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A STUDY OF ADENOSINE DEAMINASE LEVEL IN PATIENTS WITH PLEURAL EFFUSION

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ABSTRACT

Introduction: Pleural fluid is an abnormal collection of fluid in the pleural cavity. Tuberculosis is a major health problem in India &globally and it is a second most common cause of death from infectious diseases. Present study is to find out the role of Adenosine Deaminase level & its diagnostic utility in patients with pleural effusion.

Methods: This study includes 100 patients admitted in SCL General hospital & VS General Hospital Ahmedabad from September 2012 to July 2014 which was diagnosed as having pleural effusion.

Result: Pleural fluid ADA level of the study group ranged from 51 -145 IU/L with a mean of 76.38+- 21.33IU/L and (P value of < 0.0001) was statistically significant. Sensitivity and Specificity of the test was found 95% and 100% respectively.

Conclusion: All patients with TB pleural effusion had elevated ADA levels in pleural fluid. In this study there was a statistical significant association P value (<0.0001) of ADA levels. This pleural fluid ADA estimation seems to have the potential for being one of the reliable tests for the diagnosis of TB pleural effusion which is adequately sensitive and specific and easy to perform.

Key words: Pleural effusion, Adenosine Deaminase, Tuberculosis, Sensitivity, Specificity

INTRODUCTION

The pleural space lies between lung and chest wall and normally contains a very thin layer of fluid, which serves as a coupling system.[1]

Pleural fluid is an abnormal collection of fluid in the pleural cavity. Tuberculosis is a major health problem in India & globally and it is a second most common cause of death from infectious disease. One third of the world's population is estimated to be infected with M. tuberculosis & 8 million active cases occurs annually.[2] Recent studies of populations with high prevalence of tuberculosis report that tubeculous pleural effusion occurs in approximately 30% of TB patients.[3] Definitive diagnosis of tuberculous pleural effusion requires demonstration of mycobacterium tuberculosis in the pleural fluid, However the organism seldom detectable in the pleural fluid. Thus there is a need for a single test which is adequately sensitive and specific and at the same time inexpensive & easy to perform.[4] Conventional methods for diagnosing TB were found to have low sensitivity & specificity. Adenosine Deaminase (ADA) is an enzyme which catalyse the conversion of adenosine to inosine a stage of

purine metabolism & play an important role in the differentiation of lymphoid cells. Tubercular effusion is the result of a cell mediated immune response of Mycobacterium tuberculli as a result of cell mediated immune response. It is reflected by ADA in pleural fluid.[5] ADA has shown promising result in the diagnosis of tubercular pleural effusion. The present study was conducted to confirm the usefulness of ADA assay for diagnosis of tuberculous pleural effusion.

METHODS

Present study included 100 patients admitted in the medical wards of Shardaben general hospital, VS general hospital Ahmedabad within the period from September 2012 and July 2014 diagnosed as having pleural effusion. Patient above 14 years of age, either sex, and those patient have pleural effusion were taken for the study. Informed consent was taken from all the patients for participating in the study. After admission detailed history was taken, physical examination done. In all patient chest CXR(PA), haemogram and mountoux test were done. Thoracocentasis was performed in all patients. Total protein and LDH level were obtained for both serum and pleural fluid specimen taken at the same siting to distinguish exudates from transudates according to **light's criteria**[7]. ADA of pleural fluid sent in a citrated tube and imediately centrifused at 3000 rpm for 20 minutes at 4 ^{0}c. ADA levels in the serum and pleural fluid were estimated by spectrophotometric method described by Guisti.[8]The finding were presented using both tubular method and descriptive statistic. Significance of the result is presented with a P value generated by chi square test and T-test.A P- value < 0.05 was considered as statistically significant. The threshold value of 50 IU/L was used to determine sensitivity and specificity.

RESULTS

Out of 100 cases of pleural effusion, 86 were found to be exudative and 11 were found to be transudative according to lights criteria. And 3 were found to be parapneumonic. Out of 100 patients studied 68%were male and 32%were females. Age of presentation is ranged between 20 to 90 years with a mean age of presentation is 48 years (SD=±15)In this study incidence of pleural effusion is highest among 51 to 60 years of age. Both tuberculosis and transudative pleural effusion were common among 51 to 60 years of age groups. Incidence of pleural effusion was highest among males (68%) than in females (32%).

Table-1: Age and sex of study patients

Variables	Patients (n=86)	Parapneumonic Effusion (n=3)	Transudative effusion (n=11)
Age			
20-30	15(17.44)	1(33.3)	2(18.18)
31-40	14(16.27)	1(33.3)	1(9.09)
41-50	19(22.17)	1(33.3)	1(9.09)
51-60	23(26.75)		4(36.37)
61-70	10(11.67)		2(18.18)
>70	5(5.80)		1(9.09)
Sex			
Male	59(68.60)	2(66.67)	7(63.67)
Female	27(31.40)	1(33.33)	4(36.33)

Figure in parenthesis indicate percentage.

Table-2: Clinical manifestations in patients with pleural effusion

	Patients (n=86)	Parapneumonic Effusion (n=3)	Transudative effusion(n=11)
Fever	70(81.39)	3(100)	2(18.18)
Cough	60(69.76)	3(100)	2(18.18)
Dry cough	28(46.67)	1(33.33)	
Sputum production	32(53.33)	2(66.66)	2(18.18)
Anorexia	62(72.09)		
Weight loss	45(52.33)		
Dysponea	32(37.2)	2(66.66)	9(81.82)
Hemoptysis	14(16.27)		
Chestpain	22(25.58)	3(100)	6(54.55)

Figure in parenthesis indicate percentage.

Table-3: Level of ADA(U/L)in patients studied

ADA(U/L)	Patients (n=86)	Parapneumonic Effusion (n=3)	Transudative effusion(n=11)
1- 10	-	-	5(45.45)
11 -20	-	1(33.33)	5(45.45)
21—30	-	1(33.33)	-
31—40	1(1.16)	1(33.33)	1(9.09)
41- 50	3(3.48)	-	-
51- 60	27(31.39)	-	-
>60	55(63.95)	-	-

Figure in parenthesis indicate percentage.

In the present study, the commonest symptom is fever (79%) followed by cough (65%), anorexia (62%), breathlessness (43%), chest pain (31%). The commonest symptoms in tuberclous effusion were fever (70%) and cough (60%).All the patients with tuberculous pleural effusion had their pleural fluid Adenosine Deaminase level between 37 to148U/L. Among 86 patients 82 patients of tuberculous pleural effusion had their pleural fluid ADA levels between 51 to100U/L, only 4 patients have their values between 30 and 50U/L. All the patients of parapneumonic pleural effusion had their ADA values below 40U/L.

Pleural fluid ADA level of the study group ranged from 51 to 145 IU/L with a mean of 76.38±21.33 IU/L and P value of <0.0001 was statistically significant.

DISCUSSION

In present study tuberculous pleural fluid had ADA values in the range of 51 to 145U/L. The mean pleural fluid ADA level in case of tuberculous pleural effusion in present study was 76.38 (SD±21.33) which was significantly higher than other types of pleural effusions. The pleural fluid ADA values for tuberculous cases reported by various authors are Piras et al (1978) 83.04±25.51 U/L[9], Black and Berman (1982) 46.0±13U/L[10], R Gilhotra (1989) 72.9±30.32 U/L[12] and RK Chopra 114±7.22U/L[11]. Our findings that the pleural fluid ADA values in case of tuberculous pleural effusion above 50U/L with the p value <0.0001 was statistically significant and is consistent with various authors mentioned above.

In present study patients with pleural effusion, 82 patients have postiive ADA levels and 4 patients nave negetive for ADA levels while none of the patients were positive for ADA level in nontuberclous pleural effusion and 14 patients were negative. So, sensitivity and specificity of ADA level for diagnosis of tuberculous pleural efftusion were 95% and 100% respectively. The study done by P C Mathur et al shows ADA level in tuberculous pleural effusion ranged from 45-160U/L with a mean of 100U/L and sensitivity &specificity of 100%[13].Another study done by Burges Lj showed ADA activity in tuberculous effusion was higher than in any other study group .At a level of 50U/L the sensitivity &specificity for the identification of tuberculosis was 90% & 89% respectivey.[14] In developing countries like India, the commonest cause of pleural effusion is tuberculosis. In this study exudative pleural effusion causes are considered as tuberculous pleural effusion and transudative effusion causes as non tuberculous. Early recognition of the cause of pleural effusion avoids unnecessary additional diagnostic procedures and help in definitive therapy. Most of the diagnostic procedures used to establish the pathogenesis are time consuming and also the specific diagnostic test like PCR is not available at all setups.

CONCLUSION

Fom the study we concluded that serum ADA was significantly higher in tuberculous pleural effusion. Thus pleural fluid ADA estimation seems to have the potential for being a single test for the diagnosis of pleural effusion which is adequately sensitive and specific and at the same time, inexpensive and easy to perform in the field of setting.

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