



## Value of Single Widal test in Children for Diagnosis of Typhoid Fever

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### Abstract

**Background:** Typhoid is one of the medical illnesses that are contagious. S-caused infection in typhoid fever. S. and typhi. Paratyphi A is still a huge worldwide safety concern. This is difficult to treat typhoid fever scientifically because the signs frequently differ and appear close to those of other febrile diseases. Numerous studies are now possible in genetic, immunological, biochemical and microbiological settings.

**Objective:** To establish the relevance of widal test in the diagnosis of typhoid fever.

**Method:** This research was conducted at Tertiary Medical College Hospital, Dhaka from January 2016 to January 2018 to examine improvements in enteric fever clinical trends. The research has caused a minimum of 120 children aged 0 to 14 to be in typhoid fever. For all, 90 children had definite diagnosis, as shown by S isolation for typhoid or paratyphoid fever. or S typhi. Blood paratyphi and 30 were accused of harmful blood production but not typhoid fever, in scientific words. The Widal research was performed using the quick diaphragm agglutination process and was tested in accordance with the results from blood cultivation.

**Results:** Results showed that the accuracy of the widal tube and slide agglutination tests as used in the study in terms of sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) were 73%, 62%, 92% and 28%, respectively.

**Conclusion:** It is concluded that a large-scale test remains important as a typhoid fever diagnostics device, more flexible, cheaper and quicker than other molecular and serological studies.

### Introduction

In the countries where water and hygiene are under provided, typhoid fever exists. It almost has been replaced by waste and water treatment projects from developed nations, but remains a prevalent disease in third world countries and a significant cause of morbidity and death. Every

year approximately 16 million new infections are recorded worldwide with 600000 deaths from Salmonella Enterica Typhi serotype (S. Typhi).<sup>1</sup> The largest occurrence in Southeast Asia (1000 incidents per 100,000 people annually).<sup>2</sup> The individual is at near risk for enteric fever when exposed to polluted food or water.<sup>3</sup> The number of

outbreaks of typhoid is reported at over 100 cases/100,000 people each year in the Asia-Pacific region. Kids face the greatest risk of illness.<sup>4</sup> In 1896, Georges Fernand Isidore Widal developed a serological diagnostic test for enteric fever.<sup>5</sup> It's an agglutinating reaction that reveals a serum in patients of O-and H-anti-gene suspensions of lipopo-lyphide (LPS) somatic (O) and fla-gella (H) agglutinins. Com-mercial kits are available for antigens of Salmonella para-typhi A, B and C. The recommended method of performing the widal test is by the tube agglutination technique were serial two-fold dilutions of the subject's serum from 1:20 to 1:1280 are tested.<sup>6</sup>

The definitive diagnosis of typhoid fever requires the isolation of Salmonella typhi or paratyphi from the blood, feces, urine or other body fluids. In developing countries, facilities for isolation and culture are often not available especially in smaller hospitals, and diagnosis relies upon the clinical features of the disease and the detection of agglutinating antibodies to S. typhi and S. paratyphi by the Widal test. Many studies.<sup>7,8</sup> Nonetheless, data have been generated with severe reservations about the Widal test's validity. A four-way rise in anticorps in pairs of sera classically is called typhoid fever diagnosis.<sup>9</sup> However, it is sometimes challenging to procure paired sera, so a single widal examination needs complex chemotherapy to be applied. Provided reservations about Widal's importance, a single Widal test in the diagnosis of typhoid fever was intended for re-evaluation in this report.

One of the major drawback of widal test is cross-reactivity due to which some other bacteria of same genus often produces false positive results, so the positive results must correlate clinically before prescribing medicine. Typhoid is another rapid test used to ascertain the diagnosis of typhoid fever, but not cost effective as widal. So widal test is the choice for typhoid fever especially in rural area.

## Materials and Methods

This research was conducted at Tertiary Medical College Hospital, Dhaka from January 2016 to January 2018 to examine improvements in enteric fever clinical trends. The research has caused a minimum of 120 children aged 0 to 14 to be in typhoid fever. Blood samples were collected from apparently healthy individual and out-patients visiting the laboratory sections. Venipuncture was used for the tests of patients whose typhoid was verified and yet to be treated. Ethylene diamine tetra acetic acid (EDTA) was dispensed into fresh tissue. In the medium-stream urine collection, patients also received clean, clear, broad-necked, leak-proof, standardized laboratory flasks. Stools for culture were collected in clean wide- mouth containers and the patients were instructed to avoid contaminating the feces with urine. The patient's names, date and period of sampling were written on each container image.

## Screening Analysis

The Sera for widal test were collected from fresh blood samples by centrifugation. Using a Pasteur's pipette, six to eight drops of each serum were transferred onto eight rings on a white tile. In the rings was also removed the Salmonella antigen reagent. We all were carefully mixed together using a stick and for an evident agglutination the tile softly whirled for 1 minute. The reacting antigens were recorded positive (+) while nonreactive antigens were classified as negative (-). Reactive titers of 1:60 and above were regarded as positive (+) while titers less than 1:80 were negative (-). All Negative slide tests were confirmed by the tube test.

## Analysis of Samples

Two techniques were used to analyze the blood samples; a general examination of typhoid fever diagnose, and a blood culture of salmonella typhoid, the source of typhoid tissue, were used. To order to evaluate the serum / antigen titrate amount before the wide-slide agglutination test was conducted, an extension tube agglomerating

test was first conducted with each blood sample. The findings of the slide agglutination study, most of which are used in our laboratories, may be accurately interpreted. Any examination of the conclusive treatment of typhoid fever was then cultured with blood.

### Widal Slide Agglutination Test

The slide clamp test was conducted for each serum sample after the tube clamping test showed the values for the titre. Equal amount (0.5ml) of undiluted patient's serum and anti-tigens O<sub>A</sub>, O<sub>B</sub>, O<sub>C</sub>, and O were placed side by side on a plastic agglutination slide and rocked by hand for one minute. The same procedure was repeated for the H<sub>A</sub>, H<sub>B</sub>, H<sub>C</sub> and H antigens O<sub>A</sub>, O<sub>B</sub> and O<sub>C</sub> represent *S. paratyphi* O antigen while H<sub>A</sub>, H<sub>B</sub> and the represent *S. paratyphi* H antigen. O and H represent *S. typhi* O and H antigens, respectively. Agglutinations were noted as either positive or negative, agglutinations greater than or equal to the titer shown in the tube agglutination test were regarded as significant and counted as positive.

### Biochemical Tests

Biochemical tests were carried out on blood culture iso-lates of each sample to confirm the presence of *Salmonella* which are as follows Gram reaction, motility test, lactose fermentation, glucose fermentation test and citrate utilization test. The procedures for the test are according to monicachesbrugh 1998.

### Results

Table 1 displays the effects of the wide tube agglutination study. Titre value for *Salmonella* antigen from 1:80 and above was found important and ultimately optimistic. A total of 90 (75% approx) out of the 120 children had significant (O titre  $\geq$  1:80, H titre  $\geq$  1:80) slide agglutination titer values and therefore were regarded as positive. In this study, 72 (60%) of the 120 childrens positive for salmonella species infection as shown by growth on agar. Gram staining, motility check, lactose fermentation check, glucose-fermentation test and citrate consumption test in two zones were biochemical experiments conducted on each sample's blood culture isolates.

**Table-1:** "O" Agglutination titer in children of different age groups

Groups	Number of Cases	1:80	1:160 and more
Normal children	30	2(10)	0
Children between 5-10 years of age with typhoid fever	30	2(10)	8(30)
Children between 10-15 years of age with typhoid fever	30	0(0)	8(30)
Children under 5 years of age with typhoid fever	30	2(10)	6(30)

**Table-2:** "H" Agglutination titer in children of different age groups

Groups	Number of Cases	1:80	1:160 and more
Normal children	30	1(10)	0
Children between 5-10 years of age with typhoid fever	30	2(10)	24(55)
Children between 10-15 years of age with typhoid fever	30	2(5)	20(55)
Children under 5 years of age with typhoid fever	30	3(15)	18(45)

**Table-3:** Results of Biochemical test

Groups	No. of Isolates Examined	Gram Staining	Motility	Lactose Ferm	Glucose Ferm	Citrate Utilization
Normal children	30	Very few -	Very few +	Very few -	Very few +	Very few -
Children between 5-10 years of age with typhoid fever	30	-	+	-	+	-
Children between 10-15 years of age with typhoid fever	30	-	+	-	+	-
Children under 5 years of age with typhoid fever	30	-	+	-	+	-

### Discussion

Typhoid fever in many countries is a significant public health issue with high mortality and morbidity.<sup>[10]</sup> Blood culture appears to be the traditional gold tool for typhoid fever diagnostics, but its early detection usage is limited to the early stage of the epidemic, rendering it impossible for an individual to separate itself. The Widal test in this cut-off titer was very positive with regard to responsiveness, characteristics and NPV, but its PPV was poor. PPV was claimed to be the most significant clinical diagnosis indicator because it measures the percentage of the successful patients with correctly reported test outcomes. The PPV is non-test intrinsic; the incidence of the disorder is impaired.

The assessment of the Widal method has some issues. Firstly, the rates of agglutinins found in communities not affected from different areas differ significantly from time to location based on the disease's endemicity that influences research. For example, the sensitivity and specificity of a Widal test. Widal positivity is more of an epidemiological evaluation rather than clinical because a rising titer repeated after two weeks duration should be demonstrated before it is of clinical significance, although this has also been under serious criticism in recent years. The function of the large test in diagnosing typhoid fever in O and H antigen shared by other salmonella and other Enterobacteriaceae.<sup>11</sup>

### Conclusion

The consequence is that the Widal test is now one of the safest tools for diagnosing typhoid fever, readily available, inexpensive and easy in contrast with other molecular and biochemical studies.

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