



# Comparison between CSF Lactate dehydrogenase and CSF Transaminases as better discriminatory marker in meningitis

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## ABSTRACT:

**Introduction :** Sudden in onset infections of the nervous system are among the most important public health problems and early recognition, efficient decision-making, and rapid institution of therapy can be lifesaving .

**Aim and Objectives:** To estimate and compare CSF Lactate dehydrogenase (CSF LDH) and CSF Transaminases (CSF GOT, GPT) as discriminatory marker in meningitis. **Material and methods:** The present study was carried out on 40 patients out of that 32 suffered from pyogenic meningitis and 8 suffered from tuberculous meningitis of meningitis termed as cases and 20 controls from paediatric age group over the period of 2 years. All the CSF specimens obtained by lumbar puncture were subjected to 'Calorimetric method' for estimation of CSF GOT, GPT and CSF LDH. **Results:** The majority of the patients with meningitis were children i.e. below the age group of 5 years (77.5%). The levels of CSF GOT, GPT and LDH were found to be significantly increased in pyogenic and tuberculous meningitis as compared to controls. These investigations helps the clinician for diagnosing meningitis in addition to the routine investigations. **Conclusions:** Among the different enzyme levels studied, compared to CSF GPT, specifically CSF GOT and LDH were significantly increased in pyogenic meningitis as compared to tuberculous meningitis.

**Key-words:** Transaminases, Lactate dehydrogenase.

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## I. Introduction :

Sudden in onset infections of the nervous system are among the most important public health problems and early recognition, efficient decision-making, and rapid institution of therapy can be lifesaving, these various types of clinical syndromes include bacterial meningitis, viral meningitis, encephalitis, focal infections such as brain abscess and subdural empyema, and infectious thrombophlebitis, etc. Each may present with a nonspecific prodrome of fever and headache, which in a previously healthy individual may mimic be benign nature of disease, until (with the exception of viral meningitis) altered consciousness, focal neurologic signs, or seizures develop<sup>1, 15,16</sup>.

Microbial invasion of the CNS gives rise to Meningitis, is the most common and its neurological sequelae are serious and rather common among survivors<sup>[2], 15,16</sup>. It is one of the serious infectious diseases Section and more common in developing countries than developed countries. So, early diagnosis and treatment remains a challenge to the clinician<sup>2</sup> The culture of CSF which gives growth of distinctive organism giving diagnosis and most importantly the antibiotic sensitivity pattern of the infecting organism, takes longer time. More over CSF culture for pyogenic organisms are positive only in the range of 30% to 60%<sup>[3], 15,16</sup>.

Though the CSF examination gives reliable tests but as it is time consuming may not be suitable to diagnose patients to initiate the prompt treatment based upon the then cause, Many enzymes are present in the nervous system and Meningitis damages the blood brain barrier (BBB) and causes leakage of the enzymes in the CSF, and hence various investigators like AP Aggarwal et al.,<sup>[4]</sup>, MK Jain et al.,<sup>[5]</sup>, PR Donald et al.,<sup>[6]</sup>, have used them for the purpose of diagnosis and determining the prognosis in the patients of meningitis.

Outcomes in the patients i.e. mortality is directly related to the Delayed initiation of the treatment. A late or missed diagnosis of tubercular meningitis can have gravies consequences and diagnosis is far from easy.<sup>7</sup>

Being biological fluid CSF is associated with biochemical changes in neurological disorders and enzymatic changes in Glutamic oxaloacetate transaminase (GOT), Glutamic pyruvate transaminase (GPT) and Lactate dehydrogenase (LDH) which are liberated into CSF whenever there is either destruction of neurons or any serious impairment of physiological function. As these enzymes in CSF are not utilised for any of functions of brain, hence their existence in CSF indicates leakage from the neuronal cells.<sup>8, 15,16</sup>

However, the role of various CSF enzymes needs to be evaluated as not enough work has been carried out and majority of workers have estimated one of these enzymes either in CSF or serum.

## II. Aim and Objectives

1. To estimate the levels of CSF Lactate dehydrogenase and CSF Transaminases in meningitis
2. To compare discriminatory marker between these two in meningitis

## III. Material and methods

This was a cross-sectional study based on the biochemical analysis of CSF obtained by lumbar puncture from paediatric ward meningitis patients. The CSF samples were taken from patients admitted in Government Medical College and Hospital, Aurangabad from June 1999 to June 2001 over a period of 2 years. It was carried out on 40 patients of meningitis and 20 controls from paediatric age group. The clinical symptoms in acute meningitis include fever, malaise, vomiting, and in some cases, petechial rashes. Among younger children's the signs of meningeal irritation are rare including neck stiffness, Kernig's sign and Brudzinski's sign. Moreover, an inability to feed, vomiting, drowsiness, and convulsions was observed in small children.<sup>9</sup>

Common tools were used for the diagnosis of meningitis. It was made on the basis of clinical findings, microscopic examination of CSF, biochemical examination of CSF, culture studies and radiological studies. A total of 20 patients whose final diagnosis was primarily non neurological for example respiratory tract infections, gastroenteritis, septicemia etc. were selected as controls. A separate consent form has been filled for each case including the demographic and clinical features as well as the laboratory results of the patients. Statistical analysis was performed using standard statistical software (SPSS version 16.0). All data are expressed as mean  $\pm$  S.D. The data were also tested using student's t-tests; the significance level was set up at 95% CI and  $p < 0.05$ .

Forty patients of meningitis included 32 suffering from pyogenic meningitis and 8 suffering from tuberculous meningitis. CSF samples from patients suffering from pyogenic meningitis (32), tuberculous meningitis (8) and control subjects (20) were examined. All the CSF specimens were subjected to 'Calorimetric method' for estimation of CSF GOT, GPT and CSF LDH.<sup>10</sup>

## IV. Results and Observations:

**Table 01: Table showing distribution of cases and controls.**

Group	Type of Study Subject	Cases
I	Controls	20
II	Cases –Meningitis (Total=40)	
	Pyogenic meningitis	32
	Tuberculous meningitis	08

The majority of the patients were of Pyogenic meningitis i.e. 32 cases and Tubercular were 8.

**Table 02: Age-wise distribution of all study subjects**

Age intervals	Controls	Cases
0-11 month	2(10%)	14(35%)
1-4 yrs.	8(40%)	17(42.5%)
5-9 yrs.	4(20%)	4(10%)
10-12 yrs.	6(30%)	5(12.5%)
Total	20(100%)	40(100%)

In the present study, among the controls chosen, male to female ratio was 1.5:1 and majority of the children were in the age group of 1-4 yrs (40%). While, among the cases with meningitis, 75% were males and 25% were females. Majority of the children were below the age group of 5 yr (77.5%).

**Table 03: Age wise distribution of All Meningitis cases**

Age intervals	Meningitis cases (Total=40)	
	Pyogenic Meningitis	Tuberculous Meningitis
0-11 month	13(40.62%)	1(12.5%)

*Comparison between CSF Lactate dehydrogenase and CSF Transaminases as better ..*

1-4 yrs.	13(40.62%)	04 (50.0%)
5-9 yrs.	3(9.37%)	1(12.5%)
10-12 yrs.	3(9.37%)	2(25.0%)
Total	32(100%)	8(100.0%)

The majority of the patients in Pyogenic meningitis were 0-11 months and 1-4 Yrs. Were 40.62%. In tuberculous meningitis were 1-4 yrs. were 50.0% , 10-12 yrs. were 25.0%.

**Table 04: Comparison of CSF biochemical parameters (GOT, GPT, LDH) in meningitis cases and controls**

Parameters	Controls (n=20)	Meningitis Cases (n=40)	Pyogenic Meningitis (n=32)	Tuberculous Meningitis (n=8)
<b>CSF GOT (IU/L)</b>				
Range	7-11	9-24	9-24	9-19
Mean ± S.D.	9.1±1.88	15.8±3.46	16.43±3.22	13.25±3.41
<b>CSF GPT (IU/L)</b>				
Range	5-11	7-24	7-24	7-17
Mean ± S.D.	7.3±1.97	13.05±3.44	13.25±3.5	12.12±3.22
<b>CSF LDH (IU/L)</b>				
Range	5-44	49-180	50-180	49-119
Mean ± S.D.	26.85±10.79	87.42±28	91.84±27.91	69.75±21.76

**Table 05: Table showing comparison between Group I and II**

Biochemical Enzymes	Parameters	Group I (Controls)	Group II (Cases)	't'-value	'P'-value
CSF GOT (IU/L)	Mean	9.1	15.8	8.07	<0.05
	S. D.	1.88	3.46		
CSF GPT (IU/L)	Mean	7.3	13.05	7.61	<0.05
	S. D.	1.97	3.44		
CSF LDH (IU/L)	Mean	26.85	87.42	9.3	<0.05
	S. D.	10.79	28.0		

From above table it is clear that there is increase in mean CSF GOT value, mean CSF GPT value and mean CSF LDH value in group II than group I and this increase is statistically significant (P<0.05)

**Table 06: Table showing comparison between Group III and IV**

Biochemical Enzymes	Parameters	Group III (Pyogenic Meningitis) N=32	Group IV (Tuberculous Meningitis)	't'-value	'P'-value
CSF GOT (IU/L)	Mean	16.43	13.25	2.46	<0.05
	S. D.	3.22	3.41		
CSF GPT (IU/L)	Mean	13.25	12.12	0.84	>0.05
	S. D.	3.5	3.22		
CSF LDH (IU/L)	Mean	91.84	69.75	2.07	<0.05
	S. D.	27.91	21.76		

Above Table No. 6 shows increase in mean CSF GOT value, mean CSF LDH value in group III than group IV. The increase is statistically significant (P<0.05). While, increase in mean CSF GPT value in group III than group IV is statistically insignificant (P>0.05).

### V. Discussion:

The majority of cases of meningitis can often be diagnosed with clinical examination. There remains a definite group of patients in whom the initial diagnosis is often in doubt because of overlapping symptoms and signs. To reduce the mortality and morbidity of meningitis a prompt and precise diagnosis is essential at its early stage, as any delay in the diagnosis and the treatment can be catastrophic.

In our study we have seen that The majority of the patients were of Pyogenic meningitis i.e. 32 cases and Tubercular were 8 .

In the present study, among the controls choosen, male to female ratio was 1.5:1 and majority of the children were in the age group of 1-4 yrs (40%). While, among the cases with meningitis, 75% were males and 25% were females. Majority of the children were below the age group of 5 yr (77.5%).

The majority of the patients in Pyogenic meningitis were 0-11 months and 1-4 Yrs. Were 40.62%. In tuberculous meningitis were 1-4 yrs. were 50.0% , 10-12 yrs. were 25.0% there is increase in mean CSF GOT value, mean CSF GPT value and mean CSF LDH value in group II than group I and this increase is statistically significant (P<0.05), increase in mean CSF GOT value, mean CSF LDH value in group III than group IV. The

increase is statistically significant ( $P < 0.05$ ). While, increase in mean CSF GPT value in group III than group IV is statistically insignificant ( $P > 0.05$ ).

These studies are similar to Srivastava G. et al<sup>11</sup>, the rise in enzymatic content may be due to the increased cellular content of CSF since leucocytes have a high endogenous enzymatic content. It is likely that the transaminases might have been released into the CSF from the cells of the affected brain tissue following the inflammatory process and thus high level of transaminases in the CSF may reflect a greater brain damage. In a laboratory measures of prognosis the CSF GOT value probably represented a more specific but less sensitive measure when compared with the CSF glucose or CSF protein level. In acute purulent meningitis the elevated CSF GOT activity may be attributed to changes in CSF blood brain barrier, damage to brain tissue or to presence of white blood cells (WBCs) or bacteria or to a combination of these factors.<sup>12</sup>, Shirole D.B. et al.<sup>13</sup> (1974) in their study estimated enzymes by colorimetric method of Reitman and Frankel and observed that, CSF GOT levels were found significantly raised in patients suffering from pyogenic meningitis while, in tuberculous meningitis levels were not significantly raised. Praharaj S.C. et al.<sup>14</sup> (1979) found that the levels of mean CSF GOT were significantly raised in pyogenic meningitis than in tuberculous meningitis.

## VI. Summary and conclusions :

The levels of CSF GOT, GPT and LDH were estimated in 40 patients and 20 controls of both sexes in 2 mths to 12 years of age who were suffering from meningitis. These were found to be significantly increased in pyogenic and tuberculous meningitis as compared to controls. Among these specifically CSF GOT and LDH were significantly increased in pyogenic meningitis as compared to tuberculous meningitis. Thus, we have concluded that CSF GOT, GPT and LDH help the clinician for diagnosing meningitis in addition to the routine investigations. Further CSF GOT and LDH may help in the differentiation between pyogenic and tuberculous meningitis.

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