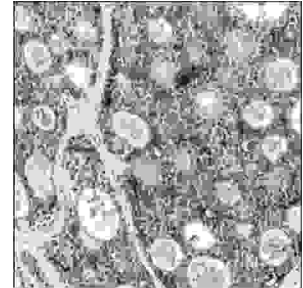


ORIGINAL

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CANCER PATIENTS; COMPARATIVE STUDY BETWEEN TOTAL SERUM SIALIC ACID AND CARCINOEMBRYONIC ANTIGEN.



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ABSTRACT... jawaidsubzwari@hotmail.com In the world cancer is one of the leading causes of death. Most cancers when detected early, can be potentially cured. Thus early laboratory diagnosis of cancer has great importance in management. The tumor markers are one of the methods of cancer management in use today. **Objectives:** To compare serum sialic acid (SA) and carcinoembryonic antigen (CEA) as tumor markers in different cancer patients. **Study Design:** Prospective study **Setting:** Shaikh Zayed Medical Complex, Lahore. **Material and Methods:** One hundred and fifty three (153) documented different cancer patients were studied to compare between serum sialic acid and carcinoembryonic antigen as a tumor marker along with fifty controls of matched sex and age distribution between 30-85 years. The sialic acid was estimated by colorimetric procedure and carcinoembryonic antigen by Enzyme Immunoassay. **Results:** The results revealed that mean levels of sialic acid and CEA in cancer patients were significantly higher ($p < 0.05$) as compared to controls, considering all malignancies together, or carcinoma, hematological malignancies and sarcoma alone. Statistical analysis showed sialic acid to be more sensitive ($p < 0.05$) than CEA in detection of cancer. **Conclusion:** Sialic acid was seen to be a good diagnostic indicator as compared to CEA in most cancer patients.

Key words: Cancer, Sialic acid, Carcinoembryonic Antigen.

INTRODUCTION

The tumor markers are those substances, which are

released due to the presence of malignancy¹. Sialic acid has been found to be a sensitive tumor marker². The

highest serum sialic acid values were seen in carcinoma of breast, lymphoma, carcinoma of lung, GIT cancer, gynaecological cancer, multiple myeloma and melanoma³. Sialic acid is a major component of every cell membrane and is acetylated derivative of neuraminic acid, which is condensation product of Manos amine and pyruvic acid⁴. There is increased shedding of cell membrane glycoproteins containing sialic acid during cell proliferation⁵. Carcinoembryonic antigen (CEA) is one of the oncofetal protein has been most widely studied tumor marker⁶. It was highly investigated as a tumor marker in GIT cancers and found to be at a greater extent in case of colon cancer⁷.

CEA test is one of the immuno-chemical techniques and needs sophisticated equipment as compared to sialic acid determination that can be done manually in a routine laboratory with spectrophotometer⁸.

The present study was carried out to compare serum sialic acid with CEA as tumor marker in relation with sensitivity.

MATERIAL & METHODS

The 153 histo-pathologically diagnosed different cancer patients belonging to carcinoma (130), hematological malignancies (17) and sarcoma group (6) were studied between 30-85 years including 112 males and 41 females age matched. 50 controls including 36 males and 14 females who were free from any symptoms of ailment were also studied. The subjects and controls both were tested for serum sialic acid and CEA.

For determination of serum sialic acid and CEA, 5ml venous blood was taken. Sialic acid concentration was assayed in duplicate by method of Shamberger with the use of N-acetyl neuraminic acid (NANA) as standard of 100mg/dl while CEA was measured by Enzyme Immunoassay (EIA) with the use of DRG-CEA, MTPL-EIA kit (Germany)^{5,8}. The concentrations of both parameters were determined after making the calibration curves with use of their standards.

RESULTS

Table-I shows age and sex distribution in controls and cancer patients indicating good match for both parameters among these groups. 46% of controls and 45.7% of cancer patients fall in age group of 36-50 years, while 32% of both control and cancer patients fall in age group of 51-65 years.

Age range	No of control (Normal)		No of cancer patients	
	Male	Female	Male	Female
0-20	1	1	4	2
21-35	3	2	9	6
36-50	15	8	46	24
51-65	14	2	43	6
above 65	3	1	10	3
Total	36	14	112	41

In control group the range of sialic acid was 33.95-56.59 mg/dl with a mean of 45.27 ± 5.66 (SD) and that of CEA was 0.9 - 3.70 ng/ml with a mean of 2.30 ± 0.70 (SD) as shown in Table-II.

Parameter	Mean \pm SD	Range
Sialic acid mg/dl (n=50)	45.27 ± 5.66	33.95 - 56.59 mg/dl
CEA ng/ml (n=48)	2.30 ± 0.70	0.9 - 3.70 ng/ml

The results also revealed that the mean \pm SEM of serum sialic acid in all cancer patients (63.35 ± 0.85), carcinoma group (63.52 ± 0.98), haematological malignancies (62.48 ± 1.58) and sarcoma patients (67.50 ± 1.81) was significantly higher ($p < 0.05$) as compared to controls (45.27 ± 0.80).

On the other hand the mean \pm SEM of serum CEA in all

cancer patients (13.3 ± 3.60), hematological malignancies (5.5 ± 1.00) and sarcoma patients (7.05 ± 2.90) only was significantly higher ($p < 0.05$) as compared to control

(2.30 ± 0.10). In case of carcinoma patients mean \pm SEM of serum CEA (28.95 ± 14.40) was not significantly higher ($p > 0.05$) as compared to control Table-III.

Groups	Sialic acid mg/dl Mean \pm SEM	CEA ng/dl mean \pm SEM	P Value
Control (n=50)	45.27 \pm 0.80	2.30 \pm 0.10	-
All cancer patients (n=153)	63.35 \pm 0.85	13.3 \pm 3.60	*p < 0.05
Carcinoma (n=130)	63.52 \pm 0.98	28.95 \pm 14.40	*p < 0.05
Hematological malignancies (n=17)	62.48 \pm 1.58	5.5 \pm 1.0	*p < 0.05
Sarcoma (n=6)	67.51 \pm 1.81	7.05 \pm 2.90	*p < 0.05
*p value significant			

When sialic acid and CEA test, results were compared it was seen that positive cases with sialic acid in case of all cancer patients including carcinoma patients were significantly raised ($p < 0.05$) as compared to CEA

In case of hematological malignancies and sarcoma patients' positivity with sialic acid were not significantly higher ($p > 0.05$) as compared to CEA. The results are given in Table-IV.

Table-V shows the comparison between predictive values of sialic acid and CEA in different cancer patients. The results show that sialic acid is more sensitive and specific parameter than CEA in different cancer patients.

Group	Sialic acid positive	CEA positive	p value
All cancer pts (n=153)	106 (69%)	75 (49%)	p < 0.05*
Carcinoma (n=130)	87 (67%)	68 (52%)	p < 0.05*
Hematological malignancies (n=17)	10 (59%)	4 (23%)	p < 0.05*
Sarcoma (n=6)	5 (84%)	2 (33%)	p < 0.05*
*p value significant			

Groups	Sialic acid		C E A	
	Sensitivity	Specificity	Sensitivity	Specificity
Malignancies (n=153)	0.97	0.58	0.42	0.57
Carcinoma (n=130)	0.95	0.60	0.41	0.61
Hematological malignancies (n=17)	0.83	0.87	0.01	0.79
Sarcoma (n=6)	0.76	0.97	0.01	0.97

DISCUSSION

Tumorigenesis is multiple step process involving several mutations each of which results in discrete changes in the cellular metabolism⁹.

A comparatively new tumor marker sialic acid was estimated to study its sensitivity in 50 healthy persons and 153 different cancer patients.

For the comparison a standard tumor marker carcinoembryonic antigen (CEA) was selected and determined in the same healthy subjects and patients as a reference marker.

In the present study, the patient group was comprised of carcinoma (130), hematological malignancies (17) and sarcoma (6). This distribution was similar to the incidence reported by Katopodis et al¹⁰.

In our study range of serum sialic acid in control group was 33.95 to 56.59 mg/dl with a mean of 45.27 ± 5.66 comparable with the findings of STewason⁵. The range of CEA in control group was 0.9-3.70 ng/ml with a mean of 2.30 ± 0.70 . The kit method used in the present study (DRG Germany) gives a range up to 5ng/ml with most of cases below 2.5ng/ml in non smokers and up to 10ng/ml in smokers which is higher than the upper limit of 3.7ng/ml seen in present study. Other workers using Roche and Hyberitech CEA kit have reported ranges of 2.6-5.0 and 3.1-6.0 ng/ml respectively^{11,12}. Deigo et al have reported a much lower serum CEA range of 1.10-1.90 ng/ml using Abbot kit which has similar methodology as that of DRG kit¹³. Thus it seems that serum CEA determination by different kits do not give comparable positive results for screening cancers in population.

In this study, the sialic acid was significantly greater ($p < 0.05$) as compared to control group in all cancer patients including hematological malignancies and sarcoma patients. Our results concise with findings of already published studies^{5,10,14}.

As shown in this study, the concentration of CEA was

significantly raised ($p < 0.05$) as compared to control group among all hematological malignancies and sarcoma patients correlating with the findings of previous studies^{8,11,13}.

In our study when sialic acid and CEA tests were compared in different cancer patients the positive cases with sialic acid were significantly greater ($p < 0.05$) as compared to CEA in all malignancies as a whole and carcinoma cases specifically. These findings are in agreement with results of Dnistrian et al⁸.

When diagnostic sensitivity of sialic acid and CEA was calculated, it was seen that sialic acid found to be more sensitive as compared to CEA for all malignancies as a whole, all carcinoma, hematological malignancies and sarcoma cases as these findings are similar to that mentioned in studies of Dnistrian et al. On the other hand when diagnostic specificity was compared, both tests were found equally specific for all malignancies, carcinoma and sarcoma cases, while sialic acid appeared to be more specific in haematological malignancies as compared to CEA. This observation is similar to the incidence shown by other workers, who reported increased value of serum sialic acid in cases of leukemia, lymphoma, Hodgkin's disease with the conclusion that sialic acid may be a useful tumor marker in these cancer patients⁸.

Thus it has been concluded from our study that sialic acid is a better diagnostic marker as compared to CEA in cancer patients.

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