Original research article

Evaluation of clinico-demographic and biochemical profile of paediatric patients diagnosed with typhoid Fever

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Abstract

Aim: To evaluate clinical & laboratory profile of typhoid fever in children in Bihar Region. **Methods:** A prospective observational study was conducted in the Department of Pediatric, Anugrah Narayan Magadh Medical College and Hospital, Gaya, Bihar, India from September 2019 to February 2020. Total 100 Children aged below 18 years with history of fever of more than 7 days duration were included in this study. In each case, age, sex, presenting complaint, laboratory investigations and antibiotic sensitivity pattern are collected and analysed.

Results: Out of 100 cases, 68 cases (68%) were males, 32 cases (32%) were females. The most common age group was 4-8 years. The most common symptom was fever (100%), followed by anorexia (64%), vomiting (47%), pain abdomen (19%), diarrhea (14%), headache (10%), and cough (6%). The most common sign was toxic look in 72% of the cases followed by coated tongue in 53%, hepatomegaly 40%, splenomegaly 22%, hepatosplenomegaly in 12% of cases and pallor in 8% of cases. Anemia found in 20 (20%) cases, leucopenia and leucocytosis was observed in 32 (32%) cases and 14 (14%) cases respectively. neutropenia found in 38 (38%) cases and neutrophilia was found in 35 (35%) cases. Eosinopenia was seen in 42 (42%) cases, eosinophilia in 9 (9%) cases and thrombocytopenia in 17(17%) cases. SGOT levels was elevated (>200IU/ml) in 10 (10%) cases and SGPT (>200IU/ml) in 13 (13%) cases.

Conclusions: Typhoid fever is most commonly observed with unhygienic practices and eating of unhealthy outside food. This major public health issue can be tackled by bringing awareness among people regarding disease transmission and its various preventive measures.

Keywords: Children, Clinical profile, Coated tongue, Typhoid fever

Introduction

Typhoid fever is an infectious disease caused by gram negative bacteria Salmonella enteric serovar typhi (S.typhi). In developed countries, the incidence of typhoid fever is less than 15 cases per 100,000 populations, with most cases occurring in travelers; whereas in developing countries the estimated incidence rate ranging from 100-1000 cases per 100,000 populations[1].

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It is endemic in developing countries where water supplies and sanitation are sub-standard[2]. Humans are the only natural reservoir of the organism. Direct or indirect contact with an infected person is a prerequisite for infection. The infected person sheds the bacteria in stool and urine. Ingestion of food or water contaminated with S. typhi from human feces is the most common mode of transmission[3]. Assessment of a child presenting with fever is always a challenge to most pediatricians. Typhoid fever is one of the common causes of fever in children with varied presentation and significant difference in the signs and symptoms compared to adults. Populationbased studies from South Asia indicate that age specific incidence of typhoid fever is highest in children under 5 years of

age, in association with comparatively higher rates of complications and hospitalization[1]. The gold standard of the diagnosis of typhoid fever is a positive result of culture from the blood, urine or stool[1].The classic Widal agglutination test is one of the most utilized diagnostic tests for typhoid fever, especially in developing countries[4]. In a country like Nepal where typhoid fever is endemic and the infrastructure for prompt laboratory diagnosis and management is not available at the all levels of health care system, it is largely diagnosed on the basis of clinical signs and symptoms in the outpatient clinics. This often leads to over or under diagnosis of typhoid fever.

Treatment of typhoid includes proper hydration, correction of electrolyte imbalance, antipyretic therapy and appropriate antibiotics. Soft and easily digestible food should be continued. The prognosis depends on the rapidity of diagnosis and the institution of appropriate antibiotics. Other factors which decide prognosis include patient age, general health status and nutrition. Children with malnutrition and multidrug resistance are at higher risk. Preventive measures include proper hand washing with disinfectants after defecation and before consumption of food. These measures will help in breaking the transmission of typhoid thus reducing the burden of disease. Consumption of outside food items like ice cream and cut fruits, especially in summer, is associated with high risk of acquiring typhoid. Typhoid vaccines play a very important role in reducing the burden of disease. Parents should be encouraged to get their children vaccinated.

Materials and Methods

A prospective observational study was conducted in the Department of Pediatric, Anugrah Narayan Magadh Medical College and Hospital, Gaya, Bihar, India from sept 2019 to Feb 2020.

Methodology

Total 100 Children aged below 18 years who presented to the Pediatric department with history of fever of more than 7 days duration were included in this study. These cases were included in this study after ruling out other sources of infection like respiratory, nervous system, cardiac and genitourinary; they were either Widal positive (Widal test TO Titer >1:100 or TH titre >1:200) or blood culture positive for Salmonella species. The cases which were discharged against medical advice and cases for which consent was not obtained were excluded from the study. Totally100 cases met our inclusion criteria. In all the cases, age, sex, duration of illness, presenting symptoms and other symptoms pointing towards complications were noted. Further detailed history was taken regarding their food habits, sanitation, unhygienic practices and drinking water source. History regarding previous antibiotic prescription was noted. Further antibiotics were started in each case after blood was drawn for Widal test and blood culture for Salmonella species. Each case was followed up clinically for improvement. For those cases which did not show improvement after 5 days of antibiotics, changes made according to the culture reports. Antibiotic sensitivity pattern was noted for culture positive cases. Cases were followed till discharge. The data collected was analyzed with respect to age, sex and presenting complaints.

Results

In this study, all the cases presented to OPD with a median of 7-10 days duration of fever. 65 cases (65%) had received antibiotics for a minimum period of 3-5 days prior to admission. Out of 100 cases, 68cases (68%) were males and 32 cases (32%) were females.

Table 1 show most of the cases were aged between 4 and 8 years. 26 cases were below 4 years, representing 26%. 32 cases were aged above 8 years, representing 23.0%. 42 cases were aged between 4 and 8 years (42%). In all the above age groups male predominance was seen.

Table 1: Age wise sex distribution

Age(years)	Male	%	Female	%	Total
Below 4	16	16	10	10	26
4-8	28	28	14	14	42
Above 8	24	24	8	8	32
Total	68	68	32	32	100

Duration of hospital stay varied from up to 15 days. As shown in Table-2, most of the cases (68%) stayed in hospital up to 5 to 10 days after admission. 22 % cases stayed up to 5 day in hospital and only 10% of cases stayed in hospital for more than 10 days. In these cases, fever persisted beyond 7 days. No mortality was

observed during our study period. Although mild elevated liver enzymes were observed in some cases, no complications were seen in any case.

Typhoid incidence was found to be more in lower class (54%), followed by in middle class (34%) and least in upper class (12%). Among all cases, only 10% (10 cases) had past history of typhoid fever. In all of these cases, the patient had discontinued the treatment without medical advice. Outside food eating practices, especially roadside cooked food was found in 50% (50 cases). Also, unhygienic practices like improper hand washing after defecation or before food intake was found in 70% of cases.

Table 2: Duration of hospital stay

Duration of hospital stay	No. Of cases	P-value
Below 5 days	22 (22%)	0.10
5-10 days	68 (68%)	0.00
Above 10 days	10 (10%)	0.20

Typhoid fever presents with a wide range of symptoms. Due to the use of antibiotics prior to diagnosis, children may not present with typical symptoms. However, in our study, the most common symptom was fever (100%), followed by anorexia (64%), vomiting (47%), pain abdomen (19%), diarrhea (14%), headache (10%), and cough (6%)

Table 3: Common presenting symptoms

Presenting symptom	No. of Cases	P-value
Fever	100 (100%)	0.001
Anorexia	64 (64%)	0.000
Vomiting	47 (47%)	0.001
Pain abdomen	19 (19%)	0.014
Diarrhea	14 (14%)	0.079
Headache	10 (10%)	0.99
Cough	6 (6%)	0.169

Table 4: Various physical findings

Signs	No. of Cases	P-value
Toxic look	72 (72%)	0.001
Coated tongue	53(53%)	0.001
Hepatomegaly	40 (40%)	0.002
Splenomegaly	22 (22%)	0.058
Hepatosplenomegaly	12 (12%)	0.088
Pallor	8 (8%)	0.206

Coming to physical findings, the most common sign we observed was toxic look in 72% of the cases followed by coated tongue in 53%, hepatomegaly 40%, splenomegaly 22%, hepatosplenomegaly in 12% of cases and pallor in 8% of cases. In this study, we also reported the source of drinking water. In most cases (75%), the source of drinking water was through municipal water pipelines; majority of these belonged to the urban area. Only in 25% of cases, the source of drinking water was bore well water; these cases were from rural background.

Table 5: Laboratory parameters

Laboratory parameters	Abnormal values	No. of cases	P-value
Hemoglobin	Anemia (Hb <11g%)	20 (20%)	0.020
Total leukocyte count	Leucocytosis (>11000cells/mm^3)	14 (14%)	0.031
	Leucopenia (<4000cells/mm^3)	32 (32%)	0.00

Polymorphs	Neutropenia	38 (38%)	0.00
	Neutrophilia	35 (35%)	0.00
Eosinophils	Eosinophilia	9 (9%)	0.20
	Eosinopenia	42 (42%)	0.00
Platelets	Thrombocytopenia	17 (17%)	0.01
SGOT	Elevated SGOT	10 (10%)	0.22
SGPT	Elevated SGPT	13 (13%)	0.19
Widal titres	TO >1:100	93 (93%)	0.00
	TH >1: 200	84 (84%)	0.00
Blood culture positive	Salmonella	19 (19%)	0.01

Table 5 depicts the laboratory parameters. Anemia found in 20 (20%) cases, leucopenia and leucocytosis was observed in 32 (32%) cases and 14 (14%) cases respectively. neutropenia found in 38 (38%) cases and neutrophilia was found in 35 (35%) cases. Eosinopenia was seen in 42 (42%) cases, eosinophilia in 9 (9%) cases and thrombocytopenia in 17(17%) cases. SGOT levels was elevated (>200IU/ml) in 10 (10%) cases and SGPT (>200IU/ml) in 13 (13%) cases. The elevated levels of liver enzymes lasted only few days. There were no complications observed during our study period. *Salmonella typhi* O titres >1:100 was seen in 93 (93%) cases and TH titres >1:200 in 84 (84%) cases. Blood culture positive for *Salmonella typhi* noted in 19 (19%) cases. Out of 100 cases only 18 cases had been immunized with typhoid vaccine. All of them had taken typhoid polysaccharide vaccine more than 3 years prior to illness.

Table 6: Antibiotic sensitivity pattern

Drug	**Sensitivity**	**P-value**
Ceftriaxone	98%	0.000
Cefixime	98%	0.000
Ofloxacin	94%	0.000
Chloramphenicol	83%	0.000
Cefotaxime	80%	0.002
Azithromycin	55%	0.177
Ciprofloxacin	84%	0.001
Amoxicillin	67%	0.089

Significant p<0.01

Table 6 depicts antibiotic sensitivity patterns among culture positive cases. As mentioned in the table, ceftriaxone and cefixime sensitivity was seen in all the cases (98%) followed by ofloxacin (94%), ciprofloxacin (84%), chloramphenicol (83%), cefotaxime (80%),amoxicillin (67%) and azithromycin in (55%). *S. typhi* was more sensitive to ceftriaxone, cefixime followed by ofloxacin. Least sensitivity was seen with azithromycin. During the course of our study, none of the subjects suffered any complications nor were there any fatalities. All the patients regained full health.

Discussion

Typhoid fever is a major public health problem in India. In present study, male predominance was seen. Similar results were reported in other studies[5-7]. Common age group reported in our study was 4 to 8 years. A study done by R Modi et al also reported maximum incidence of typhoid in the age group 6 to 10 year[8]. Another study also reported maximum number of cases in the age group above 5 years[9]. Highest incidence of typhoid fever in this age group can probably be attributed to outside food eating practices. These results were in accordance with the concept of typhoid that says typhoid fever is common in school age children. School children are at high risk of consuming contaminated drinking water. They are also exposed to various food items from street vendors. These factors make them more vulnerable to exposure to typhoid bacilli. The duration of hospital stay varies, with maximum number of cases staying in hospital between 5-10 day. Cases were discharged after 3 consecutive days of afebrile period without antipyretics. These results were in accordance with study done by Hyder et al[10]. We observed high incidence of typhoid fever in lower class, lesser in middle class society and least in higher class. This can be explained by differences in drinking water sources and hygienic practices like hand washing and sanitary latrine facilities. Similar results were reported in other study[11]. Typhoid fever was more commonly observed in those who were using municipal water as drinking source compared to bore well water. Similar results reported in the study done by R Modi et al[8]. We also observed higher incidence of disease in cases with history of consumption of outside food. This probably can be attributed to eating food items without hand wash or quality of food handled by road side food vendors.

Typhoid fever manifestations are diverse. The most common symptoms apart from fever were anorexia, vomiting, pain abdomen, diarrhoea followed by headache and cough. A study done by Sinha A et al[12]. Kapoor JP et al also reported similar results[13]. Other studies also showed similar clinical picture [14-16].Contradictory to this, a study done by Joshi et alreported headache as the most common symptom next to fever[17]. In our study we reported Toxic look (72%) as the most common sign followed by coated tongue (53%), Hepatomegaly (40%), splenomegaly, Hepatosplenomegaly. Study done by Laishram et al reported coated tongue (80%) as the most common sign followed by Hepatomegaly (76%) and splenomegaly (38%)[18]. Other study reported toxic look (93%) and coated tongue (66%) as most common signs.[33] In other study they had reported relative bradycardia and hepatomegaly as the most common sign[19].

During our study, all cases were positive for Widal. Blood culture was positive in 19% of cases. Other study also reported 16% culture positive cases[10]. A study done by Banu et al also reported 28% culture positive cases[19]. Due to prior use of antibiotics, the culture positive cases are decreasing. Thus, need for relay on other serological tests for diagnosis of typhoid exists. Study done by Modi et al reported 97% Widal positive cases[8]. Anemia was seen in 20% of cases. The other studies reported little higher percentage of anemias. A study done by Raj C et al reported anemia in 41.8% of patients and Lefebvre et al reported anemia in 78% of cases[20,21]. in our study Leucocytopenia and Eosinopenia found in 32% and 42% respectively. Similar results reported in Lefebvre et al[21]. Although leucocytosis and eosinophilia are rare in typhoid, our study reported leucocytosis in 14% of cases and eosinophilia in 9% cases respectively. Thrombocytopenia was found in 17% of cases. Elevated SGOT is seen 10 % of cases and SGPT was raised in 13% of the cases. The other study reported elevated liver enzymes in 70% of cases[22].

Antibiotic sensitivity was similar to other studies. Most of the culture positive cases showed sensitivity to ceftriaxone, cefixime, ofloxacin, ciprofloxacin. Similar sensitivity pattern reported in other study[17]. However sensitivity pattern varies from place to place. Other studies showed return of sensitivity pattern with chloramphenicol, cotrimoxazole, amoxicillin.[15,23,24] A study done by Mishra et al reported 100% sensitivity to azithromycin[25]. In our study the sensitivity to azithromycin was 55%. A Study done by Hyder et al. reported 100% sensitivity to ceftriaxone and ciprofloxacin[10]. All other culture negative cases were treated with ceftriaxone. All cases responded to above antibiotics without any complications and mortality.

Conclusion

Typhoid fever remains a major public health problem in the developing countries predominantly seen in school going children among pediatric age group. Public health interventions like supply of safe drinking water, appropriate sanitation, awareness of the disease and its transmission, and good personal hygiene practices may be employed. Food handlers especially in hotels, hostels and government schools should be educated about proper hand washing techniques. Also typhoid vaccination and rationale use of antibiotics based on the culture sensitivity pattern will help in reducing the burden of the disease.

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