



## Status of Triple Antigen Test among Community Acquired Febrile Illness Patient attended at Tertiary Care Hospital, Bogura

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### Abstract

**Background:** Bacterial etiologies of febrile illnesses have significantly become important due to high mortality and morbidity. **Objective:** This study aimed to identify the prevalence of rickettsial fever, brucellosis, and typhoid fever by triple antigen test. **Methodology:** This cross-sectional study was conducted at TMSS Medical College Bogura district in Bangladesh for 6 months. Febrile patients aged from 1 to 65 years of both sexes were recruited from the outpatient department of this Medical College Bogura. Blood sample were taken from all patients for antibody test by microscopic plate agglutination test according to manufacturer instruction. **Results:** A total of 140 patients were enrolled and 74/140 (52.86%) patients were positive by any of three antigens, among them female were 54/74 (72.97%), most common age group was 21 to 30 years which was 22/74(29.73%), TO titre was greater than TH titre, which was 24/36 (66.66%). **Conclusion:** The study has underscored the importance of febrile antigen detection for bacterial diseases including zoonosis such as rickettial fever, brucellosis and typhoid fever in febrile patient and thus reducing diagnostic dilemma of febrile diseases. However, further diagnostic tests for diagnosis of febrile illnesses also needed. This will be helpful for febrile patients to receive the correct diagnoses and facilitation of accurate and prompt treatment. [*Bangladesh Journal of Infectious Diseases, June 2020;7(1):18-21*]

**Keywords:** Triple antigen; Widal test; febrile antigen

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## Introduction

Febrile illnesses due to bacterial etiologies contribute significantly to morbidity and mortality in developing countries, including Bangladesh<sup>1,2</sup>. To know the bacterial causes of fever, triple antigen test is very important. In Bangladesh, data on the prevalence of these diseases in several regions is limited. These infections cannot be recognized clinically, and thus the lack of diagnostic tools in most health facilities leads to misdiagnosis and maltreatment of febrile patients. The diagnosis of bacterial febrile illnesses poses a challenge particularly in resource poor countries where laboratory diagnostic facilities are limited<sup>3</sup>. Differential diagnosis of several bacterial febrile illnesses without laboratory tests is difficult due to overlapping clinical manifestations among these diseases.

Febrile antigen includes Salmonella, Brucella, Weill-Felix multi screening antigen test. It is very helpful to diagnose a case of fever without acute infection. Well-Felix is a nonspecific agglutination test which detects anti-rickettsial antibodies in patient's serum. Well-Felix test is based on cross-reactions which occur between antibodies produced in acute rickettsial infections with antigens of OX (OX 19, OX 2, and OXK) strains of Proteus species<sup>4</sup>. The Well-Felix test can be done as either a slide or a tube test. The antigen necessary (OX2, OX19, and OXK) can be obtained commercially.

The signs and symptoms of uncomplicated typhoid fever are nonspecific, and an accurate diagnosis on clinical grounds alone is difficult<sup>5</sup>. Although a definitive diagnosis can be made by isolation of *Salmonella typhi* from blood or bone marrow<sup>6</sup>. The Widal test has been in use for more than a century with the aid in diagnosis of typhoid fever. Serological diagnosis relies classically on the demonstration of a rising titer of antibodies in paired samples 10 to 14 days apart. It is a tube dilution test which measures agglutinating antibodies against the lipopolysaccharide O and protein flagellar H antigens of *S. typhi*<sup>7</sup>. For practical purposes, a treatment decision must be made on the basis of the results obtained with a single acute-phase sample. The resulting Widal result may lack sensitivity and specificity, particularly in a community with endemic typhoid fever<sup>8</sup>. Worldwide; approximately 17 million people are infected every year by this pathogen<sup>9</sup>. Typhoid fever still continues to be one of the major public health problems particularly in developing countries. In Bangladesh, the overall incidence of typhoid fever is 390 cases per 100,000 populations

per year<sup>11</sup>. *Salmonella Paratyphi* is also becoming a substantial cause of emerging cases of enteric fever from many Asian countries.

Brucellosis is an ancient and one of the world's most widespread zoonotic diseases affecting both, public health and animal production. It is endemic in many developing countries of Asia, Africa and Latin America including Bangladesh<sup>13</sup>. Aim of the study was to determine the status of febrile antigen in community acquired febrile illness patient in outpatient department in a tertiary care hospital.

## Methodology

This cross sectional study was conducted in the laboratory of the Department of Microbiology at TMSS Medical College, Bogura, Bangladesh. This was a 700 bedded Hospital. This study was carried out from May 2019 to November 2019 for a period of 6 months. All the patients at any age with both sexes presented with febrile illness irrespective of antibiotic treatment, who were attended at the OPD were taken as study population. History of Fever with any obvious focus for other infection such as urinary tract infection, otitis media etc. were excluded. History of immunization with typhoid vaccines also excluded. Blood from all patients was taken by aseptic procedure. Triple antigen reagent (Linear, Spain) was used. Procedure has been performed according to manufacturer instruction. Interpretation was done according to Bakr et al<sup>14</sup>. *Salmonella typhae* O and H agglutinin titres > 1:80 and > 1: 160 were considered to be significant with 88% sensitivity and 98% specificity respectively<sup>15</sup>. Statistical analysis was performed by SSPS 25.0. Qualitative variables were expressed as frequency and percentage. Quantitative variables were expressed as mean with standard deviation.

## Result

A total number of 140 samples were collected after fulfilling the inclusion and exclusion criteria and among them 74(52.86%) cases were positive by any three type of test (Table 1).

**Table 1: Rate of Positive Febrile Antigen among Study Population**

Febrile Antigen Test	Frequency	Percent
Positive	74	52.86
Negative	66	47.14
<b>Total</b>	<b>140</b>	<b>100</b>

Rate of bacterial species present among study population *Salmonella* species and Rickettsia

species were 36(48.6%) cases, 40(54.1%) cases respectively but none in case of *Brucella* species (Table 2).

**Table 2: Rate of Bacterial Species Present Among Positive Study Population**

Type of Bacteria	Frequency	Percent
<i>Salmonella spp</i>	36	48.64
<i>Rickettsia spp</i>	40	54.05
<i>Brucella spp</i>	00	00.00
Both	10	13.51

Male and female were 27.03% cases and 72.97% cases respectively among the positive study population (Table 3).

**Table 3: Gender Differences among Positive Febrile Antigen Study Population**

Gender	Frequency	Percent
Male	20	27.03
Female	54	72.97
<b>Total</b>	<b>74</b>	<b>100</b>

Most common age group were 21-30 years of age which was 29.73% (22/74) (Table 4).

**Table 4: Age distribution of positive cases among study population**

Age Group	Frequency	Percent
1 To10 Years	10	13.51
11 To 20 Years	12	16.22
21 To 30 Years	22	29.73
31 To 40 Years	18	24.32
41 To 50 Years	10	13.51
51 To 60 Years	0	0.00
More than 65 Years	2	2.70
<b>Total</b>	<b>74</b>	<b>100.0</b>

Significant titre for TO (1:320) is more than others and it is 66.66% (24/36) (Table 5).

**Table 5: Distribution of TO and TH among Widal positive population**

Titre	<1: 160	>1:320	Total
TO	12(33.33%)	24(66.66%)	36
TH	17(46.66%)	19(53.33%)	36

## Discussion

Febrile illnesses due to bacterial etiologies are significant for increasing morbidity and mortality

particularly in children in developing countries, including Bangladesh<sup>13</sup>. The bacterial diseases such as urinary tract infections (UTI), acute respiratory tract infections and typhoid fever have been reported as common causes of fever in children in Bangladesh<sup>1</sup>. Furthermore, bacterial zoonotic diseases such leptospirosis and brucellosis have also been reported<sup>13</sup>. Brucellosis is a neglected bacterial zoonotic disease in many countries affecting both humans and animals.

In this study 74(52.86%) cases were positive in total 140 patients, either any of three antigen. So far, we did not find any published data about febrile antigen test in this region. Among them 36 (48.64%) were positive by *Salmonella spp.*, 40 (54.05%) by *Rickettsia spp.* and 10 (13.51%) by both positive (table II), there was no positive about *Brucella spp.* Some reported an enteric fever rate of 23.1% in Nepal, 14.3% in India, 30.7% in Bangladesh, 14.3% in Nigeria, and 4.1% in Addis Ababa, Ethiopia<sup>14</sup>. In this study it was very high comparison with other studies may be due to small sample size. But Chowdhury MAY was found 83.33% Widal positive<sup>15</sup>. The true prevalence of brucellosis in domestic animals and humans is very limited and is essential for analyzing the impact of this disease in Bangladesh. Islam MA and his colleagues found that *Brucella* prevalence was (2.5-18.6) % in Bangladesh<sup>16</sup>. Chowdhury et al<sup>17</sup> found *Rickettsia felis* in blood samples from all the regions in Bangladesh was 19.6% cases. In this study *Brucella* species was not found, it may be due to patients attended at OPD may not have history of contact with domestic animals. Another important cause may be our sample size is small and limited time duration. There were 54 (72.97%) female positive by triple antigen test; however, Sattar et al<sup>18</sup> shown more common in male. The cause may be socio demographic variation.

In this study we found (21 to 30 years) were more common 22 (29.73%) cases. This finding was not correlates with the observation made by Saha<sup>19</sup> and associates who found that children between 2 to 3 years of age are most susceptible age group (35.6%). But similar by Sattar et al<sup>18</sup>. It may be due to Saha<sup>19</sup> and associates studied under the age group of <18 years, where we included up to 65 years. TO titre in this study was 24(66.66%) cases >1:160 and TH titre was 19(53.33%) cases >1: 160, which was similar with Chowdhury<sup>15</sup> who found TO titre positive (> 1: 160) 66.6%, which is greater than TH titre 56.6% cases. There are some limitations of this study. In the present study there was no control group. We could not confirm bacteriologically and serologically (compare rising titre) of typhoid fever.

## Conclusion

High prevalence of *Salmonella spp.* and *Rickettsia spp.* in this study was observed and it was very alarming, this study recommended further study needed by researchers as well as relevant authority.

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