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تأثير الميثيل بريدينزلون على البلوغ الجنسي ودورة الشبق في اناث الفئران البيضاء

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أجريت هذه الدراسة لمعرفة تأثير أحد المشتقات الصناعية من سيترويدات قشرة الغدة الكظرية وهي مادة خلات الميثيل بريدبنزولون على اللبلوغ الجنسي في انـــــاث الفئران البيضاء والاناث البالغة أثناء دورة الشبق٠

أدى حقن العقار الى نقص معدل النمو وزيادة نسبة النفوق بعد حقن جرعة عاليـــة من العقار وتأخر البلوغ الجنسي٠ حدث نقص في محتوى المصل من هرمون الحاثه الجرابية وزيادة هرمون الاباضه ولم يحدث تغير ملحوظ في تركيزهما في الغده النخامية ٠ وفـــــي حالة الفئران المحقونة أثناء مرحلة الشبق، أدى حقن العقار الى زيادة كبيرة فـــــي مستوى كلا الهرمونين في المصل، أما بالنسبة للغدة النخامية فقد زاد محتواها من هرمون الحاثة الجرابية وتناقص بوضوح مستوى هرمون الاباضة ٠

في مرحلة الهدوء الجنسي تسبب حقن العقار الى تناقص مستوى هرمون الحاثـــــة الجرابية في المصل مع زيادة تركيزه في الغده النخامية ٠ أما بالنسبة لهرمون الاباضـــة فبينما تناقص تركيزه في الغده النخامية لم يتغير مستواه تغيرا معنويا في المصل٠

وقد اتضح من البحث أن الزيادة في هرمونات القشرة الكظرية ذات تأثير سيىءعلى نشاط الغدد الجنسية لاثرها الهدام على الانسجة٠

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THE INFLUENCES OF METHYL PREDNISOLONE ON PUBERTY AND ESTROUS CYCLE OF FEMALE ALBINO RATS

(With 3 Tables)

By
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SUMMARY

The present study showed that injection of 1.0 or 2.0 mg methyl prednisolone acetate (MPA) into immature female rats resulted in a significant decrease in their rate of growth, increased deaths and retardation of the onset of puberty. Injection of MPA into immature female rats resulted in a significant decrease in serum FSH and increase LH level without affecting their concentration in the pituitaries.

Administration of MPA into estrous rats resulted in a significant increase of FSH concentration in the serum and pituitary. MPA injection increased serum LH level, with a pronounced decrease of its concentration in the pituitary.

During diestrus, administration of MPA led to a pronounced decrease in serum FSH level accompanied with a rise of its concentration in the pituitaries. Pituitary LH contents decreased without influencing serum LH level.

It seems that, Exces methyl prednisolone acetate have an adverse effect on gonadal function which is attributed to its catabolic nature.

INTRODUCTION

Cyclic variation of adrenal cortex have been recorded during the estrous cycle in several species of animals. Hypofunction of adrenal cortex is associated with anestrus, while hyperactivity of this gland is associated with cystic ovaries and nymphomania (SOLIMAN and SHAKER, 1965). GELATO et al. (1978) found that adrenalectomy delayed puberty. Replacment therapy with corticosterone was able to correct the effect of adrenalectomy, but had no effect on vaginal opening in intact mature rats. They also found that FSH and LH levels in the serum showed no significant changes in adrenalectomized or corticosteronetrone treated female rats at the age of 21 days old. SRIDARAN and BLAKE (1980) and EVERETT and TYREY (1982) reported that, adrenalectomy to rats did not alter the magnitude of the proestrus or estrus increases in serum FSH and LH when compared with normal rats.

The aim of the present study is to investigate the effect of methyl prednisolone acetate (MPA) a potent synthetic glucocorticoid on onset of puberty and its effect on pituitary and serum FSH and LH in immature female rats and during the estrous cycle.

MATERIAL and METHODS

In the first experiment 30 immature female rats 3 weeks old were equally divided into three groups, one group injected i.m. with 0.2 ml saline and the other groups were injected i.m. with 1.0 and 2.0 mg Methyl prednisolone acetate (MPA) (Upjon, USA) respectively, contained in 0.2 ml. saline. Injections were repeated every 7 days. Slaughter of rats was done at the age of 8 weeks.

In the second experiment, 40 mature female rats with 4 day estrous cycle were divided equally into estrus and diestrus groups according to vaginal smear. Each group was classified into two subgroups. The first was considered as control and injected with 0.2 ml saline i.m. The second subgroup was injected with 1 mg MPA dissolved in 0.2 ml saline for two successive days. On the third day the rats were slaughtered. Individual serum samples were collected and corrosponding pituitaries were dissected and weights with a torsion balance. The sera and pituitaries were stored at -20°C until use. The serum and pituitary contents of FSH and LH were estimated by the haemoagglutination inhibition immunoassay according to ALLEN (1969).

Data were statistically analysed according to DIXON and MASSAY (1957).

RESULTS

Administration of 1.0 or 2.0 mg MPA into immature female rats resulted in a significant decrease in their rate of growth. Increased deaths were recorded in rats which recieved the higher dose. A mild retardation of the onset of puberty was also detected (Table 1).

Injection of 1.0 mg APA into immature female rats resulted in a significant decrease in FSH and increase in LH levels in the serum without affecting their concentrations in the pituitaries as compared to the controls (Table 2).

Administration of MPA into estrous rats resulted in a significant increase of FSH concentration in the serum and pituitary glands as compared to controls. Regarding LH, MPA injection led to a significant increase of this hormone in the serum accompanied with a pronounced decrease of its concentration in the pituitary as compared to control rats.

During diestrus, administration of MPA led to a pronounced decreae in serum FSH level accompanied with a significant increase of its concentration in the pituitaries than control. A significant decrease in pituitary LH contents without influencing serum LH level was recorded in case of injected rats as compared to their respective control values (Table 3).

DISCUSSION

A) The effect of MPA on puberty of female rats :

The present study indicated that administration of MPA into immature female rats retard puberty and general body development. This may be attributed to its catabolic nature by stimulating energy consumption from non carbohydrate sources. Consequant results of a reduction in serum FSH level may augment the retarding effect of glucocorticoids on puberty. GELATO et al. (1978) assumed that, the day of vaginal opening is in association with increased gonadotropic levels in the blood. Our findings suggest that MPA inhibits the release of FSH from the pituitaries of rats with infantile ovaries and thus LH remains in the circulation without being utilized. It seems that, Excess glucocorticoids (PMA) beside its antinfilammatory action. They have adverse effects on gonadal function which is attributed to its catabolic nature.

B) Effect of MPA on estrus and diestrus rats :

Administration of MPA during estrus increased the concentration of FSH in the pituitary and serum of rats. It also increased the release of LH from the pituitaries into the circulation. Glucocorticoids could thus be responsible for persistant estrus in animals. Nymphomania in cattle and cystic ovaries in camels are accompanied with increased activity of adrenals (SOLIMAN and SHAKER, 1965).

Administration of MPA to diestrus rats inhibited completly the secretion of FSH which was present in negligable amount in the circulation and retained in the pituitary, while pituitary LH contents decreased significantly without affecting serum LH. Glucocorticoids facilitate gonadal steriods action on release of FSH as shown by BROWN-GRANT (1974). FEDER et al. (1971) found that, administration of dexamethasone phosphate resulted in blocking ovulation which could be reversed by progesterone. They also found that injection of ACTH at diestrus or metestrus blocked ovulation of intact rats. It thus appear that estrogen and progesterone seems to play a role in modulating the action of this corticosteriod on the pituitary gonadotrophins.

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Table (1): Effect of MPA on body weight and vaginal opening of immature female rats.

Treatment	Age (weeks)				
	3	4	5	6	7
Control saline Body weight (gm)	52.40 ±2.94 (10)	70.40 ±3.99 (10)	101.60 ± 6.42 (10)	101.60 ± 6.42 (10)	104.40 ± 6.96 (10)
Opened vagina	0	5	7	7	10
			**	*	**
1.0 mg MPA Body weight (gm)	49.80 ±3.28 (10)	61.80 ±4.12 (10)	55.00 ±4.30 (10)	80.90 ±6.50 (9)	70.40 ±4.90 (9)
Opened vagina	0	0	5	5	6
		*	**	**	**
2.0 mg MPA Body weight (gm)	55.60 ±2.08 (10)	58.20 ±5.23 (10)	58.00 ±5.25 (5)	75.00 ±0.70 (2)	67.00 ±2.12 (2)
Opened vagina	0	0	2	2	2

** : Significantly different from control at P/0.01.

* : Significantly different from control at P/0.05.

() : Number of animals.

± : Standard error.

Table (2): Effects of injection of MPA on gonadotrophins of pituitary glands and sera of immature female rats.

Treatment	FSH (i.u)		LH (i.u)	
	Serum	Pituitary	Serum	Pituitary
Control saline	7.09 ± 0.85	0.21 ± 0.03	0.18 ± 0.04	0.10 ± 0.04
MPA (10 mg)	0.20** ± 0.00	0.24 ± 0.05	1.12** ± 0.14	0.14 ± 0.04

± : Standard error

** : Significantly different from control at P/0.01

Table (3): Effect of injection of MPA on gonadotropins of pituitary glands and sera of estrous and diestrous rats.

Treatment	FSH (i.u)		LH (i.u)	
	Serum	Pituitary	Serum	Pituitary
Estrous control	5.49 ± 0.00	0.30 ± 0.04	2.40 ± 0.00	3.10 ± 0.00
Estrous MPA	21.06** ± 0.00	0.71** ± 0.08	4.90** ± 0.00	0.39** ± 0.07
Diestrous control	8.32 ± 0.44	0.22 ± 0.00	1.74 ± 0.22	0.78 ± 0.07
Diestrous MPA	0.02** ± 0.00	1.13** ± 0.10	1.35 ± 0.00	0.27** ± 0.00

± : Standard error

** : Significantly different from respective group at P < 0.01