

The Level of Total Sialic Acid In Patients With Typhoid Fever

Z. T. Al-Assady

Department of Biology, College of Education- Ibn Al-Haitham,
University of Baghdad

Abstract

The aim of this research is to shed some light on the level of serum total sialic acid (TSA) in individuals with typhoid fever. The individuals were at age of (35-45) years old and (TSA) was measured by resorcinol reagents. The results showed significant reduction in (TSA) compared to control or normal individuals.

Introduction

Many biological activities involve numerous interactions between cells and soluble effectors such as antibodies, toxins, lectins and cytokines(1).

It was assumed that carbohydrate moieties of membrane glycoproteins and glycolipids played a key role in these recognition phenomena(2). In this context, sialic acid represents an essential component of most glycoconjugates they are a family of 9-carbon carboxylated monosaccharides found as terminal residues of glycoconjugates(3), and present in molecules of different complexities, this may be of importance for steric presentation of the in vivo events(4).

There are many factors affecting serum sialic acid such as immunostimulators like Bacilli Calmette-Guerin (BCG) vaccine, Freund's adjuvant as well as several antigens increase serum sialic acid. In contrast, treatments causing immunosuppression, like γ -radiation and application of cyclophosphamide, did not influence the serum sialic acid(5).

The aim of this research was to measure the level of serum total sialic acid (TSA) in patients with typhoid fever.

Materials and Methods

Determination of (TSA) by Sevennerholm's method(6) using resorcinol reagent and butyl-methanol solution. The control and patient individuals at age of (35-45) years old and the number of samples were (15) for patients and (15) for control. Statistical significances of differences between the two groups were tested with two-tailed t-test.

Results

The results of this study showed a significant reduction in the level of serum (TSA) in patients with typhoid fever (11.41 ± 4.9) $\mu\text{g/mL}$ compared to control group (39.65 ± 4.2) $\mu\text{g/mL}$ as in the figure (1).

Discussion

The results of this research showed a significant decrease in the value of (TSA) in the serum of individuals with typhoid fever compared to normal individuals. This reduction caused by the effects of *Salmonella typhi* on the sialic acid synthesis inside cells or remove it by the activity of sialidase enzyme from the glycoproteins in cell surfaces(7).

The bacilli of *Salmonella typhi* that causes typhoid fever are Gram-negative bacteria living inside macrophages, thus they are intracellular pathogens(8). The pathogenicity comes from the toxic effect associated with the lipopolysaccharide layer of these organisms, which is termed "endotoxin"(9) and also these bacilli produce enterotoxin and cytotoxin. The action of these toxins resembled by inhibiting host cell protein synthesis and allowing Ca^{2+} to escape from host cells then lyses them(10). Therefore, it's possible that these toxins affect the expression of glycoproteins that contains sialic acid inside infected cells, especially macrophages which appear rich in receptors positive sialylated glycoconjugates(11).

Also, the reduction in serum sialic acid may be resulted from the activation of sialidase enzyme after infection by these bacilli that lead to remove sialic acid residues from glycoproteins during recycling process in the course of which lysosomes could fuse with vesicles endocytosed from the cell surface(12), especially the activity of sialidase enzyme has been shown in immunocompetent cells such as lymphocytes and phagocytes(13). The activity of this enzyme may

be exerted from the very beginning of the infection(14). It has been demonstrated that sialidase through desialylation of glycoconjugates has a potential pathogenic effect and the desialylation is efficiently induced by either soluble (*Vibrio cholerae*) or particle-bound (*Influenza virus*)(15).

The conclusion of this work revealed that the infection by *Salmonella typhi* caused reduction in the level of (TSA) in serum by affecting the synthesis of glycoconjugates that contain sialic acid on the macrophages surfaces and others cells, or removing sialic acid residues from these molecules by the activity of sialidase enzyme.

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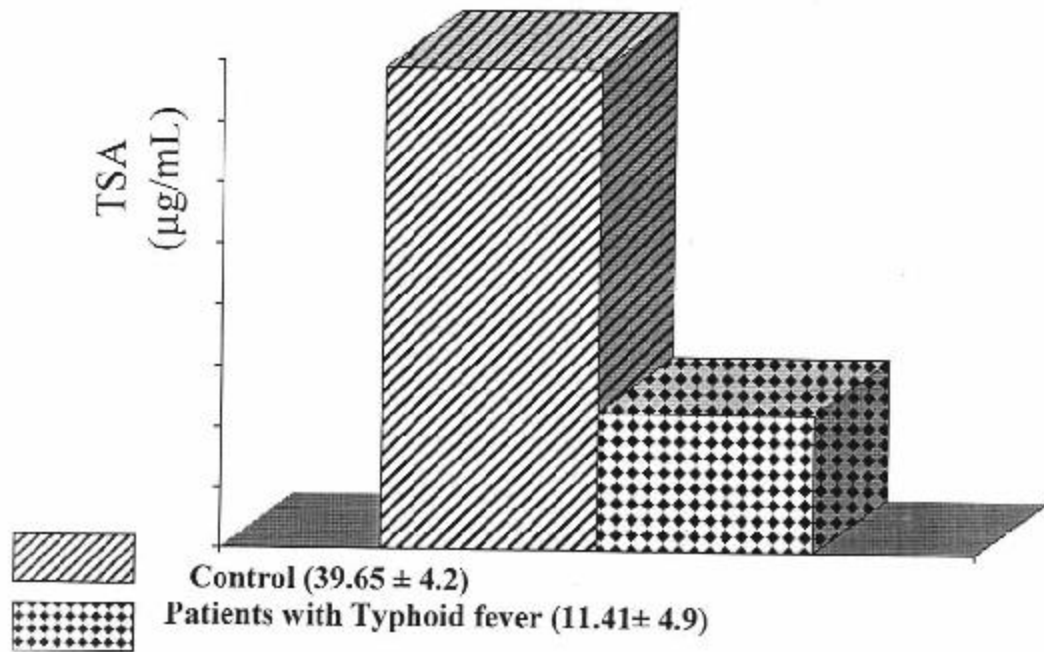


Fig. (1): The level of (TSA) in patients with typhoid fever and control

مستوى حامض السيليك الكلي عند الاشخاص المصابين بحمى التيفوئيد

زينب ثامر الاسدي

قسم علوم الحياة، كلية التربية- ابن الهيثم، جامعة بغداد

الخلاصة

الهدف من هذا البحث هو تسليط الضوء على مستوى حامض السيليك الكلي في مصل الاشخاص المصابين بحمى التيفوئيد والذين تراوحت اعمارهم ما بين (35-45) عاماً، وتم قياس حامض السيليك الكلي باستخدام كاشف الـريزورسينول. أظهرت النتائج حصول انخفاضاً معنوياً في مستوى هذا الحامض مقارنة مع الاشخاص الطبيعيين او مجموعة السيطرة.