

THE VALUE OF CSF ADENOSINE DEAMINASE LEVELS IN THE DIFFERENTIAL DIAGNOSIS OF CHILDHOOD MENINGITIS*

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SUMMARY: Baki A, Uçar B, Değer O. (Department of Pediatrics, Karadeniz Technical University Faculty of Medicine, Trabzon, Turkey). The value of CSF adenosine deaminase levels in the differential diagnosis of childhood meningitis. Turk J Pediatr 34: 99-101, 1992.

In this study, adenosine deaminase (ADA) levels of serum and cerebrospinal fluid (CSF) in a total 28 children (13 with bacterial meningitis, 5 with mumps meningoencephalitis and 10 with febrile convulsions) were determined. The comparisons between the serum values were insignificant ($p > 0.05$) but the CSF levels of the children with bacterial meningitis were higher than in the others ($p < 0.05$). These findings suggest that serum ADA levels are not important in the diagnosis and differential diagnosis of these diseases. However, ADA levels of CSF may be useful in differentiating between bacterial and viral meningitis. *Key words:* adenosine deaminase, cerebrospinal fluid (CSF), children, meningitis.

Adenosine deaminase (ADA) specifically reacts with adenosine and several adenine nucleoside analogues. The enzyme is widely distributed in animal and human tissues and its activity is particularly high in lymphocytes and leukocytes¹. Until now, the determination of its activity has been used in diagnosing pleural, peritoneal, pericardial and meningeal tuberculosis, and sarcoid meningitis²⁻⁴.

Its prognostic importance in bacterial meningitis has been reported and these studies have been conducted primarily on adult patients⁵. After a review of the literature, we were unable to find any studies concerning the comparisons of serum and cerebrospinal fluid (CSF) levels in children with bacterial meningitis, viral meningoencephalitis (a central nervous system manifestation of mumps) and febrile convulsions. Therefore, we decided to investigate the significance of ADA in the diagnosis of meningitis and also in the differential diagnosis of bacterial and viral meningitis.

Material and Methods

The study population comprised a total 28 children hospitalized in Farabi Hospital between January 1990 and June 1991. ADA levels were determined by the

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method of Giusti and Galanti¹ in 13 children with bacterial meningitis, aged between 6 months and 14 years (mean: 6.6 years), in 5 children with mumps meningoencephalitis (all having parotitis), aged between 2 and 11 years (mean: 7.2 years), and in 10 children with febrile convulsions, aged between 11 months and six years (mean: 2 years). Initial lumbar puncture fluids were used to determine the enzyme. The causative agents of the bacterial meningitis were *Streptococcus pneumoniae* in 5 patients and *Neisseria meningitis* in 8 patients. A viral study could not be carried out. The Mann - Whitney U and Sperman's tests were used for statistical analyses.

Results

Adenosine deaminase levels are shown in Table 1.

No correlation was found between serum and CSF adenosine deaminase activities (Sperman's test). There were statistically significant differences between the CSF levels of children with bacterial meningitis, mumps meningoencephalitis and febrile convulsions ($p < 0.05$). However, the comparisons involving the serum values and the differences between the ADA levels in the children with mumps meningoencephalitis and febrile convulsions were insignificant ($p > 0.05$).

The mean number of cells in CSF was 4158 (97 % polymorphonuclear leukocytes and 3 % percent lymphocytes per ml) for the cases with bacterial meningitis and 693 for those with mumps meningoencephalitis (13 % polymorphonuclear leukocytes and 87 % lymphocytes). However, no cells were observed in the CSF of the patients with febrile convulsions.

TABLE I: Serum and CSF Adenosine Deaminase Levels of the Patients (mean and range values)

	Serum U/L		CSF U/L	
Bacterial- meningitis (n = 13)	15.6 ± 6.8	(1 - 26)	7.9 ± 2.05	(5 - 18.0)
Mumps meningoencephalitis (n = 5)	20.5 ± 13.12	(2 - 44)	4.0 ± 1.1	(0.1 - 7.0)
Febrile Convulsions (n = 10)	18.1 ± 13.1	(3 - 44)	1.7 ± 0.3	(0.1 - 2.0)

Discussion

CSF adenosine deaminase activity has been found to be considerably high in cases of tuberculous meningitis (generally > 9 IU/L)^{4,6,7}. It has been reported that very high ADA levels (> 15 U/ml) indicate a poor prognostic factor in purulent meningitis⁵. In this study, ADA levels in CSF were higher in the children with bacterial meningitis than in those with mumps meningoencephalitis or febrile convulsions. ADA values greater than 7 U/L in CSF may suggest acute bacterial meningitis while values below 5 U/L may signify viral meningitis. Very low ADA levels (< 2 U/L) in a child with fever and convulsions may be reason to rule out bacterial meningitis if this opinion is supported by other clinical and laboratory findings. In addition, no correlation was found between ADA levels and the number of cells in CSF ($p > 0.05$). This result has been corroborated by another study⁵. Our findings also demonstrate that serum ADA levels are of no value in making differential diagnoses.

Although, the number of cases in our study was limited, we nevertheless suggest that a test for CSF adenosine deaminase activity be carried out. This test is simple, rapid, inexpensive and available in most hospitals and may be useful in the differential diagnosis of the diseases mentioned. A more extensive study is needed to confirm our preliminary data.

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