



Adenosine deaminase as a screening test for the diagnosis of tuberculous pleural effusion

Swetha Garimella^{*1}, Ramchander Merugu¹, Archana A. Dharwadkar²

¹University college of Science and Informatics, Mahatma Gandhi University, Nalgonda-508254 India

²Kamineni Institute of Medical Sciences, Narketpally, Nalgonda, Andhra Pradesh, India

ABSTRACT

Tuberculosis is one of the commonest infectious diseases, which affects lungs. In tubercular diseases, diagnosis of pulmonary tuberculosis is usually done by sputum examination for AFB. Pleural fluid biochemistry, cytology and pleural biopsy investigations are required for the diagnosis of extra pulmonary tuberculosis. Detection of AFB and its culture, histopathological study of a pleura is not desirable as they are time consuming. Advanced tests like ELISA and PCR are expensive. Adenosine deaminase screening test has been proposed to be a useful marker for pleural tuberculosis. In this study, levels of adenosine deaminase for early diagnosis of extra pulmonary tuberculosis along with its specificity and sensitivity have been evaluated and discussed.

Keywords: Adenosine deaminase; Pulmonary tuberculosis; screening marker

INTRODUCTION

Tuberculous pleurisy could be a delayed hypersensitivity reaction which develops due to the presence of mycobacterial antigens. This causes the release of lymphokines, which activate macrophages for an enhanced bactericidal effect. Diagnosis of tuberculous pleural effusion (TPE) is difficult because of the low sensitivity and specificity of noninvasive traditional diagnostic tools. Diagnostic confirmation of tuberculous pleural effusion is difficult due to the identification of mycobacteria in the pleural fluid (<50%) (Bueno *et al*, 1990). Levels of adenosine deaminase (ADA) in TPE as a diagnostic test can be explored because it is a non invasive technique. Many studies have suggested ADA for diagnosis of tuberculous pleural effusion (Valdes *et al*, 1995; Ungerer *et al*, 1994) The sensitivity and specificity of ADA for the diagnosis of pleural TB was investigated by several workers (Villegas *et al.*, 2000; Greco *et al.*, 2003). Diagnostic significance of Adenosine deaminase in pleural tuberculosis using the technique of gel electrophoresis was studied by Khurshid *et al.*, (2007). Hence, in the present study ADA as a screening test was investigated to study TPE.

MATERIALS AND METHODS

The study included 67 patients with pleural effusion with age groups ranging from 13 to 70 years. Patients

were divided into two groups

Group-1(24) patients (Male-18 and Female-6) were diagnosed with non tubercular pleural effusion and

Group-2(43) patients (Male-31 and Female-12) were diagnosed with tubercular pleural effusion.

ADA levels; Group-2 (n=43) tubercular pleural effusion

Pleural effusion caused by tuberculosis was confirmed in patients by bacteriology and clinical examination. The study was carried out on patients suffering from pleural effusion who attended OPD of Pulmonary Medicine and GM of KIMS, Narketpally. Detailed clinical history, physical examination, pleural fluid biochemical analysis, pleural fluid acid fast staining and routine and relevant investigation of all patients, including ADA estimation by Galanti and Giusti (1974) method was done.

RESULTS

ADA Level in tuberculous pleural effusion ranged from 32-124 U/L with a mean level of 60U/L .ADA levels in non tuberculous pleural effusion ranged from 7.8-38.7 U/L with a mean level of 21.6 U/L($p < 0.001$, highly significant).

Table 1: ADA levels in tuberculous and nontuberculous pleural effusion

Type of pleural effusion	Range (U/L)	Mean(U/L)
Tuberculosis	32-124 U/L	60U/L
Non-Tuberculosis	7.8-38.7 U/L	21.6 U/L

Discussion

In the present study, specificity of ADA for diagnosis of tubercular pleural was low which may be due to less

* Corresponding Author

Email: rajumerugu01@gmail.com

Contact: +91-9989427725

Received on: 23-03-2013

Revised on: 17-08-2013

Accepted on: 19-08-2013

number of cases of pleural effusion. It has been clearly shown that ADA levels are significantly high in tuberculosis as against non tuberculous causes. This test has shown 86% sensitivity and 85.7% specificity for diagnosing tuberculous etiology with positive and negative predictive values of 93.4% and 72% respectively. ADA screening could be useful when it is not possible to do a pleural biopsy because of small extent of the effusion. In conclusion, the ADA assay could be considered as a screening test for further diagnostic procedures in pleural effusion cases.

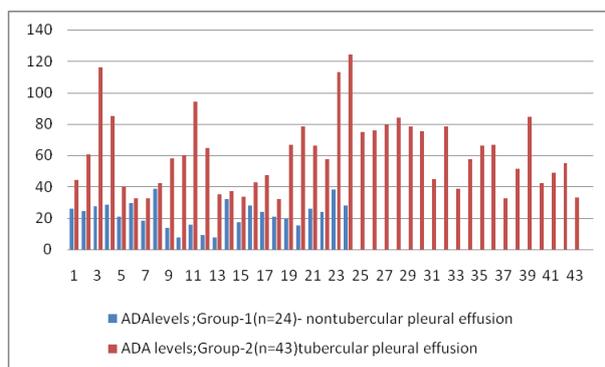


Figure 1: ADA levels in tuberculous and nontuberculous pleural effusion

Table 2: Sensitivity and specificity of ADA for tuberculous pleural effusion

Test	Disease present	Disease absent
Positive test	43	03
Negative test	07	18

Table 3: Sensitivity and specificity of ADA for tuberculous pleural effusion estimated values

Parameter	Estimated value	95% confidence interval
Sensitivity	86 %	73.8 % to 93.0%
Specificity	85.71 %	63.63 % to 96.78 %
Positive Predictive Value	93.48 %	82.08 % to 98.56 %
Negative Predictive Value	72 %	52.4 % to 85.7 %
LR+	6.02	2.099 to 17.265
LR-	0.163	0.08 to 0.332

Sensitivity (%) = 86%, Specificity = 85.7%,

Positive Predictive value = 93.48%, Negative predictive value = 72%

REFERENCES

Carlos Escudero Bueno, M. García Clemente, B. Cuesta Castro, L. Molinos Martín, S. Rodríguez Ramos, A. González Panizo, J. Martínez Glez-Río. Cytologic and Bacteriologic Analysis of Fluid and Pleural Biopsy

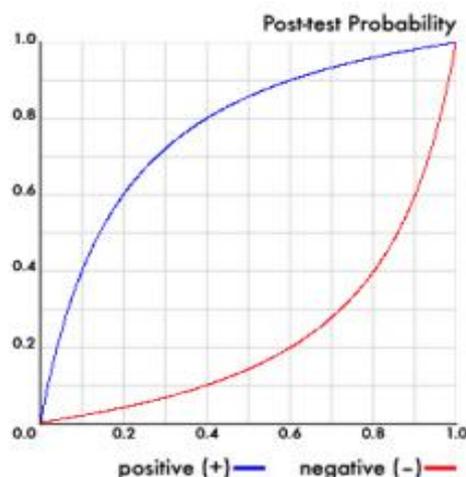


Figure 2: Relation between pre- and post-test probabilities of positive (upper left half) and negative (lower right half) likelihood ratio

Specimens With Cope's Needle Study of 414 Patients. *Arch Intern Med.* 1990;150(6):1190-1194.

Giusti G. Adenosine deaminase. In: Bergmeyer HU, ed. Giusti, G.: Adenosine deaminase in Methods of enzymatic analysis Vol. II Bergmeyer H.D. Editor, N.Y. Academic Press. Inc. USA, 1092, 1974.

Greco S, Girardi E, Masciangelo R, Capocchetta GB, Saltini S. Adenosine deaminase and interferon gamma measurements for the diagnosis of tuberculous pleurisy: a meta-analysis. *Int J Tuberc Lung Dis* 2003; 7: 777-86.

Prasad R, Tripathi RP, Mukerji PK, Singh M, Srivastava VML. Adenosine deaminase activity in pleural fluid. A diagnostic test of tuberculous pleural effusion. *Indian J Chest Dis Allied Sci* 1992; 34: 123-6.

Rukhshan Khurshid, Najla Shore, Mahjabeen Saleem, Mammona Naz, Nazia Zameer Diagnostic significance of adenosine deaminase in pleural tuberculosis *Pak J Physiol* 2007;3(2)

Ungerer JPJ, Oosthuizen HM, Retief JH, Bissbort SH. Significance of adenosine deaminase activity and its isoenzymes in tuberculous effusions. *Chest* 1994; 106: 33-7.

Valdes L, Alvarez D, San Jose E, et al. Value of adenosine deaminase in the diagnosis of tuberculous pleural effusions in young patients in a region of high prevalence of tuberculosis. *Thorax* 1995; 50: 600-3.

Villegas MV, Labrada LA, Saravia NG. Evaluation of polymerase chain reaction, adenosine deaminase and interferon- γ in pleural fluid for the differential diagnosis of pleural tuberculosis. *Chest* 2000; 118: 1355-64.