Scholars Journal of Applied Medical Sciences (SJAMS)
Abbreviated Key Title: Sch. J. App. Med. Sci.
©Scholars Academic and Scientific Publisher
A Unit of Scholars Academic and Scientific Society, India
www.saspublishers.com

ISSN 2320-6691 (Online)
ISSN 2347-954X (Print)

Paediatrics

Relationship between Typhoid Fever and Socio-Economic, Demographic and Environmental Conditions among Children in A Tertiary Hospital, Dhaka, Bangladesh

Dr. Amal Kanti Banik[1*], Dr. Nurul Kabir[2], Dr. Jahangir Alam[3]
[1]Registrar, MBBS, DCH, Dhaka Shishu Hospital, Dhaka, Bangladesh
[2]Consultant (Anesthesiology), Medi Home Hospital, Pirerbag, Mirpur, Dhaka, Bangladesh
[3]Professor, Department of Paediatric Rheumatology, Dhaka Shishu Hospital, Dhaka, Bangladesh

Original Research Article

***Corresponding author**
Dr. Amal Kanti Banik

Article History
Received: 02.10.2018
Accepted: 11.10.2018
Published: 30.10.2018

DOI:
10.36347/sjams.2018.v06i10.033

Abstract: Typhoid fever is an acute disease associated with several social factors and is most often caused by the Salmonella typhi bacteria. Typhoid fever is a rare disease in industrial countries but continues to be a significant public-health issue in developing countries. Aim of this study is to assess the association between Typhoid fever and socio-economic, demographic and environmental conditions among children. A case-control type of study was conducted over a period of 6 (Six) months following approval, in Department of Paediatric of Dhaka Shishu Hospital, Dhaka The sample size for this study was 240 (120 cases and 120 controls). Out of 120 participants, in 79.2% cases and 68.3% controls respondents were the mother of the child. In both groups most of the participants were from younger age group; 63.3% of cases and 80.8% of controls aged ≤ 5 years. Mean ± SD of age was (5.1042 ± 3.11575) for cases and for controls (3.5951 ± 2.50218). There was a statistical difference in age distribution p = 0.0001 for t-test and 0.01151045 for chi-square, ($p<0.05$) More than half of the participants in both group (69.2% cases and 55.0% controls) were Males. Male: Female ratio was about 2.25:1 and 1.2:1 respectively. There was a positive association between male gender and typhoid fever (RR=1.2582 and OR=1.8383). Accordingly, the difference was statistically significant (χ^2 = 4.284, p = 0.03847271). The low incoming family was more among cases (17.5%) than the controls (16.7%). Mean ± SD of monthly income was (17,350.00 ± 8,799.016) in cases and (17,175.00 ± 6,847.268) in controls. In the conclusion, we can say, Typhoid fever has a strong relationship with socio-economic and environmental conditions.

Keywords: Typhoid fever, socio-economic, demographic, environmental conditions.

INTRODUCTION

Typhoid fever is a systematic clinical syndrome by certain salmonella organism. It encompasses produced by certain *Salmonella typhi*, and Paratyphoid 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, and food or through flies [4]. Typhoid fever is an important causes of morbidity and mortalityin 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 partsof Bangladesh and still constitutes a significant health hazard. The resistance of *Salmonella enterica* subspecies *enterica*serovarTyphi (*S.* Typhi) to chloramphenicol was first reported in Indiafrom Kerala, where a substantial outbreak took place in 1972. Since then multidrug-resistantstrains of *S. Typhi* have escalated into a worldwide problem. The steadily increasing multidrug resistancein *S. Typhi* strains is a cause of grave concern in Bangladesh; wheresuch 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]. According to Indonesia Demographic and Health Survey (2002 – 03) report prevalence of typhoid fever in children under five years of age was 26% [8]. 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 a 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 a 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 to 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]. Purification of supply water, improvement of basic sanitation and promotion of food hygiene are essential measures to interrupt transmission of typhoid fever[13].

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. 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. Now and then epidemics of varying virulence and severity occur [14]. Few studies have been performed worldwide about these particular topics of Typhoid fever. But in Bangladesh, such studies are practically absent. So, this study aimed to assess the relationship between Typhoid fever and socio-economic, demographic and environmental conditions among children.

OBJECTIVES

General objectives

- To the association between Typhoid fever and socio-economic, demographic and environmental conditions among children.

Specific objectives

- Typhoid fever scenarios in city dwellers
- To make awareness among city dwellers about Typhoid fever
- To give information to the researchers and policy makers for future projects in Typhoid fever

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. On the basis of Widal test and/or blood culture children were grouped into the case (Typhoid positive) and controls (Typhoid negative). Association with age, sex and blood group (ABO and R) is then calculated. 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).

RESULTS

This study was undertaken with the objective to assess the association between Typhoid fever and age, sex and blood phenotypes ABO and Rh 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 (%)	$\chi 2$	P-value
Gender	Male	20.8	31.7	3.069	0.07979854
	Female	79.2	68.3		
Age groups of the children	≤ 5	63.3	80.8	4.009(t-test)	0.0001
	5-10	26.7	16.7		
	10>	10.0	2.5		
Religion	Muslim	95.0	90.9	1.709	0.42549589
	Hindu	5.0	8.3		
	Others	0	0		
Educational status of the respondents				48.024	0. 0001
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			
Occupation of the respondents			10.676	0.00480547	
Job	57.5	65.8			
Business	28.3	32.5			
Others	14.2	1.7			

Table-2: Socio-economic and environmental condition of the respondents (n=240)

Respondents	Case (%), n= 120	Control(%), n=120	$\chi 2$	P-value
≤ 10,000	27.5	16.7	0.160	0.873
10,000-20,000	51.7	61.6		
> 20,000	20.8	21.7		
Mean ± SD	17,350.00 ± 8,799.016	17,175.00 ± 6,847.268		
Area of Residence				
Urban	89.20	96.70	4.134	0.04202989
Rural	10.80	3.30		
Water consumption		RR=0.8044; 95% CI: 0.6663-0.9713 OR=0.4894; 95% CI: 0.2647-0.9047 $\chi 2$ = 5.28; p-value = 0.021572		
		RR=0.33; 95% CI: 0.0981-1.11 OR=0.3071; 95% CI: 0.0857-1.1013 $\chi 2$ = 3.62; p-value = 0.057089		
		RR=2.6316; 95% CI: 1.4923-4.6405 OR=3.5101; 95% CI: 1.7283-7.1291 $\chi 2$ =12.85; p-value = 0.000337		
Boiled water	61.7	76.7		
Tube well	3.3	10.0		
Supply water	35.0	13.3		
Habitat				
Neat	61.7	89.2	RR=3.5463; 95% CI: 1.9158-6.5645 OR=5.1269; 95% CI: 2.4237-10.8452 $\chi 2$ = 20.41; p-value < 0.0001	
Crowdie	38.3	10.8		
Sanitation				
Sanitary	95.9	98	4.186	0.04075916
Hanging	3.3	1		
Open	0.8	1		
Food Habits				
Raw food	18.1	5.8	7.37	0.006632
No raw food	89.9	94.2		

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-value = 0.07979854; which means there are no any association between different gender groups. By age distributions of both groups were in the '≤ 5 years' age group; 63.3% of Cases group and 80.8% of Controls group were in the age group. Mean ± SD of age was calculated to be, (5.1042 ± 3.11575) for Cases group and for Controls group (3.5951 ± 2.50218). The p-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-value = 0.03847271) ($p<0.05$). Above table shows that low incoming family was more in cases [33 (17.5%)] than controls [20 (16.7%)]. Mean ± SD of monthly income was (17,350.00 ± 8,799.016) in cases and (17,175.00 ± 6,847.268) in controls. There was no association between the groups (t-test = 0.16, p-value = 0.873 and $\chi 2$ = 3.523, df = 2, p-value = 0.17178699).

DISCUSSION

This study was aimed to assess the association of Typhoid fever and socio-economic, demographic and environmental conditions among children. A total of 120 cases (typhoid fever) and 120 controls (non-typhoid) were included in this study. Most of the respondents were mothers of the child, 79.2% in cases and 68.3% in controls. Chi-square calculate: $\chi 2$ = 3.069, df = 1, p-value = 0.07979854; which explains that there was no significant statistical difference between the groups in distribution of respondents.

In both groups most of the participants were in the '≤ 5 years' age group; 63.3% of Cases group and 80.8% of Controls group were in the age group. Mean ± SD of age was, (5.1042 ± 3.11575) for cases and for controls (3.5951 ± 2.50218). The p-value was 0.0001 for t-test and 0.01151045 for chi-square, which means there was statistical difference in age distribution between the groups ($p<0.05$). A study in Dhaka Metropolitan Area found the age-specific incidence rate was highest for the 0–4 years age group (277 cases).41

More than half of the participants in both groups (69.2% cases and 55.0% controls) were Males. Male: Female ratio was about 2.25:1 in cases and 1.2:1 in controls. There was a positive association between male gender and typhoid fever (RR=1.2582 and OR=1.8383). Accordingly, the difference in male-female distribution between the groups was statistically significant ($\chi 2$ = 4.284, df = 1; p-value = 0.03847271) ($p<0.05$). Valenzuela CY and Herrera P found a mild susceptibility to males.39 The male-female ratio of typhoid cases was found to be 1.36 by Dewan AM, Comer R, Hashizume M and Ongee ET, suggesting that in this population males are either more susceptible to typhoid, or more likely to present for hospital treatment, than females 41.

Limitations of the study

This study was conducted in a tertiary care hospital in Dhaka. So the study findings may not reflect the exact scenario of all around the country regarding typhoid fever. The current study was conducted among 240 febrile children, not a large study to draw a definite conclusion about typhoid fever. Very limited study so far found regarding fever associated with environmental conditions, not only in Bangladesh but also in the whole world. So, difficulty was faced to compare the findings to other research findings

CONCLUSION AND RECOMMENDATIONS

Risk of typhoid fever is higher in children aged ≤ 5 years. Male are more susceptible to develop typhoid fever. Typhoid fever has positive association with the risk factors, such as, drinking supply water, eating raw or under cooked food, crowdie habitat and, use non-sanitary latrine. So, our recommendations are to Improvements of water-supply infrastructure or promotions of household disinfection of water represent important measures to reducing the burden of typhoid fever in endemic areas.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

REFERENCES

1. Mrs R.S. Tambulwadkar, "Paediatric nursing" Vora medical publications, 2nd edition, page 108.
2. Balentine JR. Typhoid fever. Available in [on line]: http://www.medicinenet.com/typhoid_fever/article.htm
3. Enteric fever. Textbook of Microbiology. Ananthanarayan and Paniker by Orient Blackswan; 7th ed. 295 – 303
4. .Introduction of typhoid fever. Available in [on line]: http//www.google.com.
5. Park. "Text book of preventive and social medicine" BanarsidasBhanot. 16th edition, 2000. page 187.
6. Crump JA, Luby SP, Mintz ED. The global burden of typhoid fever. Bull World Health Organ .2004; 82: 346-53.
7. Paniker CK, Vimala KN. Transferable chloramphenicol resistance in Salmonella typhi. Nature. 1972 Sep;239(5367):109.
8. Etward J E, Nowesn J. Prevalence of typhoid fever in children; Journal of paediatrics. 2004.
9. Ratner JJ, Thomas VL, Roland IN. The relationship between human blood group, bacteria pathogens

and urinary tract infections. The American J of Ned Sc. 1986; 292 (2): 87-9

10. Omoregie R, Ogufere HO, Omokaro EU, Omorogbe E. Distribution of ABO and Rhesus blood group and Haemoglobin phenotypes among Tuberculosis patients in Benin City – Nigeria J Med Lab Sc 11 (i). 2000; pp 68 – 70
11. Issit DD and Anstee DJ. Applied blood group Serology. 4th Ad. Montgomery Scientific Public. 1996; 218 – 246.
12. Admin. Blood Group and Susceptibility to Diseases. URL: http://www.yourbtdiet.com/blood-type-health/blood-group-and-susceptibility-to-diseases/
13. Preventive aspects of Typhoid fever; Available in [on line] http//www.alldisease.com
14. Dewan AM, Corner R, Hashizume M, Ongee ET. Typhoid Fever and its association with environmental factors in the Dhaka Metropolitan Area of Bangladesh: a spatial and time-series approach. PLoS neglected tropical diseases. 2013 Jan 24;7(1):e1998.
15. Schesselman J. Case Control Studies. 1982 p. 145.