Vet. Med. J., Giza. 38, No. 3, 439-446 (1990)

FLUCTUATIONS OF SERUM GONADOTROPINS AND THEIR SPECIFIC PROTEIN BINDING CAPACITIES DURIOUS STAGES OF FOLLICULAR DEVELOPMENT IN SHE-CAMEL

BY

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(Received:1 . 10.1990)

ITRODUCTION

Camel is considered one of the important sources of animal products. In order to attain an optimal production of this species, an accurate knowledge about the reproductive performance of she-camel should be well established. Previous studies clarified that ovulation in she-camel is induced by copulation (Musa and Abu-Sineina, 1978 and Hafez, 1980). Moreover, Taha et al., (1984) demonstrated that the reproductive cycle in non-pregant camels is restricted only to the follicular development with the absence of corpora lutea. Also, Mahmoud (1976) claimed that she-camel has a breeding season extending from December to April in Egypt.

It was previously documented that follicle stimulating hormone (FSH) and luteinizing hormone (LH) have a synergistic role for the regulation of the functional activity of the ovaries (Swenson, 1977; Mc-Donald. 1980, Aboul-Ela, 1981; Radwan et al., 1984 and El - Ghandour, 1985). Furthermore, the level of these hormones in the circulation could be modulated according to the potency of their specific protein binding substances (Ateia, 1985 in sheep; El-Ghandour, 1985 in cattle and buffalo and Aboul-Ela et al., 1986 and 1990 in camel).

Therefore, this work was devoted to study variations of serum FSH and LH levels as well as their specific protein binding potencies in relation to different stages of follicular development in she-camel.

MATERIAL AND METHODS

Thirty individual blood samples with their corresponding ovaries were collected from non-pregnant she - camels during the breeding season (December, 1989 - March, 1990) from Cairo abattoir. The blood samples were equally divided into 3 groups according to diameter of the follicles. The first group had ovaries with small follicles (2-5 mm). The second and third groups had ovaries with medium (5 - 10 mm) and large (more than 10 mm) follicles. Sera were separated and kept at - 20°C till the hormonal assay. Estimation of serum FSH and LH besides their specific protein binding potencies was done using the indirect enzyme-linked immunosorbent assay (ELISA) as described by Voller et al., (1979). Determination of the specific serum protein binding activity for FSH and LH was expressed as the obility of the serum to neutralize a fixed standard dilution of the specific hormone (El-Ghandour, 1985). Standard pregnant mare serum gonadotropin "PMSG" (Gestyl, Nile Co., Egypt) were used as antigens for the preparation of their specific rabbit antisera (Tadeusz, 1974). Statistical analysis of the data was carried out according to Snedecor (1971).

RESULTS

Data presented in Table 1 showed that as the follicles became more developed, serum FSH level decreased while its binding activity increased. Maximal serum LH level was in animals with small follicles while the hormone

Table 1 : FSH and LH levels as well as their specific protein binding activities in the serum of she-camels during various stages of follicular development (Mean ± S.E.)

Diameter of the follicles (mm)	FSH (i.u./ml)	FSH protein binding potency (i.u./ml)	LH (i.u./ml)	LH protein binding potency (i.u./ml)
Small follicles (2 - 5 mm)	6.83 ± 0.41^{a}	0.23 ± 0.04^{a}	2.41 ± 0.23^{a}	0.42 ± 0.03^{a}
Medium follicles (5 - 10 mm)	4.79 ± 0.36^{a}	0.49 ± 0.08^{a}	0.68 ± 0.08^{ab}	0.89 ± 0.10^{a}
Large follicles (more than 10 mm)	3.04 ± 0.27^{a}	0.91 ± 0.11^{a}	2.06 ± 0.31^{b}	0.12 ± 0.02^{a}

Values in the same column having an identical letter differ significantly from each others at $P < 0.01$.

binding capacity was minimal in animals with large follicles.

DISCUSSION

It is generally accepted that the reproductive performance in domestic animals is translated, to a great extent, through hormones mainly gonadotropins. The present study is an endeavor to correlate between ovarian status and variations in serum gonadotropins as well as their specific serum protein binding activity in she-camel.

It appears from Table 1 that free serum FSH level was maximal in animals with small follicles, in the meantime its serum binding potency was minimal. This pattern seems to be necessary to provide the ovary with an ample supply of free FSH responsible for stimulation of the follicles growth. This suggestion comes in agreement with previous studies of Radwan et al., (1984) in she-camel and El-Ghandour (1985) in cow and buffalo. Abdo and El-Mougy (1976) and Taha et al., (1984) recorded that there was a positive correlation between serum estrogens level and the diameter of the ovarian follicles in she-camel. Also Nasr et al., (1961); Radwan et al., (1984) and Ateia (1985) concluded that estrogens have an inhibitory influence on serum FSH. Therefore, the gradual decline in serum FSH level with the increase of its protein binding activity in she-camels with medium and large follicles, recorded in the present study, could be accepted.

Regarding LH, its maximal level in the serum was recorded in she-camels with small follicles, meanwhile its specific binding activity was relatively low (Table 1). Previous reports showed that LH augments the action of FSH for the growth of the follicles (Nequin et al., 1979; Radwan et al., 1984 and Ateia, 1985). Furthermore, FSH alone was ineffective to induce its stimulatory

action upon the follicles (McDonald, 1980). In animals with medium follicles, data of the present study disclosed that serum LH level was minimum with maximal protein binding capacity to the hormone. She-camels having large follicles exihibited a minimal binding potency to the circulating LH level which did not differ significantly than its level recorded in animals with small follicles (Table 1). Ovulation occurs in all mammals in response to LH (Swenson, 1977). Moreover, ovulation in induced ovulators is a physiological event calls on both nervous and endocrine systems for its culmination. Stimulation of the cervix during copulation causes impulses to travel through the spinal cord to the hypothalamus resulting in secretion of LH-RH which enhances the release of LH from the pituitary gland to the circulation (McDonald, 1980). Under such circumstance, it is logic to detect in the present study the minimal binding potency to LH in the circulation of favour suitable conditions for the free released hormone to induce ovulation of the ripe follicles.

Thus, from the present investigation it could be concluded that in she-camel FSH and LH act synergistically for maintenance of the follicular formation and growth. The protein binding capacity for each hormone undergoes variations coincide with the stage of follicular development. The minimal binding activity to LH was detected in animals with large follicles so that it furnishes free released LH to induce ovulation.

SUMMARY

Both serum FSH and LH levels as well as their specific protein binding activity were determined during different phases of follicular development in she-camels using the ELISA technique. Gonadotropins and their specific binding capacities in the serum showed certain fluctuation which match with the requirements of the

functional activity of the ovaries. It was concluded that ovarian activity in she-camel depend not only on the level of serum gonadotropins but also on the variations of their specific binding potencies.

RFERENCES

1. Abdo, M.S. and El-Moughy, S.A. (1976): Hormonal variations in the blood of the one humped camel (Camelus dromedarius) during the various reproductive stages. II. Free estrogens content in the ovaries and blood. Vet. Med. J., 26: 71-76.

2. Aboul-Ela, A. (1981): Changes in the anterior pituitary of the buffalo in relation to activity. M.V.Sc. Thesis, Cairo Univ.

3. Aboul-Ela, A.; El-Ashalany, M.A.; Ragab, A.M.; Rashad, S.M. and Gad El-Maula, B. (1986): Variations of gonadotropins in male camels naturally infected with Trypanosoma evansi and after treatment. Vet Med. J., 34: 365-373.

4. Aboul-Ela, A.; El-Seify, M.A.; Abu El-Magd, M.M. and Gomaa, A. (1990): Alterations of gonadotropins in male camels naturally infected with Dipetalonema evansi before and after treatment. In Press.

5. Ateia, M.M. (1985): Cyclic variations in inhibin and competitive protein binding to gonadotrophin during estrous cycle in ewes. Ph. D. Thesis, Cairo Univ.

6. El-Ghandour, S.M. (1985): Role of gonadotrophin binding proteins in regulating reproductive performance of cows and buffaloes. Ph. D. Thesis, Cairo Univ.

7. Hafez, E.S.E. (1980): Reproduction in Farm Animals. 4th Ed., Lea and Febiger, Philadelphia, USA.

8. Mahmoud, U.A. (1976): Histological and histochemical studies on the endometrium of the she-camel in relation to ovarian activity. Ph.D. Thesis, Cairo Univ.

9. McDonald, L.E. (1980): Veterinary Endocrinology and Reproduction. 3rd Ed., Lea and Febiger, Philadelphia, USA.

10. Musa, B.E. and Abu-Sineina, M.E. (1978): The estrous cycle of the camel. Vet. Rec., 103: 556-557.

11. Nasr, H.; Soliman, F.A. and Abdou, M.S. (1961): Variations in the levels of follicle stimulating and luteinizing hormones in the blood of ewes during the estrous cycle. Vet. Med. J., 7: 175-180.

12. Nequin, L.G.; Abdrez. J. and Schwartz, N.B. (1979): Measurement of serum steroid, gonadotrophin levels and uterine and ovarian variables throughout 4 days at 5 days estrous cycle in the rat. Biol. Reprod., 20: 659-670.

13. Radwan, Y.M.; Ismail, A.A.; El-Badry, A.A. and El-Mougy, S.A. (1984): Variations in the plasma levels of total estrogens, FSH, LH, prolactin and TSH in she-camel (Camellus dromedarius).
I. During different stages of follicular development and cystic ovary. Ann. Conf. of the Society for the study of fertility. Reading, UK., July 11-13.

14. Sendecor, G.W. (1971): Statistical Methods. 14th Ed., Ames, Iowa, The Iowa Univ. Press, USA.

15. Swenson, M.J. (1977): Dukes' Physiology of Domestic Animals. 9th., Cornell Univ. Press, Ithaca and London.

16. Tadeusz, S. (1974): Attempts to determine immunologically the activity of pregnant mare's serum gonadotrophins. Bull. Vet. Institt, Pulawy, 18: 108-111.

17. Taha, A.; El-Mougy, S.A.; Heshmat, H.A. and Ismaiel, A.A. (1984): Some endocrine changes during the ovarian activity of the non-pregnant one humped camel, Camelus dromedarius. Egypt. J. Vet. Sci., 21: 115-120.

18. Voller, A.; Bidwell, D.E. and Bartlett, A. (1979): The Enzyme Linked Immunosorbent Assay (ELISA). The Zoological Society of London, pp. 16-17.