

COMPARATIVE STUDY OF POST ABORTAL LEUCOCYTIC ALKALINE  
PHOSPHATASE ACTIVITY IN SPONTANEOUS AND INDUCED  
ABORTION\*

by

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The steady rise in leucocytic or neutrophilic alkaline phosphatase activity (L.A.P.A.) during pregnancy has been adequately demonstrated by various workers. This simple semiquantitative histochemical test (Kaplow's 1955) has been suggested as a diagnostic test of pregnancy or as an index of prognosis in cases of threatened abortion (Gupta *et al*, 1976) and of placental insufficiency (Karna, 1975 and Ashraff *et al*, 1977) as it is probably hormone dependent. Leucocytic alkaline phosphatase activity takes 6 to 9 weeks in post partum period to return to normal (Pritchard *et al*, 1957; Karna, 1975) and two weeks after first trimester induced abortion (Mirchandani *et al*, 1980).

*Material and Method*

L.A.P.A. was studied in following cases:

(A) 50 normal regular menstruating females .... Once only.

\*Part of Thesis accepted for M.D. in Obstetrics and Gynaecology, Delhi University 1978.

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Accepted for publication on 24-6-81.

(B) 102 normal women in first trimester of pregnancy.

(C) 50 cases of spontaneous abortion. In both groups B and C it was estimated thrice.

I. On day of abortion.

II. On 7th day.

III. On 14th day.

Data on group B was reported earlier (Mirchandani *et al*, 1980).

Extent of alkaline phosphatase activity stained by Kaplow's (1955) technique was scored by individual rating of degree of positivity of 100 consecutive polymorphs in a well spread area of peripheral blood smear as suggested by Hay Hoe and Inalins (1964). Intensity and appearance of the precipitated dye was scored as follows:

0 — Cytoplasm colourless, negative

1 — Faint tinge with occasional granules

2 — Diffuse positivity with numerous granules

3 — Strong positivity with numerous granules

4 — Very strong reaction with many coarse granules, sometimes partially obscuring the nucleus.

The sum of 100 individual cell ratings

gave the L.A.P. score for each smear the possible range being 0-400.

*Observations*

1. At mid cycle i.e. between 12 to 16 day of the menstrual cycle L.A.P.A. mean score is highest i.e. 36.22 compared to mean score of 18 and 15.96 earlier and later, the difference is being highly statistically significant,  $P < .001$  (Table I).

2. Initial L.A.P.A. score on day of abortion is markedly lower than that of normal pregnancy of corresponding period (Table II). The difference according to duration of amenorrhoea was observed even in this initial figure of L.A.P.A. activity on the day of abortion. L.A.P. activity mean score were lower on 7th and 14th day. The difference of first and 14th day score being statistically

significant in all groups. The difference between scores of 7th and 14th were significant in groups of 8-9, 10-11 and above 14 weeks of amenorrhoea (Tables III and IV and Fig. 1).

TABLE III

*Comparison of Leucocytic Alkaline Phosphatase Activity 7 Days After Spontaneous Abortion and MTP*

Week of Gestation	Spont. Abortion Mean $\pm$ S.D.	MTP cases* Mean $\pm$ S.D.
**6-7	17.9 $\pm$ 4.3	27.33 $\pm$ 7.7
**8-9	18.75 $\pm$ 4.1	27.73 $\pm$ 6.1
10-11	22.0 $\pm$ 4.1	26.5 $\pm$ 6.3
12-13	20.5 $\pm$ 5	30.5 $\pm$ 7
14	27.3 $\pm$ 2.9	30.13 $\pm$ 12.1

\*\* Difference statistically highly significant P value less than .01.

\* Reported earlier.

TABLE I

*Leucocytic Alkaline Phosphatase Activity in 50 Normal Non-pregnant Women*

Day of Menst. Cycle	No. of Patients	Mean Score	S.D.	Range
1-11	18	18	6.5	8-34
12-16	9	36.22	10.1	21-52
17-28	23	15.96	6.1	6-26

Difference between 1 and 2 highly significant. P less than .001.

Difference between 1 and 3 not significant. P. more than 0.3.

TABLE II

*Comparison of Leucocytic Alkaline Phosphatase Activity of Spontaneous abortion With MTP Cases*

Week of Gestation	Spontaneous abortion			Before MTP*		
	No. of cases	Mean LAPA	S.D.	No. of cases	Mean LAPA	S.D.
6-7	20	27.75	$\pm$ 7.2	30	92.8	$\pm$ 6.6
8-9	12	39.25	$\pm$ 16.5	40	111.43	$\pm$ 11.3
10-11	8	36.13	$\pm$ 6.6	16	123.19	$\pm$ 14.2
12-13	6	50.67	$\pm$ 21.1	8	141.5	$\pm$ 25.9
14	4	69.5	$\pm$ 17.1	8	14.6	$\pm$ 20.5



**TABLE IV**  
 Comparison of Leucocytic Alkaline Phosphatase Activity 14 Days After Spontaneous Abortion and MTP

Weeks of Gestation	Spontaneous Mean $\pm$ S.D.	MTP cases* Mean $\pm$ S.D.
6-7	14.45 $\pm$ 4.2	16.77 $\pm$ 5.3
8-9	13.08 $\pm$ 2.8	17.1 $\pm$ 5.6
10-11	13.4 $\pm$ 2.3	15.8 $\pm$ 3.6
12-13	16.33 $\pm$ 2.5	21.5 $\pm$ 6.3
14	16.3 $\pm$ 1.5	14.63 $\pm$ 4

3. Seven days after abortion LAPA score in spontaneous abortion cases was significantly lower than that on 7 days after MTP ( $P < .001$ ) in 6-7 weeks and 7-8 week pregnant groups. The difference was present in the remaining groups but was not statistically significant (Table III). In only 2 out of 50 sp. abortion cases score exceeded 24 i.e. mean of follicular phase plus one S.D. While this was exceeded in 66% of MTP cases.

Fourteen days later LAPA score in all spontaneous abortion cases and in 95% of MTP cases was 24 or lower i.e. corresponded to that of follicular phase and lower than that at midcycle peak.

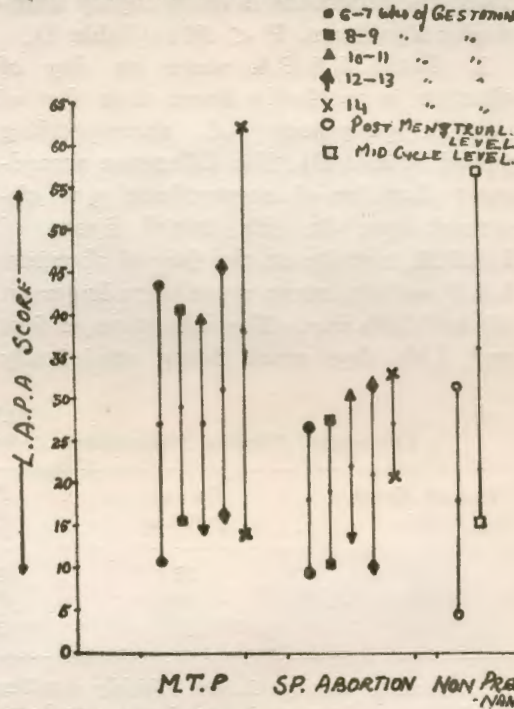
**Comments**

Mid cycle peak of LAP activity reflects the peak of ovarian estrogen activity. Goldstein (1965) and, Polishuk *et al* (1968) showed a positive response of leucocyte alkaline phosphatase activity by administering estrogen in post menopausal women, while progesterone and gonadotropin had no effect. They demonstrated increase in L.A.P.A. activity in pregnant women by estrogen administration and no significant effect with progesterone and decrease with hydrocortisone administration.

Continued high level of L.A.P.A. in

post partum period may be due to persistent biological effect which may depend on life survival of leucocytes. In the present study, L.A.P.A. activity, after spontaneous abortion continued to decline till 14th day after abortion (Fig. 1) when

**COMPARISON OF L.A.P.A AFTER 7 DAYS OF M.T.P. + AFTER 7 DAYS OF SPONTANEOUS ABORTION.**  
 (MEAN  $\pm$  S.D.)



**FIG. 61**

levels correspond to low normal levels in menstrual cycle. Initial mean levels on the day of abortion vary between 27 to 69 which were lower than the lowest level score of 76 in normal early pregnancy.

B. It is accepted that ovarian function remains in abeyance during pregnancy as F.S.H. response to L.H.R.H. disappears rapidly during pregnancy and returns only 15 days after delivery. and LH response to LHRH remains low even 26-35 days after delivery (Miyake *et al*, 1978).

In a study of return of ovarian function after abortion first midcycle LH peak occurred 16 days after abortion and estradiol continued to decrease till 14 days after abortion (Lahteenmaki and Luukkainen, 1978).

In present study mean L.A.P.A. score of follicular phase was  $18 \pm 6.4$ , and the score of 24 (Mean + SD) or above was found in 2 cases only 7 days after spontaneous abortion—Scores being just 27 and 28 respectively, while 66% of cases after MTP had score above 24. All cases of spontaneous abortion and 95% of MTP cases had score 24 or below on 14th day.

Pitkin and Zlatkin (1980) Commenting on study of Lahteenmaki and Luukkainen 1978 postulated that 80-85% of patients ovulate during the first cycle after induced abortion, with evaluation probably occurring 20-24 days after the termination. It is possible that after spontaneous abortion, ovarian function returns earlier hence one must emphasize earlier contraception in these cases.

#### Summary

Serial leucocytic alkaline phosphatase activity in 50 cases of spontaneous abortion showed a steady decline till low normal levels were reached on 14 days after abortion. On the day of abortion, 7 and 14 days later levels are significantly lower than those after induced normal first trimester pregnancy.

#### Acknowledgement

We are grateful to principal and medical superintendent Dr. S. Chawla, Lady Hardinge Medical College, New Delhi and associated hospitals and Prof. and Head of Department of Obstet. and Gynaecology Dr. Y. Pinto do Rosario and Professor and Head of Department of Pathology and Professor Dr. G. Bazaaz Mallik, for permitting this study and publication of it. Thanks are also due to staff of both departments and Clerk Mr. K. K. Chopra for their co-operation.

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