ORIGINAL RESEARCH

Antimicrobial susceptibility pattern of Enteric fever among children between 1 to 14 years: A descriptive observational study from VIMS, Ballari, Karnataka

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ABSTRACT
Background& Objectives: Enteric fever is a global public health problem, and over 21 million are getting infected and 0.2 million people are died annually. Almost 90% of the cases were from Asia.3 The trend of enteric fever prevalence is increasing worldwide with emergence of antimicrobial resistance, especially the multidrug resistance to ampicillin, chloramphenicol and cotrimoxazole is a major public health problem which further complicates the treatment and management of enteric fever. **Objectives:** To study the antimicrobial susceptibility pattern of Enteric fever among children between 1 to 14 years. **Methods:** The present Descriptive observational study was carried out at Department of Paediatrics, VIMS, Bellary involving 100 children between 1-14 years, clinically diagnostic of enteric fever during the period from January 2020 to January 2021. **Result:** Out of these 100 children, majority i.e., 51% were from 6-10 years, mean age of the study population was 7.67±3.09 years. 45% were males and 55% were females in our study. Antibiotic susceptibility pattern of Enteric fever revealed resistance to Cotrimoxazole in 17% cases, Chloramphenicol in 16% cases and Amoxicillin in 12% cases. Antibiotic susceptibility pattern according to organism revealed that s. typhi sensitive to Cotrimoxazole in 14% cases, Chloramphenicol in 10% cases, Amoxicillin in 9% cases. **Conclusion:** S. typhi was found resistance to Cotrimoxazole in 17% cases, Chloramphenicol in 16% cases, Amoxicillin in 12% cases and to Cipro floxacillin in 7% cases and sensitive to Cotrimoxazole in 14% cases, Chloramphenicol in 10% cases, Amoxicillin in 9% cases and to Cipro floxacillin in 5% cases. S. Paratyphi resistance to Cotrimoxazole in 3% cases, Chloramphenicol in 3% cases, Amoxicillin in 3% cases and to Cipro floxacillin in 3% cases.
Key words: Enteric fever, s. typhi, antibiotic sensitivity, resistance etc.

INTRODUCTION

Enteric fever is a global public health problem, and over 21 million are getting infected and 0.2 million people are died annually.[1,2] Almost 90% of the cases were from Asia.[3] The trend of enteric fever prevalence is increasing worldwide, in 2010 the prevalence of enteric fever was higher in African countries (724.6/100,000) than in Asian countries (170.8/100,000).[4]

In 2015, it was estimated 17 million cases of typhoid and paratyphoid fever with highest affected people seen in South Asia and other areas were Southeast Asia and Sub-Saharan Africa.[5,6] Fever, that last for more than 7 days is the most common clinical manifestation present in almost all patients with enteric fever.[2,3] Other features are vomiting, headache, abdominal pain and diarrhea along with clinical signs and hepato-splenomegaly.[7,8]

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Clinical features of typhoid and paratyphoid fever are generally similar, although paratyphoid infection tends to be a milder form.[7] Rose spot, round, non-pruritic, erythematous papules, about 6-12 in number are mostly seen in trunk in typhoid fever, however, such Rose Spot are found significantly higher number in paratyphoid fever. [9]

Emergence of antimicrobial resistance, especially the multidrug resistance to ampicillin, chloramphenicol and cotrimoxazole is a major public health problem which further complicates the treatment and management of enteric fever.[10]

Thus, our study directs towards the antimicrobial susceptibility pattern of enteric fever in VIMS Ballari.

Objectives

To study the antimicrobial susceptibility pattern of Enteric fever among children between 1 to 14 years.

MATERIALS AND METHODS

Study setting: Department of Paediatrics, VIMS, Bellary

Study population: Children between 1-14 years, clinically diagnostic of enteric fever admitted in the department of Paediatrics, VIMS, Bellary.

Study period: Two years (From January 2020 to January 2021)

Study design: Descriptive observational study

Sample size: 100 cases

Sampling technique: Simple Random sampling method

Inclusion Criteria

- Children aged between 1-14 years, clinically diagnostic of Enteric fever
- Children with Widal titre TO and TH >160 or four-fold or greater rise in Widaltiters
- Positive culture of Salmonella typhi

Exclusion Criteria

- Not willing to participate
- Febrile children who received antibiotic treatment within 1 week before coming to hospital
- Children who were diagnosed for other known febrile illness like malaria, rickettsial fever, dengue fever, urinary tract infections, brucellosis, liver amebiasis.

Methods of Data Collection

After obtaining the informed written consent, the patients' details, clinical data, laboratory parameters, and treatment were noted in a predesigned and pre-validated proforma and analyzed.

Statistical Analysis

Data was collected by using a structure proforma. Data entered in MS excel sheet and analysed by using SPSS 24.0 version IBM USA. Qualitative data was expressed in terms of proportions. Quantitative data was expressed in terms of Mean and Standard deviation. Association between two qualitative variables was seen by using Chi square/ Fischer's exact test. Descriptive statistics of each variable was presented in terms of Mean, standard deviation, standard error of mean. A p value of <0.05 was considered as statistically significant whereas a p value <0.001 was considered as highly significant.

RESULT

Table 1: Distribution according to age group

Age	No of Cases	Percent
≤ 5	28	28.0
6-10	51	51.0
> 10	21	21.0
Total	100	100.0
Age		
Mean		7.67
Std. Deviation		3.09

We included total 100 children between 1 to 14 years having confirmed diagnosis as enteric fever in our study. Out of these 100 children, majority i.e. 51% were from 6-10 years, 21% from above 10 years and remaining 28% from below 5 years age group. Mean age of the study population was 7.67±3.09 years.

Table 2: Distribution according to gender

Gender	No of Cases	Percent
Male	45	45
Female	55	55
Total	100	100.0

45% were males and 55% were females in our study.

Table 3: Duration of hospital stay of children with Enteric fever

Duration of hospital stay		
Mean	6.86	
Std. Deviation	1.47	
Duration of hospital stay	No of Cases	Percent
2-4	8	8.0
5-7	53	53.0
8 - 10	38	38.0
> 10	1	1.0
Total	100	100.0

Mean duration of hospital stay in our study was 6.86 ± 1.47 days. Majority of the patients i.e. 53%. Have hospitalization duration of 5-7 days followed by 38% having duration of 8-10 days, 8% had duration of 2-4 days.

Table 4: Organisms isolated among children with Enteric fever

Organism isolated	No of Cases	Percent
S. typhi	26	26.0
S. Paratyphi	3	3.0
No growth	71	71.0
Total	100	100

S. typhi was isolated in 26% cases and S. Paratyphi in 3% cases in our study

Table 5: Antibiotic susceptibility pattern of Enteric fever

Antibiotic susceptibility pattern	Sensitive	Resistant
Cotrimoxazole	12	17
Chloramphenicol	16	13
Amoxicillin	17	12
Cipro floxacillin	22	7
Ceftriaxone	29	0
Cefixime	29	0
Azithromycin	28	1

Antibiotic susceptibility pattern of Enteric fever revealed resistance to Cotrimoxazole in 17% cases, Chloramphenicol in 16% cases, Amoxicillin in 12% cases, Cipro floxacillin in 7% cases and azithromycin 1% cases. We found no resistance to ceftriaxone and cefixime.

Table 6: Antibiotic sensitivity according to organisms

Antibiotic susceptibility pattern	S. typhi (n=26)		S. Paratyphi (n=3)	
	Sensitive	Resistant	Sensitive	Resistant
Cotrimoxazole	12	14	0	3
Chloramphenicol	16	10	0	3
Amoxicillin	17	9	0	3
Cipro floxacillin	20	5	1	3
Ceftriaxone	26	0	3	0
Cefixime	26		3	0
Azithromycin	25	1	3	0

Antibiotic susceptibility pattern according to organism revealed that s. typhi is sensitive to Cotrimoxazole in 14% cases, Chloramphenicol in 10% cases, Amoxicillin in 9% cases and to Cipro floxacillin in 5% cases. S. Paratyphi resistance to Cotrimoxazole in 3% cases, Chloramphenicol in 3% cases, Amoxicillin in 3%, Cipro floxacillin in 3% cases and azithromycin in 1% cases.

DISCUSSION

Typhoid fever is a global health problem. It is a common infectious disease presenting as acute multisystem febrile illness caused by Salmonella typhi and Salmonella Paratyphi. It is a major public health problem in India where patients report throughout the year with monsoon clustering patterns. Low standards of living are the main reasons behind the higher endemicity in India. The disease burden is compounded by explosive emergence of multidrug

resistant salmonellae which are resistant to conventionally used drugs like chloramphenicol, ampicillin and cotrimoxazole. Growing drug resistance is an important factor in the morbidity and mortality of the typhoid fever. Blood cultures are the gold standard diagnostic method for diagnosis of enteric fever. The sensitivity of blood culture is highest in the first week of the illness and reduces with advancing illness.

Demographic information
We included total 100 children between 1 to 14 years having confirmed diagnosis as enteric fever in our study. Out of these 100 children, majority i.e., 51% were from 6-10 years, 21% from above 10 years and remaining 28% from below 5 years age group. Mean age of the study population was 7.67±3.09 years. 45% were males and 55% were females in our study with the ratio of male to female as 0.81:1

Shekhar V. et al[11] reported that majority of the patients i.e. 52 (38.2%) patients were in the age group of 8 to 12 years, followed by 44 (32.3%) patients in the age group of 12-16 years, 27 (19.8%) patients in 4-8 years, and 13 (9.5%) patients below 4 years of age which is similar with our study findings.

Shekhar V. et al[11] reported that majority of the patients were males 78 (57.4%) and 58 (42.6%) were females which is in contrast to our study findings. Male to female ratio was observed to be 1.3:1.

Budhathoki S et al[12] conducted the study with the objective to describe clinical and laboratory parameters among children with enteric fever and reported that the incidence of enteric fever was common in the age group of 11 to 15 years age group 53.8% (n=43) and lesser 21.3% (n=17) in age group 1-5 years. These findings are showing variation in the age compared to our findings. They also observed that enteric fever was more common in the male population 61.3% (n=49) as compare to female 38.8% (n=31) and the male female ratio of 1.6:1 which is contrast to our findings.

Study by**Baviskar et al[13]** reported that 9 to 12 years age group were the most common age of presentation of typhoid fever, whereas 5 to 10 years was found as the most common age of presentation of typhoid fever in study by **Ramaswamy et al[14]**, and **Walia et al.[15]** The most likely reason for higher rate typhoid fever in this age group may be due to consumption of unhygienic foods or water from outside. Beyond 12 years of age, probably immunity is better which provides better protection against Salmonella than younger age group. The possible reason might be due to children of this age group seems to be very active and may be exposed to external environment and outdoor activities.

Duration of hospitalization
Mean duration of hospital stay in our study was 6.86 ± 1.47 days. Majority of the patients i.e. 53%. Have hospitalization duration of 5-7 days followed by 38% having duration of 8-10 days, 8% had duration of 2-4 days.

Malini A. et al[16] reported mean duration of fever at hospitalization was 8.4 ± 4.4 days and ranged from 5 to 30 days which is slightly higher as compared to our study findings.

Antibiotic susceptibility pattern
Antibiotic susceptibility pattern of Enteric fever revealed resistance to Cotrimoxazole in 17% cases, Chloramphenicol in 16% cases, Amoxicillin in 12% cases, Cipro floxacillin in 7% cases and azithromycin 1% cases. We found no resistance to ceftriaxone and cefixime

Shekhar V. et al[11] reported that Ampicillin, amoxicillin and chloramphenicol resistance was observed in 76%, 71% and 22% of patients with typhoid fever respectively in the present study. Maximum sensitivity was observed with ceftriaxone (95%), followed by aztreonam (92%), ciprofloxacin (84.5%), and azithromycin (77%)

Ceftriaxone was reported sensitive to all culture positive cases in our study, same sensitivity pattern observed in study conducted by **Jeeyani et al[17], Walia et al[15] and Singh et al.[18]**

CONCLUSION
- Antibiotic susceptibility pattern of Enteric fever revealed resistance to Cotrimoxazole in 17% cases, Chloramphenicol in 16% cases, Amoxicillin in 12% cases and to Cipro floxacillin in 7% cases
- Antibiotic susceptibility pattern according to organism revealed that s. typhi sensitive to Cotrimoxazole in 14% cases, Chloramphenicol in 10% cases, Amoxicillin in 9% cases and to Cipro floxacillin in 5% cases. S. Paratyphi resistance to Cotrimoxazole in 3% cases, Chloramphenicol in 3% cases, Amoxicillin in 3% cases and to Cipro floxacillin in 3% cases.

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