SHORT COMMUNICATION

URINARY EXCRETION OF 17-KETOSTEROIDS AND 17-HYDROXYCORTICOIDS IN THE OVULATORY AND ANOVULATORY MENSTRUAL CYCLES

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Summary: Excretion of 17-ketosteroids and 17-hydroxycorticoids in three consecutive ovulatory menstrual cycles in pre and post ovulatory phases was investigated in 22 normal medical students. There was a consistant and statistically siginficant increase in the excretion of 17-hydroxycorticoids during the post ovulatory phase in all the subjects. Except for one subject, the excretion of 17-ketosteroids was also increased in the post ovulatory period. To ascertain if ovulation has any relationship with the increase in the excretion of these metabolites, five an-ovulating subjects were compared with the five ovulating ones. In the anovulating cycles too there was an increase in the 17-ketosteroids and 17-hydroxycorticoids in the premenstrual period.

Key words: 17-hydroxycorticoids 17-ketosteroids urinary excretion ovulating cycles anovulating cycles

INTRODUCTION

Menstural cycle is controlled by the cyclic variation in the production of gonadotropins and ovarian hormones. Adrenal cortical and thyroid hormones are also konwn to exert influence on it. Variations in adrenocortical functions are associated with disturbances in menstrual cycle. There are numerous reports on the excretion of 17-ketosteroids and 17-hydroxycorticoids in normal women (3, 5, 6, 7) but information regarding their variation during the follicular and luteal phases in the normal mestrual cycle and in the anovulatory cycles is negligible. The present study was undertaken to investigate if there are any cyclic variation in the excretion of these metalbolites and if it has any relationship with ovulation in normal adult females.

MATERIALS AND METHODS

The study was carried out in two stages. In the first stage, variations in the excretion of 17-ketosteroids and 17-hydroxycorticoids between the pre and post ovulatory period were observed in 22 normally ovulating medical students who kept a record of their basal body temperature during the entire menstrual cycle. Two 24 hr urine samples were collected: (i) in the first week of the menstrual cycle and (ii) in the last week of the cycle. Thus 17-ketosteriods and 17-hydroxycorticiods were estimated in the pre and post ovulatory phases of three consequtive ovulatory cycles.

In the second part of the study, 5 ovulating and 5 non-ovulating females in the same age group as in the first part *i.e.* 17-20 yrs were investigated. The criterion for anovulation was the failure of elevation of the basal body temperature in the later half of the menstrual cycle. Their 17-ketosteroids and 17-hydroxycorticoids were estimted every 3 or 4 days throughout the menstrual cycle to see if ovulation has any relation with the alteration in the excretion of these metabolites. The 17-ketosteroids were estimated by the method of Callow *et al.* (4) as modified by Vestergaard *et al.* (15), and 17-hydroxycorticoids were estimated by the method of Norymberski *et al.* (9) as modified by Brike *et al.*(2).

RESULTS

The average excretion of 17-ketosteroids in the pre and post ovulatory phases of the menstrual cycle was 7.45 and 8.72 *mg* respectively. All the 22 subjects except one showed post ovulatory rise in the 17-ketosteroids excretion.

TABLE I

Sl. No.	*Excretion of 17-Ketosteroids in 24 hr. urine in mg. (Average of 3 cycles)*		*Average difference in 17-K.S. excretion*	*Excretion of 17-Hydroxycorticoids in 24 hr. urine in mg. (Average or three cycles).*		*Average difference in 17-Hydroxycorticoid excretion*
	Preovu	*Postovu*	*Difference*	*Preovu*	*Postovu*	*Difference*
1.	9.08	10.01	+0.93±0.14	10.50	13.60	+3.09±2.54
2.	5.89	8.18	+2.29±2.24	10.04	14.67	+4.62±3.73
3.	6.99	6.83	−0.16±1.02	11.83	14.12	+2.29±0.25
4.	5.65	6.77	+1.14±3.08	8.82	12.92	+4.10±0.51
5.	7.67	7.95	+0.28±0.42	5.88	8.59	+2.70±0.22
6.	11.92	12.50	+0.58±9.46	9.90	12.72	+2.82±1.61
7.	7.68	9.81	+2.13±3.48	5.47	9.94	+4.46±3.88
8.	7.68	9.69	+2.01±1.18	5.95	7.99	+2.14±0.84
9.	10.77	11.43	+0.66±0.69	4.69	5.91	+1.32±0.74
10.	5.13	5.92	+0.79±1.20	7.93	9.18	+1.25±0.49
11.	5.76	7.06	+1.29±0.75	9.19	10.67	+1.47±1.11
12.	3.65	6.82	+3.17±1.46	6.65	8.52	+1.86±0.66
13.	5.26	6.39	+1.13±0.83	10.28	12.00	+1.72±0.28
14.	5.50	5.53	+0.03±0.62	4.41	8.17	+3.76±0.96
15.	7.07	7.86	+0.79±2.05	7.03	12.86	+5.83±5.97
16.	6.93	7.21	+0.29±1.57	11.59	13.24	+1.65±0.87
17.	16.43	17.55	+1.14±4.82	15.88	20.32	+4.44±3.92
18.	7.28	9.44	+2.16±1.44	5.64	14.18	+8.64±4.12
19.	5.50	8.61	+3.11±1.18	5.76	10.40	+4.65±1.65
20.	9.02	9.79	+0.77± .55	13.59	15.66	+2.07±1.11
21.	6.10	6.53	+0.43±1.06	8.22	17.20	+8.98±5.32
22.	7.83	9.87	+2.87±3.07	7.00	8.28	+1.28±0.99

The exception *i.e.* subject No. 3 (Table I) showed an increase (average of 0.16 *mg*) in the pre-ovulatory excretion of 17-ketosteroids in all the three cycles. Statistically, however, this was not significant. The average difference in the 24 hr 17-ketosteroid urinary excretion in the two phases of the menstrual cycle was 1.26 *mg* (S.D. ± 0.99). The excretion of 17-hydroxy-corticoids in all the 22 subjects was more in the post-ovulaory period. The average excretion in pre and post ovulatory period was 8.47 and 11.91 *mg* respectively, with an average difference of 3.84 (S.D.±2.197) betwen the two phases.

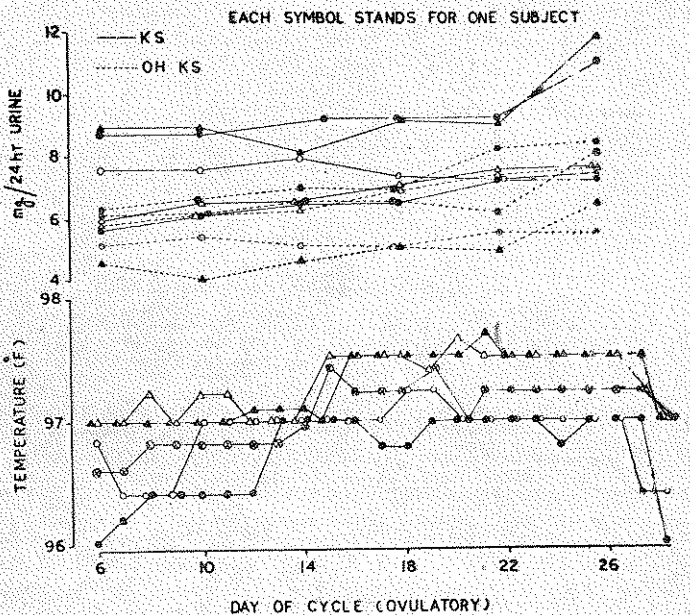

Fig. 1: Urinary excretion of 17-ketosteroids and 17-hydroxycorticoids in the ovulatory cycle.

In the second series of experiments (Fig 1 and 2), there was a premenstrual rise in the excretion of 17-ketosteroids and 17-hydroxycorticoids in all subjects both in ovulatory and anovula-latory cycles. The average rise in the 17-ketosteroids excretion in the anovulatory cycles during the premenstrual period was 1.78 *mg* and that in the 17-hydroxycorticoids excretion during the same period was 1.52 *mg*. All five ovulating cases sudied in this series showed premenstrual rise in the excretion of 17-ketosteroids and 17-hydroxycorticoids, with an average difference of 2.5 *mg* and 2.22 *mg* respectively. The premenstrual increase in the excretion of 17-hdroxycorticoids was more marked in the ovulatory than in the anovulatory cycles.

DISCUSSION

Smith *et al.* (14) using formaldehydogenic method observed 25 to 50% higher excretion of 17-hydroxycorticoids during the period within 36 hrs preceding the onset of menstruation. Pathak and Kahali (11) using indirect method of eosinophil count for the assessment of the adrenocortical

function, observed that in the 18 cycles out of 20 cycles studied, the lowest eosinophil counts fell in the luteal phase of the menstrual cycle.

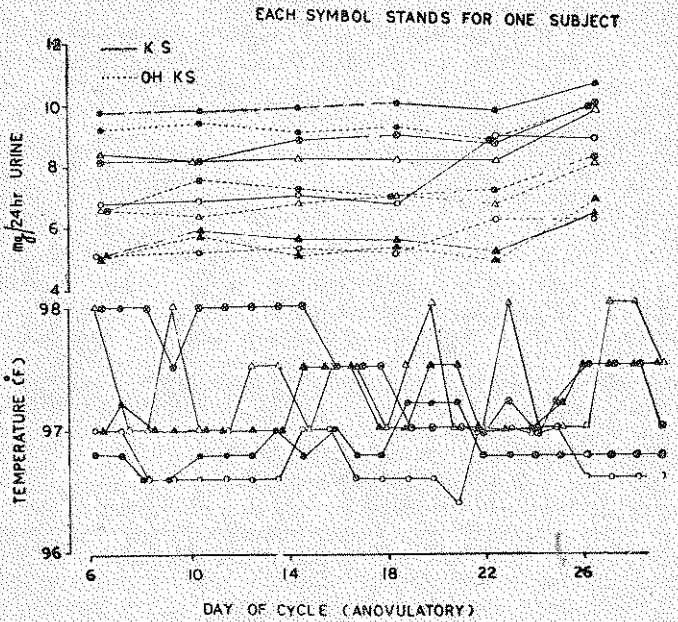

Fig. 2: Urinary excretion of 17-ketosteroids and 17-hydroxycorticoids in the anovulatory cycle.

Smith suggested that the onset of menstruation is preceded by a sudden oxidative inactivation of estrogen(13). A fall in plasma estrogen level in the late luteal phase has also been reported by Mishell Jr. *et al.* (8). The present study shows that the increase in the 17-ketosteroids and 17-hydroxycorticoids in the premenstrual period does not have any relationship with ovulation since it occurs both in ovulating and anovulating females. These results signify that the premenstrual stress acts at the level of central nervous system, possibly by stimulating the hypothalamic pituitary axis thus bringing about increased release of corticotrophin during the premenstrual period (1, 10 & 12).

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