



## Age and Gender Difference of Typhoid Fever among Paediatric Patients Attended at a Tertiary Care Hospital in Bangladesh

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[Received: 10 January 2016; Revised: 12 March 2016; Accepted: 26 October 2016; Published: 1 December 2016]

### Abstract

**Background:** Typhoid fever varies according to different age and gender of the patients. **Objective:** The purpose of the present study was to observe different age and gender of typhoid fever patients among the paediatric group. **Methodology:** This cross sectional study was conducted at Department of Microbiology at Sir Salimullah Medical College, Dhaka, Bangladesh from January 2006 to December 2008 for a period of two (2) years. Blood samples from clinically suspected typhoid fever patients of different age and sex group was collected. Blood culture was done in all patients in the first week of illness. Widal test was done in all patients by using the first serum samples and in case of culture negative patients second serum samples (paired sera) were also tested by widal agglutination test. DOT Enzyme Immunoassay was also done in culture positive and culture negative typhoid patients by using the first serum sample. **Result:** A total number of 118(59%) paediatric patients were recruited. The highest rate of blood culture positivity for *S. typhi* was found among patients within 6 to 15 years of age group (19.14%). The rate of isolation of *Salmonella typhi* from blood of male patients were 19(15.1%) out of 126 cases and female patients were 11(14.9%) ( $P>0.05$ ). The highest number of patients was in the low income group (72.5%). Highest number, 37(63.8%) patients were within the 6-15 years of age group followed by 13(22.41%) in 16-25 years age group. **Conclusion:** In conclusion typhoid fever mostly occurs in the age group of 6 to 15 years male patients with low socioeconomic status. [Bangladesh Journal of Infectious Diseases 2016;3(2):36-39]

**Keywords:** Typhoid fever; *Salmonella typhi*; enteric fever; Widal test

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**Conflict of interest:** There is no conflict of interest to any of the authors of this article.

**Funding agency:** This research work was performed by own cost. There was funding agency had given the support.

**Contribution to authors:** AFMAS, MAY & NH were involved from protocol preparation up to report writing. SMJHC, MB, WB & SJ were revised the manuscript.

**How to cite this article:** Sattar AFMA, Chowdhury MSJH, Yusuf MA, Jesmin S, Ara S, Islam MB. Age and Gender Difference of Typhoid Fever among Paediatric Patients Attended at a Tertiary Care Hospital in Bangladesh. Bangladesh J Infect Dis 2016;3(2):36-39

## Introduction

Typhoid fever is a systemic infectious disease of the reticulo-endothelial system characterized by an acute illness<sup>1</sup>. The first typical manifestations are fever, headache, abdominal pain, relative bradycardia, splenomegaly, and leukopenia<sup>2</sup>. It is a life-threatening illness caused by *Salmonella enterica* subspecies *enterica* serotype *typhi*<sup>3</sup>.

It is distributed worldwide. Typhoid fever was an important cause of illness and death in the overcrowded and unsanitary urban conditions of the United States and Europe in the 19<sup>th</sup> century<sup>4</sup>. From a study by WHO, there was 16.6 million cases of typhoid fever in all around the world with a 60,000 deaths in each year<sup>5</sup>. In the United States, 2445 cases were reported to the Centers for Disease Control and Prevention between 1985 and 1994, 72% of which were imported while traveling internationally, most frequently from Mexico or India<sup>6</sup>. The provision of clean water and good sewage systems led to a dramatic decrease in the incidence of typhoid in these regions. Despite its diminishing incidence in the United States and Europe, typhoid fever remains a major cause of illness in many parts of the developing world with an estimation of 12.5 million cases each year<sup>7</sup>. It is endemic in many developing countries particularly in Indian subcontinent, South and Central America, the most part of sub-Saharan Africa and also Southeast Asia<sup>8</sup>. It is also a major public health problem in developing countries like Bangladesh<sup>9</sup>. Reliable data from which to estimate the burden of disease in these areas are difficult to obtain, since many hospitals lack facilities for blood culture and up to 90.0% of patients with typhoid are treated as outpatients<sup>10</sup>. The purpose of the present study was to observe different age and gender of typhoid fever patients among the paediatric group.

## Methodology

This cross sectional study was conducted at Department of Microbiology at Sir Salimullah Medical College, Dhaka, Bangladesh from January 2006 to December 2008 for a period of two years. Laboratory works were performed in Microbiology Department. A total number of 200 clinically suspected typhoid fever patients of different age groups who attended at the outdoor department (OPD) of Sir Salimullah Medical College, Dhaka and Dhaka Medical College, Dhaka, were included in this study. All patients who have high grade of temperature for more than 4 days and a clinically suspicion of typhoid fever were included in this study. Patients taking antibiotics prior to come to

outdoor department (OPD) and patients having others diagnosed febrile diseases were excluded from the study. Patients under therapy on immunosuppressive drugs were also excluded from this study. Blood was taken from each patient in the first week of illness from the 200 cases for culture and serological tests. A second blood sample was collected only from the culture negative patients 7 to 10 days after collection of the first blood sample to demonstrate rise in titre in Widal test. Verbal consents were taken from the patients or from their attendants before collection of samples. With all aseptic precautions, blood was collected from 200 patients. Blood culture was performed in conventional method. Suspected colonies were identified as *Salmonella typhi* by Gram stain and motility test followed by inoculation into Kligler Iron agar (KIA) and Motility Indole Urea (MIU) media. The suspected organisms were further confirmed by biochemical tests and by specific antisera. Widal agglutination test was done in all patients using the 1<sup>st</sup> serum samples and in culture negative patients also using the 2<sup>nd</sup> serum samples (Paired sera) and by rapid slide titration method, using stained febrile antigens (Plasmatec Laboratory products Ltd., UK) containing O and H antigens of *Salmonella typhi* and O and H antigens of *Salmonella paratyphi* A and B with serial dilutions of sera beginning at 1:20. Dot enzyme Immunoassay was done as per manufacturer's instruction using the 1<sup>st</sup> serum samples from all groups of patients and controls.

## Result

A total number of 118(59%) paediatric patients were recruited of which majority were in the age group of 6 to 15 years which was 94(79.7%) cases followed by 2 to 5 years and 0 to 1 years which were 22(18.6%) cases and 2(1.7%) cases respectively (Table 1).

**Table 1: Age Variation among the Study Populations (n=118)**

Age group (Years)	Frequency	Percentage
0 to 1	2	1.7
2 to 5	22	18.6
6 to 15	94	79.7
<b>Total</b>	<b>118</b>	<b>100.0</b>

The highest rate of blood culture positivity for *S. typhi* was found among patients within 6 to 15 years of age group which was 18(19.1%). In 2 to 5 years

age group only 2(9.1%) cases were culture positive (Table 2).

**Table 2: Age Variation according to Confirmed Typhoid Fever Paediatric Patients (n=20)**

Age Group	Confirmed Typhoid Fever		Total
	Positive	Negative	
0 to 1 Years	0(0.0%)	2(100.0%)	2(100.0%)
2 to 5 Years	2(9.1%)	20(90.9%)	22(100.0%)
6 to 15 Years	18(19.1%)	76(80.9%)	94(100.0%)
<b>Total</b>	<b>20(16.9%)</b>	<b>98(83.1%)</b>	<b>118(100.0%)</b>

Male was predominant than female which was 74(62.3%) cases and 44(37.3%) cases respectively. The ratio of male and female was 1.7:1 (Table 3).

**Table 3: Gender Difference among the Study Populations (n=118)**

Gender	Frequency	Percentage
Male	74	62.7
Female	44	37.3
<b>Total</b>	<b>118</b>	<b>100.0</b>

The rate of isolation of *Salmonella typhi* from blood of male patients were 19(25.7%) out of 74 cases and female patients were 11(14.9%). There is no significant ( $P>0.05$ ) difference between male and female patients (Table 2).

**Table 3: Rate of Positivity of Confirmed Typhoid Fever Patients according to Gender (n=118)**

Gender	<i>Salmonella typhi</i>		Total
	Positive	Negative	
Male	13(17.6%)	61(82.4%)	74(100.0%)
Female	7(15.9%)	37(84.1%)	44(100.0%)
<b>Total</b>	<b>20(16.9%)</b>	<b>98(83.1%)</b>	<b>118(100.0%)</b>

Out of 200 patients the highest number of patients was in the low income group which was 145(72.5%) cases and the number of patients was lowest in high income group which was 8(4%) cases (Table 3).

**Table 3: Socioeconomic Status of the Study Populations (n=118)**

Income group	Male	Female	Total
Lower	87(43.5%)	58(29%)	145(72.5%)
Middle	34 (17%)	13(6.5%)	47(23.5%)
Higher	5 (2.5%)	3(1.5%)	8(4%)

Total	126	74	200
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## Discussion

Typhoid fever is endemic in many developing countries particularly in the Indian subcontinent including Bangladesh<sup>11</sup>. It is a dreaded disease because of its long course if not detected & treated early and its associated complications<sup>12</sup>. There are reports of changing clinical features in typhoid fever caused by drug resistant organism<sup>13</sup>. This leads to difficulty in clinical diagnosis. The gold standard in the diagnosis of typhoid fever is the isolation of *S. typhi* from the patient's blood.

Human restricted *Salmonella enterica* serotype Typhi causes typhoid fever and globally more than 21 million cases of *S. Typhi* infection and 216,510 deaths due to typhoid fever are reported each year<sup>13</sup>. In endemic areas such as Bangladesh and India, young children under 5 years of age bear a large burden of *S. Typhi* infection<sup>17</sup>, although it has been suggested that typhoid fever may be less severe in such young children<sup>6</sup>. In reality, the immunological responses and clinical characteristics in young children with *S. Typhi* bacteremia have to date remained poorly characterized. Similarly, it has also been suggested that infection with multi-drug resistant (MDR: resistant to ampicillin, chloramphenicol, trimethoprim / sulfamethoxazole) *S. Typhi* may impact clinical severity and outcome although little is known about MDR *S. Typhi* infection in young children<sup>13</sup>.

However, isolation of the organism takes at least 48-72 hours and the yields is often very low at 40-75%, hence limiting its use to a confirmatory basis only<sup>14</sup>. Widal test has become the most commonly used serologic test in the diagnosis of typhoid fever in endemic areas of the developing world where bacteriologic facilities are lacking<sup>15</sup>. But the test has limitations such as the difficulty in interpretation, the need to demonstrate a four-fold rise after a week and necessity of knowing the endemicity of the area<sup>16</sup>. So, to avoid prolonged hospital confinement and associated mortalities, there is a need for a rapid diagnostic test that is reliable, simple and economical. Several tests like counter-immunoelectrophoresis and haemagglutination assay<sup>17</sup> have been developed but none of them gained widespread use because of methodological difficulties.

In the present study a total of 30 *Salmonella typhi* was isolated with an isolation rate of 12%. Similar

findings were also reported from Philippines<sup>19</sup> and from Nigeria<sup>20</sup> who found an isolation rate of 18.40% and 10.3% respectively. Similarly, Asna and Haq<sup>21</sup> from Bangladesh reported an isolation rate of 19.2%. Jhora<sup>22</sup> from Bangladesh reported an isolation rate of 27.5%. The disease affected all ages, however most of the patients 170(68%) of these study were between 6 to 15 years of age. This finding correlates with the observation made by Jhora<sup>22</sup> who found that 61.67% of patients were within 15 years of age. The highest number of patients in this age group was perhaps due to exposure to external environment and practice of taking pre-cooked food from street hawkers<sup>11</sup>.

## Conclusion

In conclusion this study permits to conclude that typhoid fever mostly occurs in the age group of 6 to 15 years. Furthermore, it occurs more commonly among the male than female. Interestingly low income group are mostly suffered from typhoid fever. Further large scale study should be carried out in Bangladesh.

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