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Effect of the season on male dog testosterone, SSH, LH level in Iraq

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ABSTRACT

The aim of this study was to investigate the mean value and effect of the seasons on hormonal level of the male dogs in Iraq. Blood samples was collected from 24 adult male dogs were used in this study. The year was divided into four seasons which was spring 2014 (March, April, and May), summer 2014 (June, July, and August), autumn 2014 (September, October, and November) and winter 2014-2015 (December, January, and February). The hormonal assay was done by using ELISA test. The mean testosterone hormone was (0.7±0.01ng/ml), (1.6±0.09ng/ml), (1.75±0.01ng/ml) and (0.7±0.01ng/ml) in spring, summer, autumn and winter respectively. In the same time SSH (Spermatogenesis Stimulating Hormone) was (5.2±0.58ng/ml), (0.8±0.03ng/ml), (1.90±0.03ng/ml) and (8.3±0.04ng/ml) during spring, summer, autumn and winter respectively. Also LH (Leydig Hormone) was (0.9±0.05ng/ml), (1.4±0.08ng/ml) (0.7±0.01) and (0.7±0.01) in spring, summer, autumn and winter respectively. There was no significant differences between seasons in testosterone, SSH and LH hormones. These results indicated that there was no effect of seasons of Iraq on hormonal male dog's level.

KEYWORDS Gonadotropins, Testosterone, male Dogs, Seasons.

Introduction:

There were a number of mechanisms controlling the neuroendocrine axis in the male dog (DePalatis *et al.* 1978). Reproductive events were regulated from the hypothalamus which in response stimuli produces and releases the GnRH, which, in turn, influences the pituitary gland to secrete SSH and LH, these two gonadotropins hormones induce androgen production in the male, the hypothalamic-pituitary-gonadal axis was regulated via complicated feedback mechanisms (Linde-Forsberg 2007). The gonadotropins from the anterior pituitary gland stimulate testosterone synthesis in the testis (Martins *et al.* 2006). Some of the researcher stated that the testosterone levels vary with age and season, being highest in spring and autumn (Martins *et al.* 2006). The photoperiod and temperature rate influence the reproductive cycle (Blackshaw 1977). There was a seasonal variation in both LH and testosterone concentration has been detected in dogs (Hewitt 1998). However, the hormonal levels of the male dog or the influence of the seasonal changes on these hormones in Iraq has not been studied before, so the objective of the present study was to evaluate the levels of testosterone, SSH and LH hormones during different season in Iraq.

Materials and Methods:

Twenty four adult dogs of local breed Iraqi dogs aged ranged from 1-2 years old were used in this study. These dogs were kept in kennel house inside Surgery and Obstetrics Department, from the 1st of March 2014 to the end of February 2015. The food and water was provided ad libitum. Blood collection was done once monthly from the jugular vein and it centrifuged immediately at (3000g for 15 minutes). Serum was recovered after centrifugation and it divided into two samples and stored at -20°C until hormonal assay. The hormonal assay was done by ELISA test using commercial kits (Biocompare, USA) for each hormone. The year was divided into four seasons' spring (March, April, and May), summer (June, July, and August), autumn (September, October, and November) and winter (December, January, and February). The data was analysis by using ANOVA test and the LSD was used to determine the significant differences between means (Al-Mohammed *et al.* 1986).

Results:

The mean±SE of testosterone hormone during different seasons in male dog in Iraq was (0.7±0.01ng/ml) during spring, (1.6±0.09ng/ml) during summer, (1.75±0.01ng/ml) during autumn and (0.7±0.01ng/ml) in winter (Figure 1). There was no significant difference between seasons in testosterone hormones (Figure 1). While the mean±SE of SSH hormone was spring (5.2±0.58ng/ml), summer (0.8±0.03ng/ml), autumn (1.90±0.03ng/ml) and winter (8.3±0.04ng/ml) (Figure 2). Also there was no significant difference in SSH hormone between seasons (Figure 2). Whereas LH mean±SE was (0.9±0.05ng/ml) in spring, (1.4±0.08ng/ml) in summer, (0.7±0.01) in autumn and (0.7±0.01) in winter (Figure 3). In the same direction there was no significant difference in LH hormone in different seasons of the year (Figure 3).

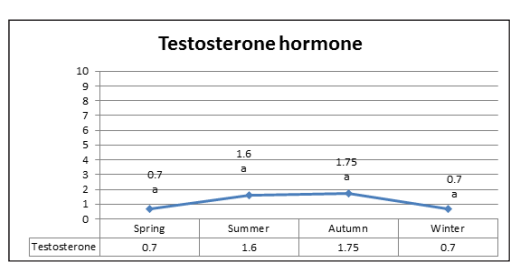

Figure 1: Testosterone hormone (ng/ml) during different season in the male dog.

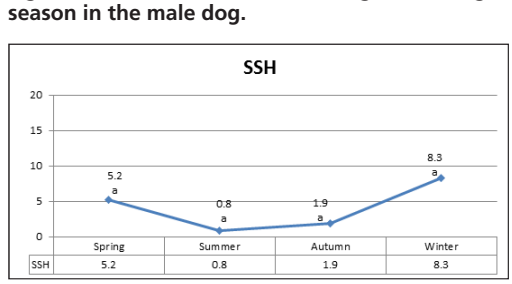

Figure 2: SSH hormone (ng/ml) during different season in the male dog.

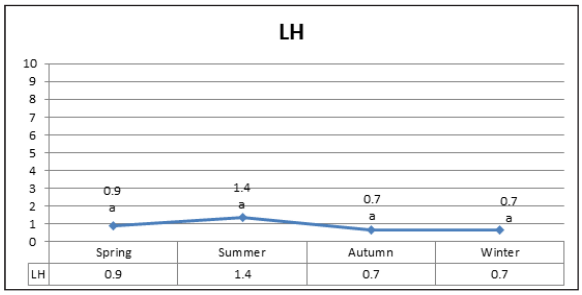

Figure 3: LH hormone (ng/ml) during different season in the male dog.

Discussions:

This study revealed that it is closed to the mean values of other studies which done in other parts of the world using measurement of dog testosterone (DePalatis *et al.* 1978, Takeishi *et al.* 1980, Taha and Noakes 1982, De Souza *et al.* 2004, Ortega-Pacheco 2006, Martins *et al.* 2006 and Johnston *et al.* 2007). There is a similar result with the studies of (Martins *et al.* 2006, Ortega-Pacheco 2006, Ortega-Pacheco *et al.* 2006, Johnston *et al.* 2007 and Albrizio *et al.* 2013) during their seasonal studies on male dogs. While it agreement partly with (Taha and Noakes 1982) whom found that testosterone hormone is higher in summer and autumn than that of winter and spring. When as our recent study declared that data which recorded from estimation of LH hormones is near the means of (DePalatis *et al.* 1978) in his study without referring to seasonal effect. So we conclude that the seasons inside Iraq has no effect on hormonal levels of the male dogs.

Testosterone is needed to initiates spermatogenesis at puberty and maintenance this process in the adult (Paccia, 1994). As well as being responsible for male secondary sexual development (Perusquia and Stallone 2010). In the dos species it also take a responsible for aggression (Jacobs *et al.* 2006). Testosterone is the major androgen hormone that presents in the blood in spite of production of others androgens from the testis in small amount (Gustafson and Shemesh 1976), and the testosterone plays a role in the development of age-related prostate hyperplasia (Wilson 2011). Any hormonal trouble interacts with hypothalamus-pituitary axe lead to an influence on spermatogenesis and then fertility (Fontbonne 2011). Spermatogenesis depends on the action of testosterone (Sharpe *et al.* 1988). Also testosterone is converted to estrogen in male dogs, and the regulation of androgens levels is controlled by the pituitary-gonadal axis via GnRH, LH and SSH (Buijtels *et al.* 2012 and De-Gier *et al.* 2012). The estrogen synthesis in male has a critical synergistic role for proper development and maintenance of testicular function (Hess *et al.* 2011).

REFERENCES

• Albrizio M, Siniscalchi M, Sasso R and Quaranta A (2013). Effects of the environment on dog semen parameters and testosterone concentration. Theriogenology, 80(7): 800-804. | • Al-Mohammed NT, Al-Rawi KM, Younis MA and Al-Morani WK (1986). Principles of Statistics. Book House for Printing and Publishing. Al-Mosel University. | • Blackshaw AW (1977). Temperature and Seasonal Influences. In: Johnson AD and Gomes WR editors. The Testis. Volume IV. Advances in Physiology, Biochemistry and Function. New York: Academic Press Inc., p: 517–545. | • De Souza FF, Leme DP, Uechi E, Trinca LA and Lopes MD (2004). Evaluation testicular fine needle aspiration cytology and serum testosterone levels in dogs. Brazilian J. Vet. Res. Ani. Sci., 41:98-105. | • Depalatis L, Moore J and Falvo RE (1978). Plasma concentration of testosterone and LH in the male dog. J. Repro. Ferti., 52: 201-207. | • Hewitt D (1998). Physiology and Endocrinology of the Male. In: England GCW and Harvey M, editors. Manual of Small Animal Reproduction and Neonatology. Cheltenham, p: 61. | • Johnston SD, Ward D, Lemon J, Gunn I, Mac Callum CA, Keeley T and Blyde D (2007). Studies of male reproduction in captive African wild dogs (Lycaon pictus). Ani. Repro. Sci., 100 (3-4): 338-355. | • Linde-Forsberg C (2007). Biology of reproduction of the dog and modern reproductive technology. In: A Ruvinsky and J Sampson. The Genetics of the Dog. http://www.cabi.org/cabebooks/ebook/20013143490. pp: 401-432. | • Martins MI, De Souza FF, Oba E and Lopes MD (2006). The effect of season on serum testosterone concentrations in dogs. Theriogenology, 66: 1603-1605. | • Ortega-Pacheco A (2006). Reproduction of Dogs in the Tropics with Special Reference to the Population Structures, Reproductive Patterns and Pathologies, and a Non-surgical Castration Alternative. Doctoral Thesis/Swedish University of Agriculture Science. | • Ortega-Pacheco A, Segura-Correa JC, Bolio-Gonzalez ME, Jimenez-Coello M and Linde-Forsberg C (2006). Reproductive patterns of stray male dogs in the tropics. Theriogenology, 66(9): 2084-2090. | • Taha MB and Noakes DE (1982). The effect of age and season of the year on testicular function in the dog, as determined by histological examination of the seminiferous tubules and the estimation of peripheral plasma testosterone concentration. J. Small Ani. Prac., 23(6): 351-357. | • Takeishi M, Tanaka N, Imazeki S, Kodama M, Tsumagari S, Shibata M and Tsunekane T (1980). Studies on reproduction in the dog. XII. Changes in serum testosterone level and acid phosphatase activity in the seminal plasma of sexually mature male Beagles. Bull. Coll. Agri. Vet. Med., Nihon University, 37: 155-158. | • Buijtels JJ, De-Gier J, Kooistra HS, Grinwis GC, Naan EC, Zijlstra C and Okkens AC (2012). Disorders of sexual development and associated changes in the pituitary-gonadal axis in dogs. Theriogenology, 78(7): 1618-1626. | • De-Gier J, Buijtels JJ, Albers-Wolthers CH, Oei CH, Kooistra HS and Okkens AC (2012). Effects of gonadotropin-releasing hormone administration on the pituitary-gonadal axis in male and female dogs before and after gonadectomy. Theriogenology, 77(5): 967-978. | • Fontbonne A (2011). Infertility in male dogs: recent advances. Rev. Bras Repro. Ani. Belo Horizonte, 35 (2): 266-273. | • Gustafson AW and Shemesh M (1976). Changes in plasma testosterone levels during the annual reproductive cycle of the hibernating bat, myotic lucifugus lucifugus with a survey of plasma testosterone levels in adult male vertebrates. Biol. Repro., 15: 9-24. | • Hess RA, Fernandes SA, Gomes GR, Oliveira CA, Lazari MF and Porto CS (2011). Estrogen and its receptors in efferent ductules and epididymis. J. Andro., 32(6): 600-613. | • Jacobs C, Van-Den-Broeck W and Simoens P (2006). Increased number of neurons expressing androgen receptor in the basolateral amygdala of pathologically aggressive dogs. J. Vet. Med. Physio. Patho. Clini. Med., 53(7): 334-339. | • Paccia, D (1994). Intercellular signaling systems. In: Paccia D (eds.), Molecular Aspects of Spermatogenesis. RG, Landes Company, Austin, TX, USA. | • Perusquia M and Stallone JN (2010). Do androgens play a beneficial role in the regulation of vascular tone? Nongenomic vascular effects of testosterone metabolites. Ame. J. Physio. Heart Circul. Physio., 298: 1301-1307. | • Sharpe RM, Donachie K and Cooper I (1988). Re-evaluation of the intratesticular level of testosterone required for quantitative maintenance of spermatogenesis in the rat. J. Endo., 117: 19-26. | • Wilson JD (2011). The critical role of androgens in prostate development. Endocrinology Metabo. Clini. North Ame., 40(3): 577-590. |