

Determination of the fetal age through progesterone level in Dromedary camels (*Camelus dromedarius*)

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Abstract: Few studies were carried out concerning the hormonal profile during gestation in humped camel. The aim of the present work was to study the levels of progesterone hormone at the determined ages humped camel. The fetuses were collected from Cairo abattoir at different gestational ages and taken to the laboratory where the fetal age were determined by crown vertebral rump length (CVR), the developmental standard morphometrically methods were used. Biometrically the weight of the fetus, CVR increased with the advancement of gestational ages (1st trimester to the 3rd trimester). The hormonal profile of progesterone was estimated by RIA. The progesterone values showed increasing pattern of 1.8 ± 0.79 ng/ml, 2.38 ± 1.00 ng/ml and 2.95 ± 1.3 ng/ml for the first (up to 4 months), second (4 to 8 months) and third stage of pregnancy (9 months up to full term) respectively. Moreover, this pregnancy may be confirmed by the ultrasound. While in the second stage of pregnancy (4-8 month) it is quite difficult to detect the age of the fetus by ultrasonography; since the fetus is large in size the hormonal level may be of value to determine (approximately) the fetal age.

Keywords: Humped camel, gestation, fetus, progesterone, pregnancy, ultrasonography.

INTRODUCTION

With the advance of technology (ultrasonography) in the determination of fetal age; still the gross and morphometric method is used for studying the developmental changes during gestational period in slaughter house materials which is available and not expensive compared to the living animals; at the same time estimation of progesterone hormone is done. Few reports were carried out concerned the hormonal profile during the late stage of pregnancy in one humped camel, while with early stage; a lot of research was done in mares; cattle and buffalos depending mainly on ultrasonography but not on hormonal values (Hunnam *et al.*, 2009) and in goats (Koker *et al.*, 2012). Gestation periods were divided into stages according to cranial vertebral length rump (CVR) (Williamson and Payne, 1978). The size of the fetus at different stages of gestation and the rate of change of the quantities and proportions of the two fetal fluid is of interest to the clinician (Laing, 1979; Agarwal *et al.*, 1987; Howida *et al.*, 2017). Progesterone's main importance, the maintenance of pregnancy, is achieved by its production from different sources as corpus luteum, placenta and adrenals in different animals (Jöchle and Lamond, 1980 Amal *et al.*, 2015.);

The mean progesterone levels fluctuated between 4 and 5ng/ml throughout pregnancy except for a slightly lower value at 9 to 10 months of gestation. On an average, the camels carrying a male fetus had higher progesterone levels (5.13 ± 0.69 ng/ml) than those carrying a female fetus (3.45 ± 0.28 ng/ml) The

data suggested that the steroid hormone levels are influenced by the stage of pregnancy and sex of the fetus (Agarwal, 1987). Progesterone quantities rise after a successful mating. This significant rise was ≥ 2.96 ng/ml two days after mating in all female. These levels decrease and tend to basic level at calving day (Kamoun and Jemmali, 2014).

For all studied females the average of serum progesterone is 3.99 ± 1.26 ng/ml she-camel. The overall mean of progesterone concentration was slightly higher during pregnancy in the first half than the second half [7]. In a study to assess the potential of progesterone as pregnancy indicator, in pregnant llamas and alpacas, it was detectable 4 days after breeding and was maintained > 2 ng/mL throughout pregnancy (Bravo *et al.*, 1996). While in Bactrian camel, serum progesterone concentrations increased by 15 d after artificial insemination (AI) and remained elevated throughout most of gestation, the mean concentrations were similar to those reported for many species during the same stage of pregnancy (Zhao *et al.*, 1998).

The reproductive physiology of camel has been incompletely characterized. Most literature describe general characteristic such as occurrence, growth, maturation, diets and pregnancy rate (Kamoun and Jemmali, 2014; Hammadi *et al.*, 2001; Ayoub *et al.*, 2003; Deen, 2008; Babiker *et al.*, 2011; Mostafa *et al.*, 2018). Twenty three blood samples were taken from pregnant she camels. Fetal age was determined according to formula given by EL-Wishy (1981) and Bella *et al.* (2012). The aim of the present work is to study the levels of progesterone hormone at the determined ages.

MATERIAL AND METHODS

Study area:

Present study was carried out at National Research Centre, Cairo Egypt. All samples were taken from Cairo abattoir at 25 December 2017.

Blood sampling and preparation:

Twenty three blood samples from pregnant she camels are taken. Samples were centrifuged at 3000 rpm and serum was stored at -18 °C until the hormonal assay was done.

Progesterone hormone estimation:

Progesterone hormone was estimated by RIA technique according to Stupnicki (1974) at the Institute of Physiology and Nutrition - Jabłonna – Poland.

Fetal age determination:

Fetal age was determined according to the formula (EL-Wishy (1981) : Bella *et al.* (2012) [14,15].

$$\text{Age of embryo} = \frac{\text{CVR (cm)} + 23.99}{0.366}$$

Statistical Analysis:

All data were subjected to one-way analysis of variance (ANOVA) at a 95% confidence limit, using SPSS software, version 16.19.

RESULTS AND DISCUSSION

As shown from tables 1, 2 and 3; the increase in the gestation is accompanied by an increase in CVR of the fetus. Moreover, the progesterone values showed increasing pattern of 1.8 ± 0.79 ng/ml, 2.38 ± 1.00 ng/ml and 2.95 ± 1.3 ng/ml for the first (up to 4 months), second (4 to 8 months) and third stage of pregnancy (9 months up to full term) respectively. The overall mean progesterone was 2.35 ± 1.09 ng/ml

for all samples covering the whole pregnancy. These results disagree with those of (Kamoun and Jemmali, 2014) who reported, in Camelus dromedaries, slightly higher figures during pregnancy in the first half than the second half 4.37 ± 1.38 ng/ml vs. 3.70 ± 0.96 ng/ml. Moreover, the results did not match with (Zhao *et al.*, 1998) who reported higher serum progesterone concentrations in Bactrian camel (3.06 ± 0.49 to 8.51 ± 4.80 ng/mL) throughout most of gestation. While the results agree with those of Bravo *et al.*, (1996). in pregnant llamas and alpacas, as progesterone was detectable 4 days after breeding and was maintained > 2 ng/mL throughout pregnancy.

The fluctuation in progesterone levels may be attributed to the difference in type of the fetus which is not recorded. This fluctuation is in agreement with. Agarwal *et al.*, (1987) who stated that the camels carrying a male fetus had higher progesterone levels (5.13 ± 0.69 ng/ml) than those carrying a female fetus (3.45 ± 0.28). Moreover, the steroid hormone levels are influenced by the stage of pregnancy and sex of the fetus. Although, the general characteristics as occurrence, growth, maturation, diets and pregnancy rate; have been described in most literature in camel; its reproductive physiology has been incompletely studied (Kamoun and Jemmali, 2014; Hammadi *et al.*, 2001; Ayoub *et al.*, 2003; Babiker *et al.*, 2011; Mostafa *et al.*, 2018). It was clear that concentration of progesterone level (ng/ml) increased with increasing gestation period in she-camel and increasing the fetal age especially 1st stage and 2nd stage while the 3rd stage was of non significance, So, it may be said that the progesterone level is of value in determine the fetal age in camel tables 1,2 and 3.

Table 1: Fetal age, CVR and progesterone in she- camel (1-4 months).

No.	Gestation (in days)	Cranial Vertebral Rump (Cm)	Progesterone (ng/ml)
1	89	8.5	0.6
2	92	9.5	2.1
3	107	15	2.8
4	109	16	1.2
5	116	18.5	2.9
6	123	21	1.2
7	127	22.3	1.8
			Mean \pm SD 1.8 ± 0.79

Table 2: Fetal age, CVR and progesterone in she- camel (5 -9 months).

No.	Gestation (in days)	Cranial Vertebral Rump (Cm)	Progesterone (ng/ml)
1	137	26	1.2
2	156	33	2.1
3	171	38.5	3.6
4	199	49	0.6
5	202	50	3.2
6	208	52	2.9
7	218	56	1.8
8	224	58	2.1
9	235	62	2.7
10	246	66	3.6
			Mean \pm SD 2.83 ± 1.00

Table 3: Fetal age, CVR and progesterone in she- camel (10 months -full term).

No.	Gestation (in days)	Cranial Vertebral Rump (Cm)	Progesterone (ng/ml)
1	298	85	2.1
2	301	86	5.2
3	311	90	3.6
4	317	92	1.8
5	331	97	3.1
6	369	111	1.9
			Mean \pm SD 2.95 \pm 1.30

CONCLUSIONS: From the present study it was concluded that in the first stage of pregnancy (1-4 months); progesterone level may be an evidence for pregnancy, moreover, this pregnancy may be confirmed by the ultrasound. While in the second stage of pregnancy (4-8 month) it is quite difficult to detect the age of the fetus by ultrasonography; since the fetus is large in size. So, in both Dromedary, Bacterin camel and in Llama; the hormonal level may be of value to determine (approximately) the fetal age. Regarding the last stage of pregnancy (9 months to full term); the progesterone level shows non significant increase, than the second stage. So, it may be said that the progesterone level is of value in determine the fetal age in camel.

REFERENCES

1. Amal M A El-M , Mahmoud A I E , Faten, I Gabr, Omima H E et al., 2015. Thyroid and Sex Hormones in Serum of Pregnant and Non Pregnant Camels (*Camelus dromedaries*) Egypt. J. Vet. Sci. Vol. 45-46 pp. 41-53.
2. Agarwal SP , Khanna ND,; Agarwal VK and Dwaraknath PK, et al., 1987. Circulating levels of estrogen and progesterone in female camel (*Camelus dromederius*) during pregnancy Theriogenology, vol 28, issue 6: 849-859.
3. Ayoub MA, El-Khouly AA and Mohamed TM, et al., 2003. Some hematological and biochemical parameters and steroid hormone levels in the one-humped camel during different physiological conditions. Emirates Journal of Agricultural Science, 15 (1): 44 – 45.
4. Bravo PW, Stewart D R, Lasley B L and Fowler ME, *et al.*, 1996. Hormonal indicators of pregnancy in llamas and alpacas. Journal of the American Veterinary Medical Association 208 (12):2027-30.
5. Babiker E A, Ahmed A I, Husna M E and Abdel-Aziz B, et al., 2011 Serum testosterone and progesterone levels and ovarian activity as indicators for seasonal breeding in dromedary camels in Sudan. roavs, 1(5), 309-312.
6. Bello A, Onyeanusi B I, Sonfado M L, Adeyanju J B and Umaru M A, et al., 2012 A biometric study of the digestive tract of one-humped camel (*camelus dromedaries*) fetuses. Sci. J. Zool. 1 (1): 11-16.
7. Deen A, 2008. Estradiol and testosterone profiles, their correlation with sexual libido in male camels. Proceedings of the WBC/ICAR Satellite Meeting on Camelid Reproduction, Budapest, Hungary.

8. EL-Wishy A B, Hemeida A B, Omar M A, Mubark A M and EL-Syaed M A, *et al.*, 1981 Functional changes in the pregnant camel with special reference to fetal growth. *Br. Vet. J.* 137, 527-537.
9. Hunnam J, Parkinson T, Lopez-villalobos N. and McDougall S, *et al.*, 2009. Association between gestational age and bovine fetal characteristics measured by transcutaneous ultrasound over the right flank of the dairy cow. *Aust. Vet. J.* 87: 379-383.
10. Howida MA Abd-El-Rahman, Maha AI and HA Elmetwaly *et al.*, 2017. Hormonal Profile, Antioxidant Status and Some Biochemical Parameters during Pregnancy and Periparturient Period in Dromedary She Camel Egypt. *J. Vet. Sci.* Vol. 48, No. 2 pp.81-94.
11. Hammadi M , Khorchani T, Khaldi G, Majdoub A, Abdouli H, Slimane N, Portetelle D, Renaville R, *et al.*, 2001. Effect of diet supplementation on growth and reproduction in camels under arid range conditions. *Biotechnol. Agron. Soc. Environ.*, 5: 69-72.
12. Jöchle W and Lamond DR, 1980. Control of Reproductive Functions in Domestic Animals. VEB Gustav Fischer Verlag Lena, Germany.
13. Koker A, Ince. D and Sezik M, *et al.*, 2012. The accuracy of transvaginal ultrasonography for early pregnancy diagnosis in Saanen goats: A pilot study. *Small Rom. Res.* 105: 227-281.
14. Kamoun M and Jemmali B, 2014. serum progesterone level of camel (*Camelus domedarius*) according to the physiological status. *Journal of New Science*, Vol. 3; art.2.
15. Mostafa TH , Abd El-Salaam AM ., Ahmadi EAA , Fadel MS, Zeidan AEB. And Abdel-Khalek AE *et al.* ,2018. Development of Some Fetal Measurements and Ovarian Hormones during Gestation Period in Maghrebian She-Camels under Egyptian Conditions *IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS)* Volume 11, Issue 7 Ver. I, PP 50-5.
16. Stupnicki R, 1974. Direct Radioimmunoassay of progesterone in plasma of farm animals. *Endokeinologie* 66, 145-151.
17. Williamson G and Payne WJA, 1978. An introduction to animal husbandry in the tropics 3rd edition, London, Longman.
18. Laing J A, 1979. Fertility and infertility of domestic animals. Bailliére Tindall, New York, USA.
19. Zhao XX hang YZ and Chen BX, *et al.*, 1998. Serum progesterone and 17 β -estradiol concentrations during pregnancy of Bactrian camel. *Theriogenology*, Volume 50, Issue 4, September 1998, 595-604.