CSF analysis in a patient with meningitis with special reference to LDH

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ABSTRACT
Acute infections of the nervous system are among the hugest issues in the medicine considering the way that early affirmation, gainful dynamic and speedy association of the treatment can be lifesaving. Standard routine assessment of CSF in meningitis doesn’t commonly give speedy definitive information without a doubt. Therefore there was need for additional tests. The present study conducted in Department of Medicine. The study included clinical appraisal and CSF assessment of 65 occurrences of meningitis. Lumbar cut was done in each consistent case and CSF was assembled in sterile containers. In majority cases of meningitis sugar less than two third of blood sugars, and majority of TBM cases had sugar level between 40-60 mg%. Higher cell count was seen in pyogenic meningitis cases. In context to LDH levels among the different types of meningitis, significant increased CSF LDH levels was observed in TBM and PM as compared to VM and CM but no noteworthy distinction between TBM and PM. Overall conclusion of study was that estimation of CSF LDH levels is not only supplementary aid but diagnostic and differentiating aid for meningitis.

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INTRODUCTION
Acute infections of nervous system were the hugest issues in the medicine considering the way that early affirmation, gainful dynamic and brisk association of the treatment can be lifesaving (Dey et al., 2016). Acute tainting of the central tangible framework is the most generally perceived purpose behind fever related with signs and symptoms of central tactile framework disease. Most common infection of the CNS are meningitis and encephalitis. Meningitis is an acute infection within the subarachnoid space. It is associated with a CNS inflammatory reaction that result in decreased consciousness, seizures, raise intracranial pressure and stroke. Encephalitis indicates brain parenchymal involvement. Because these anatomic boundaries are often not distinct and should be considered to have meningoencephalitis (Quaglia et al., 2013). Infection within central nervous system does not differ dramatically from the infection process in other tissues. However the aspect of repair following acute inflammation and infection is pathophysiologic, because repair is mostly by connective tissue replacement with scar formation. Neuronal loss obviously becomes magnified into functional loss of the body parts innervated or controlled by that part of spinal cord that has become infected. Moderate or genuine squeal occur in ~25% of survivors, despite the way that the particular rate contrasts with the debasing living thing. Ordinary squeal fuse decreased insightful limit, memory shortcoming, seizures, hearing hardship and drunkenness, and step aggravations (Dey et al., 2016). Therefore it is imperative to recognize CNS infections early.
and to treat them promptly and aggressively. Such approaches have markedly reduced both mortality and long term sequel in meningitis.

Meningitis is an extreme disturbance of the meninges covering brain and spinal line. The exacerbation may be achieved by malady with contaminations, tiny creatures, or various microorganisms, and less usually by certain non-overwhelming conditions. In 2013 meningitis resulted in 303,000 deaths – down from 464,000 deaths in 1990 (Abubakar et al., 2013). TB is the seventh driving explanation behind death and impediment around the globe. In 1997, TBM was the fifth most essential kind of extra pulmonary TB. TBM spoke to 5.2% of all occasions of just extra pulmonary contamination and 0.7% of each uncovered case of TB. Central Nervous System tuberculosis is most serious complication in children, and is uniformly fatal without effective treatment. Approximately 10% cases of tuberculosis have CNS involvement (Murthy, 2012).

Meningitis disturbs the blood brain barrier and is expected to cause rise in the enzymatic activity. Thusly, various examiners have driven investigates on various impetus levels in CSF for finding similarly concerning choosing the speculation in occurrences of meningitis. Various studies have described the clinical significance of CSF Lactate Dehydrogenase levels. Levels are high in pyogenic meningitis and tubercular meningitis as compared to viral meningitis (Friedman, 2000; Nand et al., 1993). In study we had plan to attempt to explain the relationship and usefulness of LDH enzyme, glucose and proteins levels in CSF in diagnosing and types of meningitis and the prognosis of the patients with meningitis.

MATERIALS AND METHODS

The present study conducted in Department of Medicine. Ethical clearance was obtained by the ethical clearance committee of the institution.

The study included clinical evaluation and CSF analysis of 65 cases of meningitis admitted to Medicine wards during the period of November 2013 to June 2015.

Selection of cases

Those cases admitted with fever, vomiting, headache, altered sensorium, with or without convulsion in the age group of 15 years and above were examined in detail for any clinical evidence of meningitis. Clinically away from of meningitis were indiscriminately picked and submitted for ordered history and careful physical evaluation. After point by point clinical and fundus appraisal, blood was drawn for estimation of glucose. In stable cases Lumbar cut was performed speedily, in cleared out cases and cases with verification of raised intracranial weight lumbar cut was postponed till the patient is offset. During Lumbar puncture pressure was assessed and macroscopic appearance of fluid was noted. Altogether 5-6 ml of CSF collected in 5 to 6 clean sterile bottles, depending upon investigations needed to order. One bottle each was sent for

1. Culture and sensitivity.
2. Gram and ZN stain;
3. Biochemistry for sugar, proteins and LDH;
4. Cell cytology; and
5. Special investigations (ADA, Indian Ink, etc).

Those cases of traumatic tap were excluded from the study.

Analysis of CSF

All the models were immediately taken for assessment. Biochemical assessment for protein, sugar and LDH was done in part of normal science using standard techniques.

Other Investigations

In all cases routine urine and blood examination were done. Complete Blood Count, Differential Leucocyte Count, ESR, Renal Function Tests, Chest Xray, Urine routine/microscopy were done. Peripheral smear was studied in all cases with attention for evidence of acute infection like band cell count and toxic granules in the neutrophils. Blood sugar estimation was done to compare with CSF sugar. Other serum biochemical studies like calcium, phosphorus, liver function tests done whenever indicated. Blood culture was done in most of the cases of pyogenic and aseptic meningitis patients. CT scan or MRI scan of brain done which ever was suitable. Sputum was examined for AFB in all possible cases.

RESULTS AND DISCUSSION

Diagnosis of patients studied

Total 65 cases were studied among which 27 (41.54%) were tubercular meningitis, 20 (30.77%) cases were pyogenic meningitis, 13 (20%) cases were viral meningitis and 5 (7.69%) cases were cryptococcal meningitis.

Age distribution

Majority 24.61% of patients were in age group of 31-40 years of age followed by 18.46% in age group of 41-50 years.
Gender distribution
Among full 65 cases 33 (50.77%) were folks and 32 (49.23%) were females. Male force was seen in TBM assembling however pyogenic and viral meningitis bundles showed female amazing quality and sex extent was for all intents and purposes equal in cryptococcal meningitis gathering.

CSF analysis in different types of meningitis
In TBM group the mean total cell count was 230.67±261.23 cells/cu.mm, mean polymorphs percentages were 12.59±15.15%, mean lymphocytes percentages were 83.70±22.42%, the mean proteins were 222.62±131.88 mg/dL and the mean sugar was 42.37±27.32 mg/dL. In pyogenic meningitis group the mean total cell count was 867.00±155.56 cells/cu.mm, mean polymorphs percentages were 65.70±24.79%, mean lymphocytes percentages were 34.30±24.79%, mean protein were 183.85±156.92 mg/dL and mean sugar was 57.00±32.14 mg/dL. In viral meningitis group the mean total cell count was 113.12±97.85 cells/cu.mm, mean polymorphs percentages were 28.07±12.17%, mean lymphocytes percentages were 64.23±21.19%, mean proteins were 80.76±74.35 mg/dL and mean sugar was 74.07±27.57 mg/dL. In cryptococcal meningitis group the mean total cell count was 22.00±13.51 cells/cu.mm, mean polymorphs percentages were 6.00±8.94%, mean lymphocytes percentages were 74.00±42.19%, mean proteins were 127.80±18.57 mg/dL and mean sugar was 31.61±15.14 mg/dL. P value is significant.

Levels of LDH in different meningitis
Mean LDH levels in tubercular, pyogenic, viral and cryptococcal meningitis were 101.77±34.79 IU/L, 133.95±32.32 IU/L, 31.84±13.78 IU/L and 25.40±5.81 IU/L, respectively. The mean value of LDH of total 65 cases was 91.18±32.14 IU/L.

Meningitis is one of the most common causes of mortality and morbidity in patients of all age groups worldwide. Neurological outcome and survival depend largely upon the extent of damage done to central nervous system prior to effective treatment. Sometimes prompt diagnosis in meningitis is difficult due to wide spectrum of signs and symptoms. It is typical practice to start against microbials before the all out examination place results are open. Such outwardly disabled cures are generally in sub-supportive doses for meningitis. Huge bit of patients who offered an explanation to facility, along these lines, have quite recently been treated with lacking segment of hostile to contamination operators and present atypical features in CSF. It was difficult to compare one study with other, in context to CSF LDH in various meningitis. Every study had different age group distribution, as studies were conducted mainly in paediatric age group, and different exclusion criteria. And also the levels of CSF LDH vary among different laboratories due to variation in the standardization of apparatus and reagents used. In our study the mean values of CSF LDH levels in tubercular, pyogenic, viral and cryptococcal meningitis were 101.77±34.79 IU/L, 133.95±32.32 IU/L, 31.84±13.78 IU/L and 25.40±5.81 IU/L, respectively. CSF LDH levels increased in PM and TBM groups as compared to VM group and also more in PM group, in our study and it is correlated well with various studies done in past. Jain et al (Jain et al., 1991) and Gupta et al (Gupta et al., 1982) found a linear relationship between rise in LDH levels and cell count. In this present study we found the results consistent with these studies. When compared among the different types of meningitis, increase in CSF LDH levels was observed in TBM and PM as compared to VM but no noteworthy distinction between TBM and PM as they had overlapping results. The examination results are according to the revelations of Wroblewski et al (Wroblewski et al., 1958), Khanna S.K. et al (Khanna et al., 1976). The revelations of our examination are clashing to the disclosures of Nand et al (Nand et al., 1993) who concluded that, the CSF LDH levels was significantly higher in PM as compared to TBM. The levels of LDH is increased in meningitis still a subject of speculation. Various authors have attributed the rise to altered blood-brain/ CSF-barrier, presence of microorganisms and pleocytosis in CSF. It has been recommended that the over the top system that awards blood and plasma to show up at the spinal fluid results in extended enzymatic activity by morals of the dedication of impetus from plasma. In cases of acute meningitis there is increased permeability of the CNS leading to disruption of BBB resulting into exudation of plasma proteins including LDH along with circulating leukocytes into the spinal fluid. In study also studied CSF LDH levels in cryptococcal meningitis which was not studied in the past. But our sample size for this group was very small (n=5). Hence it requires further evaluation on large scale. In present study observed very high levels of CSF LDH in TBM and PM, as compared to VM. Hence this can be a useful diagnostic marker of meningeal inflammation be it of pyogenic or tubercular nature and also to differentiate TBM and PM from VM and CM. But it was very difficult to correlate the prognosis of the patient with the CSF LDH levels, as there were many confounding factors associated. Patients’ prognosis was dependent more upon
the accompanying medical conditions and there outcome.

**CONCLUSIONS**

TBM is more common than pyogenic meningitis which is in turn viral meningitis in adult population. Estimation of CSF-LDH levels can help in differentiating from VM from TBM and PM. But no noteworthy distinction between TBM and PM as they had overlapping results. CSF LDH levels have direct relationship with leucocytosis. Prognosis of the patient was dependent more upon associated other medical conditions rather than only CSF LDH levels. Measuring CSF LDH levels is also very cost effective. So, overall conclusion of study is that estimation of CSF LDH levels is not only supplementary aid but diagnostic and differentiating aid for meningitis.

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**Conflict of Interest**

None to Disclose.

**REFERENCES**

Abubakar, I. I., Tillmann, T., Banerjee, A. 2013. Global, regional, and national age-sex specific all-cause and cause-specific mortality for 240 causes of death, 1990-2013: a systematic analysis for the Global Burden of Disease Study. *Lancet*, 385(9963):117–171.

Dey, A., Nath, B. K., Bhattacharjee, P., Das, D. 2016. Bacteriological profile of patients with acute pyogenic meningitis-A hospital based study. *Journal of Evidence Based Medicine and Healthcare*, 3(19):758–763.

Friedman, L. N. 2000. Tuberculosis: current concepts and treatment. pages 849315654–849315654.

Gupta, M. M., Ahmad, P., Malik, A., Raza, S. 1982. Serum and cerebrospinal fluid LDH profile in common neurological disorders. *Indian Pediatr*, 19(12):981–985.

Jain, M. K., Shah, A., Rao, S. R., Sheth, S. S. 1991. Cerebrospinal dehydrogenases in central nervous system infections. *Indian pediatrics*, 28(4):369–374.

Khanna, S. K., Gupta, D. K., Gupta, B. K., Khanna, P. 1976. Cerebrospinal fluid lactic dehydrogenase activity in various neurological disorders. *The Journal of the Association of Physicians of India*, 24(1):29–36.

Murthy, J. M. K. 2012. Multi-drug-resistant central nervous system tuberculosis. *Neurology India*, 60(2):143–143.

Nand, N., Sharma, M., Saini, D. S. 1993. Evaluation of lactic dehydrogenase in cases of meningitis. *Indian journal of medical sciences*, 47(4):96–100.

Quaglia, A., Karlsson, M., Larsson, M., Taylor, W. R., Diep, N. T. N., Trinh, D. T., Trung, N. V., Kinh, N. V., Wertheim, H. F. L. 2013. Total lactate dehydrogenase in cerebrospinal fluid for identification of bacterial meningitis. *Journal of Medical Microbiology*, 62(11):1772–1773.

Wróblewski, F., Decker, B., Wróblewski, R. 1958. The Clinical Implications of Spinal-Fluid Lactic Dehydrogenase Activity. *New England Journal of Medicine*, 258(13):635–639.