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Leucocyte Alkaline Phosphatase Activity in Benign and Malignant Tumours of Female Genital Tract (including Breast).

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Summary

Leucocyte Alkaline Phosphatase (LAP) was estimated in 140 benign disease cases and 114 cases of malignancy of the female genital tract and compared with 30 age matched healthy female controls. The benign cases comprised of leiomyomas (50) benign ovarian tumours (54) and breast lumps (36). Significantly low LAP was recorded when both benign ovarian tumours and breast tumours were compared with each other as well as with controls. Leiomyomas on comparison with controls exhibited nonsignificant results.

The malignant cases included carcinoma endometrium (16) ovarian tumours (30) and breast cancers (68).

The fall in LAP in malignancy endometrium and ovaries and the rise in malignancy breast were highly significant as compared to controls. Also significant results were obtained when benign breast and ovarian tumours were compared with their malignant counterparts. However pre and post treatment levels of LAP in breast cancer yielded insignificant findings.

Introduction

Leucocyte Alkaline Phosphatase (LAP) is an enzyme which catalyses the hydrolysis of phosphate-esters in alkaline pH. The role of LAP in haematological disorders and pregnancy has been established (Wintrobe, 1981) but the role of LAP in benign and malignant diseases is variable. The present study was conducted with the following aims and objectives.

1. To compare the LAP values in benign and malignant condition amongst each other and with normal controls.
2. To determine the pre and post treatment LAP activity and evaluate its prognostic significance.

Material and Methods

LAP scores were estimated in patients suffering from benign and malignant disorders of the female genital tract (including breast) attending the out and in patient departments of Jawaharlal Nehru Medical College, Aligarh Muslim University, Aligarh for a period of two years (1996 to 1998). The study group comprised of 140 benign lesions and 114 cases of malignancy, 30 age matched female healthy volunteers served as controls.

LAP was estimatd by the modified technique as described by Kaplow (1955) and the scoring of 0 to 4 based on the intensity of staining and appearance of precipitated dye in the cytoplasm of 100 consecutive neutrophils was also based on the same method.

The observations were statistically evaluated using the students 't' test.

Results

Control Group - (30 cases); The LAP scores in female controls ranged from 28 to 199 with a mean of 61.76 ± 23.28. No difference in LAP was noted in relation to age of the individual.

LAP Scores in Benign lesions - It was observed that when both benign ovarian tumours and breast lesions were compared with controls and with each other, the fall in LAP was significant (Table I).

Although leiomyoma showed statistically significant difference in its LAP scores when compared with benign ovarian tumours and benign breast lesions, on comparison with controls the results were statistically insignificant (Table I).

No difference in LAP score was recorded when submucous, intramural and subserosal leiomyomas were compared with each other or with controls. Also the different histological types of benign breast lesions and benign ovarian tumours when compared with each other exhibited nonsignificant LAP scores.

Malignant lesions - The fall in LAP of carcinoma endometrium and malignant ovarian tumours and the rise in this score in breast malignancy was highly significant as compared to controls. However only carcinoma breast when compared with either carcinoma endometrium and malignant ovarian tumours revealed difference in LAP scores which were statistically significant. On comparing LAP scores of endometrium with malignant ovarian tumours the results were nonsignficant (Table I).

The different subtypes of benign cancer and ovarian cancers did not exhibit any change in LAP scores.

As depicted in Table II when the LAP score of both benign breast and ovarian lesions were compared with their malignant counterparts, the results were markedly significant ($p<0.001$). No difference in LAP scores were recorded when pre treatment cases of malignancy breast were compared with LAP levels after treatment (Table III).

Discussion

Although histopathology plays a major role in the diagnosis of malignancy, recent studies indicate that LAP is altered in benign and malignant conditions and therefore may supplement information regarding these tumours.

LAP in controls

The LAP scores in 30 female controls ranged form 28-109 with a mean of 61.76 ± 23.28. Our findings are similar to Arora et al. (1990), and Bisht et al (1994). LAP scores were not affected by age. This is consistent with the studies of Arora et al (1990) but in contrast to Jedwab et al (1974) who noted a decline in LAP after the sixth decade.

Table I
LAP Scores in different benign and Malignant Lesions of female genital tract (including breast)

S.No.	Type of cases	No. of cases	LAP		
			Range	Mean	SD
A	Benign Lesions				
1.	Leiomyomas	50	49 - 70	59.88	6.74
2.	Ovarian Tumours	54	29 - 50	43.59	4.16
3.	Breast Lesions	36	39 - 61	49.88	7.07
B.	Malignant Lesions				
4.	Carcinoma Endometrium	16	10 - 39	21.0	8.60
5.	Ovarian Tumours	30	12 - 28	19.40	4.22
6.	Breast Cancer	68	21 -315	151.44	86.92
C. 7.	Control	30	28 - 109	61.76	23.38

A. Benign Lesions
1:7 ($p>0.05$) 2:7 ($p<0.001$) 3:7 ($p<0.05$)
1:2 ($p<0.001$) 1:3 ($p<0.001$) 2:3 ($p<0.001$)

B. Malignant Lesions
4:7 ($p<0.001$) 5:7 ($p<0.001$) 6:7 ($p<0.001$)
4:5 ($p>0.05$) 4:6 ($p>0.001$) 5:6 ($p<0.001$)

Table II
LAP Scores in benign and Malignant Breast and Ovarian Lesions

S.No.	Type of cases	No. of cases	LAP		
			Range	Mean	SD
1.	Benign Breast Lesions	36	39 - 61	49.88	7.07
2.	Malignant Breast Lesions	68	21 -315	151.44	86.92
3.	Benign Ovarian Tumours	54	29 - 50	43.59	4.16
4.	Malignant Ovarian Tumours	30	12 - 28	19.40	4.22

1:2 ($p<0.001$) 3:4 ($p<0.001$)

Table III
LAP Scores in pre and post treatment cases of Breast Carcinoma

S.No.	Type	No. of cases	LAP		
			Range	Mean	SD
1.	Pre treatment	20	21 - 38	30	5.51
2.	Post treatment	16	19 - 37	28.5	6.07

1:2 ($p>0.05$)

LAP scores in benign lesions

LAP scores in benign lesions were significantly low as compared to controls. However Arora et al (1990) observed slightly higher LAP values and Levine et al (1966) reported LAP levels within the normal range in benign lesions.

While both benign breast lesions and benign ovarian tumours showed significant decline in LAP as compared to controls, the decrease in LAP in leiomyomas was nonsignificant. Jedwab et al (1974) also observed normal LAP values in leiomyomas.

Significant results were noted on comparing LAP scores of benign breast and ovarian lesions and leiomyomas amongst each other. However, no significant alteration in LAP was seen when different subtypes of leiomyomas, benign ovarian tumours and breast lesions were compared with each other. To the best of our knowledge no literature is available where such comparisons have been studied.

LAP scores in malignancy

Breast Cancer: Markedly high LAP scores were observed in 68 cases of Breast cancer as compared to controls. Similar results were obtained by Lokich (1977) and Arora et al (1990). However Ho et al (1979) failed to get any significant changes in LAP in cancer breast. On comparing different histological types of breast cancers, the results were nonsignificant. Contrary to Levine et al (1966), a significant difference in LAP scores was recorded on comparing benign lesions with their malignant counterparts.

Ovarian Cancer

We observed low LAP scores in ovarian cancers as compared to controls. Ho et al (1979) also observed a decrease of LAP but their findings were statistically nonsignificant. As with breast cancers, significant difference in LAP was obtained on comparing benign and malignant ovarian tumours. These results are contrary to Levine et al (1966) who did not observe any significant changes in LAP.

Endometrium Cancer: There was a significant decrease in LAP values in 16 cases of endometrial cancer. Similar findings were obtained by Levine et al (1966) who explained that low LAP levels were because of prolonged unopposed action of estrogen. Jedwab et al (1974) reported normal values of LAP in endometrial cancer and explained that estrogen activity in this malignancy may be too low to stimulate an increase in LAP.

Relationship with treatment

No statistical difference in LAP scores were noted before and after treatment in breast malignancy. Our observations closely agree with those of Lokich (1977).

Thus our study of LAP has been helpful in diagnosing malignancy and for distinguishing benign breast and ovarian lesions from their malignant counterparts.

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