicular size. Similar findings were recorded in female dromedary camels **(Ali *et al.*,2011;El-Shahat *et al.*, 2013; 2019).** Estradiol 17 β alone has little effect on the granular cells in maturing follicles, but its effect is important in initiating LH receptor expression and responsiveness **(Segaloff *et al.*, 1990)** and prevention of atresia **(Billing *et al.*,1993).** Since all camels included in the present study were non pregnant,serum progesterone levels were expected to be low than 1ng/ml.Serum progesterone concentration was significantly ($p<0.05$) higher in camels have large follicles than that with small follicles. These results are similar with those reported by **Rahman *et al.*, (2008) and Ali *et al.*, (2011). Tibary and Anouassi (1997)** found that**,** serum progesterone levels were below 1.0 ng/ml in non pregnant camels in the absence of ovulation.

Camels having large follicles on their ovaries had significantly higher serum T3 contents than those with small ovarian follicles ($p<0.05$). However, the follicular size had non significant effect on serum T4 contents (Table 1).This finding agrees with previous studies in female dromedary camels **(Ali *et al.*, 2011).** According to **Spicer *et al.*, (2001)** T3 and T4 may have a major positive impact on LH production which would result in estrogen production by follicles that was contrary to those recorded by **Ghoneim *et al.*,(2013) and Rahman *et al.*, (2008).**

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