# ORAL EPITHELIAL ALKALINE PHOSPHATASE IN VARIOUS PHASES OF MENSTRUAL CYCLE

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**Summary :** We report here on the changes in the Alkaline Phosphatase staining reaction in oral mucosa of women in various phases of menstrual cycle. It appears that the highest reaction for alkaline phosphatase is shown just after ovulation (about 15th–16th day of cycle). It is possible to judge the period of ovulation by taking daily smears and staining them for Alkaline phosphatase.

**Key words :** oral mucosa menstrual cycle alkaline phosphatase (ALP) ovulation

## INTRODUCTION

Animal experiments have demonstrated the relationship of alkaline phosphatase in oral epithelium with sex hormones in mammals (3, 4). While castration decreases, the administration of sex hormones increases the alkaline phosphatase in oral epithelium in mice (1). There seems to be a relation between level of sex hormone, and alkaline phosphatase in oral epithelium in mice. Probably similar relationship may be present in human being as well. Since the level of sex hormones in the female changes in different phases of menstrual cycle, it is possible that alkaline phosphatase in oral mucosa may also show a phasic pattern in the menstrual cycle. In that case it is worthwhile investigating whether it will also help in judging a probable period of ovulation.

## MATERIAL AND METHOD

The study was carried out in 60 female subjects (Staff and Students of Dr. V.M. Medical College, Solapur) in the age group of 18–45 (Sexually matured). Detailed menstrual history was taken to exclude the subjects of any gynaecological disorders. Thus all the subjects in the present study were having a regular menstrual cycle. Also they were without any hormonal therapy for at least 6 months prior to the testing. Care was taken to exclude the subjects with any oral infection and pregnancy. Lactating mothers were also excluded from this study. The subjects were called between 9-10 a m. on every alternate day. The study was carried out for two consecutive menstrual

cycles for judging the reproducibility of the results. The subjects in whom there was gross difference between the results in the two months, were excluded form the present study.

The smears from oral mucosa were obtained by scrapping and were spread over clean glass slides. After immediate fixation, smears were stained for alkaline phosphatase (2) and studied under light microscope for the intensity of reaction. The relative qualification of alkaline phosphatase was done by rating the slides –ve, +, ++, +++, and ++++.

## RESULTS

The results obtained were tabulated as per the days of menstrual cycle. One plus (+) sign denotes very less intensity, (++) denotes little more, (+++) indicates still more, while four plus (++++) shows darkest staining reaction.

Level of alkaline phosphatase in oral mucosa during normal menstrual cycle.

| *Days of menstrual cycle* | *Alkaline phosphatase as judged by staining reaction* |
|---|---|
| 1– 5 | — ve, + |
| 6–10 | ++ |
| 11–15 | +++ |
| 16–24 | ++++ |
| 25 onwards | ++ |

## DISCUSSION

From the present study, it is obvious that the quantity of alkaline phosphatase in oral epithelium is directly related to the circulating sex hormones in female. During 1st–5th day of the menstrual cycle (Menstrual phase), alkaline phosphatase is as good as absent in the oral smears, as there is no appreciable secretion of estrogen and progesterone at this time.

Between 5th–10th day of menstrual cycle, alkaline phosphatase has just started appearing in the cells of oral mucosa (Fig. 1) indicating that estrogen has an effect on the synthesis of alkaline phosphatase, because during this period, the graafian follicle starts secreting estrogen. Between 11th-15th days, the level of alkaline phosphatase has

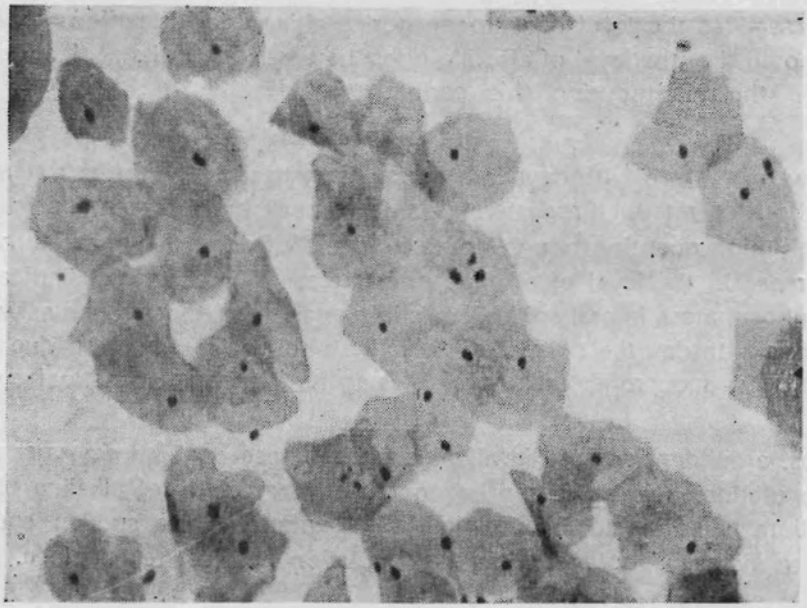

Fig. 1 : ALP on 8th day of cycle.

Fig. 2: ALP on 24 th day of cycle.

further increased as the level of estrogen during this period is sufficiently high. But it should be noted that the level of alkaline phosphatase is not at its peak although estrogen has reached the peak during this period.

Between 16th to 24th days in a normal menstrual cycle, the estrogen and progesterone are both secreted. Progesterone is at its peak but the estrogen is also secreted in sufficiently high quantity though not at its peak. During this phase there is a sudden marked increase in the level of alkaline phosphatase (Fig. 2) which indicates that level of alkaline phosphatase in oral epithelium is influenced both by estrogen as well as progesterone. After 24th day the decrease in alkaline phosphatase must be due to a decrease both in estrogen and progesterone which happens in normal menstrual cycle.

Thus, a sudden increase in alkaline phosphatase on 16th day very much follows a normal ovulation. Hence it can be concluded that study of alkaline phosphatase in oral epithelium helps in judging the timing of ovulation i.e. a sudden spurt in level of alkaline phosphatase should confirm that ovulation has just taken place.

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