

Sialic acid Levels in smokers and nonsmokers with malignant pleural effusion

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ABSTRACT

Objective: The present study is designed to measure sialic acid in pleural effusion and in serum samples of patients to differentiate between malignant and nonmalignant diseases. **Materials and Methods:** The present study was conducted on 30 patients with malignant pleural effusion and 30 patients with nonmalignant pleural effusion. Pleural fluid and blood samples were taken at the time of admission, before starting any treatment. Sialic acid levels were estimated in serum and pleural fluid by Warren's Thiobarbituric Acid (TBA) method. **Results:** In the present study, serum sialic acid levels were higher in group II as compared to group I. In the present study, pleural fluid (PF) sialic acid levels and PF/serum(S) ratio was higher in malignant pleural effusion (though difference was not statistically significant). Smokers in group II had higher serum sialic acid as compared to group I ($P < 0.05$). The sensitivity and specificity of PF/S sialic acid ratio with cut off value of 0.7 were 76.67% and 20%, respectively, whereas taking the cut off value of 70mg/dl for pleural fluid sialic acid in malignant pleural effusions, the sensitivity was 63.33%, specificity 60%, and positive predictive value 46.34%. **Conclusion:** These findings indicate that determination of sialic acid levels in pleural fluid has diagnostic value as a cheap, simple, and reliable marker for malignant pleural effusion.

Key words: Pleural effusion, pleural fluid, serum, sialic acid

INTRODUCTION

Malignant disease involving pleura is the second leading cause of exudative pleural effusions after parapneumonic effusions. It is one of the most common diagnostic problems encountered by specialist requiring detailed investigation.^[1] An increasing number of biochemical parameters have been reported to have diagnostic value in malignant pleural effusions.^[2-4] Sialic acid levels have been found to be elevated in neoplastic cells derived from lung, breast, stomach, colon, ovary, prostate, and liver tumors.^[5] Recently, sialic acid has been reported to have a diagnostic value.^[4] Hence, the present study is designed to measure sialic acid in pleural effusion and serum samples of patients to differentiate between malignant and nonmalignant diseases.

MATERIALS AND METHODS

The present study was conducted on 60 patients attending Outpatient Department of Tuberculosis and Respiratory Medicine in collaboration with Department of Biochemistry. They were subdivided into two groups of 30 patients each: Group I (patients with pleural effusion proved malignant by pleural biopsy) and Group II (controls with nonmalignant pleural effusion). There were 14 smokers in Group I and 21 smokers in Group II. Inclusion criteria: Sputum negative for acid-fast bacilli (AFB) (at least on three occasions), confirmed malignant by pleural biopsy, and exudative pleural effusion. All the cases were subjected to detailed clinical history, thorough clinical examination, and routine investigations. Pleural fluid and blood samples were taken at the time of admission, before starting any treatment. Sialic acid levels were estimated in serum and pleural fluid by Warren's Thiobarbituric Acid (TBA) method.^[6] Data so

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Table 1: Clinical characteristics (mean)

	Group I (n=30)	Group II (n=30)
Age	37.53	56.16
Sex	25 Male, 5 Female	19 Male, 11 Female
Smokers (%)	14 (46%)	21 (70%)
Pleural fluid protein (g%)	4.01±0.83	4.72±0.85

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Table 2: Sialic acid levels in the two groups (mean±SD, mg/dl)

	Group I			Group II		
	Smokers	Nonsmokers	Total	Smokers	Nonsmokers	Total
Pleural fluid sialic acid	64.40±24.01	67.21±22.24	65.99±22.62	79.15±20.03	72.97±15.52	77.29±18.75
Serum sialic acid	73.76±21.87	80.04±18.43	77.14±20.03	81.73±21.95	90.20±13.48	84.75±20.12
Ratio	0.87±0.21	0.82±0.12	0.84±0.17	1.04±0.41	0.80±0.19	0.96±0.37

SD: Standard deviation

obtained was analyzed statistically; student's *t*-test was applied and regression analysis was carried out.

OBSERVATIONS

The clinical characteristics of the two groups are given in Table 1. In group I, there were 14 patients who were smokers, whereas in group 2, there were 21 smokers. In group I, 4 out of 30 patients were cases of benign pleural effusion, 18 had tubercular etiology, 10 had pneumonitis, and 2 cases were with chylothorax. In group II, 5 had malignant effusion, 25 had lung cancer, and 1 had mediastinal neoplasia.

Pleural effusion and serum sialic acid levels were higher in group II as compared to group I, although the difference was not statistically significant [Table 2]. Pleural fluid/serum (PF/S) ratio was higher in group II as compared to group I, although difference was not statistically significant. Also, smokers had high pleural fluid and serum sialic acid levels and PF/S ratio as compared to nonsmokers. Smoker in groups II had higher serum sialic acid as compared to group 1 ($P < 0.05$).

DISCUSSION

In the present study, serum sialic acid levels were higher in group II as compared to group I. Raised serum sialic acid levels have been reported in various cancers.^[5] Our findings are in agreement with those reported by Krolikowsky *et al.*^[7] High serum sialic acid levels have been reported in malignant pleural effusions although difference was not statistically significant and high pleural fluid sialic acid levels and PF/S ratio were also observed.^[8]

In the present study, pleural fluid sialic acid levels and PF/S ratio was higher in malignant pleural effusion (although difference was not statistically significant). Also, smokers had high pleural fluid and serum sialic acid levels and PF/S ratio as compared to nonsmokers. Smoker in groups II had higher serum sialic acid as compared to group 1 ($P < 0.05$). These findings are in agreement with those reported in literature.^[9-11]

Implants of malignant cells on pleura can produce effusion as well as diffusion by pleural capillaries into pleural fluid. Elevated concentration of sialic acid could be either because of production and gradual absorption of sialic acid in diseased

area or elevation of both serum and pleural fluid levels, but sialic acid disappears more slowly from pleural fluid. The smokers had higher pleural fluid sialic acid levels in malignant pleural effusion as compared to nonsmokers [Table 2, $P > 0.05$]. In benign pleural effusion, pleural fluid sialic acid levels were higher in nonsmokers [Table 2, $P > 0.05$]. PF/S ratio was higher in smokers than in nonsmokers in malignant pleural effusion and lower in smokers in benign pleural effusions [Table 2, $P < 0.05$, $P > 0.05$, respectively].

Serum sialic acid levels have been reported to be increased in smokers and alcoholics as smoking induces tissue inflammation and is a known carcinogen.^[12] Hence, elevated sialic acid levels in pleural fluid could be attributed to smoking and this could possibly be a secondary process to malignancy. Studies have reported that total sialic acid levels remain unchanged following one year of smoking cessation.^[12,13] These findings are in agreement with those reported in literature.^[9,14] Thus, pleural fluid sialic acid in malignant pleural effusion along with PF/S ratio can prove to be a reliable marker in differentiating benign and malignant pleural effusion and evaluating impact of smoking in progression of malignancy.

REFERENCES

1. Leuallen EC, Carr DT. Pleural effusion: A statistical study of 436 patients. *N Engl J Med* 1955;252:79-83.
2. Niwa Y, Kishimoto H, Shimokata K. Carcinomatous and tuberculous pleural effusions: Comparison of tumor markers. *Chest* 1985;87:351-5.
3. Tamura S, Nishigaki T, Moriwaki Y, Fukioka H, Nakano T, Fuji J, *et al.* Tumor markers in pleural effusion diagnosis. *Cancer* 1988;61:298-302.
4. Martinez-Vea A, Gatel JM, Segura F, Heiman C, Elena M, Ballesta AM, *et al.* Diagnostic value of tumor markers in serous effusions. *Cancer* 1982;50:1783-8.
5. Erbil MK, Jones JD, Klee GG. Use and limitations of serum and total lipid-bound sialic acid concentrations as markers for colorectal cancers. *Cancer* 1985;55:404-9.
6. Warren L. The thiobarbituric acid assay of sialic acids. *J Biol Chem* 1959;234:1971-5.
7. Krolikowsky FJ, Reuter K, Waalkes TP, Sieber SM, Adamson RH. Serum sialic acid levels in lung cancer patients. *Pharmacology* 1976;14:47-51.
8. Bektemur G, Ozer F, Kanat F, Imecik O. Diagnostic efficiency of serum lipid-bound sialic acid level in malignant pleural effusions. *Tuberk Toraks* 2003;51:265-70.
9. Imecik O, Ozer F. Diagnostic value of sialic acid in malignant pleural effusions. *Chest* 1992;102:1819-22.

10. Alsayed S, Marzouk S. Sialic acid value in pleural effusion as a diagnostic marker of malignancy. *J Egypt Soc Parasitol* 2013;43:689-96.
11. Bansal A, Tandon S, Kharb S. Diagnostic value of sialic acid in pleural effusion. *Zhongguo Fei Ai Za Zhi* 2010;13:349-51.
12. Kakari S, Stringou E, Toumbis M, Ferderigos AS, Poulaki E, Chondros K, *et al.* Five tumor markers in lung cancer: Significance of total and "lipid"-bound sialic acid. *Anticancer Res* 1991;11:2107-10.
13. Crook MA, Scott DA, Stapleton JA, Palmer RM, Wilson RF, Sutherland G. Circulating concentrations of C-reactive protein and total sialic acid in tobacco smokers remain unchanged following one year of validated smoking cessation. *Eur J Clin Invest* 2000;30:861-5.
14. Kurtul N, Cil MY, Bakan E. The effects of alcohol and smoking on serum, saliva, and urine sialic acid levels. *Saudi Med J* 2004;25:1839-44.

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