STUDY OF ALKALINE PHOSPHATASE ACTIVITY OF HUMAN UTERINE ENDOMETRIUM IN OVULATORY AND ANOVULATORY PATIENTS

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SUMMARY

Alkaline phosphatase activity of endometrium was studied in 75 cases, 25 cases with normal ovulatory cycle, 25 cases with lactational ammenorrhoea and 25 cases taking oral contraceptives.

The alkaline phosphatase activity is considerably high among lactational ammenorrhoea cases as compared to normal ovulatory cases, during both the phases of cycle, the difference being highly significant at $P < 0.001$.

Alkaline phosphatase activity in case of patients with oral contraceptives reduces from 52.42 units/mg protein and 39.56 units protein to 44.84 units/mg protein and 31.36 units/mg protein respectively. Mean difference is highly significant showing $P < 0.001$ during proliferative as well as secretory phase.

Introduction

Variations in alkaline phosphatase which occur during menstrual cycle are thought to reflect the pattern of secretions of endogenous ovarian hormones (Atkison, Engle, 1947; Arzac, Blanchet 1948; Hall 1950 and Mckay *et al* 1956).

Alkaline phosphatase activity increases in amount during proliferative phase, reaches peak at ovulation following which it decreases in amount.

With combination type of oral contraceptives the activity of alkaline phosphatase is reduced (Connel, 1967) and (Lawrencel, 1968). More the duration of oral contraceptives less is the activity of alkaline phosphatase. Alkaline phosphatase activity is considerably very high among lactational ammenorrhoea cases as compared to normal ovulatory cases (Galbis, 1953).

Method

The alkaline phosphatase activity was studied in endometrium of patients in various phases of the menstrual cycle. The cases were divided into 3 groups.

Group A Compared of 25 cases with normal ovulatory cycles.

Group B Compared of 25 cases taking oral contraceptives.

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Group A Compared of 25 cases with lactational ammenorrhoea.

Biopsies were taken during two phases of menstrual cycle in normal ovulatory cases.

In patients on oral contraceptives two biopsies were taken before and two biopsies after subjecting to oral contraceptives during the various phases of the menstrual cycle on the same days. Similarly in cases of lactational ammenorrhoea biopsies were taken twice. Alkaline phosphatase activity was estimated by Bessy *et al* (1965) and proteins by Lowry *et al* (1951) method and activity is finally expressed as units per mg. protein.

Discussion

The presence of alkaline phosphatase have been demonstrated histochemically in the uterus by previous several authors (Gomori, 1941; Kabat and Furth, 1941).

Alkaline phosphatase activity increases in amount during proliferative phase and reaches peak at the time of ovulation following which it decreases in amount.

In human endometrium estrogen appears to stimulate production of ribonucleo protein and alkaline phosphatase activity, such a changed activity has been observed by Atkison and Engle, 1947; Arzac and Blanchet, 1948; Hall, 1950; Mckey *et al* 1956; Stanley, 1964 and Joshi *et al* 1969.

During proliferative phase activity was 56.60 units/mg protein and during secretory phase 34.84 protein as shown in Table I. The exact rate of alkaline phosphatase the cell metabolism is not known, it is believed that alkaline phosphatase is concerned directly with the transfer of metabolites across the cell memberance.

Women generally believe that breast feeding protects against pregnancy and lactation is far from being a satisfactory method of birth control. Physiological process by which lactation inhibites reproductive activity in the human are poorly defined. With this view alkaline phosphatase activity has been studied in 25 lactating women having amenorrhoea of 6 to 24 months duration as shown in Table II, mean level has been found 120.40 units at 6 months, 169.25 units at 12 months and 153 units/mg protein at 24 months duration. The difference is significant. The alkaline phosphatase activity is considerably very high among lactational amenorrhoea cases as compared to normal menstruating non-lactating cases during both the phases of cycle, the difference being highly significant at $P < 0.001$ as shown in Table III, such an increased activity has been observed by Galbis 1953. From this observation it

TABLE I

Significance of Menstrual Cycle Phases on Alkaline Phosphatase Activity in 25 Cases

Phases of menstrual cycles	Average alkaline phosphatase activity/mg protein ± S.E.	Mean difference	'p. value
Proliferative phase	56.69 ± 5.16	21.76	<0.01**
Secretory phase	34.84 ± 5.16		

Remarks (**) Indicates highly significant difference.

TABLE II

Significance of Duration of Amenorrhoea on Alkaline Phosphatase Activity 25 Lactation Amennorrhoea

Duration of Amenorrhoea	Mean Alkaline phosphatase level	Mean difference	'p' level
A— 6 months	120.40		
B—12 months	169.25	AB = 48.85	<0.02*
		AC = 32.60	<0.05*
C—24 months	153.00	BC = 16.25	—0.40

Note:—(*) Indicates Mean Alkaline phosphatase difference is significant.

TABLE III

Significance of Alkaline Phosphatase Activity Between Normal and Lactation Amenorrhoea Cases

Group	Mean alkalne phosphatase level	Mean difference	'P' value
A —Normal Proliferative PH	56.60	AC = 89.88	<0.001**
B —Normal Secretory PH	34.84	BC = 111.84	<0.001**
C —Lactational ammenorrhoea	146.48		

Note:—(**) Indicates Mean Alkaline phosphatase level differences are highly significant.

shows that alkaline phosphatase activity is very high in lactational amenorrhoea cases, it probably inhibites ovulation because prolactin and gonadotrophins cannot be produced simultaneously.

Out study as alkaline phosphatase activity in lactational amenorrhoea cases presumes that chances of conception are low till 2 years as activity remains high. It has also been seen by histopathological examination that endometrium is continuosly in proliferative phase. Although our study is small and needs further study to establish the fact whether low conception rate is due to suppression of ovulation or due to biological factors other than ovulation which may be suppressed during lactation amenorrhoea.

Alkaline phosphatase activity in endometrium was studied in 25 cases before and after subjecting to combined oral contraceptives containing norgestrol 0.5 and ethinyl estradiol 0.03 mg. The activity was 52.24 and 39.56 mg protein in proliferative and secretory phases respectively whereas after oral contraceptives the activity was reduced to 4.48 units and 31.36 units/mg protein respectively as shown in Table IV. Mean differenc is highly significant showing $P < 0.001$ during proliferative as well as secretory phase. These finding do correlate with the finding of Connel 1967; Lawrencel 1968 and Springer *et al* 1971.

TABLE IV

Significance of Alkaline Phosphatase Activity Before and After Oral Contraceptives in 25 Cases

Particulars	Proliferative phase			Secretory phase		
	Mean Alk. phase/mg.	't'	'P' value	Mean Alk. phase/mg.	't'	'P' value
1	2	3	4	5	6	7
Before oral contraceptives	52.24	6.819	<0.001**	39.56	6.175	<0.001**
After oral contraceptives	44.84			31.36		

Note:—(**) Indicates highly significant difference.

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