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SIGNIFICANCE OF ADENOSINE DEAMINASE IN TUBERCULAR PLEURAL EFFUSION

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ABSTRACT

Background- Pleural diseases diagnosis is difficult due to various benign and malignant condition. Pleural fluid cytology is mostly use for pleural disease diagnosis in India. Present study was conducted to establish diagnostic significance of Adenosine deaminase ADA in pleural fluid for pleural diseases and correlates cytological finding.

Material & methods- 100 samples of pleural fluid taken from Government Medical College Datia MP. Pleural fluid ADA and cell cytology was done.

Results- Out of 100 sample 65 male and 35 female. 37% have ADA level more than 40 IU/L and 63% have less than 40 IU/L. Pleural fluid ADA sensitivity is 91.67% and specificity is 80.26%, positive productive value is 59.46% and negative predictive value is 96.83%. Pleural fluid lymphocyte count more than 50% in 80% cases and less than 50% lymphocyte count in 20% cases. Pleural fluid lymphocyte sensitivity is 100%, specificity is 15.15%, positive predictive value is 30.00% and negative predictive value is 100%.

Conclusion-ADA pleural fluid level along with differential count will give best result for tubercular and non tubercular diagnosis.

Keyword-Pleural effusion, ADA, Cell cytology

MAIN TEXT

Introduction-

Pleural Effusion is an abnormal accumulation of the fluid in the pleural cavity and it is the most common manifestation of pleural pathology. [(1)] Pleural Effusion may be asymptomatic but if large, produce breathlessness or chest pain, or both. Breath sounds are reduced on the affected side, and the percussion note is stony dull. [(2)] Pleural Effusion is the end result of many pulmonary as well as other systemic diseases. It requires diagnostic and therapeutic tapping in most cases for final diagnosis. Adenosine Deaminase Activity (ADA) analysis in pleural fluid as well as in serum are in practice, this is the cheapest test with high diagnostic value. Adenosine Deaminase is an enzyme in the purine salvage pathway required for converting adenosine to inosine. [(3)] It is needed for the breakdown of nucleic acids in tissues. ADA value above 40 IU/L

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are known to well correlate with tubercular pathology in various studies and help to differentiate between tubercular and non-tubercular exudative pleural effusion. [4] Pleural effusions accompany a wide variety of disorders of the lung, pleura, and systemic disorders. To treat pleural effusion appropriately, it is important to determine its cause. With knowledge of pleural fluid cytology, biochemistry and clinical presentation, an etiological diagnosis can be established in approximately 75% of patients. [5] There has been a need to study the diagnostic efficacy of ADA in pleural effusion and its cytological correlation aa a cost effective for diagnosis of tubercular effusion. This study was done to study the diagnostic significance of ADA in Pleural Fluids and its cytological for diagnosis of tubercular effusion and others.

Material & Methods-

This study includes 100 pleural fluid samples taken from patients attending **Government Medical College Hospital Datia**. All clinically diagnosed cases of pleural effusion irrespective of age and sex were included in the study. All patients who were diagnosed as a case of active tuberculosis and are on anti-tubercular treatment were excluded. The site of aspiration was located clinically or radiologically. After preparation of the site, the needle was inserted in the along the upper border of the rib in appropriate intercostal space and the pleural fluid was aspirated. The fluid sent to the laboratory for examination. Physical examination of the fluid was done. The fluid was subjected for ADA level measurements and cytological examination. The data collected was analysed according to the standard statistical methods to reach a conclusion. All statistical analyses were performed using IBM SPSS Statistics version 19. A2 tailed P value of <0.05 was taken to be statistically significant.

Results-

Total 100 patients were included in the study. There were 65 males and 35 females. The mean age was 42.02±17.73 years. The mean age among men was 41.05±16.64 years and in women were 44.62±20.15 years. Majority of the patients were in the age group of 21-40 years and 41-60 years. The mean quantity of pleural fluid was 10.88±7.14 ml. Most of the patients came with chief complaint of dry cough, fever, weakness, dyspnoea and chest pain. Out of 100 patients 10 were smokers and 11 were alcoholic.

ADA Level	Tubercular	Non-Tubercular	Total
>40IU/L	22	15	37
≤40IU/L	2	61	63
TOTAL	24	76	100

Sensitivity = 91.67%

Specificity= 80.26%

Positive Predictive Value= 59.46%

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Negative Predictive Value= 96.83%

Table 2- Cytology Sensitivity & Specificity of Lymphocyte Counts for Pleural Fluid

Lymphocyte Percentage	Tubercular Effusion	Non-Tubercular	Total
>50%	24	56	80
≤50%	0	20	20
TOTAL	24	76	100

Sensitivity = 100%

Specificity = 15.15%

Positive Predictive Value = 30.00%

Negative Predictive Value = 100%

Discussion-

In the present study, the mean quantity of pleural fluid was 10.88±7.14 ml. Most of the patients came with the chief complaint of fever (56), dry cough (47), dyspnoea (43) and chest pain (16). These finding are compatible with the study done earlier by **Moudgil et al**. [6]

Alaarag AH et al, [7] in their study showed that the most prevalent complaint was cough (100%) followed by expectoration in 83.3% patients, dyspnea in 80% patients, fever and dry cough are the most common symptom in all chest diseases and for which patients came to physicians. [8]

Among our 100 cases, 10 cases of exudative pleural effusion had, less than 1000 Total Leucocyte Count, 70 cases had more than 1000 Total Leucocyte Count; whereas in Transudative Pleural Effusions 20 cases had Total Leucocyte Count less than 1000.

Kushwaha et al, [9] also stated that overall, 52.44% of exudative effusions had Total Leucocyte Count greater than 1000cells/cu.mm. It was noted that 96.88% of tubercular effusions had more than 50% lymphocytes, 81.25% jad protein greater than 5gm/dl.In India, tubercular effusion is the commonest cause of exudative effusions. This is similar to the observation in another study from India by **Maldhure et al**, [10] where they showed that the tubercular effusions constitute 66% of the effusions, malignancy 15%, and parapneumonic effusion 4.8%. Sputum for AFB was positive in 16 patients, CBNAAT test was positive in 7 patients; Montoux test was positive in 4 patients and one patient showed blood culture for klebsiella. These are similar to the finding of Valdes et al. [11]

In our study, Mean ADA Levels were 35.57±22.79 in non-malignant effusions, 36.2±3.93 in malignant effusions, 75.88±29.04 in tuberculous effusions and 30.73±20.04 in case of other effusions. The Mean ADA were high in the 2 Indian studies done by **Rajendra Prasad et al**, [12] and Gilhotra et al, [13] with the Mean ADA level ranging between 76.8±23.8 IU/L – 95.8±57.5IU/L.

According to the literature, Pleural Fluid Adenosine Deaminase (ADA) has got a good discriminative value in differentiating tuberculous effusions from malignant effusion and other effusions. Although a pleural fluid ADA above 70 IU/L is diagnostic of tuberculosis, it has to be

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considered if the pleural fluid ADA is between 40 IU/L and 70 IU/L. An ADA level less than 40 IU/L rules out pleural tuberculosis. [14]

Castro et al, [15] studied 410 cases of lymphocytic pleural effusion. The negative predictive value of the ADA test was very high (99%) similar to the present case.

They also stated that with the decline in the prevalence of tuberculous pleural effusion in some areas, the positive predictive value of pleural fluid ADA also declines but the negative predictive value remains high. Besides, lymphocytes count and ADA level in pleural fluid, even other parameters will also help to build up a conclusion toward diagnosis as stated by Liam et al.

Conclusion-

Diagnosis of pleural diseases create due to overlapping cytological and histopathological features of various benign and malignant conditions. However, in developing countries like ours, where investigations and health facilities are inadequate and cost of treatment is often unaffordable, pleural fluid analysis and cytology should continue to be the first line investigation to screen out the pleural effusion cases, as it is convenient, cost-effective and safe investigation. Measurement of ADA level in pleural fluid in combination with the differential count of pleural fluid will give best results to categorize and to rule in the diagnosis of tubercular pleural effusion.

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