Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 5, 2021, Pages. 2372 - 2379
Received 15 April 2021; Accepted 05 May 2021.

Relationship Between Season and Level of Hormones in Gazelle Subgutturosa Marica In Iraq

Kareem Kadhim Radhi[1]*, Jaber Radhey Abdulhamza[1]; Al-Hamedawi, T.M.[2], Sarah I.K.AL-Anawe[1], Ahmed Hassan Sallah[1], Ali Hamzah Maktouf[1] and Dheyaa Ali Neamah[1].

[1]Department of Surgery and Obstetrics / College of Veterinary Medicine/ University of Al-Qasim Green.
[2]Department of Surgery and Obstetrics / College of Veterinary Medicine/ Baghdad university.
*Corresponding: karemrathy8@vet.uoqasim.edu.iq

SUMMARY

The dissertation's aim is to study the reproductive performance in Iraqi deer (Gazelle subgutturosa marica) and hormonal assay throw the months of year and to investigate. This study was conducted on sixteen fertile adults (2-4 year) Gazelle subgutturosa marica (reem); composed of fifteen females and only one adult male that were selected from Al-Qasim region Babylonian / Iraq. The duration of study was extended up to tenth months started from March of 2020 to December of 2020. study included adaptation, hormonal assay. blood samples were collected at evening in day 11 from each month from the jugular vein for hormonal assay. The results of hormonal assay and the evaluation of the relationship between hormonal levels (prolactin, melatonin, and estradiol) with the monthly of year beginning in March to November reverted, the optimum levels of prolactin in May, June, July was 3.33 ± 0.22 ng/ml, 3.81 ± 0.27 ng/ml and 3.71 ± 0.28 ng/ml, respectively, while low levels observed in the March and April 0.40 ± 0.02, 0.44 ± 0.02, respectively. Statistically measurements gave significant ($P<0.01$) differences between monthly levels of hormones.

Melatonin level was also evaluated, higher level was on August, September and October 14.31 ± 0.31, 13.68 ± 0.32, and 14.76 ± 0.21, respectively but the significant differences between September and October. While low level founded in March , April and May 6.91 ± 0.37 pg/ml , 7.41 ± 0.37 pg/ml, and 7.04 ± 0.36 pg/ml, respectively , results show no significant difference between the three months but is significantly different with the other months ($P<0.01$).

Estradiol recorded higher level in September 173.00 ±12.74 pg/ml which was significantly ($P<0.01$) different if compared with other months. Current findings recorded high prolactin level via lambing and suckling periods as, 3.570 ± 0.18 ng/ml and 3.343 ± 0.17 ng/ml, respectively with no differences between them. Results showed that; E2 level is significantly differ with pregnant animals (0.420 ± 0.02 ng/ml) and estrus phase (0.846 ± 0.07ng/ml). Melatonin level is significantly ($P<0.01$) different among four status of animals at the values 7.16 ± 0.26 pg/ml, 8.89 ± 0.43 pg/ml, 12.91 ± 0.35 pg/ml and 14.47 ± 0.17 pg/ml, at pregnant , lambing ,suckling and within , respectively.

Keyword: Gazelle subgutturosa marica, melatonin, pregnancy, Estradiol.

Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 5, 2021, Pages. 2372 - 2379
Received 15 April 2021; Accepted 05 May 2021.

Introduction

The Arabian sand gazelles; Gazella subgutturosa marica (G. s. m) reem is classified as vulnerable (VU) It is one of the subspecies on the International Union for Conservation of Nature and Natural Resources' list of endangered species (IUCN Red, 2009). Animals are affected by seasonal variations in climatic variables, which are often attributed to changes in latitude and altitude in relation to overall insolation obtained. In temperate regions, the daily photoperiod and annual cycles of ambient temperatures are the most striking variables, while in tropical regions, annual cycles in rainfall, with the resulting cycles in food supply, are the most striking variables (Vivien-Roels and Pévet, 1983). The pineal gland produces melatonin in addition to the length of darkness (Malpaux et al., 2001). Melatonin controls the circadian rhythmic cycles and reproductive shifts in animals that reproduce seasonally (Barrett et al., 1997). Melatonin's reproductive and circadian impact are mediated through its binding to high affinity melatonin receptors, with the largest density of melatonin receptors (MTNR1A) being correlated with prolactin secretion (Dupré et al., 2008), whereas the premammillary area of the hypothalamus (PMH) was found to be strongly linked to GnRH secretion regulation (Chabot et al1998).

Materials and Methods

Sixteen adult Gazelle subgutturosa marica (reem); fifteen females (2-4 year's age) and one adult male (3-4 year's age) with known fertility were used in this study Ten ml of blood samples without EDTA were collected from the jugular vein and Sera is isolated by centrifugation for 10 minutes at 3000 rpm. Sera is held at -20 °C in test tubes. Hormonal assay of prolactin, melatonin and estradiol concentrations were conducted using kits of Prolactin, melatonin and estradiol. The duration of study was extended up to tenth months started from March of 2020 to December of 2020. study included adaptation, hormonal assay . blood samples were collected at evening in day 11 from each month from the jugular vein for hormonal assay The first part of the study included adaptation Al-Qasim region Babylonian / Iraq. The duration of study was extended up to tenth months started from March of 2019 to December of 2020. study included adaptation, hormonal assay .

Results and discussion

The evaluation of relationship between hormonal levels (prolactin, melatonin, and estradiol) with the months of year eventually in March to November which was viewed in the table 1 and figure 1, it revealed that optimum levels of prolactin ware in May, June and July that were 3.33 and ± 0.22 ng/ml, 3.81 ± 0.27 ng/ml and 3.71 ± 0.28 ng/ml respectively, while low levels observed in the March and April that were 0.40 ± 0.02, 0.44 ± 0.02, respectively. Statistical analysis gaves significant differences ($P<0.01$) between months.Melatonin level were evaluated gives some variation in the different months of year like high level at august, September and October 14.31 ± 0.31, 13.68 ± 0.32,and 14.76 ± 0.21, respectively but the significant between September and

Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 5, 2021, Pages. 2372 - 2379
Received 15 April 2021; Accepted 05 May 2021.

October. low levels of melatonin recorded in march , April , and may 6.91 ± 0.37 pg/ml , 7.41 ± 0.37 pg/ml and7.04 ± 0.36 pg/ml, respectively , with no significant between this months while significant($P<0.01$) with the other months. Estradiol recorded high level in September 173.00 ±12.74 pg/ml which was significant differences ($P<0.01$) with the other months.

Melatonin

Melatonin (MT) ELISA kit was used to assay MT levels in the serum of Arabian sand gazelle during different seasons. In the four seasons, there were significant (P0.01) variations in the intensity and length of nocturnal plasma melatonin profiles. During the winter, the nocturnal mean level of melatonin, the length of nocturnal secretion levels, and peak concentrations were all substantially higher than during the summer. Melatonin peaked significantly ($P<0.01$) during both October and November and they were declined during March, April and May. These results agreed with those of Andre´s Garcı´a et al, (2003) During various seasons, in female Iberian red deer Eloronta et al., (1992) tested seasonal melatonin in female reindeer in the winter and observed that nocturnal mean melatonin levels, length of nocturnal secretion levels, and peak concentrations were slightly (P0.05) higher at the winter solstice than at the summer solstice or equinoxes. This may be due to melatonin syntheses, as in the sheep, increases at night and the duration of the peak varies with the length of the night, giving an endocrine index of the current photoperiod (Robinson et al., 1985). Present results revealed that melatonin level was significantly higher during the short day seasons. Currently the studied gazelle's cycle with sexual activity were throughout the September, October and November months. It was found significant ($P<0.05$) differences of melatonin levels in October and November compared with other months except for that of August. These findings suggested that Gazella subgutturosa was a seasonal species, with the primary breeding season taking place in the fall (Iraq). In Baghdad reserves or amateur breeding fenced localities, deer come into estrus during October to December. If impregnated at estrus, deer will give birth in early spring (Admin, 2018). Related to the white-tailed deer (Odocoileus virginianus) found in the Midwest of the United States (Green et al.,2017). The annual cycle of gonadal activity is produced endogenously in deer and is entrained to a specific time of year by responses to environmental cues such as day length, temperature, and diet (Lincoln, 1992). Other researchers found cyclic activity during October to February with a lower but notable proportion in September , whereas it was negligible in the remaining period (García et al., 2002).It was found that melatonin in the studied gazelles peaked in November and October with lower levels during March-June months. Melatonin levels in the blood drop after the winter solstice, allowing prolactin output to ramp up before peak levels are hit by mid-June (George, 2006).

In our study the correlation coefficient between hormones with the differences at the different status of reproduction in animals recorded significant in the level of $P<0.05$ between prolactin and melatonin in pregnant status. No significant recorded in the lambing status between different hormones .While the significant differences recorded in the estrus status between Prolactin and

Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 5, 2021, Pages. 2372 - 2379
Received 15 April 2021; Accepted 05 May 2021.

Melatonin. In Persian gazelles, melatonin therapy reduced PRL concentrations but had little effect on the duration of the estrous season, implying that the reproductive cycle was governed by an endogenous rhythm (Sempéré et al., 2001).

Prolactin

Assay of the peripheral level of prolactin in sand gazelle through different months and reproductive state showed that it was elevated in lambing and suckling gazelle during the hot months of the year (May, June and July), while recorded lowest level during March and April (pregnant gazelle). Other previous researchers also recorded significantly high level of prolactin in sand gazelle (Antony et al., 2001), non-pregnant Awassi sheep (Rahawy, 2016) in hot months. This suppression in the level of prolactin may be related to the action of melatonin (Molik et al., 2010). Furthermore, the hypothalamo-adenohypophysial system's reaction to melatonin can be affected by the hormone's effect on the central nervous system's metabolism of certain neuromediators and/or neuromodulators (Zakad et al., 2006). During the anestrous season, the pattern of plasma prolactin (PRL) In Persian gazelles (Uzbekistan) and sand gazelles (Saudi Arabia), PRL levels varied greatly between the two groups; in the Persian gazelles, PRL levels rose significantly in June, while in the sand gazelle, PRL levels did not rise significantly in summer and fluctuated widely (Sempéré et al., 2001).

Estradiol

In normal reproductive gazelle, the peak of estradiol, when measured throughout the year, was detected in September (estrus status), this high level might be due to the ovarian reproductive activity in this month. During the estrus status, present results showed that there was a strong correlation between melatonin and estradiol levels. No data found concerning estradiol through-out the year in Reem gazella. Within 16 hours of superovulation, estradiol plasma concentrations begin to increase. The preovulatory estradiol peak and maximum concentrations occurred 40 hours after therapy (Riesenberg et al., 2001), similar data were obtained in the present experiment. The significance between Estradiol and Prolactin in addition between Estradiol and Melatonin at the level of $P<0.05$ observed in the suckling status. Current study recorded the estradiol levels at different status. The highest recorded at estrus phase(128.52 ± 7.19 pg/ml) , while the lowest level at the pregnant and lambing reached ,108.87 ± 6.62 and 106.87 ± 4.89, respectively. It was significant with the estrus phase at the level $P<0.01$. Other study mentions the Estradiol concentrations in serum (25+/-25 pg/ml) (Bubenik 1986). Both inside and between animals, levels of estradiol varied. Non-detectable to 11.2 pg/ml levels were found. Between 3 days before estrus and the day of estrus, though, all species had their maximum estradiol level (9.1± 0.7). Days 9 through 4 before estrus (5.30.4 pg/ml; P0.01) had slightly higher mean estradiol levels than days 9 through 4 before estrus (7.00.6 pg/ml) (Edward et al., 1980). Many factors effect of the concentrated of hormonal level in the serum, like estradiol concentration of serum, the peak of the concentration of estradiol related with the emergence of the largest follicle (Chen et al., 2014).

Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 5, 2021, Pages. 2372 - 2379
Received 15 April 2021; Accepted 05 May 2021.

The current research discovered a substantial (P0.05) difference in suckling status between Prolactin and Estradiol, as well as between Melatonin and Estradiol, indicating that late pregnancy is associated with higher estrogen levels than early pregnancy and the estrous cycle (Plotka et al.,1977). Hormonal Study in the gazelle in Iraq assessed the Estradiol in non-pregnant animal reached 42 pg / ml (Shahooth et al.,2015)

Table1. Effect of different months in level of hormones in gazelle

Month		Mean ± SE		
		Prolactin (ng/ml)	Melatonin (pg/ml)	Estradiol (pg/ml)
March	pregnant	0.40 ± 0.02 d	6.91 ± 0.37 d	110.66 ± 10.24 b
April	pregnant	0.44 ± 0.02 d	7.41 ± 0.37 d	107.07 ± 8.74 b
May	Lambing& suckling	**3.33 ± 0.22 ab**	7.04 ± 0.36 d	105.35 ± 7.54 b
June	Lambing& suckling	**3.81 ± 0.27 a**	10.73 ± 0.37 c	108.38 ± 6.49 b
July	suckling	**3.71 ± 0.28 ab**	11.50 ± 0.36 c	113.17 ± 8.51 b
August		2.97 ± 0.17 b	14.31 ± 0.31 ab	118.02 ± 8.21 b
September		1.073 ± 0.12 c	**13.68 ± 0.32 b**	**173.00 ± 12.74 a**
October	season	0.633 ± 0.07 cd	**14.76 ± 0.21 a**	104.98 ± 9.19 b
November	season	0.833 ± 0.14 cd	14.95 ± 0.25 a	107.58 ± 5.37 b
LSD value		0.4885 **	0.930 **	24.614 **

** (P<0.01).

No.= 15

Means having with the different letters in same column differed significantly.

Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 5, 2021, Pages. 2372 - 2379
Received 15 April 2021; Accepted 05 May 2021.

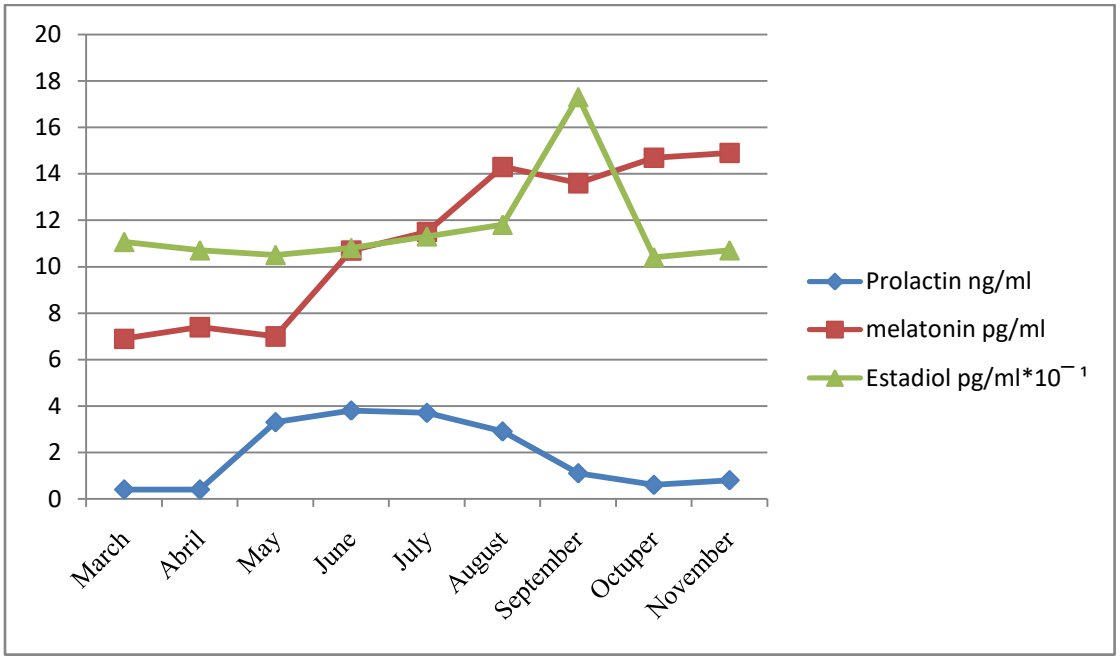

Figure 1. Diagram show effect of different months on the levels of hormones.

References

1- Admin, (2018). The Impact of Reproductive Seasonality Cycle for Deer on Humans. www. Deer Repellent Packs .com.

2-Andre´s Garcı´a, Toma´sLandete-Castillejos, LuisZarazaga, Julia´n Garde and Laureano Gallego (2003). Seasonal changes in melatonin concentrations in female Iberian red deer (Cervus elaphus hispanicus). J. Pineal Res. 34(3): 161–166

3-Eloronta, E., Timisjarvi, J., Nieminen, M., Ojutkangas, V., Leppaluoto, J. and Vakkuri, O.(1992). Seasonal and daily patterns in melatonin secretion in female reindeer and their calves. Endocrinology; 130: 1645–1652.

4-Robinson JE, Wayne NL, Karsch FJ. (1985). Refractoriness to inhibitory day lengths initiates the breeding season of the suffolk ewe. Biol Reprod; 32:1024–1030.

5-Kelly, A.C., Satterthwaite-Phillips, D., Manjerovic, M. B., Shelton, P., Novakofski, J. and Mateus-Pinilla, N. (2017). Reproductive characteristics of female white-tailed deer (Odocoileus virginianus). in the Midwestern USA. Theriogenology. 94: 71-78.

Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 5, 2021, Pages. 2372 - 379
Received 15 April 2021; Accepted 05 May 2021.

6-García, A. J., cTLandete-Castillejos, Garde, J.J. and Gallego.L. (2002). Reproductive seasonality in female Iberian red deer (Cervus elaphus hispanicus). Theriogenology. 58(8): 1553-1562.

7-George, A. B. (2006). Seasonal regulation of deer reproduction as related to the antler cycle - a review. Vet. arhiv 76: 275-285.

8-Sempere J, Brown N, Pereladova OB, Bahloul K, Lacroix A, Soldatova N (2001).. Comparative analysis of reproductive cycles in female Persian gazelle (Gazella subgutturosa subgutturosa). (Central Asia). and Sand Gazelle (Gazella subgutturosa marica). (Arabian Peninsula). Gen. Comp. Endocrinol.,

9-Rahawy, M.A. (2016). Investigation of Possible Ability of Local Ewes to Lambing in Different Seasons Associated with Frequency of Alleles in the MTNR1A Gene. Thesis Submitted to the University of Baghdad for the Degree of PhD of Science in Veterinary Medicine (Theriogenology)

10-Molik, E., Misztal, T., Romanowicz, K. and Zieba, D.A. (2010). The effects of melatonin on prolactin and growth hormone secretion in ewes under different photoperiods, during the early post-partum period. Small Rum. Res., 94(1).137-141.

11-Zakład Patofizjologii i Neuroendokrynologii Doświadczalnej, Katedry Patologii Ogólnej i Doświadczalnej, (2006). The role of the pineal gland and melatonin in the regulation of adenohypophysial hormone synthesis and secretion. Postepy Hig Med Dosw. (online)., 60: 653-659

12-Bubenik, G. A. (1986). Regulation of seasonal endocrine rhythms in male boreal cervids. In “Endocrine Regulations as Adaptive Mechanisms to the Environment” (I. Asenmacher and J. Boissin, Eds.) 461–472. CNRS, Paris.

13-Edward D. Plotka, Ulysses S. Seal, Louis J. Verme and John J. OZOGA4 (1980). Reproductive Steroids in Deer. Ill. Luteinizing Hormone, Estradiol and Progesterone around Estrus. Biology of Reproduction 22, 576-581.

Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 5, 2021, Pages. 2372 - 2379
Received 15 April 2021; Accepted 05 May 2021.

14-Plotka, E.D., Seal, U.S., Schmoller, G.C., Karns, P.D., and Keenlyne, K.D. (1977). Reproductive Steroids in the White-Tailed Deer (Odocoileus virginianus borealis). I. Seasonal Changes in the Female. Biology of Reproduction 16: 340-343.

15-Shahooth, M.A., Zalzala. S.J., Hatif, S.A. (2015). Study of Reproduction in the Local Reem Gazelle (Gazella subgutturosa marica). World J Pharm Sci; 3(5): 810-814 significance. Neurochem. Int. 24: 101–146

16-IUCN Red List (2009). http://www.iucnredlist.org.

17-Vivien-Roels, B., Pévet, P., (1983). The pineal gland and the synchronization of reproductive cycles with variations of the environmental climatic conditions, with special reference to temperature. Pineal Res. Rev. 1, 91–143.

18-Malpaux, B., Migaud, M., Tricoire, H. and Chemineau, P. (2001). Biology of mammalian photoperiodism and the critical role of the pineal gland and melatonin. J Biol Rhythms 16: 336–347.

19-Barrett, P., Conway, S., Jockers, R., Strosberg, A. D., Guardiola- Lemaitre B., Delagrange, P. and Morgan, P. J. (1997). Cloning and functional analysis of a polymorphic variant of the ovine Mel 1a melatonin receptor. Biochim. Biophys. Acta. 1356: 299–307.

20-Dupré, S. M., Burt D. W., Talbot, R., Downing, A., Mouzaki, D., Waddington D. et al. (2008). Identification of melatonin-regulated genes in the ovine pituitary pars tuberalis, a target site for Seasonal hormone control. Endocrinology 149: 5527–5539.

21-Chabot, V., Caldani, M., de Reviers, M. M. and Pelletier J. (1998). Localization and quantification of melatonin receptors in the diencephalon and posterior telencephalon of the sheep brain. J. Pineal Res. 24: 50–57.