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THE EFFECT OF SEX STEROIDS ON PARATHYROID HORMONE (PTH) AND SOME SERUM ELECTROLYTES IN HUBBERD CHICKENS

BY

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INTRODUCTION

The effect of sex hormones on homeostasis of calcium (Ca) and phosphorous (P) ions have been accepted in different species of animals. Delorme, et al. (1983) revealed that the formation of Ca-BP was increased after the administration of 17^{B} - estradiol even at the physiological level and concluded that estrogens play a role in the embreyological characters which related to the binding of protein with Ca. Braidman and Anderson (1985), pointed the presence of steroid receptors in bones, while Delorme, et al. (1983) revealed the presence of shell gland receptors.

Ca homeostasis during Vit. D defficiency was influenced by sex of rat (Thomas and Forte, 1981). Ibrahim (1985) reported that the level of Ca in birds differ according to sex and age. Moreover Peng and Garner, (1980), found that Gonadectomy of male resulted in a decrease of (P) while ovariectomy of female did not alter the level.

Soares (1984) pointed that the calcitonin, parathromone, Vit. D and estrogen play a role in the Ca metabolism.

Therefore the present investigation was designed to determine the effect of estradiol benzoat and testosterone propionate on some serum mineral levels as well as tissue and blood PTH of 8 weeks chickens.

MATERIAL AND METHODS

Twenty four Hubbard male chickens, 8 weeks age were given a balanced diet and water ad libitum and reared under good hygienic conditions to avoid stress factors. The chickens were divided into three groups, each of 8 chickens. Each bird in the first group was injected subcutaneously with 0.2 ml olive oil and considered as control. In the second group the chickens were injected with 10 ug Estradiol benzoate contained in 0.2 ml oil (Folone, M. sr Co.) chickens of the third gorup were injected with testosterone propionate(Testocortigen, Richter, Milan, Italy) as the same regimen of the first and second group. All injections were repeated for three successive days. On the fourth day, individual blood sam-

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ples were collected, sera were obtained for hormonal and biochemical analysis. Thyroids, parathyroids and ultimobranchial glands were immediately removed and half of the glands were fixed in neutral formaline 10% for histological examination while the other half was used for hormonal assay. Parathormone extracts were obtained after grinding each gland with 1.0 ml physiological saline and kept in deep freeze till use.

PTH was determined in sera and extracts using double antibody I^{125} radioimmunoassay kits according to the method adopted by Kao (1982). The obtained sera were used also for determination of the total calcium using colorimetric kits according to Weissman and Pileggi (1974), inorganic phosphorus using kits according to Tietz (1970), sodium and potassium using flame photometer acording to Varley et al. (1980) and magnesium according to Neil and Neely (1956).

RESULTS

Table (1) shows that repeated estradiol benzoate injection for three successive days resulted in a significant decrease PTH in serum, parathyroid, thyroid, and ultimobranchial glands. These results was accompanied by a singificant decrease of Ca, mg and K without any change in serum P and Na (Table 2). Also table (1) revealed a significant increase in serum and PTH extracts. Meanwhile there was significant decrease in serum P in group which was injected with testosterone. At the same time serum Ca, Mg, Na and K did not exhibit any change (Table 2).

Table (1): The effect of sex steroids on PTH concentration in serum and different glandular extract of Hubbard chickens.

Group	Serum PTH ng/dl	Thyroid extract PTH ng/dl	Parathyroid extract PTH ng/dl	Ultimobranchial extract PTH ng/dl
Control	68.25 ± 1.74	54.67 ± 11.7	68.33 ± 4.41	49.5 ± 12.6
Estrogen	13.0 * ±2.96	22.33 * ± 6.5	25.0 * ± 1.57	12.3 ± 2 43
Testosterone	120.0 * ± 5.18	51.67 ± 4.4	128.3 * ± 9.7	139.3 * ± 13.3

Mean ± standard error
* – mean significantly different from control at P < 0.01

Histological results:

Repeated estradiol benzoate in-

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Table (2): The effect of sex steroids on some serum electrolytes on Hubbard chickens.

Group	Ca mg%	P mg%	Mg mg%	Na mEq.%	K mEq%
Control	9.81 ± 0.8	4.08 ± 0.16	5.67 ± 1.2	20.85 ± 0.94	4.15 ± 0.05
Estrogen	7.10 * ±0.23	5.94 * ± 0.42	1.87 * ± 0.43	20.4 ± 17	3.35 * ± 0.23
Testosterone	9.36 ± 0.5	2.64 * ± 0.24	2.63 * ± 0.14	22.8 ± 1.69	4.43 ± 0.64

Mean ± standard error
* = mean significantly different from control at P < 0.01

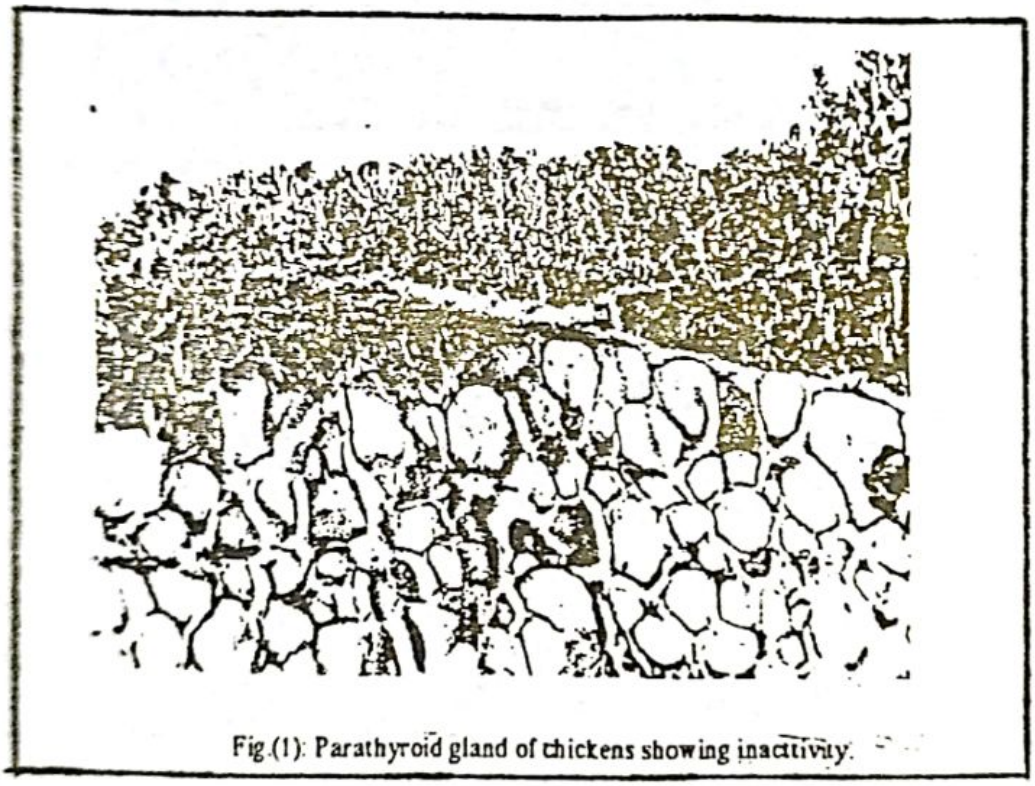

Fig.(1): Parathyroid gland of chickens showing inactivity.

jection for three successive days resulted in inactive parathyroid and ultimobranchial gland as shown by the reduced size and compact hyperchromatic cells with prominant C.T. stroma (Fig. 1, 2). Ultimobranchial gland of testesterone injected chickens showed activity as indicated by the large sized cells with large granular nuclei (Fig. 3, 4).

DISCUSSION

In addition to perathormone and calcitonin, sex hormones have been reported to affect Ca metabolism in different species including birds. The data obtained revealed that estradiol benzoate was significantly decrease serum Ca, Mg and K at

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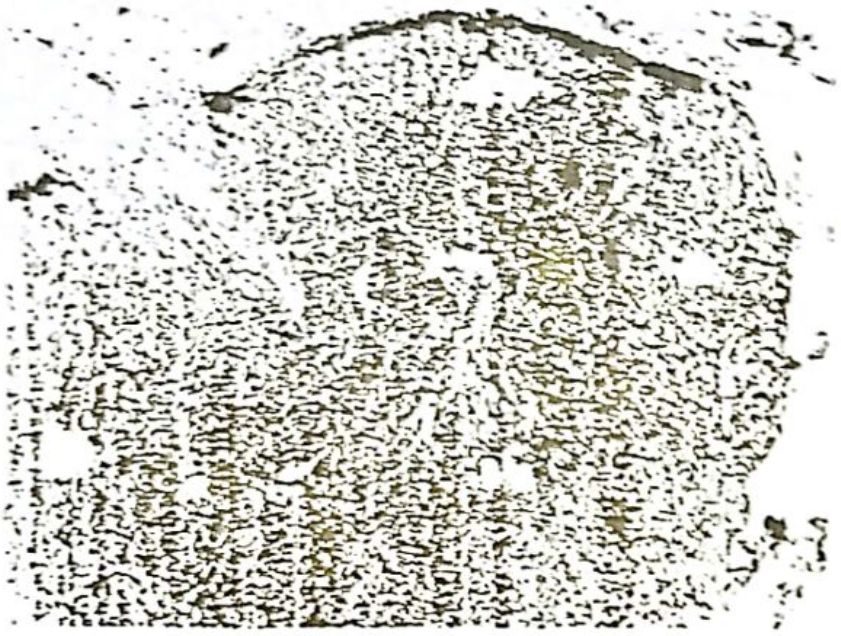

Fig.(2): Ultimobranchial gland showing inactivity with prominant C.T. stroma.

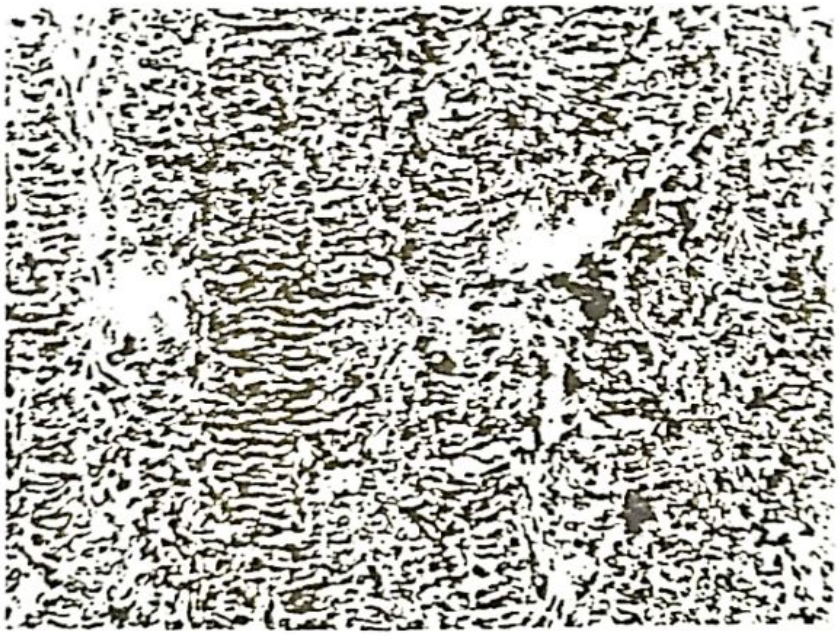

Fig.(3): Ultimobranchial gland showing activity of some cells

the same time parathormone (PTH) in serum and in the studied tissues and showed a significiant decrease. The previous data are considered as a confirmatory result to the studies of Dietel et al. (1979) who pionted that Vit. D_3 and also steroid hormone combined with the recep-

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Fig.(4): Ultimobranchial gland showing active cells.

tors in the parathyroid cells and go to the nucleus through the cytosol lead to increase of Ca inflex and CaBP, the former inhibit the change of ATP to CAMP which is essential for the formation of PTH. It is also established that estrogen activation of osteoplast cells enhance utilization of Ca & Mg (Thomas and Forte, 1981). At the same time the significant decrease of Mg^{++} which obtained was in agree with Anast et al., (1976) and Chase and Slatopolsky, (1974) who reported that the Mg^{++} is one of the main electrolytes for parathyroid function, and there are a direct relationship between the level of PTH & Mg^{++}. Shoback et al., (1983) also found that there are indirect relationship between PTH and cystosolic Ca^{++} on dependance of Mg^{++} and Ca^{++} change in the extracellular fluids.

Our data revealed no change in the serum P and Na of those chickens injected estradiol benzoate. These are in contradiction with data obtained by **Klinefelter et al. (1984).**

Concerning testosterone administration, the data showed a significant increase of PTH in both serum & glandular extracts with a significant decrease in serum P and Mg^{++} which may indicate rapid excretion of P from the kidney of domestic fowl as reported by **Klinefelter et al. (1984).** The elevation of PTH as a result of testoterone injection confirm the results obtained by **Thomas and Forte, (1981).** The differences between

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the data obtained as a result of estradiol benzoat or testosterone injection , may be clarified by **Delorme et al. (1983)** who pointed that steriods play a role in the emberyological characters which related to the binding protein of Ca.

The work nedds extensive study including sex, age, more different steriods & species to clarify the role of steroids on mineral homeostatic mechanisms.

SUMMARY

In the present study, twenty four, 8 weeks old Hubbard male chickens were used, to clarify the effect of estradiol benzoate and testosterone propionate on serum Ca, P, Mg, Na and K and also tissue and blood parathormone (PTH). The results obtained revealed that, estradiol benzoate significantly decreased serum Ca, Mg. K and PTH in serum and the studied tissues. Testosterone propionate injection significantly increase serum and glandular PTH with a significant decrease in serum P and Mg. The differences between the data obtained as a result of sex steroid injection were conducted to conclusion that steroids play a role in the embryoiagical characters which related to the binding protein of calcium. (CaBP).

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