

“Comparison of clinical profile considering typhoid Fever among Children in a tertiary hospital, Bangladesh”

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ABSTRACT: A case-control type of study was conducted over a period of 6 (Six) months following approval in the Department of Paediatric of Dhaka Shishu Hospital, Dhaka to compare clinical profile considering Typhoid fever among children. The sample size for this study was 240, divided into two groups A) 120 cases and b) 120 controls. Most of the study participants were from younger age group ≤ 5 years; 63.3% of cases and 80.8% of control. Mean \pm SD of age were (5.1042 ± 3.11575) for cases and (3.5951 ± 2.50218) for controls Age distribution of the children was statistically significant where p-value was 0.0001 for t-test and 0.01151045 for chi-square ($p < 0.05$). There was no positive association of different blood group but when each group was individually considered, blood group ‘B’ indicated there may be some positive association ($RR = 1.4505$, $OR = 1.8713$ and $\chi^2 = 4.66$, $p = 0.030873$). Only 3.3% children in case group and 4.2% in control group had Rh negative blood group. Widal test result was positive in 83.3% of cases; the remaining 16.7% were found to be Widal negative. The difference was statistically significant ($\chi^2 = 18.22$, $p = 0.0001$). Blood culture was done in only 50 (41.7%) participant from the case group among them only 4 were negative culture and the difference was statistically significant ($\chi^2 = 52.585$, $p = 0$, ($P < 0.05$). Typhoid fever has a strong relation with blood phenotypes.

Key words: Clinical profile, Widal Test, Typhoid fever, blood phenotype ABO, Rh

I. INTRODUCTION

Typhoid fever is a systematic clinical syndrome by certain salmonella organism. It encompasses produced by certain *Salmonella typhi*, and Para typhoid fever is caused by *Salmonella paratyphi*.¹ Typhoid fever is rare in industrial countries but continues to be a significant public-health issue in developing countries.² The incidence, mode of transmission and consequences of typhoid fever differs significantly in developed and developing countries. The incidence has decreased markedly in developed countries. In the United States about 400 cases of enteric fever are reported each year giving an annual incidence of less than 0.2% per 1, 00,000 population which is similar to that in western, Europe and Japan.³

Typhoid fever is transmitted via the faecal oral route or urine. This may take place directly through soiled hands, contaminated with faeces or urine of cases or carrier or indirectly by ingestion of contaminated water, milk, food or through flies.⁴ Typhoid fever is an important cause of morbidity and mortality in many developing countries. In 2000, it was estimated that over 2.16 million episodes of typhoid occurred worldwide, resulting in 216 000 deaths, and that more than 90% of this morbidity and mortality occurred in Asia.⁵ Typhoid fever is endemic in all parts of Bangladesh and still constitutes a significant health hazard. The resistance of *Salmonella enterica* subspecies *enterica* serovar *typhi* (*S. Typhi*) to chloramphenicol was first reported in India from Kerala, where a substantial outbreak took place in 1972. Since then multidrug-resistant strains of *S. typhi* have escalated into a worldwide problem. The steadily increasing multidrug resistance in *S. typhi* strains is a cause of grave concern in Bangladesh, where such strains are endemic in many parts.⁶ Typhoid fever may occur at any age, but it is considered to be a disease mainly of children and young adults. In endemic areas, the highest rate occurs in children aged 8-13 years. In a recent study from slums of Delhi, it was found that contrary to popular belief, the disease affects even children aged one to five years. About 20-30% of typhoid fever cases are children below ten years.³ Human ABO blood group have been associated with susceptibility to certain infection.^{9, 10} It has been observed that some historical pandemics have influenced the current distribution of the ABO gene frequencies in different part of the world.¹¹ Various adaptations of people with different phenotypes of ABO blood group are considered to be the result of screening mutagens. Immunologists explain this by the presence of some pathogens of antigens similar to antigens of human blood.¹²

During long-term observations it is found that the holders of blood groups O, A, B, and AB have different predisposition to diseases. Statistical studies confirm that holders of blood group A get sick of viral hepatitis more often, and O-type people are less resistant to influenza virus.¹² According on the blood group, children under 7 years old usually get sick with diseases such as paratyphoid fever, rubella, scarlet fever, colibacillosis, and among children with blood group A it fails to develop immunity against smallpox even at re-vaccination.¹²

So, there is a great need for the people to be aware of all the consequences of typhoid fever and it is the most important area where the health personnel should take serious measures to create an understanding and awareness among the public regarding typhoid fever and its risk factors. Typhoid fever continues to be a major health problem in Bangladesh. In the topical areas however, it is endemic in many places, due to the low standard of living, unprotected water supply and unhygienic methods in the preparation and handling of food. Many children with Typhoid fever are admitted in the hospital with various complications.

Few studies have been performed worldwide about these particular topics of Typhoid fever. But in Bangladesh such studies are practically absent. If these can be done then probably we will be able to increase the awareness about Typhoid fever so they may enjoy a good quality of life

II. OBJECTIVES

General objective:

1. To assess clinical profile considering typhoid among children.

Specific objectives:

1. To find out blood groups among children in a tertiary hospital in Bangladesh
2. To find out blood phenotype among children in a tertiary hospital in Bangladesh

III. MATERIALS AND METHODS

We conducted a case-control study among the child admitted with fever in Dhaka Shishu (children) hospital. After getting written permission from the concerned authority of the selected Institute the patients were approached. The study included children of paediatric age group both male and female. For each baby detailed history of age, sex, socio-economic information, and blood group were recorded. Subjects were grouped on the basis of age, sex, blood phenotypes, ABO and Rh into the case (Typhoid positive) and controls (Typhoid negative). Then assessed association between fever and socio-economic, demographic and environmental conditions. 240 samples were purposively selected for the study which was divided into 120 cases and 120 controls. 1 to 18 years old children and toddlers were included in the study who were suffering from typhoid as case and suffering from any febrile illness, other than typhoid fever as control group. Participants suffered from meningitis, febrile convulsion, immune-compromised children, unwillingness to participate were excluded from the study. Prior to data collection, a questionnaire was designed for this study by reviewing all the available questionnaire of previous studies. The questionnaire was finalized following pretesting. Prior to answering the semi-structured questionnaire, every respondent had to undersign an informed written consent. All the data were collected and recorded systematically in a questionnaire and was analyzed using computer software SPSS - 17 (Statistical Package for Social Sciences).

IV. RESULTS

This study was undertaken with the objective to assess the association between Typhoid fever and age, sex and blood phenotypes ABO and Rh group among children. A total of 240 children, out of whom 120 were suffering from typhoid fever (cases) and 120 were non-typhoid (controls), were included in this study.

Table: 1 Demographic characteristics of the respondents (n=240)

| Respondents | Case (%) | Control (%) | χ^2 | P-value |
|-----------------------------------|----------|-------------|----------------|------------|
| Gender | | | 3.069 | 0.07979854 |
| Male | 20.8 | 31.7 | | |
| Female | 79.2 | 68.3 | | |
| Age groups of the children | | | 4.009(t-test) | 0.0001 |
| ≤ 5 | 63.3 | 80.8 | | |
| 5-10 | 26.7 | 16.7 | | |
| 10> | 10.0 | 2.5 | | |
| Religion | | | 1.709 | 0.42549589 |
| Muslim | 95.0 | 90.9 | | |

| | | | | |
|---------------------------------------|------|------|--------|------------|
| Hindu | 5.0 | 8.3 | 48.024 | 0.0001 |
| Others | 0 | 0 | | |
| Educational status of the respondents | | | | |
| Illiterate | 4.2 | 0.8 | | |
| Primary | 30.8 | 7.5 | | |
| Secondary | 21.7 | 28.3 | | |
| Higher secondary | 15.0 | 51.7 | | |
| Graduate | 20.0 | 11.7 | | |
| University | 8.3 | 0.0 | 10.676 | 0.00480547 |
| Occupation of the respondents | | | | |
| Job | 57.5 | 65.8 | | |
| Business | 28.3 | 32.5 | | |
| Others | 14.2 | 1.7 | | |

The most of the caregiver of the children were female, 79.2% in cases and 68.3% in controls. $\chi^2 = 3.069$, $df = 1$, $p\text{-value} = 0.07979854$; which means there are no any association between different gender groups of the caregivers. By age distributions of both groups ‘ ≤ 5 years’ age group dominated the distribution; 63.3% of Cases group and 80.8% of Controls group were in this group. Mean \pm SD of age was calculated to be, (5.1042 ± 3.11575) for Cases group and for Controls group (3.5951 ± 2.50218) . The $p\text{-value}$ was 0.0001 for t-test and 0.01151045 for chi-square, which means there was an association in age distribution between the groups. ($p < 0.05$). It is illustrated that more than half of the participants in both Cases group [83 (69.2%)] and Controls group [66 (55.0%)] were Males. Male and Female ratio was about 2.25:1 in cases and 1.2:1 in controls. There might be a positive association between male gender and typhoid fever. Accordingly, the difference in male-female distribution between the groups was statistically significant ($\chi^2 = 4.284$, $df = 1$; $p\text{-value} = 0.03847271$) ($p < 0.05$).

Table-2: Laboratory findings of all study participants (n=240)

| Blood Group | Cases (n=120) Percent | Controls (n=120) Percent | Statistical calculations |
|-------------|-----------------------|--------------------------|---|
| O | 16.7 | 27.5 | RR=0.6073; 95% CI: 0.3535-1.0433 OR=0.5285; 95% CI: 0.2665-1.0482 $\chi^2 = 3.39$; $p\text{-value} = 0.065593$ |
| A | 25.0 | 25.0 | RR=1.0; 95% CI: 0.5272-1.6162 OR=1.0; 95% CI: 0.6187-1.8967 $\chi^2 = 0.0$; $p\text{-value} = 1.0$ |
| B | 48.3 | 33.3 | RR=1.4505; 95% CI: 1.0287-2.0452 OR=1.8713; 95% CI: 1.0565-3.3144 $\chi^2 = 4.66$; $p\text{-value} = 0.030873$ |
| AB | 10.0 | 14.2 | RR=0.7042; 95% CI: 0.3293-1.5061 OR=0.6714; 95% CI: 0.2837-1.5889 $\chi^2 = 0.83$; $p\text{-value} = 0.362273$ |

It is illustrates that in a gross calculation, there was no statistically difference in distribution of ABO blood group of the children between cases and controls ($\chi^2 = 6.125$ $df = 3$; $p\text{-value} = 0.10568457$). However, when each group was individually considered, blood group ‘B’ indicated there may be some positive association with typhoid fever [RR = 1.4505 (95% CI: 1.0287-2.0452) and OR = 1.8713 (95% CI: 1.0565-3.3144)]. The difference was statistically significant $\chi^2 = 4.66$, $df = 1$; $p\text{-value} = 0.030873$. ($p < 0.05$)

Table-3: Laboratory findings of all study participants (n=240)

| Blood group | Cases (n=120) Percent | Controls (n=120) Percent | Statistical calculations |
|--------------------|-----------------------|--------------------------|---|
| Rh typing of Blood | | | |
| Positive | 96.7 | 95.8 | RR=0.7857; 95% CI: 0.1909-3.2341 |
| Negative | 3.3 | 4.2 | OR=0.7784; 95% CI: 0.1791-3.3828 |
| | | | $\chi^2 = 0.112$ $df = 1$; $p\text{-value} = 0.73787855$ |

| Widal Test | | | |
|---------------|------|-----|--|
| Positive | 83.3 | 0 | $\chi^2 = 18.22$ df= 1; p-value=0.0001 |
| Negative | 16.7 | 100 | |
| Blood Culture | | | |
| Not done | 58.3 | 100 | $\chi^2 = 52.585$; df= 2; p-value = 0 |
| Positive | 38.3 | 0 | |
| Negative | 3.3 | 0 | |

Above Table shows that only 3.3% children in case group and 4.2% in control group had Rh negative blood group. There was no positive association [RR = 0.7857 (95% CI: 0.1909-3.2341) and OR = 0.7784 (95% CI: 0.1791-3.3828). Widal test result was positive in 83.3% of cases; the remaining 16.7% negative in case group and all (100.0%) of the controls were found to be Widal negative in control group. The difference of Widal test result between the groups was statistically significant $\chi^2 = 18.22$, df= 1; p-value < .0001. (p< 0.05). Participants were included on the basis of their blood culture and/or Widal test findings; patients who had already done either one or both of the tests were considered for this study. Thus, blood culture was done in 50 (41.7%) participants from the case group; out of them negative culture was obtained in 4 (3.3%) individual and the remaining 46 (38.3%) were culture positive. The difference was statistically significant $\chi^2 = 52.585$, df= 2; p-value = 0. (p< 0.05)

V. DISCUSSION

This study was aimed to compare clinical profile among two groups considering Typhoid Fever in a tertiary hospital in Bangladesh. A total of 120 cases (typhoid fever) and 120 controls (non-typhoid) were included in this study. In both groups most of the study participants were in the ‘≤ 5 years’ age group, Mean ± SD of age was, (5.1042 ± 3.11575) for cases and for controls (3.5951 ± 2.50218), p-value was 0.0001 for t-test and 0.01151045 for chi-square, which means there was statistically difference in age distribution between the groups (p<0.05). On gross calculation, there was no statistically difference in distribution of ABO blood group of the children between cases and controls ($\chi^2 = 6.125$ df= 3; p-value = 0.10568457). However, when each group was individually considered, blood group ‘B’ indicated there may be some positive association with typhoid fever [RR = 1.4505 (95% CI: 1.0287-2.0452) and OR = 1.8713 (95% CI: 1.0565-3.3144)]. The difference was statistically significant $\chi^2 = 4.66$, df= 1; p-value = 0.030873. Valenzuela CY and Herrera P found that, the B allele conferred protection to females. Herrera P et.al. Tested a hypothesis that blood phenotype B is associated to typhoid fever either directly or interacting with other phenotypes of the Rh or MNSs blood systems.³⁸ Only 3.3% children in case group and 4.2% in control group had Rh negative blood group. There was no positive association [RR = 0.7857 (95% CI: 0.1909-3.2341) and OR = 0.7784 (95% CI: 0.1791-3.3828)]; nor any statistically difference in distribution of the blood group of the children between cases and controls ($\chi^2 = 0.112$ df=1; p-value = 0.73787855). Valenzuela CY and Herrera P reported the CDe haplotype (or the RH3 phenotype, mostly CDe/CDe) was associated with protection against Salmonella in both sexes, while cDE (or RH7, mostly cDE/cDE, and RH8, mostly cDE/cde) was associated with susceptibility to typhoid fever. Widal test result was positive in 83.3% of cases; the remaining 16.7% of cases and all (100.0%) of the controls were found to be Widal negative. The difference of Widal test result between the groups was statistically significant $\chi^2 = 18.22$, df= 1; p-value < .0001. Blood culture was done in 50 (41.7%) participant from the case group; out of them negative culture was obtained in 4 (3.3%) individual and the remaining 46 (38.3%) were culture positive. The difference was statistically significant $\chi^2 = 52.585$, df= 2; p-value = 0.

VI. LIMITATIONS OF THE STUDY

This study was conducted in a tertiary care hospital in Dhaka. Therefore the study findings might not reflect real situation of all around the country relating to Typhoid Fever. The present study was conducted among 240 symptom children, not a large study to draw an exact conclusion regarding enteric fever. Very limited study so far found concerning typhoid fever related to clinical conditions in Bangladesh however conjointly within the whole world. So, problem was faced to match the findings to alternative analysis findings

VII. CONCLUSION AND RECOMMENDATIONS

Finding out clinical profile is important before going to treat the child. Different Blood phenotype has an association of typhoid fever among children. So, Besides Improving environmental conditions and socio-economic status need to consider clinical profile before treating them who are already affected. This was

a small-scale study done at a single centre over a brief period of time. A large scale, multi-centre study over long duration will give a complete picture on association of typhoid fever with various factors.

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