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Hormonal Concentrations During Different Monthly Groups in Iraqi Mares

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ABSTRACT

The aim of the study is to study the concentration of reproductive hormones (follicle-stimulating hormone, luteinizing hormone, progesterone, and melatonin) in Iraqi mares, for three different monthly groups. The results showed a decrease in the significant level (P<0.05) of the progesterone hormone during the (Feb., March, April), and also showed a significant increase (P<0.05) in the levels of both follicle-stimulating hormone and the luteinizing hormone during the (May, June, July), while there was no significant difference (P<0.05) in the levels of the melatonin hormone during the period of study.

Introduction:

A mare's estrous cycle is controlled by the interplay of gonadal hormones, The horse's retinas get light as the photoperiod lengthens, stimulating the pineal gland and decreasing melatonin production. Gonadotrophin-releasing hormone (GnRH), which is secreted by the brain and stimulates the pituitary gland to release follicle-stimulating hormone and luteinizing hormone, is antagonistic to the action of melatonin. When the prolonged photoperiod suppresses melatonin production in the pineal gland, GnRH levels rise and LH and FSH secretion are boosted, The estrous cycle restarts due to this hormonal interaction (Schneider *et al*, 2006).

was the first to describe this idea from a neuroendocrine standpoint in ovariectomized estradiol-implanted sheep that were kept under a continuous photoperiod for 5 years, All ewes

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showed circannual increases in LH secretion, but in the absence of a photoperiodic timing cue, these changes became out of phase. Similar principles were discovered in studies on mares, showing that mares kept under continual long-day photoperiod commencing at the summer solstice nevertheless went through their annual ovulation (Karsch *et al*,1989).

Due to the economic importance of livestock in Iraq, there have been many researches in various fields such as (Ibrahim & Zaid, 2017; Zaid, 2017; Abd Al-Rhman, 2009; Al-Hamedawi, 2011; Al-Hamedawi, 2012; Al-Musawi *et al*, 2017; Eidan *et al*, 2020; Al-Rubeii *et al*,2015).

Materials and methods:

This research was conducted on 15 Iraqi mares subject to the same environmental and nutritional conditions. 10 ml of blood was drawn from the jugular vein at a constant rate once a month. Hormonal analysis was performed using ELISA technique to study the concentrations of (Follicle-stimulating hormone, luteinizing hormone, progesterone and melatonin). For three monthly groups.

Results and Discussion:

Table 4-1 showed Hormonal concentrations during three monthly groups in Iraqi mares, The Progesterone hormone concentration were 1.51±0.28, 4.62±0.56 and 3.34±0.49, for 1^{st} (Feb., March, April), 2^{nd} (May, June, July) and 3^{rd} (August, Sep.) respectively. The result showed significant decrease ($p<0.05$) for the progesterone hormone during (Feb., March, April) when comparative with other groups.

The FSH hormone concentration were 2.78±0.27, 3.83±0.35 and 3.36±0.49 for 1^{st} ,2^{nd} ,3^{rd} monthly groups respectively. The result showed The result showed significant decrease ($p<0.05$) for the FSH hormone during (Feb., March, April) when comparative with other groups.

Also the LH hormone concentration were 0.916±0.22, 1.14±0.25 and 0.284±0.03 for 1^{st} ,2^{nd} ,3^{rd} monthly groups respectively. The result showed significant increase ($p<0.05$) for the LH hormone during (May, June, July) when comparative with other groups.

While the melatonin hormone concentration were 0.933±0.01, 0.949±0.03 and 0.893±0.04 for 1^{st} ,2^{nd} ,3^{rd} monthly groups respectively. The result showed no significant differences ($p<0.05$) for the melatonin hormone during all groups of the study.

The study was divided into three groups (1^{st} , 2^{nd} and 3^{rd}) depending on the noticeable change in the length of the lighting period, where the first group included (1^{st}) three months (Feb., march and April), the second (2^{nd}) include three months (may, June and July), while the third included (3^{rd}) two months only(August and Sep.). Assuming that the first group is the spring season, the second group is summer, and the third is autumn, our discussion will be as described later.

The circannual endogenous rhythm, which is influenced by environmental variables like photoperiod, temperature, nutrition, and physical condition, produces the seasonal reproductive pattern.

The estrous cycle causes changes in the peripheral blood levels of steroid hormones like progesterone, and ovulation causes a significant change in corpus luteum-derived progesterone levels, The vernal and autumnal changes appear to change luteal function. this agree with (King *et al.*, 1988) that refer to some Horses have year-round extended luteal activity without uterine

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disease. And Nagy *et al*., (2004) found that There was a season effect (P < 0:001) but no significant luteal morphological influence Plasma progesterone concentrations.

Gonadotroph cells can be found in the pars distalis and pars tuberalis of the horse pituitary. All three types of gonadotrophs have been found in the pars distalis, but there are few, if any, FSH monohormonal cells in the pars tuberalis of the equine pituitary. Monohormonal gonadotrophs are subsets that produce and store either LH or FSH, while bihormonal gonadotrophs produce and store both gonadotrophins. The variation in the pattern of LH and FSH storage within the gonadotroph population is assumed to be the physical basis for the varied control of LH and FSH production during the mare reproductive cycle.

Particularly during the Summer season, the connections between follicle growth and circulating FSH concentrations were found to be significant, this disagree with (Irvine *et al.*, 2000), who repeated blood collection showed no differences in FSH pulsatility between the ovulatory season and the transition to fall, This difference resulted from different times of blood withdrawal.

Dominating anovulatory follicle development Although dominant follicles appear to require LH for growth during both the anovulatory season and the ovulatory season, dominant follicles respond to LH less responsively during the spring transition than they do during the ovulatory season, as seen by lower levels of LH receptor, The result is that whereas transitional follicles' low levels of LH receptor expression are sufficient for LH to stimulate follicular growth, they are too low to effectively mediate ovulation in response to exogenous gonadotropins. These results agree with the researcher Irvine *et al*., (2000) who mentioned In mares that are still intact, the frequency of LH pulses steadily rises in the weeks leading up to the spring's first ovulation.Similar to this, in mares who have undergone ovariectomies, the annual pattern of plasma LH concentrations follows changes in photoperiod and peaks around the summer solstice..

The melatonin concentration results showed no significant differences Between all monthly groups of the year, despite the variation in the lighting periods between the study seasons, the reason for this may be due to the good health of the mares and the appropriate nutrition through the provision of green and concentrated fodder, as well as the good environmental conditions available (temperature) for the animals during the study period. This result dis agree with (Gerlach and Aurich, (2000) that showed Animals in the northern hemisphere are exposed to more melatonin at night, particularly during the extended winter hours of darkness. Conversely, during the summer's long days, melatonin levels fall, due to different of the region of the study.

Table 4-1 Hormonal concentrations during different monthly groups in Iraqi mares.(ng/ml)

Month groups	Progesterone	FSH	LH	Melatonin
1st (Feb., March, April)	1.51±0.28 b	2.78±0.27 b	0.916±0.22 ab	0.933±0.01 a
2nd (May, June, July)	4.62±0.56 a	3.83±0.35 a	1.14±0.25 a	0.949±0.03 a
3ed (August, Sep.)	3.34±0.49 a	3.36±0.49 ab	0.284±0.03 b	0.893±0.04 a
P. value	0	0.046	0.037	0.476

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