ISSN: 0976-3031

International Journal of Recent Scientific Research

Impact factor: 5.114

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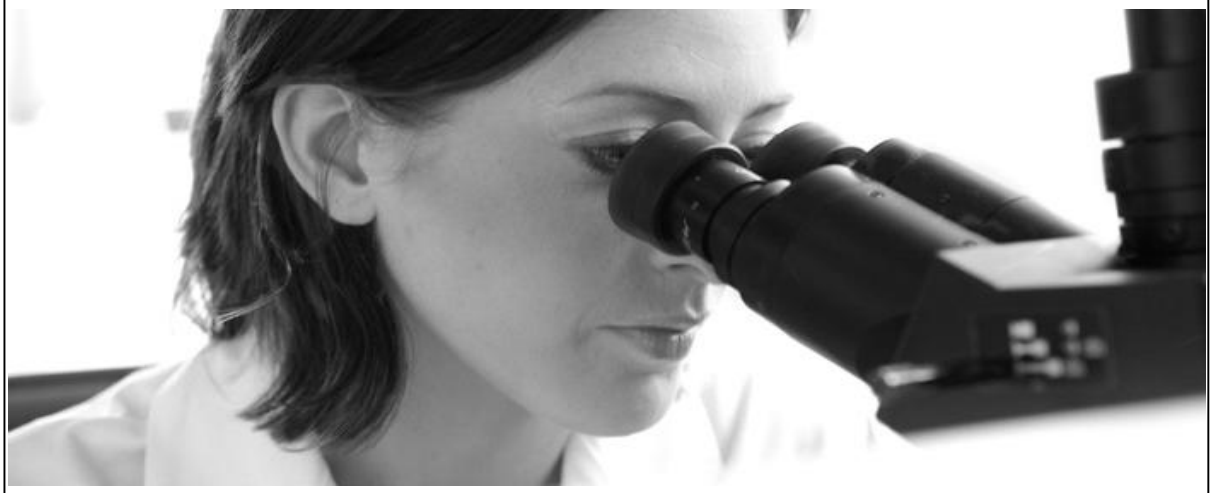

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Volume: 6 Issue: 9

THE PUBLICATION OF
INTERNATIONAL JOURNAL OF RECENT SCIENTIFIC RESEARCH
http://www.recentscientific.com
E-mail: recentscientific@gmail.com

ISSN: 0976-3031

Available Online at http://www.recentscientific.com

International Journal of Recent Scientific Research
Vol. 6, Issue, 9, pp.6522-6524, September, 2015

International Journal of Recent Scientific Research

RESEARCH ARTICLE

ASSESSMENT OF ADENOSINE DEAMINASE IN EXTRA PULMONARY TUBERCULOSIS

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ARTICLE INFO

Article History:

Received 16th June, 2015
Received in revised form 24th July, 2015
Accepted 23rd August, 2015
Published online 28st September, 2015

Key words:

Adenosine deaminase (ADA), extra pulmonary tuberculosis (EPTB), Pleural effusion, peritoneal effusion, Light's criteria.

ABSTRACT

Tuberculosis (TB) is one of the major global health problem responsible for ill health among millions of people each year and ranks as the second leading cause of death from an infectious disease worldwide. It typically affects the lungs (Pulmonary tuberculosis) but can also affect other sides as well (extra pulmonary Tuberculosis). Clinically extra pulmonary tuberculosis varieties are numerous which makes the diagnosis difficult. Adenosine deaminase (ADA) determination can be used as one of the tests to prove serosal tuberculosis. The aim of our study was to assess the role of Adenosine deaminase in extra pulmonary tuberculosis (EPTB) like pleural and peritoneal effusion and also to determine its sensitivity and specificity. In our study 80 cases of effusions were included of which 50 were pleural and 30 peritoneal. Routine and relevant investigations including Adenosine deaminase was estimated in all the patients and classified into exudates (tuberculous) and transudates (non tuberculous) based on Light's criteria. Adenosine deaminase level in tuberculosis pleural effusion ranged from 64-110 IU/L with a mean of 84 $\pm$ 11.8 wheare as in non tuberculous effusion it was 15-40IU/L with a mean of 29 $\pm$ 6.46 ($P < 0.001$ highly significant) In tuberculous peritoneal effusion Adenosine deaminase levels were between 58-112 IU/L with a mean of 88.9 $\pm$ 14.7 where as in non tubreclous group it was 8-26 IU/L with a mean of 17.3 $\pm$ 5.8 ($P < 0.001$ highly significant). The sensitivity and specificity for diagnosing tuberculosis in pleural and peritoneal effusions were 100% with a cut off value of 50 IU/L. Hence it may be concluded that Adenosine deaminase is an excellent marker for early diagnosis of extra pulmonary tuberculosis.

INTRODUCTION

Tuberculosis is one of the major public health problems as 1/3 rd of world's population is estimated to be infected with mycobacterium tuberculosis and new infection occurs at the rate of 1 per second (Global tuberculosis control WHO 2011). According to 2011 WHO statistics 2.2 million tuberculosis cases were from India out of a global incidence of 8.7 million (TB statistics for India 2012). TB usually affects lungs, but EPTB is also not rare of which serosal tuberculosis is one (Pleural and peritoneal effusions). Effusion is a serious inflammation causing accumulation of protein poor fluid in pleural and peritoneal cavities, common etiology being tuberculosis.

Pulmonary TB is diagnosed mainly by presence of Acid fast bacilli (AFB) in sputum. However diagnosis of EPTB requires investigations like pleural fluid biochemistry, cytology and pleural biopsy. As histopathological study of pleura and positivity for AFB is very low and culture is time consuming, ELISA, PCR and interferon are very expensive tests, ADA has been proposed to be an useful surrogate marker for tuberculosis in pleural, pericardial and peritoneal fluids (Mathur *et al* 2006; Stevanovic G *et al* 2011). Studies have confirmed high sensitivity and specificity of ADA for easy diagnosis of EPTB (Mathur *et al* 2006, stevanovic G *et al* 2011; S.S. Haque 2012; Asmita. A *et al* 2014; S.K. Verma *et al* 2008). Taking this into consideration this study was done to evaluate ADA as an early marker in the diagnosis of EPTB.

MATERIALS AND METHODS

This study was carried out on 80 patients suffering from EPTB (pleural and peritoneal effusions) from S.V.R.R.G.G. Hospital, which is a tertiary care hospital attached to S.V. Medical College, Tirupati. After obtaining informed written consent, a detailed clinical history, physical examination and routine investigations like AFB, cytological and biochemical examination, X-ray chest, USG, ECG, Echo and other relevant investigations including pleural & peritoneal fluid ADA were done in all the patients. Diagnosed cases of typhoid, leprosy, infectious mononucleosis, viral hepatitis, HIV, Carcinoma urinary bladder and hematopoietic malignancies were excluded.

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All the effusions were classified as transudates and exudates based on Light's criteria (Light RW 2001) which is the gold standard to differentiate exudative effusions (tuberculous) from transudative effusions (non tuberculous). Patients with TB effusion were considered as study group and non TB effusion as control group. ADA in pleural & peritoneal fluid was measured spectrophotometrically by Giusti and Galanti method (Giusti G *et al* 1984).

RESULTS

Results were expressed as mean ± SD, statistical analysis were studied by using students't' test. A p-value of < 0.05 was considered to be statistically significant. A cut off value of 50 IU/L was used to determine sensitivity and specificity. Totally 80 cases of serosal effusions were evaluated and grouping was done according to Light's criteria as represented in table-1. ADA values in serosal fluid were compared between TB and non-TB groups and the difference in these values was found to be statistically significant (p<0.001) as represented in table -2 The sensitivity and specificity for pleural fluid and peritoneal fluid ADA was 100% with a cut off value of 50IU/L.

Table 1 Distribution of cases according to Light's criteria.

S.No	Group	Tuberculous	Non -Tuberculous
1.	Pleural effusion (n=50)	30	20
2.	Peritoneal effusion (n=30)	15	15

Table 2 Range, mean ± SD of serosal Fluid Type ADA in different groups.

S.No.	Type	Aetiology	Range IU/L	Mean ± SD	P Value
1.	Pleural fluid (n =50)	Tuberculous (n=30)	64 – 110	84 ± 11.8	<0.001
		Non tuberculous (n =20)	15 – 40	29 ± 6.46	
2.	Peritoneal fluid (n=30)	Tuberculous (n=15)	58 – 112	88.9 ± 14.7	<0.001
		Non tuberculous (n=15)	8 – 26	17.3 ± 5.8	

DISCUSSION

Our present study confirms the ADA level in tuberculous serosal effusions was increased when compared to non tuberculous effusions. In India the comment cause of effusion is tuberculosis (TB statistics for India 2012; S.K. Verma *et al* 2008). Among various effusions encountered in clinical practice pleural and peritoneal effusions are common (Mathur *et al* 2006). As the prevalence & incidence of tuberculosis is very high globally (Global tuberculosis control WHO 2011), early diagnosis and treatment of this condition is imperative as it is associated with high morbidity & mortality. Definitive diagnosis of tuberculosis is a difficult task as most of the diagnostic procedures used to establish the pathogenesis are time consuming & also specific diagnostic test PCR is not available at all centres (Asmita. A *et al* 2014).

ADA is considered as an indicator of cell mediated immunity & is found mainly in T-lymphocytes & macrophages which is an essential enzyme in metabolism of purine nucleosides. The selective ADA enzyme increase in tuberculous serosal effusion strongly supports the concept that the study of ADA activity is of great value in the early identification of tubercular aetiology. According to many studies, the cut off level of ADA for the diagnosis of EPTB was 40 IU/L, the sensitivity and specificity was 81-100% and 83-100% respectively.

In our study ADA level in tuberculous pleural effusion ranged from 64-110 IU/L with a mean level of 84± 11.8 where as the non tuberculous group ranged form 15 – 40 IU/L with a mean of 29 ± 6.46 (p< 0.001 highly significant). ADA level in tuberculous peritoneal effusion ranged from 58 – 112 IU/L with a mean of 88.9 ± 14.7 and in non tuberculous peritoneal effusion it was 8-26 IU/L with a mean of 17.3 ± 5.8 (P < 0.001 highly significant) The sensitivity & specificity for diagnosing tubercular effusion was 100% with a cutoff value of 50 IU/L Our observations were in agreement with other studies (Mathur *et al* 2006, stevanovic G *et al* 2011; S.S. Haque 2012; Asmita. A *et al* 2014; S.K. Verma *et al* 2008; Gupta B K *et al* 2010; Laniado- Laborin R 2005). Hence ADA has been reviewed as an excellent marker with high sensitivity and specificity for the diagnosis of both pleural & peritoneal tuberculous effusions.

CONCLUSION

In developing countries like India where the prevalence & incidence of TB is very high and diagnostic facilities are poor, the detection of ADA level in serosal fluids can be considered routinely as it is a simple, inexpensive, highly sensitive & specific test to benefit the patient for early diagnosis of tuberculosis.

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How to cite this article:

Prabhakar Rao P *et al*.2015, Effect and Optimization of Bactericide to Control Biodegradation In non Damaging Drilling Fluid (NDDF). *Int J Recent Sci Res,* 6(9), 6522-6524.

International Journal of Recent Scientific Research

ISSN 0976-3031