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Original Research Article

Prevalence of enteric fever in the patients admitted to paediatric ward in a rural tertiary care teaching hospital: a retrospective study

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ABSTRACT

Background: Enteric fever or typhoid is one of the major cause of morbidity among the human population in many regions of the world. The current knowledge on epidemiological aspects comes from studies in adult populations. However, there are conflicting opinion about the prevalence rate in paediatric age groups. Hence, in the present study an attempt has been made to find the prevalence of the enteric fever among paediatric age group in a teaching hospital of rural area.
Methods: The retrospective study was carried out in Tagore Medical College and Hospital, Rathinamangalam village, Tamil Nadu, a rural teaching hospital in India over a period of 1st January 2015 to 31st December 2017. Data regarding admitted children below 12 years of age with signs and symptoms suggestive of enteric fever were recorded.
Results: Total of 224 cases of enteric fever case were admitted during the study period. There were 115 (51%) males and 109 (49%) females. Most of the patients were above the age of 4 years. The leading clinical feature were fever (100%), headache (92.85%), followed by coated tongue (88.4%), anorexia (85.71%) and hepatomegaly (79.02%).
Conclusions: It is imperative to include Enteric fever in the differential diagnosis of febrile paediatric patients with abdominal symptoms. Even though blood culture is the confirmatory test, Widal test plays supportive role in diagnosis of enteric fever, especially when patients come after a course of antibiotics. In the present study, ciprofloxacin is still a good drug for the treatment of enteric fever.

Keywords: Enteric fever, Prevalence, Paediatrics, *Salmonella typhi*, Widal test,

INTRODUCTION

Enteric fever or typhoid is one of the major cause of morbidity among the human population in many regions of the world. It is caused by Salmonella enterica subspecies enterica serovars Typhi, Paratyphi A, Paratyphi B, and Paratyphi C. It is estimated that there is 1% fatality rate annually.[1] The current knowledge on epidemiological aspects comes from studies in adult populations.[2] However, there are conflicting opinion about the prevalence rate in paediatric age groups.[3]

The disease is mainly associated with low socio-economic status and poor hygiene, with human beings the only known natural hosts and reservoir of infection.[4] It is considered as one of the most serious infectious disease threats to public health on a global scale because of its rapid and widespread emergence of resistance to multiple antibiotics.[5,6]

Currently, two licensed typhoid fever vaccines, the oral Ty21a vaccine and the parenteral Vi polysaccharide (ViPS) vaccine, are used to immunize the children.[7-9]

Robust data on burden of disease in paediatric age groups are necessary to develop and implement typhoid vaccine policies for highly endemic countries.[10] Hence, in the present study an attempt has been made to find the prevalence of the enteric fever among paediatric age group in a teaching hospital of rural area.

METHODS

The retrospective study was carried out in Tagore Medical College and Hospital, Rathinamangalam village, Tamil Nadu, a rural teaching hospital in India over a period of 1st January 2015 to 31st December 2017. Data regarding admitted children below 12 years of age with signs and symptoms suggestive of enteric fever and fulfilling any of the following criteria was included in the study.

- Positive culture for *Salmonella typhi*
- Widal titre: TO and TH ≥1:160

The data regarding routine investigations like Haemoglobin estimation, Total and differential count for white blood cells, Erythrocyte sedimentation ratio, Urine and stool examination was recorded. Other investigation details such as a chest X ray, liver function test, abdominal sonography was also collected.

Bacterial cultures

Blood cultures is carried out by collecting aseptically 5ml of blood and added to 50ml of bile broth, incubated at 37°C for 24 hours. Initial subculture is made after 24hrs and if found negative, further subcultures was made after 48hrs, 4days and 7 days. Positive growths are subjected to standard biochemical tests. Species confirmation was done by agglutination with high titre sera. The identity of isolates is confirmed by standard biochemical tests and slide agglutination with specific antisera.

Widal test

The Widal tube agglutination test is performed according to the manufacturer's instruction, using Tidal (Span diagnostics) containing O and H antigens of S. typhi and *S. paratyphi* A and *S. paratyphi* B. Positive and negative serum controls are included, a titre of ≥1/160 to either antigen in a single serum specimen (in addition to the seroconversion) was taken to be indicative of typhoid fever. The results are correlated with blood culture results and interpreted in conjunction with the patient's history and recent clinical presentation on admission.

Antimicrobial susceptibility testing

The antimicrobial susceptibility test was using the Kirby Bauer disc diffusion method as described by the Clinical and Laboratory Standards Institute.[11] Antimicrobial agents (discs) tested and reported were obtained from HiMedia and included: ampicillin (10µg), trimethoprim – sulfamethoxazole (25/23.75µg), chloramphenicol (30µg), ceftriaxone (30µg), ciprofloxacin (5µg), cefixime(30µg) and cephalexin(30µg). MDR isolates of S. typhi were those resistant to all three first line antityphoid drugs viz., ampicillin, chloramphenicol and trimethoprim–sulfamethoxazole.[12]

RESULTS

Total of 224 cases of enteric fever case were admitted during the study period. There were 115 (51%) males and 109 (49%) females (Table 1). Most of the patients were above the age of 4 years (Table 2). The leading clinical feature were fever (100%), headache (92.85%), followed by coated tongue (88.4%), anorexia (85.71%) and hepatomegaly (79.02%).

Table 1: Year-wise distribution of male and female patients.

Year	Male	Female	Total
2015	40 (51%)	38 (49%)	78
2016	36 (44%)	46 (56%)	82
2017	39 (61%)	25 (39%)	64
Total	115 (51%)	109 (49%)	224

Only those cases which showed widal positive were taken in the present study. Blood culture was positive in 41.5%. All the 93 culture positive cases were *Salmonella typhi*. In the antibiogram, resistance was 58.06% with chloramphenicol, 88.17% with ampicillin, 81.72% with trimethoprim- sulfamethoxazole and 24.73% Cephalexin. Resistance was 0% with ciprofloxacin, ceftriaxone and Cefixime. 45.16% isolates showed multi drug resistance.

Table 2: Age-wise distribution of male and female patients.

Year	Age group in years							
	1 to 3		4 to 6		7 to 9		10 to 12	
	Male	Female	Male	Female	Male	Female	Male	Female
2015	3 (4%)	1 (1.5%)	12 (15.5%)	8 (10%)	13 (16.5%)	14 (18%)	12 (15.5%)	15 (19%)
2016	2 (2.5%)	0 (0%)	5 (6%)	9 (11%)	13 (16%)	22 (27%)	16 (19.5%)	15 (18%)
2017	1 (1.5%)	0 (0%)	4 (6%)	6 (9%)	16 (25%)	6 (9%)	18 (28%)	13 (21.5%)

Table 3: Symptoms and signs in the patients.

Symptoms/signs	Number of cases	Percentage
Fever	224	100
Headache	208	92.85
Vomiting	42	18.75
Anorexia	192	85.71
Abdominal pain and distension	156	69.64
Diarrhoea	98	43.75
Constipation	122	54.46
Cough	54	24.11
Hepatomegaly	177	79.02
Splenomegaly	72	32.14
Coated tongue	198	88.4

Complications seen in the present study were bronchitis 3 (1.3%), cholecystitis 5 (2.2%) and enteric hepatitis 1 (0.4%). In the present study, haemoglobin <10gm/dl was found in 48.2% of cases. Majority of the children had WBC count in the range 5000-10000/cu mm (81.9%).

Table 4: Antibiotic resistance pattern of *Salmonella typhi* isolated from the patients.

Antibiotic	Number resistance (N=93)	Percentage
Ampicillin	82	88.17
Trimethoprim-sulfamethoxazole	76	81.72
Chloramphenicol	54	58.06
Ceftriaxone	0	0
Ciprofloxacin	0	0
Cefixime	0	0
Cephalexin	23	24.73
Multi-drug resistance	42	45.16

DISCUSSION

In the present study, 224 children presented with the symptoms of enteric fever and widal positive were analysed. All the cases were done for blood culture and 41% cases were shown Salmonella typhi isolates. Results show that prevalence of typhoid fever was high among the school age students. This may be due to the fact that they have more exposure of having contaminated water and food from outside.[13] Most of the parents of the children in rural area may be highly educated and hence may not know the importance of safe drinking water and food.[14,15] In our geographical area, the public water supply is not chlorinated and hence any contamination due to pipeline breakage may have every chance of acquiring water borne diseases like enteric fever.

Another Important observation found in the present study is that the enteric fever among the paediatric cases were reported throughout the year and hence the study confirms the endemic nature of the disease in our geographical area.[16]

In the present study, the multi-drug resistance (MDR) strains were seen in 45% of the isolates which shows the difficulty in the treatment of such patients who are infected with these strains. Nowadays, the multi-drug resistant strains are common in many geographical areas.[17,18] The emergence of MDR *S. typhi* results in the excessive use of ciprofloxacin in the treatment of enteric fever.[19] The mechanism of drug resistance in *S. typhi* is not clear, however the various studies show that it is due to genetic change in the organism, either a chromosomal mutation or the acquisition of a plasmid or transposon.[20-22]

CONCLUSION

It is imperative to include Enteric fever in the differential diagnosis of febrile paediatric patients with abdominal symptoms. Even though blood culture is the confirmatory test, Widal test plays supportive role in diagnosis of enteric fever, especially when patients come after a course of antibiotics. In the present study, ciprofloxacin is still a good drug for the treatment of enteric fever.

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