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Evaluation of Serum Total Sialic Acid and Lipid Associated Sialic Acid as a Tumour Marker

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Abstract: *The present study was done to assess the levels of total sialic acid & lipid associated sialicAcid. Lactate dehydrogenase and total proteins in sera of patients with various malignant diseases and compared with sera of non malignant diseases, benign tumors & controls. Serum total sialic acid, LASA & LDH values are significantly increased in malignancies when compared to the controls (P<0.001), indicating altered metabolism of tumour cell surface glycoprotein & sialoglycolipids and there is decrease of total proteins in malignancies especially Gastro intestinal tract malignancies (P<0.001). We had followed up 23 patients suffering from different malignancies and were received treatment. All these patients showed clinical improvement gradually at an end of 20 days followed up period. The TSA, LASA, & LDH significantly decreased (P<0.001, P<0.01, P<0.05) respectively. So this study suggests sialic acid as a tumour marker which shows good diagnostic potential.*

Key Words: *LASA, TSA, LDH & Malignancies*

I. Introduction

Sialic acid is a common terminal sugar unit of oligosaccharides of glycoproteins and glocolipids which are cell surface constituents. These are entered in circulation by either shadding of cell lysis and are considerable interest because of their potential diagnostic value. A variety of methods are available for in detection estimation of TSA & LASA. Most widely used procedures are in colorimetric method. Here we were used colorimetric method because it is inexpensive simple to measure need not required sophistication easier, rapid and more suitable. [1] [3]. The dramatic changes in glycolipid composition and metabolism associated with oncogenic transformation suggests a specific role for membrane glycolipids in regulation of cell growth and cellular interaction. The two types of changes, one the deletion of complex glycolipids due to a block in synthesis, which leads to accumulation of precursor structures and the second the synthesis of new glycolipid due to activation of normally unexpressed glycosyl transferases can produce tumour distinative glycolipids, some of which are tumour associated antigens or markers. The present study was an attempt to the relative usefulness of TSA & LASA for detecting malignancy and monitoring in progression of malignancy with treatment.

II. Materials & Methods

92 patients with different malignances were studied. The results were compared with those of the controls 30, non malignant diseases 30, & benign tumours 20. The study group is constituted by both in sexes and different age groups. The mean age of the patient is 48 years, Range 8 to 75 years. All the malignant cases are histologically confirmed of various types.

Table-1: Number & type of Malignancies studied

S. no	Type of Malignancy	No. of Cases
1.	Malignancies of head & neck	28
2.	Malignancies of female genital tract	22
3.	Malignancies of GIT	16
4.	Malignancies of breast	10
5.	Other malignancies(bone, penis, lung, lymphoma, Leukemia, prostate)	16

Random blood samples were collected sera separated the sera were stored & frozen (-20ºc) until used. The sera were analysed for TSA, LASA, LDH and total proteins. Estimation of serum TSA and LASA by

[colorimetric method] plucinsky etal (13) Estimation of LDH by [colorimetric method] King etal and Estimation of serum total proteins by [colorimetric method] Henry's method. (4).

23 patients of different malignancies were followed up, samples were analysed before treatment 10 days after treatment and 20 days after treatment.

The data was statistically analysed. The mean and standard deviation values for each group for all parameters are calculated, followed up different malignant plus in (table 1). The significance of difference is assessed by student 't' test.

III. Results

The TSA, LASA and LDH values are increased in malignant patients when compared with controls (P<0.001) suggest increased metabolism in membrane glycolipids and glycoproteins. (10) (11).

Serum total proteins decreased in malignant patient when compared to the controls (P<0.01).

Total proteins were significantly decreased (P<0.001) in GIT malignances when compared to controls.

TSA, LASA values in malignances are higher than those non malignant diseases and benign tumours. The difference is statistically significant (P<0.001).

In order to assess the diagnostic sensitivity of the various parameters in reference ranges for them are calculated (mean +_ 2 standard deviation values) the reference ranges for various parameters are presented.

Table-2: Diagnostic sensitivity and specificities of various markers in malignancies

S. no	Markers	Sensitivity %	Specificity %
1.	Total Sialic acid – (TSA)	78.26	78.43
2.	LDH	69.57	62.75
3.	TSA + LASA	78.26	98.04
4.	TSA + LASA + LDH	91.3	100.0
5.	LASA + LDH	69.57	100.0

Table- 3: Mean & SD of various parameters in different Groups

S.no	Group	No.of cases	TSA mg%	LASA mg%	LDH IU/L	Total proteins gm%
1.	controls	30	51.03± 11.39	18.16±6.94	112.9±26.97	6.1± 0.37
2.	Benign tumours	20	54.86±15.25	1.67±8.07	100.48±22.47	6.15± 0.3
3.	Non-malignant diseases	30	66.27± 8.85	14.04± .83	184.2±65.8	5.9±0.66
4.	Total malignancies	92	81.22± 12.92	26.95±7.08	190.26±46.35	5.84±0.48

Table 4: Mean & SD of various parameters in different malignancies

S. no	Malignancy type	No. of cases	TSA mg%	LASA mg%	LDH IU/L	Total proteins gm%
1.	Head & neck group	28	82.32± .67	28.55± 7.70	187.57±51.25	5.99± o.37
2.	Female genital tract group	22	18.82± .92	23.81± 5.97	186.51±26.46	5.92± 0.46
3.	Gastro intestinal group	16	85.63± 13.25	30.79± 8.0	200.62±41.06	5.53± 0.56
4.	Breast group	10	75.90± 5.23	25.74± 5.6	188.0± 73.91	5.91± 0.54
5.	other malignancies	16	81.50± 8.83	25.35± .38	191.06±46.98	5.71± 0.41

Table 5: Mean & SD of various parameters in followed up cases of malignancies

S. no	Group	No. of cases	TSA mg%	LASA mg%	LDH IU/L	Total proteins gm%
1	Malignancybefore treatment	23	81.13± 3.08	26.34±7.65	193.65±64.3	5.8 ± 0.41
2	Malignancies 10 days after Rx	23	74.52 ± 2.37	24.42±5.42	168.13± 71.58	5.77± 0.31
3	Malignancies 20 days after the start of Rx	23	69.0 ± 9.77	22.04± 5.59	161.91± 56.29	5.92±0.32

Table 6: 't' and 'p' values of various parameters in followed up cases of malignancies

S. no	Group	No.of cases	TSA	LASA	LDH	Total proteins
1	Malign before RX Vs malign 10 days after Rx	23 23	't' 1.76 'p' ns	't' 0.98 'p' ns	't' 1.27 'p' ns	't' 0.5 'p' ns
2	Malign 10 days after Rx Vs malign 20 days after Rx	23 23	' t' 1.68 'p' ns	' t' 1.47 'p' ns	't' 0.33 'p' ns	' t '1.68 'p' ns
3	Malign 20 days after Rx Vs malign before Rx	23 23	't' 3.57 'p'<0.001	' t' 2.18 'p'<0.05	't' 1.78 'p' ns	't' 1.0 'p' ns
4	Malign 20 days after Rx Vsmalig before Rx	23	't' 6.18 'p'< 0.001	' t' 2.26 'p'<0.05	' t' 3.85 'p'<0.001	' t' 1.9 'p 'ns

Table-7: 't' and 'p' values in total malignancies and different groups of malignancies of various parameters compared with controls

S. no	Group	No.of cases	TSA	LASA	LDH	Total proteins
1	Benign tumours Vs Malignancies	20 92	't' 7.34 'p' <0.001	't '2.76 'p' <0.01	' t '13.05 'p' <0.001	't '3.26 'p' <0.001
2	Non malign Vs malign	30 28	' t '7.12 'p'<0.001	' t '11.23 'p'<0.001	't' 0.47 'p' <0.001	' t '0.46 ' p 'ns
3	Control Vs malign	30 92	't' 12.7 'p' <0.001	t 5.98 'p'<0.001	t 11.21 'p' <0.001	' t' 3.1 'p' <0.01
4	Controls Vshead&neckmalig	30 28	't'9.45 'p' <0.001	' t' 5.38 'p' <0.001	' t' 6.8 'p' <0.001	't' 1.0 ' p' ns
5	Control Vs Female genital tract malign	30 22	' t' 8.05 'p' <0.001	' t'3.15 'p' <0.01	' t' 9.85 'p' <0.001	' t' 1.47 ' p' ns
6	Control Vs GIT malign	30 16	t 8.84 'p' <0.001	t 5.35 'p' <0.001	t 7.71 'p' <0.001	' t '3.60 'p' <0.001
7	Control Vs other malig	30 16	t 10.06 'p' <0.001	t 3.9 'p' <0.001	t 6.13 'p' <0.001	't'3.09 'p' <0.01
8	Control Vs breast mali	30 10	' t' 4.74 'p' <0.001	' t' 3.63 'p' <0.001	't' 3.14 p <0.01	't' 1.03 'p' ns

IV. Discussion

Malignant cell surface glycoproteins and glycolipids have altered carbohydrate composition that may contribute to aberrant cell-cell recognition, cell adhesion, antigenicity and the invasiveness demonstrated by malignant cells, released into sera through increased tumour secretion or shedding and thus are considerable interest for their potential diagnostic and prognostic value (5) (17).

Pluconskyetal have reported significant elevation of TSA and LASA in malignances. We have also observed an increased serum TSA and LASA in malignant patients (14). Sialic acid is an acute phase glycoportein so their levels are increased in non malignant diseases, in this study TSA increased in non malignant diseases but lower the LASA and there is no significant difference of LASA values in non malignancies and controls. (6) (7) (8).

Sialic acid concentrations are significantly higher in malignant tumours than in benign tumors. The sialic acid levels in benign tumours are no significance different from those of healthy controls (15). It has also been suggested that changes in the sialic acid content of patients sera reflect growth process of benign and malignant character. (8) (9).

LDH through sensitive is not a specific marker because its concentration increase in several diseases. (12) in this present study we found higher levels of LDH in non malignant diseases and there is no statistically significant difference between malignant and non malignant diseases. (16) decreased protein values in non-malignant and there is no statistically significant difference in protein values in malignance and non-malignance. These findings indicate their non specificity. (19).

The concentration of sialic acids are related to malignant cell. So sialic acid concentrations are higher in advanced stages of malignancies than in earlier stages. (19) In this study we find out of TSA and LASA are gradually decreased in serial measurements in followed up cases. The decrease is statistically significant at the end of 20 days after treatment.

The sialic acid concentrations should be useful in monitoring the progress of the disease. This study showed decreases to sialic acid concentrations after effective treatment. (28) Our data showed lower utility of LDH as a diagnostic marker. (21) However we found that when LDH is used in combination with the TSA or LASA has increased their diagnostic potential (22).

The availability of simple and less expensive tumor markers and it is quite useful in routine diagnosis and monitoring malignancies as well as mass screening for malignancies.

V. Conclusions

The serum TSA and LASA values are significantly increased in malignancies compared to the controls indicating altered metabolism of tumor cell surface glycoproteins and sialoglycolipids. Thus TSA is a sensitive marker to evaluate the disease progression or regression in response to treatment. TSA in combination with LDH showed best diagnostic potential.

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