Comparative study of some hormones during rutting season in dromedary camel

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Abstract

This research was aimed to study the effect of age on steroids, cortisol and thyroids hormones during rutting seasons in camels. Blood serum were taken from 103 healthy camels from Al-Najaf province slaughterhouse, samples were divided according to age into two categories: pre-pubertal animals 1-4 years and mature 5-8 years. The estrogen, progesterone, cortisol, T3 and T4 hormones were tests by using Gamma counter. The recent results indicated that the age had an effect on estrogen, progesterone, cortisol, T3 and T4 and there were a significant differences ($P<0.01$) between mature and pre-pubertal ages. There were also increases in those hormones during rutting season in both age groups. We conclude that the age and rutting season had an effect on steroids, cortisol and thyroid hormones levels in dromedary male camels.

Introduction:

Camel plays a dynamic social and economic part in support human beings in the dry areas in Asia and Africa (1). Camels were important livestock species which widely-known as seasonal breeders, the seasons of the year effect on sexual activity in camel (2). Camels are in addition to regarded as seasonal breeders; the geographic area influence on the seasonal differences, food availability and conditions of climate. Rutting season occur during spring in Egypt, March to August in Sudan and from November to February in India (2). In Iraq, the highest follicular activity was recorded during spring season and the lowest was during summer (3 and 4). Changes, which might occur in hematological parameters during different seasons of the year, might have the main part in adjusting the variance activities of the animal's body with less physiological efforts within the so-called neutral zone to the existing environmental conditions (5). The upmost time of breeding efficacy in male was during winter and spring which familiar as the rutting time (6). The age was considered as an important side in supporting fertility in camels, old and young dromedary might had express different breeding capacity (7). Few reports were done to investigate hormonal levels in camel (8). It was well-marked that steroid hormones were remarkable dominant function in reproductive of the male and female animals (9). Between all domesticated animals dromedary camel had an exclusive site due to its possibility of heat stress (10). This study was undertaken to examine the age effect on steroid, cortisol and thyroid hormones during rutting season in dromedary camel.

Material and Methods:

The present study was done on 103 healthy camels from Al-Najaf slaughterhouse during the higher reproductive activity of camel according to the previous study of (3; 4, 11 and 12). The general examination of males was performed before slaughtering blood samples (10 ml) from jugular vein were taken, the samples divided depended on age into two age groups: pre-puberty 1-4 years and mature 5-8 years. Serum samples were collected by centrifugation at 3000 rpm Xg for 15 minutes, and stored at -20°C until analysis. The estrogen, progesterone, cortisol, T3 and T4 hormones were tested by using Gamma counter (privet laboratory inside Baghdad). Data were statistically analyzed by using complete randomized designs in two-ways ANOVA, differences were determined using the LSD. This was done according to (13).

Results:

The recent study indicated that the estrogen hormone decreases significantly (P<0.01) during December than other rutting months in the pre-puberty and mature male camel. The mature males showed higher significant (P<0.01) hormonal level than pre-puberty males during January, February and March months (Figure 1). The progesterone hormone had no significant differences between rutting months in pre-puberty and mature males. On March, the mature males show significant increase (P<0.01) in progesterone level comparing with pre-puberty camels (Figure 2). The cortisol hormone on March was higher significantly (P<0.01) than January and February in mature camels, comparing with significantly higher cortisol level on January than March in pre-puberty camels. The mature camels were significantly (P<0.01) higher in cortisol hormone during March than pre-pubertal camels (Figure 3). On the other hand the T3 hormone show a significant arise (P<0.01) during February and March as comparing with December in mature males. January was significantly lower (P<0.01) than December in pre-puberty males. T3 in mature males were significantly higher (P<0.01) during January, February and March as comparing with pre-pubertal camels (Figure 4). The T4 hormone was significantly (P<0.01) lower during January than February and March in pre-puberty male camels. T4 in mature males were increase significantly (P<0.01) during January than pre-pubertal males (Figure 5).

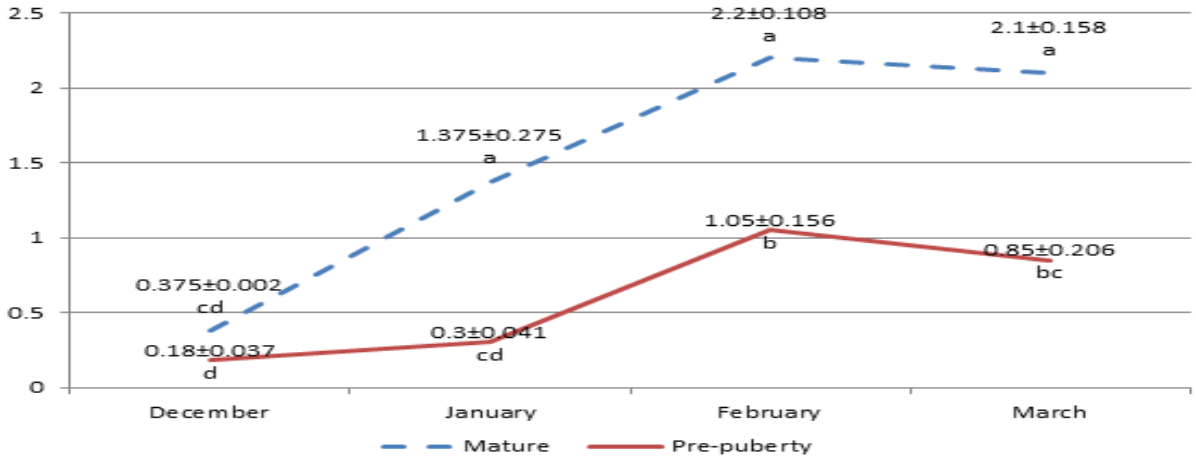

Fig. (1): Levels of estrogen hormone n. mol/L during rutting months and different ages in male camel.

- **Small letters represent significant differences at levels of (P<0.01).**

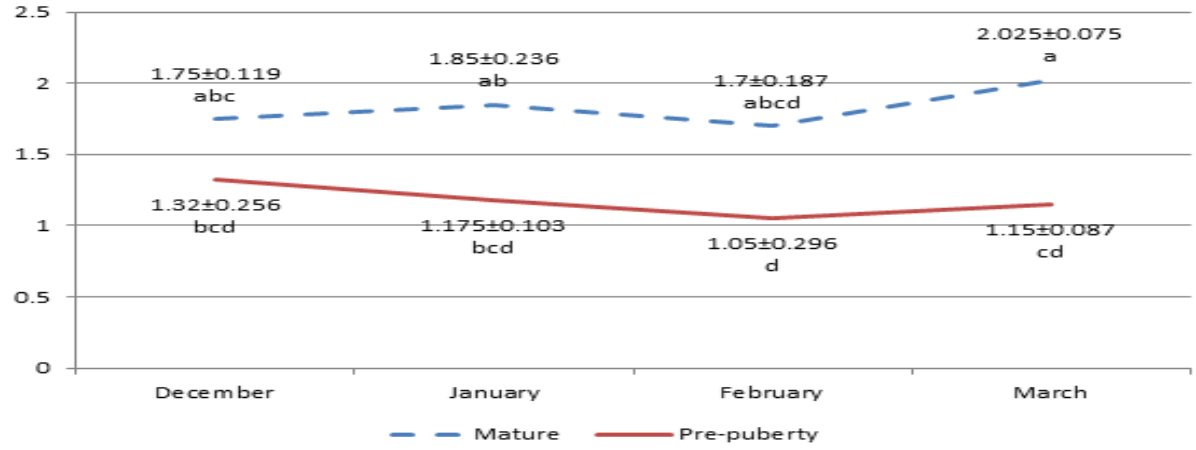

Fig.(2): Levels of progesterone hormone n. mol/L during rutting months and different ages in male camel.

- **Small letters represent significant differences at levels of (P<0.01).**

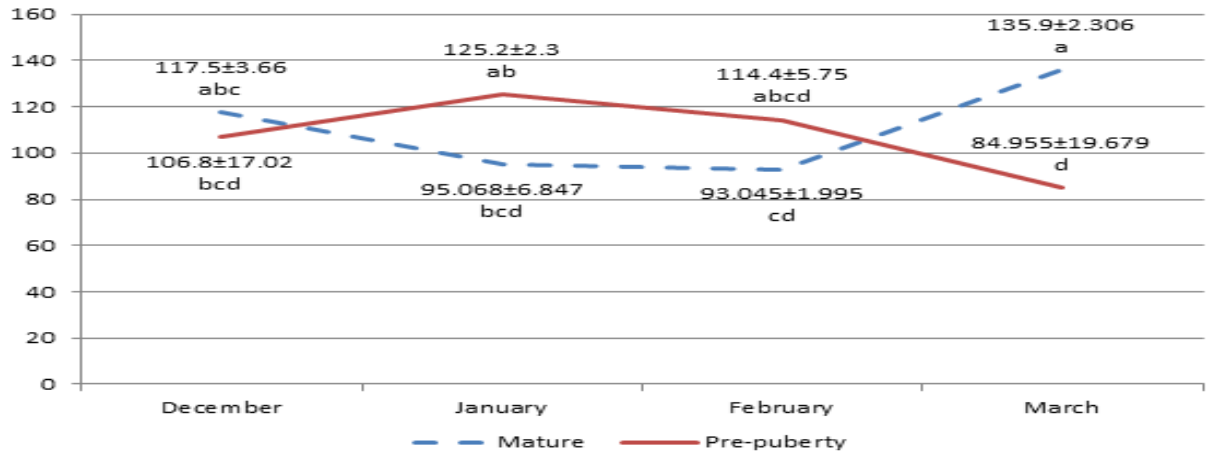

Fig. (3): Levels of cortisol hormone n. mol/L during rutting months and different ages in male camel.

- **Small letters represent significant differences at levels of (P<0.01).**

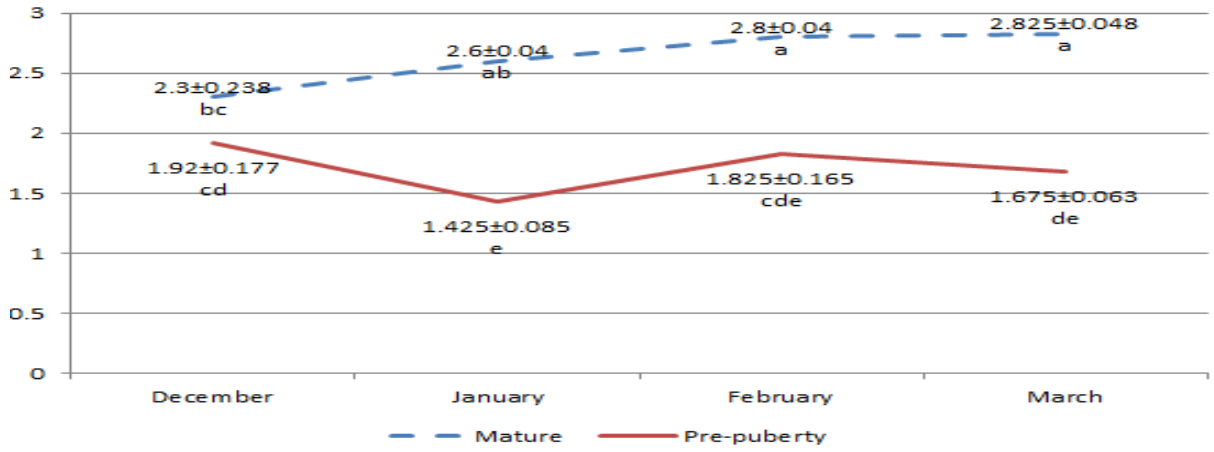

Fig. (4): Levels of T3 hormone n. mol/L during rutting months and different ages in male camel.

- **Small letters represent significant differences at levels of (P<0.01).**

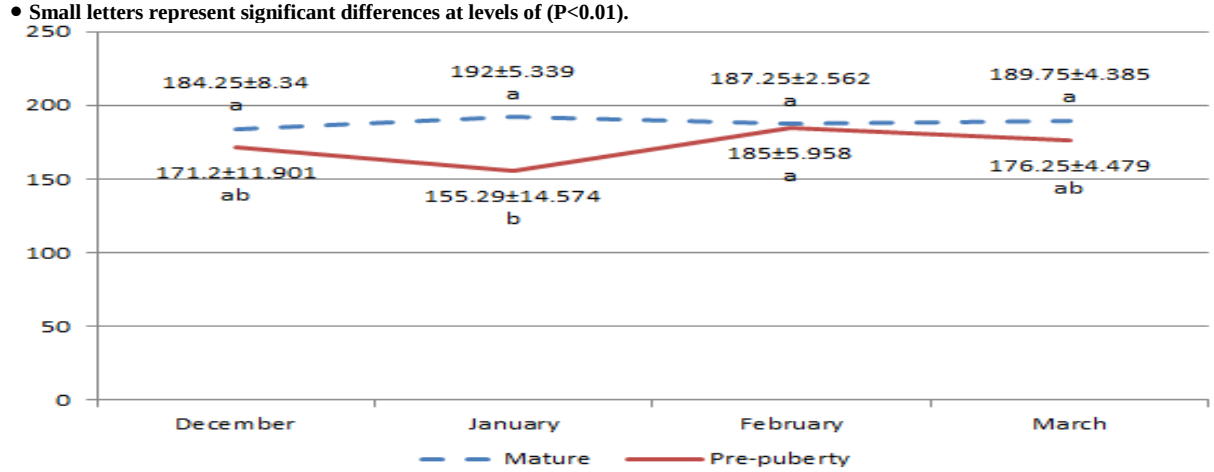

Fig.(5): Levels of T4 hormone n.mol/L during rutting months and different ages in male camel.

- **Small letters represent significant differences at levels of (P<0.01).**

Discussion:

Testosterone is converted to estrogen in male dogs and the regulation of androgen levels was controlled by the pituitary-gonadal axis via GnRH, LH and FSH (14 and 15). The estrogen synthesis in male had a critical synergistic role for proper development and maintenance of testicular function (particularly regulation of epididymal fluid reabsorption, fluid osmolality and semen pH) (16). Testosterone, which is the important product of the testis as well as it, regulates the activities of the testis (17). The elevation

of testosterone levels during rutting season perhaps related to the sensitivity elevation of Leydig cells to LH or due to increase LH secretions from pituitary gland or together (6 and 18). The major sex hormone is testosterone that regulating most of the reproductive functions involve sex accessory glands activity, spermatogenesis and libido of male animals (19). Serum estrogen level that recorded in this study was fit with the means which mentioned by (8 and 18) for adult camels. The testosterone concentrations in plasma and tissue of testes are highly significantly increased in post-pubertal than pre-pubertal camels, while serum level of testosterone was low in young animal and then increased with advancing age (1 and 20). Such increase was mainly associated with marked increase in size of Sertoli cells in camels aged between 3 and 4.5 years of age. Furthermore, the onset of puberty coincides with a dramatic increase in the average of leydig cell size, which accompanied by a peak in the steroid-producing capacity per leydig cell (1). The testosterone profile was positive and significant correlated with the total volume, total number of leydig cells and leydig cell (smooth endoplasmic reticulum) SER content (21 and 22). Figure (1) indicated that the estrogen hormone differ in mature and pre-puberty camels. This is in agreement with (8 and 18). Progesterone high level suggested that to be conversion into testosterone in rutting animals, in turn, breeding activity will stimulates. Progesterone with testosterone control synthesis and production of gonadotrophins that regulates rams sexual behavior (23). Gonads sex steroids levels and adrenal cortex glucocorticoids exhibits adverse relationship, this relation happened due to negative interactions between the hypothalamic–pituitary–adrenal axis, that in-charge-of glucocorticoid release, and the hypothalamic–pituitary–gonadal axis, that release sex steroid (6). Some worker stated that testosterone increases progesterone binding inside rat's brain, in terns, plays a vital part in sexual activities (24). Likewise corticosterone high level minimize LH receptors number and testosterone production (6). The Figure (2) indicated that the progesterone interfere with age. This is fit with study of (6). Cortisol low level during rutting period showed that animals were sexually active, although these animals did not attempt stress during that period. Anywise, during non-rutting time animals declare stressed, might be due to hot environmental temperatures, that cause increased in serum corticosterone level. Also this result was typical with finding of (6) who suggest the heat stress as a reason for increasing corticosterone level during non-rutting season. Thyroid hormones, including T3 and T4, are associated mainly with metabolism of general body (25). T3 and T4 lower levels during rutting camels probably due to that males expend most of their time in sexual activity and looking for females, this lead to decreased feed intake and lower body metabolism. Perhaps from reproductive and fertility point of view serum ratio of T4: T3 is more important than their individual level (6). Reverse to the levels of testosterone and progesterone in the non-rutting animals, the T3, T4 and corticosterone concentrations were higher ($P<0.01$) than the rutting one (6). General metabolism is modulating by thyroid hormones (26). The thyroid hormones arrange energy metabolism (carbohydrates and lipids major constituents) (27). Lipid metabolism affecting with thyroid hormones through increasing lipolysis (adipose tissue) and increasing activities of some enzymes that stimulates lipogenesis (28). Generally, serum cholesterol inversely changes with thyroid activity (29), however, in camels there are some contradictory findings concerning the relationship of serum thyroid hormones with cholesterol and triglycerides. Some studies showed that thyroid hormones concentrations were not related to cholesterol levels in male camels (10), whereby, (30) discover a significant positive correlation between serum thyroid hormones and cholesterol. Thyroid hormones levels are affected mainly by water availability, general body metabolism and season (30). Camel is well-known to be a seasonal breeder and the time of activity in the males is winter and spring seasons. Some worker recorded that the thyroid hormones concentrations of non-rutting male camels are higher than rutting

ones (6). This is in an agreement with (10) who found that winter concentrations of thyroid hormones were higher than summer. (30) Showed that summer thyroid hormones concentration in dromedary camel was higher than winter. This is in contrast to recent result. Secretion of thyrotrophic hormone increases during cold environment, which lead to higher concentration of thyroid hormones (10). Summer season in camel was inhibited thyroid due to dehydration; this inhibition helps in preservation of body water through decreasing pulmonary water loss and lowering basic metabolism (10). Similarly, T4 level during summer, drop gradually in dehydrated dromedary and increased after rehydration, contrariwise in the winter, T4 levels increased in dehydrated camels (10). The results of the recent study were agreed with (10) in that the age had an effect on hormones.

Conclusion: the age and rutting season had an effect on steroids, cortisol and thyroid hormones in dromedary male camels.

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