

## **Determination of Adenosin De Aminase (ADA) enzyme activity in patients with Salmonellosis**

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### **Abstract**

This investigation was carried out on peripheral blood samples, which were drawn from patients with typhoid fever. Fifteen patients aging 35- 45 years old as well as ten samples were collected from healthy persons, at the same range of age. Sera were used for estimation the activity and specific activity of ADA. The results showed significant increase in the enzyme activity and specific activity of the patients in comparison with control.

### **Introduction**

Many enzymes are involved in the biosynthesis of purine compounds. One of these enzymes is ADA E. C. 3.5.4.4. (1). ADA was first reported in 1972 (2). This enzyme proved to have considerable physiological importance. it catalyzes the deamination of adenosine and deoxyadenosine to inosine and deoxyinosine. ADA is found in all mammal tissue. In human, the highest level of activity was reported in thymus gland (3). The main function of ADA is the development of Immune system in human, it seems to be associated with the differentiation of epithelial cells, monocytes, neurotransmission and maintenance of gestation (1). Experimental evidence indicated that increas amount of adenosine may result in increas cAMP activity, which is known to be associated with inhibition of lymphocyte function. Any defect in ADA enzyme function will lead to Immunodeficiency (4). Several diseases also affect the activity of ADA enzyme Such as, infectious diseases and inherited diseases. There was an elevation of ADA activity in the cerebrospinal fluid when infection with Tuberculosis meningitis occur

(5). The level of ADA activity in the cerebrospinal fluid was considered a useful tool for diagnosis and follow- up infected patient with Tb meningitis (6). There was also an elevation in ADA activity in individual with Lysch-Nyhan syndrome (7). ADA enzyme can modulate the bioactivity of insulin in patients with diabetes mellitus (8). Human and mice liver are sensitive to the metabolic consequence of ADA deficiency (9). There are three enzymes involved in the synthesis of inosine monophosphate, one of them is ADA enzyme (10).

The aim of this study was included two parts.

- 1- Detection of activity and specific activity of ADA
- 2- The relation between Salmonellosis and activity of ADA enzyme.

## Material and Methods

The study was carried out on fifteen patients with typhoid fever. Their diagnosis was clinically made by the consultant medical staff at Al- karama Teaching Hospital. The diagnosis was also confirmed by Laboratory examination in comparison with ten fit persons as a control.

Venous blood was collected from patients and control. Salmonellosis was detected by using widal test.

Activity and specific activity was estimated according to (Giusti) (11). The results were analysed using T test at a confidence Level  $<0.05$  and it carried out by spss program.

## Results and Discussion

Result's showed a high significant increase in the activity of ADA enzyme in patients ( $22.1293 \pm 0.9661$ )(u/l) with respect to control ( $13.5348 \pm 1.7289$ ) (u/l). while the specific activity of enzyme in patients was ( $12.9587 \pm 3.5223$ ) (u/mg protein) with respect to control ( $0.7282 \pm 0.1627$ ) (u/mg protein) as shown in Fig. (1) and Fig. (2)

Typhoid fever infected more than 2 million patients and caused 216-500 death globally in the year 2000. affecting all ages (12). Salmonella infection was more prevalent in summer than in winter probably because warm environmental conditions are more favorable for growth of Microorganism in food. The ultimate sources of food borne Salmonella are human and worm blooded animals (13). Our results are showed a high significant increase in the activity and

specific activity of ADA enzyme, in patients in comparison with control. These results were in agreement with that obtained by Mishra (14). The physiological function of ADA is critical to control the effects of adenosine and deoxyadenosine in a variety of systems (3). Since ADA has an important role in the development of Immune system, so its activity may increases as a result for this function. This finding was confirmed by experimental and clinical studies which documented the fact that Salmonella infection induce a T-helper (Th) Immune response (15). It has been observed that the chicken which infected with Salmonella typhimurium has an increased number of both CD8 (+) and CD4 (+) T- cells (16).

A significant increase in the ratio of CD 4 (+)/ CD 8 (+) cells in immunized mice and there increased production of IL-2 and interferon- Gamma (INF-  $\gamma$  ) (17). There was also increasing in the production of IL-6 and nuclear transcription factor kappa B (NF- Kappa- B) in human when vaccinated with pilated S. typhi (18). These findings are confirm the previous reports that the infection with typhoid fever will enhance the immune response so that the activity of ADA may increases as a result to this enhancement.

### Conclusion

The results, we suggest that the activity of ADA in patients with typhoid fever may have a diagnostic value which encourage us to use it as a simple tool for the detection of this disease.

### References

1. Moriwaki, Y.; Yamamoto, T. and Itlgashino, K. (1999). *Histopathol.* 14 : 1321-1340
2. Giblett, E. R. ; Ammann, A. J. ; Sandman, R.; Wara, D. W. ; Diamond, L. K. (1972). *The Lancet.* 1: 1010-1013.
3. Khalid, A. M. ; Oivin, M. G.; Rodney, E. K. and Fredenrick, B. R. (1993). *The Journal of Biological Chemistry.* Vol. 263, No 31. Issue of November 5. 23723-23733.
4. Daniel, P. S. ; John. D. S.; Vivian, W. (1987) " Basic and clinical immunology" sixth ed. Appelten Lang. Li braine duliban .
5. Egido, J. A.; Gonzaler, J. L. and Cubo, E. (1994). *Acta-Neurol- Napoli.* Dec. 16 (5-6) : 288-290..

6. Nozaki, H. ; Fukuuchi, U.; Koto, A.; Tanaka, K. and Kobar, M. (1994). *Kekkaku*, NoV. 69 (11): 663-670.
7. Puukka, R.; Pyykka, M; Perkkia, L. and Kouualainen, K. (1986). *Biochemical medicine and Metabolic Biology*, Vol. (36), 45-50.
8. Hoshino, T. ; Yamad, K.; Mosvoka, K.; Tsuboj, I. ; Itoh, K.; Nonaka, K. and Oizumi, K. (1994). *Diabeten-Res-Clin-Pract-sep* Vol 25 (2) :97- 102.
9. Linda, F. T. and Micheal, R. (1998). *The Immunologist*, 612.
10. Sanfillipo, O.; Camici, M.; Tozzi, M. G. ; Turriani, M. and Faranda, R. (1994). *Cancer Biochem Biophys*, Vol. 14, 57-66
11. Giusti, G. (1998). *Adenosine deaminase: Methods of enzyme analysis*, Vol 2, 2<sup>nd</sup> ed. Bergmeyer 4-4,ed. 1092-1099.
12. Bhan, M. K. ; Bahi, R. and Bhatnagar, S. (2005). *Lancet* Aug. 27- sep :366 (9487). 749-762.
13. Madigan, M.T.; Mortinko, J. M. and Parkes, J: Brock (2003) *Biology of Microorganism*, 9<sup>th</sup> .Ed, Prentice Hall, Vpper Saddle pever, NT. 773.
14. Mishra, O. P.; Gupta, B L.; Ali, Z.; Nath, G. Chandra, L. (1994). *Indian- Pecliatr* -31 (11). 1379- 1384.
15. Stoycheva, M. V. and Murdjera, M. A. (2004). *Folia ned (plovdiv)*, 46 (4) 25- 102.
16. Withanage, G. S.; Wigley, P. ; Kaisers, P. ; Mastroeni, P. ; Brook, S. H.; Powess, C.; Beal, R.; Barrow, P. and Maskell, D. (2005). *Mc Connell, I, Infect Immun*, Augi 73 (8): 5173-5182.
17. Sood, S.; Rishi, P.; Vohra, H.; Sharma, S. and Ganguly, N. (2005). *J Med Microbiol*, sep 54 (ptq): 815-8212.
18. Wang, F.; Zhang, X. and Zhou, Y. Yel: Qizi Wuy, (2005). *Immunobiology*- 40 (5)2283-293.

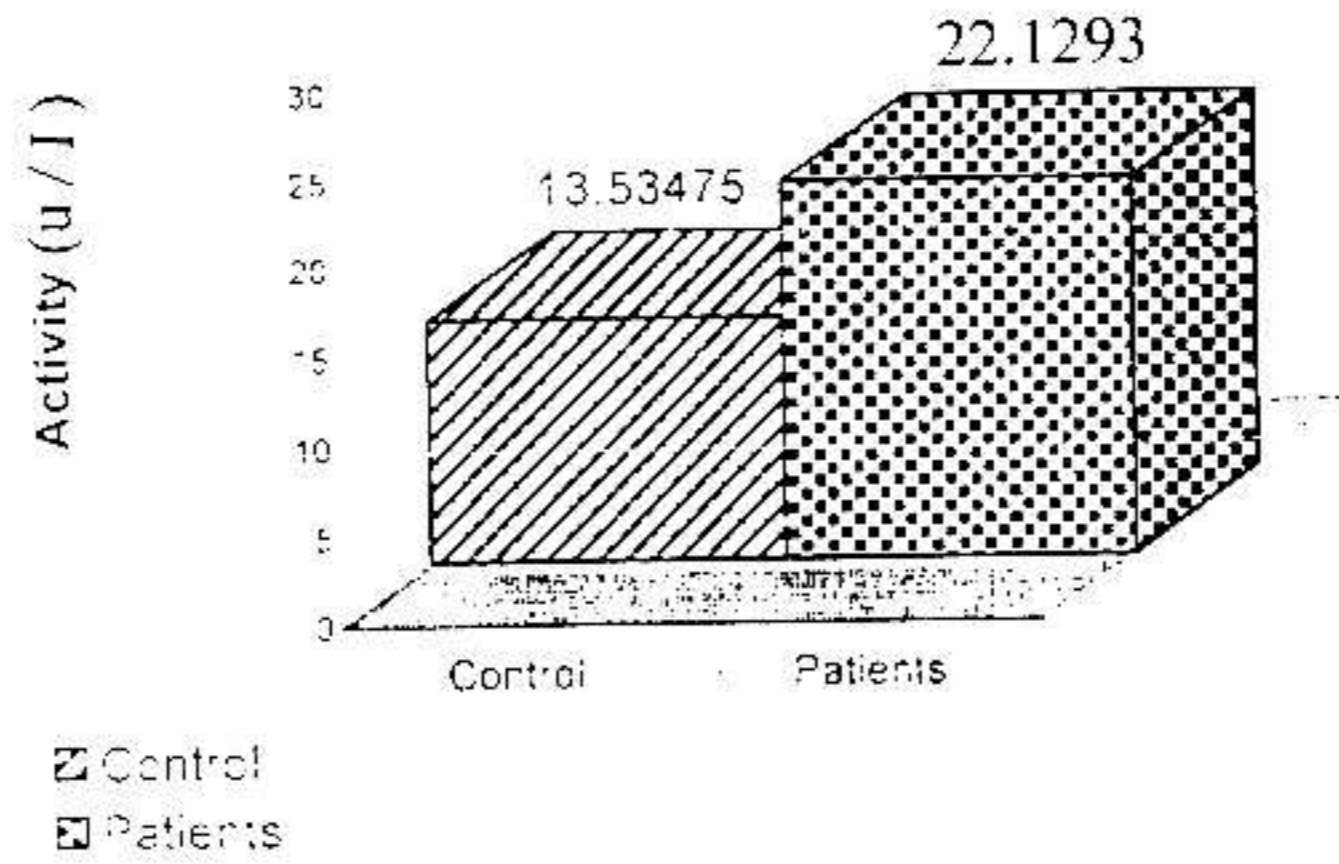


Fig. (1) Levels of ADA activity in patients and control

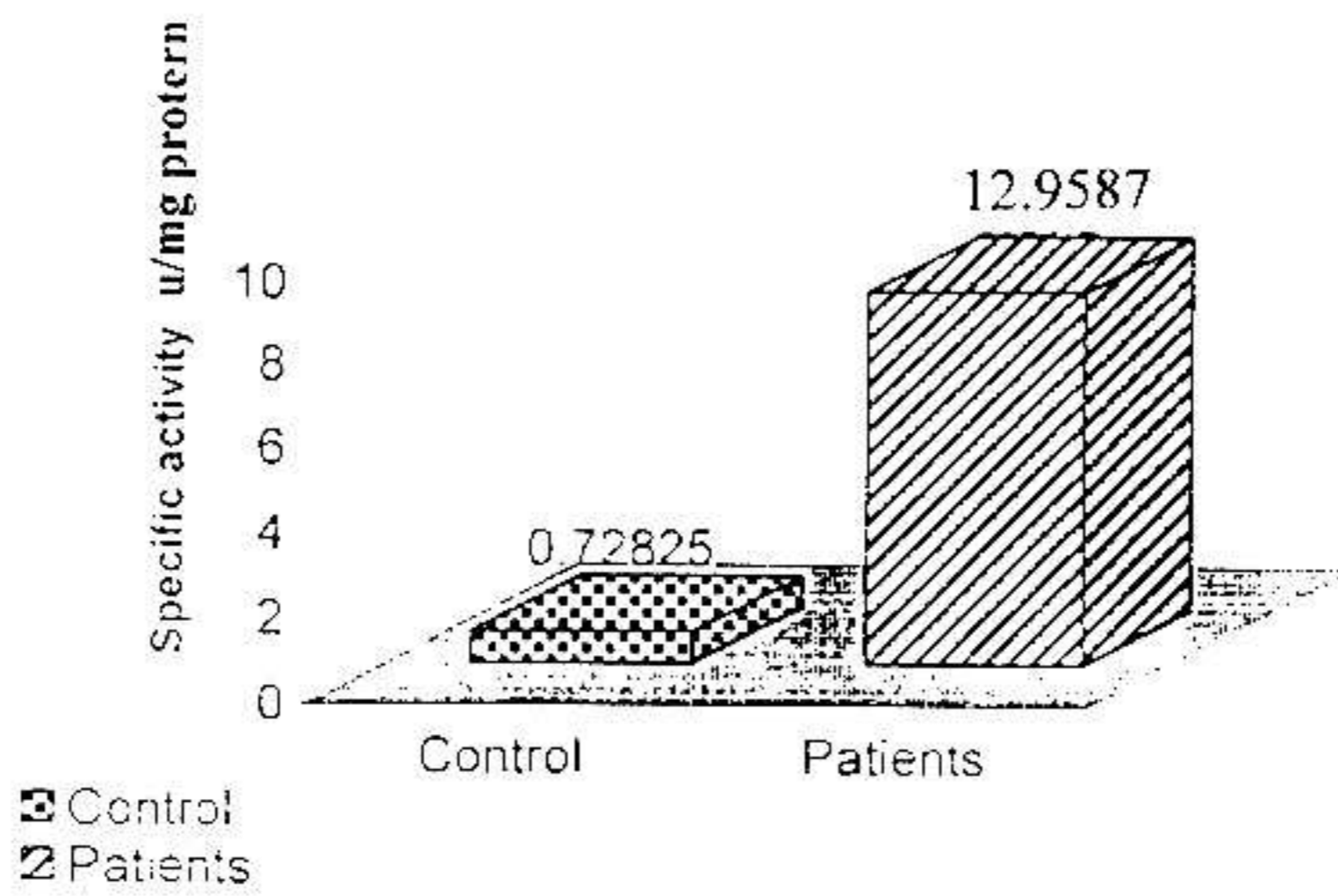


Fig. (2) Levels of ADA specific activity in patients and control

قياس فعالية الانزيم المزل للادينوسين  
ADA Adenosin De Aminase في المرضى  
المصابين ببكتريا السالمونيلا

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الخلاصة

لقد تمت الدراسة على عينات الدم المحيطي المسحوب من المرضى والأشخاص السليمين. وقد أشتملت الدراسة على 25 عينة، 15 عينة من المرضى المصابين بحمي التيفوئيد وضمن الفئة العمرية 35-45 سنة، وعشرة عينات لأشخاص سليمين (كسيطرة) وضمن الفئة العمرية نفسها. عزل المصاب لقياس الفعالية والفعالية النوعية للانزيم قيد الدراسة وقد أظهرت النتائج وجود ارتفاع معنوي في الفعالية، والفعالية النوعية للانزيم في عينات المرضى موازنة بالسيطرة.