Importance of Adenosine Deaminase Estimation in Diagnosis of Tuberculous Pleural Effusion

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Abstracts: Aim & Objective: To evaluate the usefulness of estimation of ADA (Adenosine deaminase) activity for etiological diagnosis of pleural effusion & to study the level of pleural fluid ADA in tuberculous & nontuberculous pleural effusion & establish cutoff limit of ADA activity. Materials & Methods: Present study was conducted in pathology department Pandit Dindayal Upadhyay Medical College Rajkot during year July 2005 to September 2007 for which we have taken 100 patients of all ages & either sex admitted in various medical wards, T.B. ward and O.P.D. Spectrophotometric method was used for ADA estimation. Results: The present study was carried out in 100 patients out of which 78 patients were of tuberculous pleural effusion & 22 cases were of Non-TB pleural effusion. There was minor difference in male & female Pleural Fluid (Both TB & Non TB) Mean ADA Level. Most of Tuberculous Effusion was in Range of 40-60 U/L ADA level (64 Pts) while Non Tuberculous effusion was between 16-20 U/L of ADA level (14 Pts). At level of 35 U/L of cut-off limit of ADA in pleural fluid sensitivity & specificity would be 94.7% & 72.7% respectively. Conclusion: The study concluded that estimation of ADA in Pleural Fluid is simple, rapid & less expensive laboratory investigation for diagnosis of tuberculous pleural effusion when diagnosis is uncertain by other investigation & it has valuable role as an adjuvant investigation to other diagnostic investigation of Tuberculosis. [Parghi B et al NJIRM 2012; 3(5) :94-96]

Key Words: Tuberculosis, ADA, Pleural effusion

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Introduction: Tuberculous pleural effusion is one of the most common forms of extrapulmonary tuberculosis (TB). The immediate cause of the effusion is a delayed hypersensitivity response to mycobacterial antigens in the pleural space & for this reason microbiological analyses are often negative and limited by the lengthy delay in obtaining results.[1] The key to effective management lies in early accurate diagnosis which is difficult many times with routine available diagnostic test. The level of ADA has been found to be elevated in tuberculous effusion & its estimation is new sensitive test being simple & quick procedure.[2] Recently many workers have emphasized the importance of ADA activity in pleural fluid as a diagnostic marker of tuberculous effusion.[3,4,5] The present study was an attempt to examine the cases of pleural effusion with the help of conventional methods & to evaluate usefulness of estimation of ADA activity in the etiological diagnosis of pleural effusion in our set up.

Material and Methods: Present study was conducted in pathology department Pandit Dindayal Upadhyay Medical College Rajkot during year July 2005 to September 2007.

Total 100 patients of all ages & either sex admitted in various medical wards, T.B. ward or O.P.D. were taken as sample of this study. Method of ADA estimation in tuberculous pleural effusion: Spectrophotometric method-Galanti & Guisti[6]

Principle:

Adenosine + H2O + ADA→Inosine + NH3

NH3 + Hypochloride + Phenol + Sodium nitroprusside→Indophenol (Blue colour)

Similar type of study method was also used by SK Verma.[3]

Observation & Discussion: The present study was carried out in 100 patients out of which 78 patients were of tuberculous pleural effusion & 22 cases were of Non-TB pleural effusion. Among non-TB pleural effusion, 10 cases were of pneumonia, 4 of congestive cardiac failure, 2 of cirrhosis of liver, 2 of anaemia & hypoproteinemia & 4 cases were of malignant pleural effusion.

Mean ADA level of Tuberculous pleural effusion was 59.25 +/- 10.5 & Non-Tuberculous pleural effusion was 22.13 +/- 08.25 & the difference was highly significant (p value <0.001) [Table 1] which suggest that in every case of Tuberculosis ADA

Table 1: Pleural Fluid ADA level in Tuberculous & Non Tuberculous Pleural Effusion

Study Cases	No. of Cases	Pleural ADA Mean
Tuberculous	78	59.25 +/- 10.5
Non Tuberculous	22	22.13 +/- 08.5
Un-paired t test: t value-15.53, p value: <0.001		

There was only minor difference observed in Male & Female Pleural Fluid (Both TB & Non TB) Mean ADA Level [Table 2].

Table 2 : Sex wise distribution of ADA level in TB & non TB cases

	Sex	No. of Cases	Mean ADA Level (U/L)
Tuberculous	Male	53	59.4
	Female	25	61.7
Non Tuberculous	Male	16	22.1
	Female	06	20.9

Table 3: Distribution of observation to respective Pleural fluid ADA level in Pleural Effusion

Range of Pleural Fluid ADA level (U/L)	Tuberculous N=78	Non Tuberculous N=22
0-5	00	00
6-10	00	00
11-15	00	02
16-20	00	12
21-25	00	00
26-30	02	00
31-35	04	02
36-40	10	02
41-45	10	02
46-50	14	00
51-55	12	00
56-60	18	02
61-65	06	00
66-70	00	00
71-75	00	00
76-80	00	00
81-85	02	00
Positive > 35U/L	72	06
Negative < 35U/L	06	16

level is significantly increased in plural fluid. Similar type of result also reported in a study carried out by Rajendra Prasad[4] showing mean pleural fluid ADA level in Tuberculous pleural effusion is 64.67 +/- 21.68U/L & Non-Tuberculous pleural effusion 6.99 +/- 3.69U/L.

In our study most of Tuberculous Effusion were in Range of 40-60 U/L ADA level (64 Pts) while Non Tuberculous effusion between 16-20 U/L of ADA level (14 Pts) [Table 3]. So, results were based on arbitrary cut-off level decided after study (35 U/L of pleural fluid ADA level) which is comparable to Niwa et al[5] ADA >38 U/L, Rodziguez[7] ADA >37U/L, Jindal et al[8] ADA >40U/L. At level of 35 U/L of cut-off limit of ADA in pleural fluid sensitivity & specificity would be 94.7% & 72.7% respectively and at cut-off Value of 40 U/L of pleural effusion ADA sensitivity & specificity was 100% & 80% respectively which is comparable with other studies also.[9,10,11]

Conclusion: The study was completed with remark that estimation of ADA in Pleural Fluid is simple, rapid & less expensive laboratory investigation for diagnosis of tuberculous pleural effusion when diagnosis is uncertain by other investigation.

Though it cannot be use as general screening test or as a full proof standard test for diagnosis of tuberculous pleural effusion, it has valuable role as adjuvant investigation to other diagnostic investigation of Tuberculosis.

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