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Evaluation of The Use of Ascitic Fluid Adenosine Deaminase Activity in The Diagnosis of Tuberculous Ascites

DR. RADHIKA KRISHNASWAMY	Associate Professor, Department of Biochemistry, St. John's Medical college,,Bangalore-560034 (Karnataka)
Shyam Narayan	Post graduate , Department of Biochemistry, St. John's Medical college,,Bangalore-560034 (Karnataka)
Priyadharshini K	Undergraduate, Department of Biochemistry, St. John's Medical college,,Bangalore-560034 (Karnataka)

ABSTRACT

BACKGROUND : *ADA is found to be a very useful test for early detection of extra pulmonary tuberculosis such as tubercular pleural effusion and tuberculous ascites. The present study was undertaken to evaluate the diagnostic accuracy of a cut off point of 30 U/L of ADA in ascitic fluid for the diagnosis of abdominal tuberculosis by determining the sensitivity and specificity.*

MATERIALS AND METHODS : *The study was carried out on 78 patients suffering from the ascites who were admitted in a tertiary care center in Bangalore. The patients were divided into tubercular ascites and non tubercular ascites group on the basis of detailed clinical history, physical examination, bacteriological tests(AFB),radiological investigation (abdominal scan, USG); ADA was analyzed in both groups.*

ADA analysis was done in ascitic fluid by the colorimetric procedure of GALANTI AND GIUSTI method employing reagents optimized by Kaplan.

RESULT: *In tuberculous ascites group the mean level of ADA was 43.48u/l. In Non tuberculous ascites the mean level is 9.32U/L (p<0.001, strongly significant) The sensitivity and specificity were 86.80% and 97.5% and positive and negative predictive values were of 97% and 88.6% respectively and an accuracy of 92.3 with a cutoff point of 30U/L*

CONCLUSION:- *The present study, shows that ADA with a cut off value of 30U/L is useful biochemical marker and can very well be utilized for the diagnosis of tubercular ascites.*

KEYWORDS : Adenosine Deaminase, Tubercular ascites, Peritoneal tuberculosis

INTRODUCTION

Abdominal tuberculosis is a common disease among socio economically disadvantaged communities in both developed and developing countries[1-8]. Paucity of Mycobacterium tuberculosis in peritoneal fluid makes the diagnosis of abdominal tuberculosis difficult. Peritoneoscopy and peritoneal biopsy which give a presumptive diagnosis of the tuberculosis in 90% of cases, requires trained staff and is also an expensive and risky procedure.[4,5]

Adenosine deaminase activity in ascitic fluid is a rapid, and less invasive test and found to be very useful in the diagnosis of abdominal tuberculosis.[9]ADA is produced by T lymphocytes and is involved in the maturation of T lymphocytes. It is increased in body fluids in lympho proliferative disorders and also in bacterial infections and rheumatologic diseases.. The determination of adenosine deaminase (ADA) activity in fluids including serum, CSF, pleural, peritoneal and pericardial is found to be useful in the diagnosis of tuberculosis . Many studies showed that it is a good surrogate marker for the diagnosis abdominal tuberculosis with good sensitivity and specificity [7, 9-11].

AIMS & OBJECTIVES

To find the diagnostic accuracy of ADA in ascitic fluid with the present cut off point of 30U/L for the diagnosis of Tubercular Ascites by determining the sensitivity and specificity

METHOD

The study was carried out in 78 patients in the age group of 20-60 years, suffering from ascites and admitted in a tertiary care center in Bangalore. Ascitic tap was done on the patients by the physician and sample was send to biochemistry laboratory .ADA was analyzed in the ascitic fluid .

The patients were divided into two groups, Tuberculous group and Non Tuberculous group on the basis of detailed clinical history, physical examination, bacteriological test, radiological examination eg. USG, X-RAY chest, Abdominal Scan and other appropriate investigations.

DETAILS OF SAMPLE COLLECTION:-

Ascitic fluid was obtained by performing ascitic tap on the patients by the physician and sent to biochemistry laboratory and estimation of ADA was done immediately or within 48 hours only after storing it in deep freezer at 20° C.

METHOD OF ANALYSIS

ESTIMATION OF ADA:-

ADA analysis were done by the colorimetric procedure of Guisti and Galanti[11],employing reagents optimized by Kaplan[12].

STATISTICAL METHODS:

Descriptive statistical analysis has been carried out in the present study. Results on continuous measurements are presented on Mean ± SD (Min-Max) and results on categorical measurements are presented in Number (%). Significance is assessed at 5 % level of significance, Student t test (Two tailed, independent) has been used to find the significance of study parameters on continuous scale between two groups and Inter group analysis.

STATISTICAL SOFTWARE:

Diagnostic statistics viz. Sensitivity, Specificity, PPV, NPV and Accuracy have been computed to find the correlation of ADA for diagnosis with tuberculosis patients. Student t test (Two tailed, independent), Sensitivity and Specificity using standard statistical software package. [12,13,14]

RESULT

Study Design: A Comparative study with 38 patients with tuberculous ascites and 40 patients Non-Tuberculous Ascites group was undertaken to study the ADA levels.

Table1,Fig 1 shows that tuberculous ascites was more in the age group of 20 to30 years

Table2,Fig 2 shows a male predominance in both tuberculous and Non tuberculous ascites .

Table 3 Fig3 –shows the percentage of people with ADA levels less than 30 u/l and more than 30 u/l in both tuberculous and non tuberculous group

Table 4-Components of diagnostic accuracy with a cut off value of 30 IU/L

Table 5,,Fig 4-Shows Mean ADA level in Tuberculous ascites and Non Tuberculous ascites groups.

Table 6: Diagnostic statistics of ADA for predicting the Tuberculosis at various cutoffs

Age in years	Tuberculous Ascites		Non-TuberculousAscites	
	No	%	No	%
20-30	16	42.1	9	22.5
31-40	9	23.7	5	12.5
41-50	4	10.5	9	22.5
51-60	9	23.7	17	42.5
Total	38	100.0	40	100.0
Mean ± SD	37.32±14.20		45.05±13.53	

Table 1: Age distribution of patients studied Age distribution is statistically significant in two groups with p=0.016*

Gender	Tuberculous Ascites		Non-Tuberculous Ascites	
	No	%	No	%
Male	23	60.5	25	62.5
Female	15	39.5	15	37.5
Total	38	100.0	40	100.0

Table 2: Gender distribution of patients studied Samples are gender matched P=0.858

ADA u/l	Tuberculous Ascites (n=38)		Non-TuberculousAscites (n=40)	
	No	%	No	%
<30.0	5	13.2	39	97.5
>30.0	33	86.8	1	2.5
Total	38	100.0	40	100.0
Inference	ADA levels significantly elevated in TB Ascites when compared to Non-TB Ascites c^2=56.376; P<0.001** with Seinstivity and Specificity of ADA for TB Ascites were 86.8% and 97.5%			

Table 3:Percentage of people in both tubercular and non tubercular group with ADA levels <30.0 or>30.0 U/L

Sensitivity-86.8%
Specificity -97.5%
PPV-97.1% (Positive Predictive value)
NPV-88.6%(Negative Predictive value)
Accuracy- 92.3%

Table 4- Components of diagnostic accuracy with a cut off value of 30 IU/L

ADA u/l	TuberculousAscites (n=38)	Non-Tuberculous Ascites (n=40)
Min-Max	6.40-75.80	1.20-46.00
Mean	43.48±15.39	9.32±8.43
Inference	Mean levels of ADA is significantly elevated with 43.48 u/l in Tuberculosis Ascites when compared to Non-Tuberculosis Ascites (9.32 u/l) t=12.237;P<0.001** .	

Table 5: Mean levels of ADA levels in two groups of patients studied

ADA	Sensitivity	Specificity	PPV	NPV	Accuracy
>30 U/L	86.84	97.50	97.06	88.64	92.31
>33 U/L	86.84	97.50	97.06	88.64	92.31
>40 U/L	73.68	97.50	96.55	79.59	85.90

Table 6: Diagnostic statistics of ADA for predicting the Tuberculosis at various cutoffs

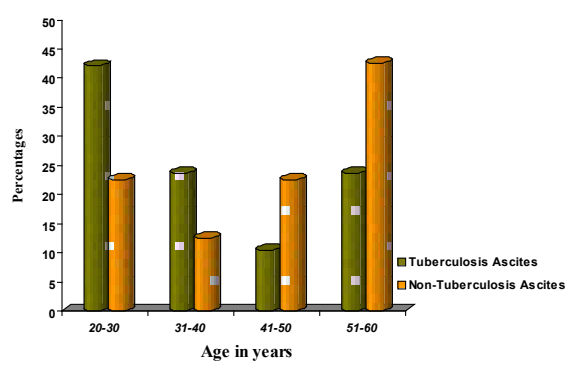

Fig-1 Age distribution of patients studied

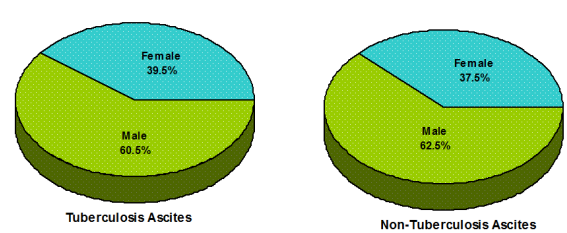

Fig-2 Gender distribution of patients studied

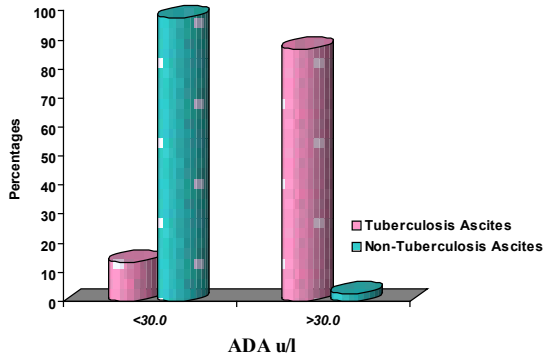

Fig3- Percentage of people in both tuberculous and non tuberculous group with ADA levels <30.0 or>30.0

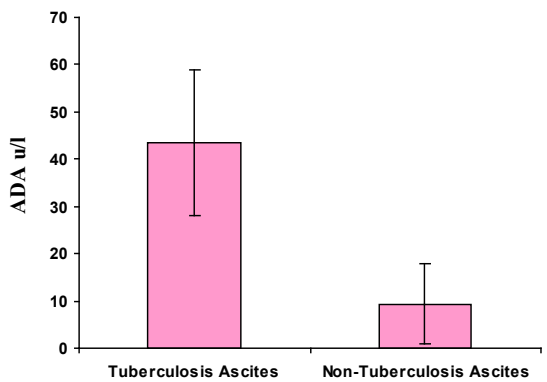

Fig-4 Mean levels of ADA levels in two groups of patients studied

DISCUSSION

In the present study ADA level in tuberculous ascites ranged from 6.40 to 75.80U/L with a mean level of 43.48U/L while in Non tuberculous ascites it ranged from 1.20 to 46.0U/L with mean level of 9.32U/L ($p<0.001$, strongly significant, Table 5. Increased ADA can be explained by its involvement in the proliferation and differentiation of lymphocytes, especially T lymphocyte with the release of ADA when stimulated in the presence of live intracellular microorganism[17]. Similar results were found in a research done by Dwivedi M. who studied the ADA level in 48 subjects with ascites and found mean ADA level of 98.8U/L with a cut off point >33U/L in 19 subjects with ascites of tubercular etiology with [18] the sensitivity, specificity , positive and negative predictive values were 100%, 96.9%, 95% and 100% respectively. Gupta V.K studied 24 ascites cases of whom seven cases were due to tubercular etiology with an ADA level of >30U/L and sensitivity and specificity of 100% and 94.1% respectively[19]. Similar study was carried out by Burgess L.J. which showed ADA activity in tuberculous effusion was higher than in any other diagnostic group with the sensitivity and specificity of 90% and 89% respectively.(20)

From this study it has been clearly shown that ADA levels are significantly high in tuberculous against non tuberculous cases. This test has 86.8 % sensitivity and 97.5 % specificity for diagnosing tubercular etiology with positive and negative predictive values of 97% and 88.6% respectively. It has accuracy of 92.3 %. Increasing the cut off level to 33 U/L does not affect the sensitivity and specificity of the present study. Increasing the cut off to 40U/L decreases the sensitivity and not he specificity. So it can be concluded that present cut off point of 30U/L of ADA in ascitic fluid/peritoneal fluid can very well be utilized for the diagnosis of tubercular ascites.

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