

التغيرات الدورية للخلايا الحائثة للمبيض وعلاقتها
بنشاط المبيض فى الجاموس

أحمد حسن ، أحمد أبو العلا* ، رشاد فتح الباب ، عزيزة سليم

قام الباحثون بدراسة هستوكيميائية للفص الأمامى للغدة النخامية فى ثلاثة وثلاثون من إناث الجاموس وتشمل حيوانات ذات دورات شبق منتظمة وأخرى تعاني خمولا فى المبيض .

وقد أمكن أيضا تقدير كمية كل من الهرمون الحاث الجرابى والهرمون الحاث الليوثيتينى فى الفص الأمامى للغدة النخامية فى هذه الحيوانات . وقد أوضحت التجارب النتائج الآتية :

- ١ - فى مرحلة قبل الشبق وجد أن الخلايا الحائثة الجرابية تزداد عددا ونشاطا وأن نسبة الهرمون الحاث الجرابى الى الهرمون الليوثيتينى هى ١٠٦٢ .
- ٢ - فى مرحلة الشبق وجد أن الخلايا الحائثة الليوثيتينية تزداد عددا ونشاطا وأن نسبة الهرمون الحاث الجرابى الى الهرمون الحاث الليوثيتينى ٢٦ .
- ٣ - فى مرحلة بعد الشبق وجد أن الخلايا الحائثة الجرابية والليوثيتينية تقل فى الغدد والنشاط عن المراحل السابقة .
- ٤ - أوضحت النتائج أنه يمكن تقسيم الحيوانات التى تعاني من خمول المبيض الى مجموعتين منفصلتين .

المجموعة الأولى : يحتوى الفص الأمامى للغدة النخامية على نسبة وكمية عالية جدا من كل من الخلايا وهرمون الحائثة الجرابية ونسبة ضئيلة جدا من كل من عدد وكمية الخلايا والهرمون الحاث الليوثيتينى .

المجموعة الثانية : يحتوى الفص الأمامى للغدة النخامية على نسبة وكمية عالية جدا من كل من الخلايا والهرمون الحاث الليوثيتينى ونسبة ضئيلة جدا من عدد وكمية كل من الخلايا والهرمون الحاث الجرابى .

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بسم الله الرحمن الرحيم

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**CYCLICAL CHANGES IN GONADOTROPIC CELLS IN RELATION
TO THE OVARIAN ACTIVITY IN BUFFALOES**
(With 1 Table & 5 Figs.)

By
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SUMMARY

The gonadotropic cells within the pars distalis of 33 mature female buffaloes, including normal cycling animals and animals suffering from ovarian inactivity were histochemically investigated. Using performic acid-Alcian blue-periodic acid Schiff-orange G (PEA-AB-PAS-OG) stain, the FSH- and LH- cells were differentiated and identified. The FSH and LH pituitary contents were also immunologically assayed. During Proestrus, the FSH-cells were increased in size and number and constituted about 14.4% of the total cell count. The FSH/LH ratio was 1.62. During estrus, the LH-cells were highly increased in amount (12.2%) and the FSH/LH ratio was 0.26. In diestrus, the FSH-cells percentage was 12.6%, while the LH-cell percentage was 10.4% with a FSH/LH ratio of 0.65. In animals affected with inactive ovaries, two contrastic data could be obtained. These animals either show a high FSH cell % and content with a negligible LH cell % and content, or a high LH cell % and content with a negligibel FSH cell % and content. It can concluded that for proper treatment of buffaloes suffering from inactive ovaries, the FSH/LH ratio should be restored to that ratio at proestrus.

INTRODUCTION

Contrasting sharply with what was reviewed about the fluctuations in pituitary and plasma contents of both FSH and LH during the estrus cycle in buffaloes, little is known about the activities of FSH-cells and LH cells in buffaloes with inactive ovaries.

Moreover, the preliminary findings of SOLIMAN and SAID (1960) dealt generally with the changes in the level of total gonadotropins in the blood of buffaloes during diestrus and not with the changes of the two fractions; FSH and LH separately. Accordingly, the aim of the present work is to determine the histochemical changes in both FSH- and LH-cells as well as the quantitative values of FSH and LH in the pituitary glands of buffales in relation to the different ovarian activities.

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MATERIAL and METHODS

The pituitary glands were obtained as soon as possible from 33 mature female buffaloes slaughtered at Cairo abattoir. The glands were bisected in the mid-sagittal plane into two halves, fixed immediately, dehydrated, and embedded in paraffin. Step serial sagittal sections at 5 microns thickness were stained with performic acid-Alcian blue-Periodic acid Schiff-Orange G (PFA-AB-PAS-OG) method (HEATH, 1965).

FSH and LH were prepared from fresh pituitaries of normal mature buffaloes, slaughtered at Cairo abattoir, according to the methods of FRANKEL-CONRAT, *et al.* (1940) and LI, *et al.* (1942) respectively as modified by ABOUL ELA (1981). These prepared hormones were used as antigens for preparation of their specific rabbit antisera according to the method of TADEUSZ SCGENCY (1974). Pituitary glands of 33 mature female buffaloes were collected from slaughter houses. The entire pituitary was removed quickly after slaughter, placed in acetone solution and put in the deep freeze at -20°C till use for immunoassay. The corresponding ovaries of each pituitary gland were collected to determine the size of the ovarian follicles and corpora lutea to determine the different phases of the estrous cycle. FSH and LH pituitary contents were immunologically assayed using the haemoagglutination inhibition reaction as reported by WIDE (1962) and SCHUURS (1969).

RESULTS

Histochemical observations of FSH and LH-cells in relation to ovarian activity (Table 1):

During proestrus, the FSH-cells were increased relatively in size (22 μm) and number and constituted about 14.4% of the total cell count. These cells stained violet with PFA-AB-PAS-OG stain and their cytoplasm contained abundant secretory granules. The LH-cells were less numerous and constituted about 9.8% of the total cell count. They appeared red in colour and their cytoplasm contained few secretory granules (Fig. 1).

During estrus, the FSH-cells were degranulated, appeared pale violet in stain and numerous cells showed a clearly visible negative Golgi image. The LH-cells were more numerous and reached its maximal percentage (12.2%). Their cytoplasm was packed with dark red cytoplasmic granules (Fig. 2).

During diestrus, the FSH-cells were smaller in size (13 μm) and represented about 12.6% of the total cell count. Their cytoplasm contained moderate amount of secretory granules. The LH cells were also smaller in size (18 μm) and moderate in number and represented about 10.4% of the total cells count (Fig. 3).

In case of inactive ovaries, the FSH and LH-cells percentages was fluctuating. In some cases the FSH-cells were very few and constituted only about 5.6%. They were relatively smaller in size (13 μm) and contained scanty cytoplasmic secretory granules, while, the LH-cells were relatively numerous, representing about 9.1% of the total cell count and they contained abundant cytoplasmic granules (Fig. 4). In other cases, the FSH-cells were more numerous (12.1%), larger in size (18 μm) and contained abundant secretory granules, while the LH-cells were relatively fewer (4.8%), smaller in sized (12 μm) and contained less amount of secretory granules scattered within their cytoplasm (Fig. 5).

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FSH and LH contents of the pituitaries of buffaloes in relation to ovarian activity (Table I):

The FSH content of the pituitary glands of buffaloes during proestrus predominated LH content with a ratio of 1.62 (FSH/LH). On the other hand LH predominated the FSH content in pituitaries of buffaloes during estrus with a ratio of 3.78 (LH/FSH). The FSH and LH contents in the pituitaries of buffaloes during diestrus tended to be shifted towards a gradual decrease of LH and increase of FSH as compared to estrus.

The pituitaries in the cases of buffaloes with inactive ovaries were of two varieties. A group of these animals had pituitaries with negligible amounts of FSH and relatively low concentration of LH as compared with normal cycling animals with FSH/LH ratio of only 0.08.

Another group of buffaloes with inactive ovaries had pituitaries containing negligible amounts of LH and relatively high levels of FSH, when compared with normal cycling animals and the FSH/LH ratio was 43.58.

DISCUSSION

In the present investigation, the FSH-cells could be differentiated from the LH-cells tentatively by using the PFA-AB-PAS-OG stain as well as by the cytological responses to the different phases of estrus cycle.

During proestrus, the FSH-cells showed marked increase in their activities than the LH-cells. Paralelly the FSH-content of the pituitary reached its maximum during this period. The FSH content predominated LH with a FSH/LH ratio of 1.62. This may support the opinion that these two hormones are different and may be synthesized at different rates and released from two different cell varieties as indicated tentatively. This does not preclude the possibility that these hormones might share a common regulatory mechanism on proestrus. A similar pattern of FSH concentration in the pituitary was observed in the blood of buffaloes by ABD0 (1962) and AHMED (1980) who found that the level of FSH was significantly high during proestrus and low during estrus.

During estrus, the activity of the LH-cells was markedly increased. The present findings showed also that the LH concentration of the pituitary was high with LH/FSH ratio of 3.78. ABD0 (1962) reported that the level of LH in the blood of buffaloes was significantly higher at estrus as compared to its level at diestrus. This is substantially supported by our findings. In the present work, the histochemical observations indicated that the number and sizes of FSH-cells were not significantly changed, though their cytoplasm showed a marked degranulation. This explain the change in FSH-content during estrus might be due to a difficiency in its synthesis. This could be also supported by the results of AHMED (1980) who found that the level of estrogens in the blood of buffaloes during estrus was doubled when compared with their levels during the other periods of the cycle.

During diestrus, the LH-cells still exhibited morphological signs of moderate cellular activities other than the FSH-cells which showed signs of decreased activities. The ratio of LH/FSH during this period was 1.54 which seems to be most suitable for luteal growth. This ratio was 1.38 in the blood of buffaloes during diestrus, as reported by AHMED (1980).

The present work revealed that the pituitaries obtained from buffaloes affected with inactive ovaries were of two different natures. A group with negligible percentage of FSH-cells

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and FSH content with relatively low percentage of LH-cells and LH content. The other group showed negligible percentage of LH-cells and LH content with a relatively high percentage of FSH-cells and FSH content. Moreover, a pronounced imbalance between FSH and LH pituitary contents was revealed. LUKTUKE and SHARMA (1978) examined the ovaries of large number of Indian buffaloes with inactive ovaries. They found that a corpus luteum was present in the ovaries of some of them, while medium sized follicles but no corpus luteum were present in the ovaries of other animals. NASR, *et al.* (1963), suggested that the absence of total gonadotropic potency in the blood of buffaloes suffering from ovarian inactivity was most probably due to imbalance between FSH and LH ratio. It is also concluded from the present investigation that the balance between FSH and LH is an important factor for ovarian activity. This is why treatment of buffaloes suffering from inactive ovaries by using gonadotrophin is not usually successful. In order to get a proper treatment, the imbalance of FSH/LH ratio should be restored to that ratio at proestrus, where FSH predominates over LH at a ratio of 1.62.

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LEGEND OF FIGURES

- Fig. (1):** Pars distalis of the pituitary glands of the buffaloes during proestrus showing follicle stimulating hormone cells (F) and lutenizing hormone cells (L). (PFA/AB/PAS/OG stain x 400).
- Fig. (2):** Pars distalis of the pituitary glands of the buffaloes during estrus showing follicle stimulating hormone cells (F) and lutenizing hormone cells (L) (PFA/AB/PAS/OG stain x 400).
- Fig. (3):** Pars distalis of the pituitary glands of the buffaloes during diestrus showing follicle stimulating hormone cells (F) and lutenizing hormone cells (L) (PFA/AB/PAS/OG stain x 400).
- Fig. (4):** Pars distalis of the pituitary gland of the buffaloes with inactive ovaries showing increased activity of lutenizing hormone cells (L) and decreased activity of follicle stimulating hormone cells (F) (PFA/AB/PAS/OG stain x 1000).
- Fig. (5):** Pars distalis of the pituitary gland of the buffaloe with inactive ovaries showing increased activity of follicle stimulating hormone cells (F) and decrease of activity of lutenizing hormone cells (L). (PFA/AB/PAS/OG stain x 1000).

Table (I)
 Percentage, average diameter and hormonal content of FSH-and LH-cells in pars distalis
 of pituitary gland in normal and abnormal cycling buffaloes

Phases	No. of animals	FSH		LH		FSH/LH	LH/FSH	Average diameter (cm)			
		Cell%	diam.Um	content ng/mg	cell%			diam.Um	content ng/mg	GF	CL
Proestrus	11	14.4	22	320.2+43	9.8	19	197.0+18	1.62	0.62	1.1	0.9
Estrus	4	14.2	20	63.6+8	12.2	23	240.2+17	0.26	3.78	1.3	0.8
Diestrus	7	12.6	18	125.2+13	10.4	18	193.4+17	0.65	1.54	0.5	1.4
Inactive ovary											
-FSH-d.	7	5.6	13	12.4+3	9.1	19	151.4+32	0.08	12.21	-	-
-LH-d.	4	12.1	18	209.2+48	4.8	12	4.8+4	43.58	0.02	-	-



