

SERUM ADENOSINE DEAMINASE ESTIMATION IN RELATION TO BCG VACCINATION

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ABSTRACT

Serum adenosine deaminase (ADA) levels reflect activity of stimulated T lymphocytes and its levels are raised whenever cell mediated immunity is stimulated. One hundred term normal newborns were studied to evaluate effect of BCG vaccination on serum ADA levels. Serum ADA was measured at birth and 6 weeks after BCG vaccination. Only 67 subjects came for follow up after 6 weeks. The levels were 6.69 U/litre at birth and 13.83 U/litre after 6 weeks of vaccination showing a significant rise. It is concluded that serum ADA levels can be used as a measure of cell mediated immunity after BCG vaccination.

Key words: Serum ADA levels, BCG vaccination.

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In our country nearly 3.4 million children have tuberculosis while 94 million are at risk of infection(1). For prevention of childhood tuberculosis, BCG vaccination is advocated. The protection is attained 4-6 weeks after BCG vaccinations and is mainly due to cell mediated immune response. Adenosine deaminase is an enzyme of the purine salvage pathway secreted by activated T lymphocytes and macrophages and is raised when cellular immunity is stimulated. Serum ADA levels in various forms of tuberculosis, mainly in adults, show a significant rise(2-4). However, no study is available in literature in children regarding relationship of serum ADA levels and BCG vaccination. The main aim of the present study was to measure serum ADA levels 6 weeks after BCG vaccination and to compare them with matched controls to evaluate if this test can be used to measure cellular immunity evoked by BCG immunization.

Material and Methods

The study was conducted in M.Y. Hospital and Chacha Nehru Bal Chikitsalaya awam Anusandhan Kendra, attached to M.G.M. Medical College, Indore from June, 91 to August, 1992. One hundred newborns were taken up from post-natal wards. On the basis of thorough history and clinical examination, all those babies who appeared to have intrauterine infection, septicemia, birth asphyxia, and were sick due to other problems were excluded from the study. Two ml of venous blood was collected before BCG vaccination and within 24 h of birth. 0.1 ml of BCG vaccination was given intradermally on the left upper arm. parents were asked to take their babies to immu-

nization clinic after 6 weeks. On follow up, BCG vaccination site was seen for formation of scar. Thirty healthy babies of 6 weeks age who were not given BCG before, were taken as controls. Two ml of venous blood was collected from all these babies for enzyme estimation. Serum ADA estimation was done by colorimetric method.

Results

Serum adenosine deaminase levels in 100 normal newborns at birth before vaccination were 6.6934 ± 1.8073 U/L. Out of them only 67 subjects, came for follow up after 6 weeks of vaccination and the levels were 13.8361 ± 3.8705 U/L (study group). Thirty six weeks old, healthy infants who came to our immunization clinic for BCG vaccination served as controls. Their serum ADA levels were 6.4521 ± 1.4137 U/L. The difference of serum ADA levels between study and control groups was statistically significant ($p < .001$). Out of 67 that came for follow up, six did not show any BCG scar. Their mean serum ADA level was 11.0141 ± 4.0563 U/L. These levels were significantly higher as compared to controls ($p < 0.05$).

Discussion

Serum ADA-estimation has been done in diseases which evoke cell mediated immune response like tuberculosis and enteric fever, especially in adults (5-7). We have earlier done ADA levels in CSF in intracranial tuberculosis in children. The above study shows that there is significant rise in serum ADA levels after BCG vaccination, and this can be used to judge cell mediated immune response that occurs after BCG vaccination. This is probably the first study of its kind and hence there are no data for comparison.

Serum ADA levels were also raised significantly even when there was no BCG scar indicating that immunity has occurred and hence there is no need for revaccination. This test is simple and inexpensive (cost per test Rs. 12/-) unlike other sophisticated and expensive ones like lymphocyte migration inhibition test and phytohemagglutination inhibition tests.

REFERENCES

1. Styblo K. Overview and epidemiologic assessment of the current global tuberculosis with emphasis on control in developing countries. *Rev infect Dis* 1989, 11:339-346.
2. Ocana I, Martines Vazquez JM, Ribera E, Sequra R, Pascal C. ADA in pleural fluids: Test for diagnosis of tuberculous pleural effusion. *Chest* 1983, 84: 51-53.
3. Strankinga WFM, Narita IIP, Strant JP, Stran J. ADA in tuberculous pleural effusion: A diagnostic test. *Tubercle* 1987, 68:137-140.
4. Piras MA, Gakis C. Cerebrospinal fluid adenosine deaminase activity in tuberculous meningitis. *Enzyme* 1973, 14: 311-317.
5. Christina M. ADA levels in CSF in the diagnosis of tubercular meningitis. *J Trop Med Hyg* 1984, 37: 33-40.
6. Mann MD, MacFariene CN, Verburg CJ, Wiggeline Khuzen J. The bromide partition test and CSF ADA activity in the diagnosis of TBM in children. *South Afr Med J* 1982, 62: 321-433.
7. Jhamaria JP, Jenaw RK, Lauhade SK, Mathur DK. Serum ADA in the differential diagnosis of pulmonary tuberculosis and common tubercular respiratory disease. *Indian J Tuberc* 1988,35:22-25.
8. Shymala P. A Study of adenosine Deaminase in CSF in CNS Tuberculosis and non-Tuberculous CNS Infection. A Thesis for Doctor of Medicine (Pediatrics). Devi Ahilya Vishwavidyalaya, Indore, 1992.