

“CSF-CPK Level as an Prognostic and Diagnostic Indicator in Cases of Meningitis”

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I. Introduction

Meningitis is inflammation of the meninges that cover the brain and spinal cord. The morbidity and mortality associated with meningitis can be avoided if early diagnosis and specific therapy is initiated. Depending on the etiology meningitis can be either bacterial(pyogenic , tubercular , or rickettsial) , viral or aseptic .Depending on the duration of illness it can be classified as acute , subacute or chronic.

Various components of csf like protein , sugar , ada , ldh ,cells and type of cells are used to diagnose meningitis and degree to which they are elevated helps in differentiating different types of meningitis. Other enzymes like gamma glutamyl trans peptidase(GGTP), CSF interleukin 1 β , tumour necrosis factor and free radicals are also elevated in relation to clinical outcome in meningitis.

Various other tests like elisa and pcr are done in order to determine the etiology. But do not carry prognostic significance. In our present study , we determine the diagnostic and prognostic implications of using csfcpk in various meningitis.

II. Objectives

1. To determine the diagnostic and prognostic significance of csfcpk in meningitis
2. To evaluate for different elevated levels in different types of meningitis.

III. Methodology

All patients of meningitis were taken into the study who had come to our hospital at ssims&rc. The study was conducted for a period of 2 years.

Inclusion criteria:

1. Patients diagnosed as having meningitis.
2. Patients of both sex.

Exclusion criteria:

1. Sepsis with toxemia.
2. Intracranial abscess.
3. Subarachnoid hemorrhage.

Control Group:

CSF for control study was collected from neurologically asymptomatic individuals with nocardiac ,skeletal muscle, liver and hematological disorders. Both serum and csf cpk levels were analysed at the same time in this control group.

Lumbar Puncture:

Lumbar Puncture was performed under all aseptic precautions. CSF was collected in 3 sterile vials, for biochemical analysis , cytological study and CPK enzyme.

In all the cases samples were collected for CSF analysis and serum CPK enzyme before starting any treatment.

IV. Results

In the control groups the means CSF- CPK value was 119 u/L with a range from 84 u/L to 161 u/L. similarly the mean serum CPK value was 110.0u/L with a range from 70 to 154 u/L.

In the study group of 50 cases the pyogenic and tuberculus meningitis were 15 and 24 cases respectively, as compared to 11 cases of viral meningitis. Majority of patients were middle aged and Male: Female ratio of 5:3

Table – 1 showing number of cases of meningitis in Males and Females and number of deaths

Clinical Diagnosis	No. of cases	Male	Female	No. of Death
Pyogenic	15	14	1	6
Tuberculosis	24	11	13	5
Viral	11	7	4	0

Table -2 showing comparative values of CSF and serum CPK levels in meningitis.

Clinical Diagnosis	No. of cases	CSF-CPK (Avg. units/It)	CPK (Avg) units/iT
Pyogenic meningitis	15	640	260
Tuberculosis meningitis	24	450	190
Viral meningitis	11	409	125

More elevation of CSF – CPK was seen in pyogenic meningitis, when compared tuberculosis meningitis^{5,6}

Table-3 Relation between CSF- CPK and levels of consciousness.

Study Group	No. of cases	Mean CSF- CPK
Conscious	36	440
Unconscious	14	647

14 patients with meningitis were unconsciousness at time of admission with elevated CSF- CPK of 647u/l. and 36 cases didn't lose consciousness with csfcpk448 u/l⁵.

CPK In Relation To Mortality:

Eleven cases of meningitis died (25%). CSF CPK was found to have a definite relationship with the prognosis as compared to serum cpk in these cases.

Table-4 Statistical difference between the expired and survived cases of meningitis.(Prognostic significance)

Range of CSF-CPK(u/L)	No. of cases	No. of Death	Percentage
Less than 600	39	4	10
More than 600	11	7	63

11 of them had CSF- CPK values more than 600u/l, and 7 cases died .

The mortality rate is 63%. 39 of them had CSF-CPK values less than 600 u/Lout of which 4 died. Mortality rate on this group is 10% . The above findings signify a direct relationship with the CSF-CPK level and mortality⁵ .

V. Discussion

Creatinine phosphokinase(CPK), an enzyme involved in the phosphorylation of the creatinine with ATP from ADP and creatinine phosphate is markedly elevated in meningitis of varied etiology. CPK elevation is found in the CSF than serum studies conducted in different parts of the world shows a high level of CSF CPK in cases of meningitis and has both diagnostic and prognostic significance.^{4,5,6}

Other enzymes like gamma glutamyl trans peptidase(GGTP), Lactic dehydrogenase(LDH) and adenosine deaminase(ADA) CSF interleukin 1β, tumour necrosis factor and free radicals are also elevated in relation to clinical outcome in meningitis.

In pyogenic meningitis CSF-CPK was elevated in 14 cases out of 15 (91.6%) with an average of 640u/l. in tuberculous meningitis CSF-CPK was elevated in 21 cases out of 24 cases of TBM (85%) with an average of 450u/l. The above findings of our study are in agreement with pasaoglu. A et al, from the department of erciyes university medical school turkey.⁸In viral meningitis out of 11 cases, 8 cases showed elevated CSF-CPK above400u/l.

In pyogenic meningitis patients 6 out of 15 cases had CSF-CPK markedly elevated and had expired . 5 patients expired out of 24 cases expired in TB meningitis group. CSF-CPK level was noted to be more than 600 u/l in 3 patients out the 5 that expired. Mortality rate was 63 % in patients with CSF CPK levels more than 600u/l and 10 % in patients with less than 600u/l . This finding in our study determines that elevated levels of CSF CPK are associated with poor prognosis. Therefore the CSF CPK levels can be used as a reliable prognostic marker in meningitis.

In our present study it was noted that csfcpk levels were elevated in all cases of meningitis. Based on the extent of elevation of csfcpk levels differentiation between different types of meningitis was possible. As it was observed that csfcpk levels were elevated much higher in bacterial meningitis compared to tubercular and viral. And tubercular had higher levels of csfcpk levels compared to viral. Mehrotra et al⁵ ,Roger et al¹⁰ and Nussinatch et al⁶ showed similar finding as our study . Nussinatch M showed that CSF-CPK was more elevated in pyogenic meningitis than in aseptic meningitis. Pancewicz S.A et al explained the elevated csfcpk

levels by noting that, CSF-CPK was increased in cases with pleocytosis in CSF which is more elevated in pyogenic meningitis than in TBM and viral meningitis⁷.

As CSF- CPK is more elevated in pyogenic, than in TBM and meningitis, CSF-CPK is a useful tool to differentiate between pyogenic meningitis and TBM, and between TBM and viral meningitis, especially if the CSF cell type and cell count are confusing and it is difficult to arrive at a diagnosis, like in case of partially treated pyogenic meningitis CSF findings may mimic that of TBM in such case CSF-CPK will be a useful tool to differentiate.

The levels of csfcpk also correlated well with the level of consciousness and the mortality , as it was observed that higher levels of csfcpk levels were associated with poorer prognosis and decreased level of consciousness. As compared to csfcpk levels , serum cpk levels had poor correlation with degree of consciousness and prognosis and was not helpful in determining the type of meningitis in our present study. In most of these patients serum cpk was determined at the same time as the csfcpk after a lumbar puncture. It was determined both from the patients and the controls and found that there was no significant or no elevation in serum cpk levels as compare to csf levels in patients. Similar picture of no correlation between serum cpk levels and clinical state of the patient as compared to csfcpk which bears a significant correlation was also observed in study conducted by mahrotra et al.⁵ Mahrotra et al also showed a significant correlation of level of consciousness with levels of csfcpk similar to our study i.e higher levels of csfcpk were observed in patients with decreased level of consciousness and unconscious compare to preserved consciousness. Among the 50 cases 11 cases had expired all of which were among the unconscious group with high levels of cpk. Pasaoglu A in his study found out that CSF-CPK was a sensitive index of acute brain damage and that it reflected the extent of CNS tissue disruption⁸.

VI. Conclusion

CSF- CPK in cases of pyogenic meningitis were significantly elevated compared with tuberculous meningitis and had a definite relationship with the mortality with 10% in whom values were less than 600 units /L as compared to 70% in patients having values more than 600u/L. It was observed that CSF CPK levels had definite correlation with level of consciousness as high csf cpk levels were seen in unconscious and semiconscious compared to conscious patients.

Hence forth CSF-CPK can be used to know type of meningitis (Acute bacterial v/s chronic), to assess the degree of brain damage and for prognostication. And also has a direct relationship with the level of consciousness of the time of admission and mortality.

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