Dept. of Theriogenology,
Faculty of Vet. Med., Assiut University,
Head of Dept. Prof. Dr. M. Abdel-Raouf.

# SEASONAL CHANGES IN SERUM TESTOSTERONE LEVEL AND IN SOME GENITAL ORGANS OF ONE-HUMPED MALE CAMELS

(With Two Tables)

By
S.H. SHEHATA and A.H. ZAGHLOUL

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التغيرات الموسمية في مستوى هرمون التستوستيرون وأوزان
بعض الأعضاء التناسلية فى ذكور الجمل وحيد السنام

شحاته حسن ، أحمد زغلول

تم في هذا البحث تقدير مستوى هرمون التستوستيرون خلال فصول العام المختلفة ومقارنتها بالنسبة لأوزان الخصية والبربخ وغدة البروستاتا وكذا قطر مجرى البول الحوضى لعدد ٢٩ ذكر ناضج من الجمل وحيد السنام . وقد أظهرت الدراسة وجود زيادة معنويه في مستوى هرمون التستوستيرون بالمصل خلال فصل الربيع مقارنة بفصول الخريف والشتاء والصيف . كما لوحظ وجود زيادة معنويه في وزن الخصية وغدة البروستاتا خلال فصل الربيع مقارنة بفصول العام الأخرى ، بينما لم تلاحظ أية اختلافات معنويه في كل من وزن البربخ أو قطر مجرى البول الحوضي خلال فصول العام . كما تبين وجود ارتباط معنوي سالب بين مستوى هرمون التستوستيرون وكلا من وزن الخصية ووزن البربخ خلال فصل الصيف ، بينما لم يكن هناك ارتباط معنوي بين مستوى الهرمون وبقية المعايير خلال فصول العام . هذا بالاضافة الى أنه قد تبين وجود ارتباط معنوي ايجابي بين كلا من وزن الخصية ووزن البربخ أثناء فصل الربيع .

## SUMMARY

Serum testosterone level was determined during the different seasons of the year in relation to testicular, epididymal and prostate gland weights and the diameter of pelvic urethra of a total of 29 adult one-humped male camels (Camelus dromedarius). Serum testosterone level showed a significant increase ($P < 0.001$) during spring than during Autumn and Winter and a significant increase ($P < 0.05$) than during Summer. A significant increase ($P < 0.05$) in testicular and prostate gland weights was observed during Spring than during other seasons of the year. No significant variations were observed in the epididymal weight or the diameter of pelvic urethra at the different seasons. A

significant negative correlation ($P < 0.05$) between testosterone level and both of testicular and epididymal weights was observed during Summer. However, a non significant correlation was found between testosterone level and different criteriae during other seasons of the year. Moreover, a significant correlation ($P < 0.01$) was detected between testicular and epididymal weights during Spring.

## *INTRODUCTION*

The reproductive process of the one-humped male camel (Camelus dromedarius) is not fully understood and the available informations about whether this animal is a seasonal breeder or not, show several inconsistencies. The male camel is said to reach sexual maturity at about five (NOVOA, 1970) or six years of age (YASIN and ABDUL-WAHID, 1957). The mating (rutting) season of the male camel is from December to March in Pakistan (YASIN and ABDUL-WAHID, 1957), from November to February in India (SINGH and BHARADWAJ, 1980), during Spring in Egypt (ABDEL-RAOUF, et al. 1975), between June and October in Sudan (EL-AMIN, 1979), during Spring (March-April) and at other times of the year, if grazing is good, in Somaliland (HORTLEY, 1979) and between January and April in Sinai Desert (YAGIL and ETZION, 1980). NOVOA (1970) revealed that breeding seasons of the camel vary geographically, suggesting that environmental factors affect the temporal pattern of reproduction.

GOMES, et al. (1971) found that high ambient temperature had the effect of reducing testosterone prodution. They added that it seemed possible that the effect of the environment on the reproductive cycle of the camel is a result of thermal stress. KALRA and KALRA (1978) reported that there is an evidence that gonadal steroid secretion in male and females is closely linked to the hypothalamohypophysio-adrenal axis. YAGIL and ETIZON (1980) recorded that a higher plasma testosterone level was detected during rutting season than during the rest of the year. However, GOMBE and ODOUR-OKELO (1977) recorded a well-defined monthly fluctuations in testosterone level in the dromedary. DIXIT, et al. (1987) mentioned that the peak of testosterone level in serum during rutting was about 2.35 ng/ml. Concerning testicular activity, VOLCANI (1954) and CHARNOT (1964) revealed that there is a direct correlation between testicular weight and sexual activity. An increase in testicular and epididymal weights was observed in February - March during rutting period and another increase was found in August-October. ABDEL-RAOUF, et al. (1975) observed an increase in the diameter of the seminiferous tubules during Spring especially during March. CHARNOT (1964) concluded that although the weight of the testis was correlated with rutting season, there were signs that spermatogenesis was present throughout the year.

The present work was carried out to clarify the effect of the season of the year on serum testosterone level in relation to testicular, epididymal and prostate gland weights of the one-humped male camel.

## *MATERIAL and METHODS*

The material of the present work was collected from Beni-Adi slaughter house (Assiut Governorate). Blood samples were collected from a total of 29 adult (6-12 years old ) male Egyptian one-humped camel over the course of one year. Blood was collected just before slaughtering through jugular venipuncture into clean dry centrifuge tube. The collected blood was transfered in a thermos containing crushed ice to the laboratory, where serum was separated by centrifugation at 3000 r.p.m. for 15 minutes at 4°C. Clear serum was allocated in small vials, labeled and stored at -20°C untile the time of hormone assay. After evisceration, male gential organs, including testes, epididymes prostate gland and pelvic urethra, were collected. Disection of this material from the adjacent tissues was carried out and their weights were determined using an electric balance. Moreover, the diameter of the pelvic urethera was measured using a caliper.

Testosterone hormone was estimated in serum samples using Coated-A count total testosterone kit supplied by Dignostic corporation, U.S.A. and following the techniques of the manufacturer and BLANCO, et al. (1981). The obtained results were statistically analysed according to the procedures of MINIUM and CLARKE (1982).

## *RESULTS*

The results of seasonal variations of testosterone level, testicular, epididymal and prostate gland weights together with the diameter of pelvic urethra, are presented in table 1. Serum testosterone increased significantly ($P \leq 0.001$) during Spring than during Autumn and Winter and significantly ($P \leq 0.05$) than during Summer.

Concerning testicular weight, the obtained results showed marked increase during Spring and Winter, however, this increase was significant ($P \leq 0.05$) during Spring only. A significant ($P \leq 0.05$) increase was also observed in the prostate gland weight during Spring than during Winter. On the other hand, no significant variations were noticed in epididymal weight or the diameter of pelvic urethra at the different seasons.

The results of correlation between different items during different seasons of the year are shown in table 2. Testosterone level was significantly correlated ($P \leq 0.05$) with testicular and epididymal weights during Summer. Moreover, a high correlation coefficient ($r = 0.87$) was obtained between testicular and epididymal weights during Spring.

## *DISCUSSION*

The mean testosterone concentration during Spring (3.68±0.54) showed a significant (P/ 0.05) increase than during Summer (1.56±0.55 ng/1). This increase was highly significant (P/ 0.001) than during Autumn and Winter (1.04±0.36 and 1.02±0.27 ng/ml, respectively). These results are nearly similar to those previously recorded by DIXIT, et al. (1987) who revealed that the peak testosterone cocentration in camels during rutting season was about 2.35 ng/ml. On the other hand, lower testosterone level was recorded by GOMBE and ODOUR-OKELO (1977) and a too much higher level of the hormone (about 30 ng/ml) during rutting, was recorded by YAGIL and ETZION (1980).

This seasonal fluctuation in testosterone level might be attributed to, the effect of primary rythm of gonadotrophine (QUABBE, 1978) or the gonadotrophin-releasing hormone LHRH (KALRA and KALRA, 1978). Moreover, ABDEL-RAOUF, et al. (1975) and SINGH and BHARADWAJ (1980) revealed that edyig cells increased both quantitatively and qualitatively during rutting season. YAGIL and ETZION (1980) suggested that the variations in testosterone level among camels at different localities, may be due to different ecological factors. In this respect, GOMES, et al. (1971) added that the heat load may be an important environmental factor influencing gonadal function in the tropics because of the high relative humidity exerting increased effect of temperature on Leydig cell function. Concerning testicular weight, the obtained results showed a significant increase (P/ 0.05) during Spring and Winter than during Summer and Autumn. Moreover, a non significant correlation was observed between testicular weight and testosterone level. Similar seasonal changes in the weight of the camel testes were previously recorded by YASIN and ABDUL WAHID (1957), CHARNOT (1964), OWAIDA (1973), EL-WISHY and OMAR (1975), WILSON (1984) and ZAGHLOUL, et al. (1988).

The present study revealed also that the testicular weight was significantly correlated with the epididymal weight (r = 0.87) and prostate gland weight (r = 0.57) during Spring at which, serum testosterone level increased markedly. These findings are strongly supported by those previously reported by OSMAN and EL-AZAB (1974) who found that the spermatozoa content per gram testicular tissues and the epididymal capacity to store spermatozoa increased significantly during Spring in male camels.

Therfore, it can be concluded that the seasonal increase of testosterone level during Spring together with the significant correlation between testicular weight and both of epididymal and prostate gland weights, give a strong indication that Spring is the season of rutting of the one-humped male camel in Egypt.

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Table (1) : Seasonal Variations in testosterone level and weight of some parts of the genital tract.

| Criteria | Spring n=12 | Summer n=3 | Autumn n=7 | Winter n=7 |
|---|---|---|---|---|
| Testosterone (ng/ ml) | 03.68 + 0.54 | 01.56 +0.55* | 01.04 +0.36*** | 01.02 + 0.27*** |
| Testicular wt.(gm) | 78.00 +10.80 | 53.30 +4.60* | 66.40 +4.60 | 79.00 +13.50 |
| Epididymal wt. (gm) | 16.4 + 1.1 | 16.00 +1.5 | 16.1 +0.5 | 15.8 + 1.5 |
| Prostate G.wt. (gm) | 23.7 + 1.5 | 22.6 +3.7 | 21.00 +2.4 | 19.00 + 1.4* |
| Pelvic uerthra 0 (cm) | 2.8 + 0.1 | 2.7 +0.2 | 2.8 +0.06 | 2.5 + 0.1 |

P< 0.05 P< 0.01
P< 0.001 += SE

Table (2) : Correlation coefficient (r) of the obtained data

| Criteria | Spring | | | | Summer | | | | Autumn | | | | Winter | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Testost. | Test.wt | Epid.wt | Prost.wt | Testost. | Test.wt | Epid.wt | Prost.wt | Testost. | Test.wt | Epid.wt | Prost.wt | Testost. | Test.wt | Epid.wt | Prost.wt |
| Testosterone | 1 | 0.16 | 0.37 | -0.2 | 1 | -0.99* | -0.99* | 0.59 | 1 | -0.12 | 0.17 | 0.32 | 1 | -0.06 | -0.22 | -0.06 |
| Testicular wt. | | 1 | 0.87** | 0.57* | | 1 | -0.6 | -0.6 | | 1 | 0.49 | 0.15 | | 1 | -0.47 | 0.49 |
| Epididymal wt. | | | 1 | 0.49 | | | 1 | -0.23 | | | 1 | 0.63 | | | 1 | 0.56 |
| Prostate wt. | | | | 1 | | | | 1 | | | | 1 | | | | 1 |

* P < 0.05 ** P < 0.01 *** P < 0.001