PROTEIN ELECTROPHORESIS IN TUBERCULOSIS

Pages with reference to book, From 58 To 60

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ABSTRACT

Serum electrophoresis was done in 31 patients with pulmonary tuberculosis and 62 age and sex matched controls. Protein values amongst controls were higher than those described by others. In tuberculosis there was significant decrease in total proteins, and albumin with corresponding increase in globulin, mainly due to an increase in gamma globulin fraction. There was no significant increase in alpha-2 levels. Decrease in albumin/alpha-2 ratio was significant in sputum positive cases, but it was due to reduction in albumin rather than increase in alpha-2 globulin. Decrease in albumin/alpha-2 ratio in this study was not diagnostic of tubercular activity (JPMA 41: 58, 1991).

INTRODUCTION

Tuberculosis remains a major cause of morbidity and mortality in Pakistan. With the introduction of more potent drugs, hundred percent cure has now become possible, but no significant advance in the diagnosis of the disease has been recorded inspite of continuous research. Effective and simple serological techniques would be of great help in the diagnosis of cases iraccesable to bacteriological examination like extra-pulmonary childhood disease and smear negative pulmonary disease. Kaoline agglutination test, Enzyme linked immunosorbant assay (ELISA) and Radio Immunoassay (RIA) were tests evolved to achieve this goal but even these efforts have not produced satisfactory results so far. Fall in albumin/globulin ratio has long been recognised in various hepatic, renal, acute and chronic diseases. It was suggested that albumin/alpha-2 globulin ratio is a very sensitive indicator of acute tuberculosis[1]. Various investigators[2-5] have reported different results when comparing the electrophoretic pattern of tuberculosis patients and normal controls. This study was done to assess if protein electrophoresis could be employed in the diagnosis of active tuberculosis, as claimed.

PATIENTS AND METHODS

Thirty one patients of pulmonary tuberculosis attending the out-patients department of respiratory medicine at K.V.S. SITE hospital were included in the study. Fifteen of 31 cases had positive sputum for AFB, while 16 were diagnosed on clinico-radiological grounds. There were 22 males and 9 females with an average age of 25 years amongst both sexes. Majority had moderate to advance pulmonary disease, and all received antituberculosis therapy for 6-9 months. Blood for protein electrophoresis was drawn after confirmation of diagnosis and before commencing therapy, then at two weeks after starting therapy and then every six weeks till completion of treatment. Electrophoresis was done using Beckman microzone apparatus and electrophoretograms were analysed by densitometery[6]. Sex and age matched controls were healthy attendants, doctors and medical students. Statistical analysis was performed using student \'t\' test.

RESULTS

TABLE I. Compersion between Pulmonary Tuberculosis and Controls.

		Pulmonary Tuberculosis	Controls	
		$\bar{x}$ S.D C.I n - 31	$\bar{x} \pm$ S.D C.I n - 62	P - Value
Total Proteins		7.45 ± 0.71	8.87± 0.46	< 0.01
	C.I.	(7.32 - 7.58)	(6.6 - 9.4)	
Albumin		3.72 ± 0.87	4.68 ± 0.58	
(g/dl)	C.I.	(3.56 - 3.88)	(4.60 - 4.76)	< 0.001
Globulin		3.73 ± 0.93	3.19 ± 0.59	
(g/dl)	C.I.	(3.56 - 3.9)	(3.11 - 3.27)	< 0.01
Alpha 1		0.24 ± 0.12	0.21 ± 0.12	
(g/dl)	C.I.	(0.22 - 0.26)	(0.19 - 0.23)	N.S
Alpha 2		0.8 ± 0.3	0.73 ± 0.23	
(g/dl)	C.I.	(0.75 - 0.85)	(0.70 - 0.76)	N.S
Beta		1.07 ± 0.58	0.92 ± 0.24	
(g/dl)	C.I.	(0.97 - 1.17)	(0.89 - 0.95)	N.S
Gamma		1.64 ± 0.6	1.32 ± 0.37	
(g/dl)	C.I.	(1.53 - 1.75)	(1.27 - 1.37)	< 0.001
Albumin/alpha-2 ratio		5.73	7.75	< 0.05

Table I shows the comparison of protein pattern of 31 cases of pulmonary tuberculosis with age and sex matched controls. There was a significant increase in total proteins and albumin levels and a significant increase in globulin levels. There was no change in alpha-i, alpha-2 and Beta globulin, Gamma globulin on the other hand was significantly increased. Similar results were observed when sputum positive and sputum negative patients were compared with the control group (Table II).

TABLE II. Comparision between afb positive, afb negative and controls.

	Controls $\bar{x} \pm$ S.D n = 62	TUBERCULOSIS AFB-Posivive	TUBERCULOSIS AFB-Necative	P- Value
Total Protein g/dl	7.87 ± 0.46	7.26 ± 0.83	7.63 ± 0.52	Ivs II <0.01
Albumin g/dl	4.68 ± 0.58	3.53 ± 0.83	3.9 ± 0.87	Ivs II,III <0.01
Alpha-1 globulin g/dl	0.21 ± 0.12	0.26 ± 0.11	0.22 ± 0.12	N.S
Alpha-2 globulin g/dl	0.73 ± 0.23	0.8 ± 0.32	0.8 ± 0.28	N.S
Beta globulin g/dl	0.92 ± 0.24	1.0 ± 0.33	1.12 ± 0.74	N.S
Gamma Globulin g/dl	1.32 ± 0.37	1.66 ± 0.63	1.62 ± 0.57	Ivs II,III <0.05
Albumin/alpha-2 globulin ratio	7.75 ± 6.21	5.44 ± 2.84	6.0 ± 3.72	Ivs II <0.05

Albumin/alpha-2 ratio showed significant reduction among positive but not with sputum negative patients.

DISCUSSION

It has been known for some time that there are alternations in the serum proteins in the course of liver, renal and acute and chronic diseases. In tuberculosis also there is reduction/in albumin with increase in globulin causing reduced albumin globulin[7,8] ratio. Further reduction occurring with the increasing severity[9]. Significant increase in alpha-i, alpha-2, and gamma globulin in the moderate and advanced tuberculosis has been described[3,4]. Baldwin[10] on the other hand found no change in these values in minimal disease, but increase in alpha-i, alpha-2 and gamma globulin levels with corresponding decrease in albumin in moderate to advanced disease with considerable fluctuations and wide overlap in values. In the present study the total proteins, albumin were significantly reduced among patients with tuberculosis, and although the values of alpha-i and alpha-2, beta and gamma were slightly high only gamma globulin was significantly increased when compared to the controls ($P < 0.001$). On comparison of sputum positive with negative cases similar results were obtained. Albumin/alpha-2 ratio was significantly lower amongst sputum positive but not amongst sputum negative cases (Table II). Even in sputum positive cases the values fluctuated considerably with wide over lapping of values. As reported earlier[11] the normal values of total protein, albumin, alpha-2 and beta globulin were higher while gamma globulin were slightly reduced than reported by others[3,4,12]. The reason for such discrepancy could be a much larger number of subjects in the present study. Our study does not agree with the previous reports of an increase in the alpha-2 fraction of globulin. The reduction of albumin/alpha-2 ratio amongst sputum positive cases is mainly due to reduction in albumin fraction rather than increase in alpha-2. Serial estimations during the treatment also showed gradual increase in albumin rather than reduction of alpha-2. In our opinion none of the changes in the globulin fractions are diagnostic of tuberculosis nor t the reduction of albumin/alpha-2 fraction conclusive of tuberculosis

activity since the results are variable. Its significance may however lie in documenting progress and efficacy of treatment. Electrophoresis reports are laboratory findings and as such do not necessarily indicate disease[13].

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