(e) ISSN Online: 2321-9599

(p) ISSN Print: 2348-6805

ORIGINAL ARTICLE

A Cross-Sectional Study on the Nature of Enteric Fever in People with Emerging Anti-bioticSensitivity

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ABSTRACT:

Introduction: Salmonella serotypes are the cause of typhoid fever, a potentially fatal systemic infection with varying degrees of severity that strikes poor nations like India. Children's typhoid fever symptoms are different from those of adults. A small number of research indicate that Salmonella is now more susceptible to chloramphenicol. **Method:** According to their clinical circumstances, 108 children between the ages of 2 and 10 who had suspected enteric fever and were hospitalized to the pediatric ward and pediatric intensive care unit were included in the research. 52 of these patients were diagnosed with enteric fever, and the clinical characteristics of the various age groups were compared. The antibiotic sensitivity profile of individuals with positive blood cultures was also examined. **Results:** Three patients utilized tanker water, while five patients used boring water. One patient was discovered to be taking Aqua Guard, while two patients were using Motor. In order to examine the differences in presentation between the two age groups, the affected patients were split into two groups: those under five years old and those over five. **Conclusion:** Children with enteric fever have varying clinical profiles depending on theirage. In blood cultures, Salmonella typhus sensitivity to ampicillin and chloramphenicol is recurring.

Keywords: salmonella typhi, clinical profile, blood culture, antibiotic sensitivity.

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This article may be cited as: Kalamkar C, Pathak D. A Cross-Sectional Study on the Nature of Enteric Fever in People with Emerging Anti-bioticSensitivity. J Adv Med Dent Scie Res 2015;3(4):239-243.

INTRODUCTION

A serious public health concern, typhoid fever is a potentially fatal systemic virus that mostly affects underdeveloped nations. An estimated 2,000,000 individuals die from the infection each year, which affects over 21.5 million people globally [1].

Children's first typhoid fever symptoms and indicators are quite different from those of adults [2]. Weakness, headache, constipation, stomach discomfort, and moderate vomiting are often seen in conjunction with this [4,5]. A cutaneous rash with rose-colored patches appears in some people. Patients may get confused in extreme situations [5], and if treatmentis not received, symptoms might last for weeks or months.[4]

The causal agent that is most often identified in the blood during the first week of sickness is Salmonella typhi (S. typhi). Typhoid fever is known to be linked to substantial morbidity and death, especially in the aftermath of the emergence of multidrug-resistant strains of the bacteria that cause the illness. Delays in diagnosis and the implementation ofsuitable treatment are known to considerably raise the risk of unfavorable outcomes and death.

Multidrug resistance to first-line medications such as ampicillin and chloramphenicol has been a problem [5,6]. With the emergence of NARST (Nalidixic acid resistant Salmonella typhi), the issue only became worse, making ciprofloxacin a dubious medication of choice for treating typhoid fever. According to some research, Salmonella's susceptibility to chloramphenicol has returned [6–8]. As the antibiogram pattern changes, it's important to keep an eye on the drug resistance pattern and comprehend the underlying process.

Method

Study design

This cross-sectional research was carried out at ICARE Institute of Medical Science, Haldia. The institute's ethics committee gave its approval to the research methodology, andall of the parents provided signed informed permission.

Participants

The research comprised children aged 2 to 10 who were hospitalized to the pediatric department of ICARE Institute of Medical Science, Haldia, and who had a fever lasting at least three days and who were suspected or confirmed to have enteric fever based on laboratory testing and clinical examination. Patients under two years old and those over ten years old are excluded, as are those who were already taking antibiotics at the time of admission or who were later diagnosed with a condition other than typhoid fever.

Sample size

A sample size of 88 patients is required based on data from other research [9], assuming a 40% positive blood culture rate, with precision error of estimate (d) = 0.10 and alpha = 0.05.At least fifty-two individuals

tested positive for Salmonella typhi. The sample size was determined using the descriptive research formula (z2 × p × q)/d2.

Procedure

On a pre-structured proforma, the clinical and demographic details of every patient who was enrolled were documented. A patient was deemed to have a fever if their axillary temperature exceeded 100 degrees Fahrenheit, which was measured by placing a thermometer in the axilla for two to three minutes. Every patient in the study underwent the following tests: liver function test, blood culture, antibiotic sensitivity pattern of organism grown, erythrocyte sedimentation rate, Typhi-dot IgM (ENTEROCHECK-WB, Zephyr Biomedicals), Widal test, and complete hemogram with absolute eosinophil count. Third-generation cephalosporins were used as first treatment for patients with a clinical diagnosis of typhoid fever. Close observation was kept on the clinical course. If there was no clinical improvement or worsening within five days after beginning a particular treatment, the clinical response to that therapy was deemed insufficient. Fever lasting more than five days was considered an indication that a second-line antibiotic should be started. The automated BACTEC 9120 blood culture device was used todo the blood culture. The CLSI (clinical and laboratory standard institute) guidelines were followed while performing antibiotic sensitivity testing (AST) [10]. The following antimicrobial drugs were tested: Ciprofloxacin (5 µg), Cotrimoxazole (25 µg), Ciprofloxacin (30 µg), Ofloxacin (30 µg), Amoxiclav (20/10 µg), Meropenem (10 µg), Ceftriaxone (30 µg), Chloramphenicol (30 µg), Cefuroxime (30 µg), Gentamycin (10 µg), and Ampicillin (10 µg). Mumbai, India's Hi-Media. As a quality check, a standard strain of E. coli ATCC 25922 was used.

Statistical Analysis

Version 29 of the statistical software for the social science system was used for statistical testing. The Student's t test was used to compare the groups' normally distributed continuous variables. The Chi-square test or Fisher's exact test, as applicable, were used to compare the nominal categorical data across the groups. The Wilcoxon Rank Sum test was used to compare continuous variables with non-normal distributions. A significant difference was defined as a P value of less than 0.05 for all statistical tests.

RESULTS

72 of the 108 patients that were identified as having blood culture, Widal, and/or Typhi-dot IgM positive results made up the study group. According to a study on the source of water supply, 41 patients (56.9%) were utilizing water from the Haryana Urban Development Authority (HUDA), whereas 8 patients, or 11.1%, were using candle filters (Fig 1). Three patients utilized tanker water, while five patients used boring water. One patient was discovered to be taking Aqua Guard, while two patients were using Motor. In order to examine the differences in presentation between the two age groups, the affected patients were split into two groups: those under five years old and those over five. Twelve people (24%) were under five years old, while forty people (77.7%) were over five years old. Both of these age groups' clinical characteristics were examined, and the most prevalent symptoms were weakness (76%), lack of appetite (79.4%), and fever (100%). Abdominal distension was far more prevalent in children under five, but nausea, constipation, and blood in the stool were nonexistent in this age group (Table 1).

Figure 1: Demographic characteristics

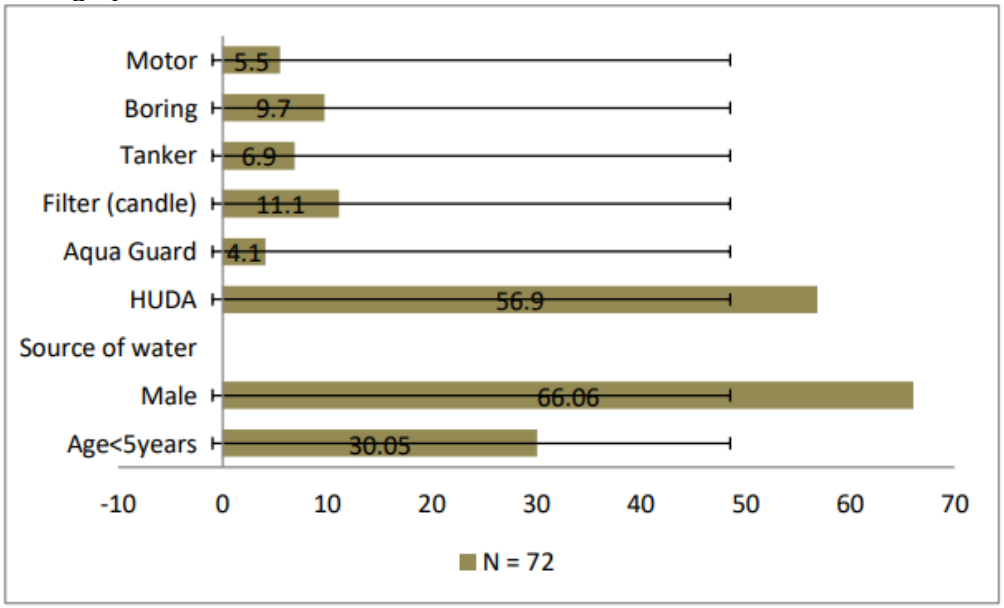


Table 1 comparison of clinical profile in children less than 5years and above

Symptoms	Less than 5years (N =22)	More than 5years (N = 50)	P value
Fever	22 (100%)	50 (100%)	--
Step ladder pattern	2 (9.0%)	12 (24%)	0.053
Loss of appetite	9 (40.9%)	34 (68%)	0.09
Abdominal pain	6 (27.2%)	32 (64%)	0.05
Vomiting	6 (27.2%)	24 (48%)	0.59
Diarrhea	4 (18.1%)	7 (14%)	0.66
Headache	5 (22.7%)	31 (62%)	0.005
Weakness	7 (31.8%)	34 (68%)	0.057
Abdominal distension	5 (22.7%)	7 (14%)	0.039
Cough	4 (18.1%)	8 (16%)	0.43
Constipation	0 (0%)	5 (10%)	0.55
Nausea	0 (0%)	9 (18%)	0.055
H/o blood in stools	0 (0%)	3 (6%)	1

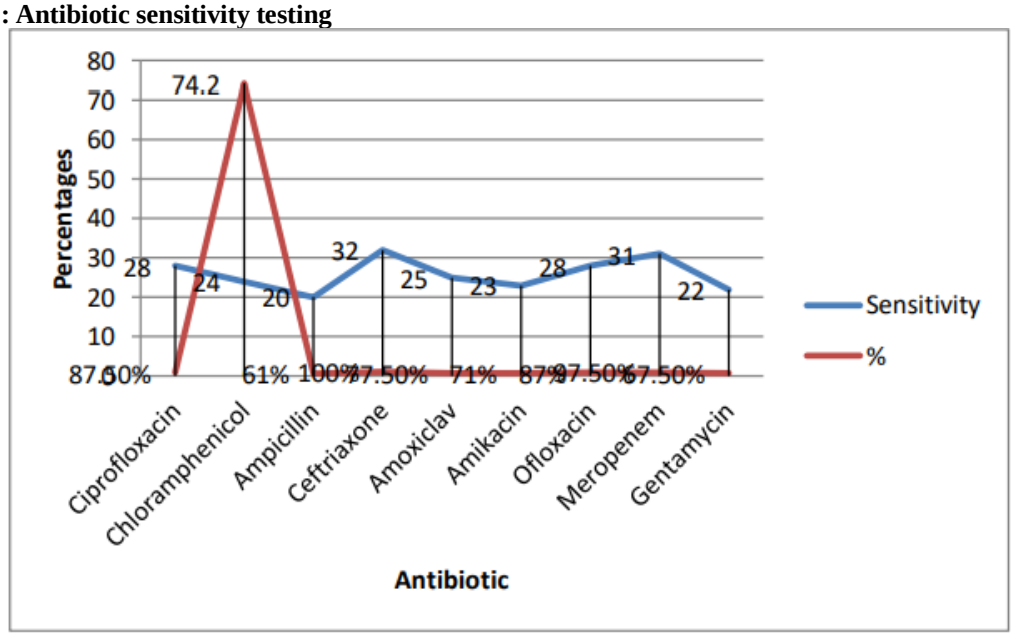
Compared to 41.67% and 33.33% in the younger group, respectively, 77.5% and 75% of children older than 5 years had abdominal discomfort and headaches (Table 2). Coated tongue was the most prevalent clinical symptom, followed by hepatomegaly.

Antibiotic sensitivity profile

It was discovered that the sensitivity for the traditional medications ampicillin, chloramphenicol, and ciprofloxacin was 87.5%, 74.2%, and 61%, respectively. Ceftriaxone was shown to have 100% sensitivity.

Amoxiclav, ofloxacin, and Meropenem had sensitivity rates of 77.5 s%, 87.5%, and 97.5%, respectively. The sensitivity of gentamycin was 67.5%, whereas that of amikacin was 71% (Figure 2).

Figure 2: Antibiotic sensitivity testing

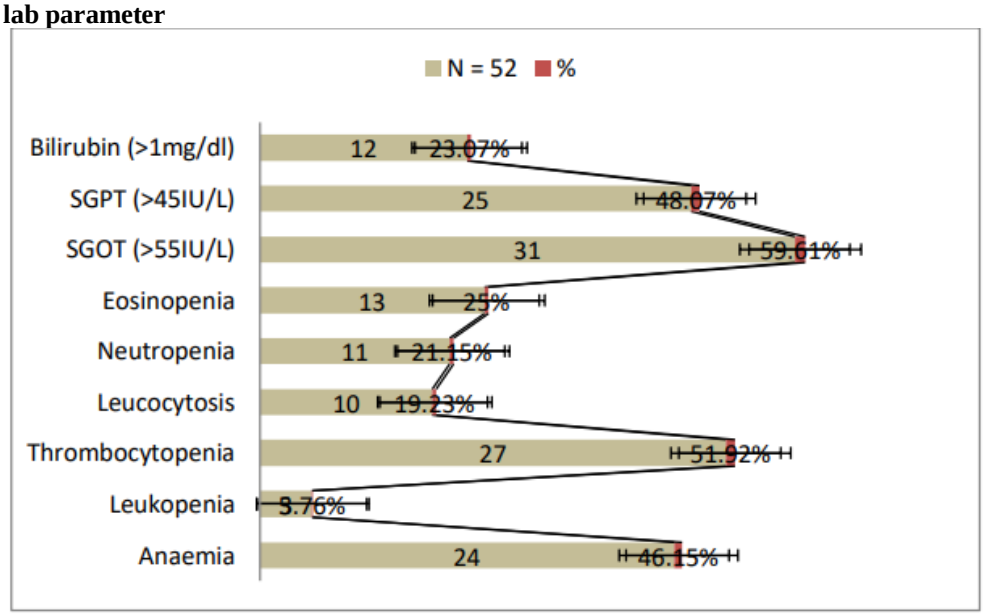


DISCUSSION

One of the main causes of illness and death worldwide is typhoid fever [11]. Typhoid fever is prevalent in India, with a morbidity rate of 112-234 per one million people [12]. Our work is a single prospective analysis of typhoid cases that focuses on the laboratory and antibiotic sensitivity patterns of Salmonella typhi isolated from these patients, as well as clinical characteristics in various age groups. In our research, 73.07% (38) of the 52 typhoid cases were men, and 23.07% (12) were women. In a research by Hayat et al., out of 100 patients with a clinical diagnosis of typhoid, 75% were men and 25% were women. 57patients (78.08%) were older than five years, and 16 patients (21.9%) were younger than five years. The average age of presentation was 7.48 years. According to a research conducted at a tertiary care facility in Chennai, South India, 169 (53.48%) of the 316 typhoid fever cases included people older than five [13]. According to Chandrasekhar et al.'s research, 60% of typhoid patients were older than five. In their investigation of children with blood culture-positive typhoid fever, Chandrasekhar et al. discovered that 73.1% of the patients were drinking

water from the municipal corporation [14]. Seventy-five percent (n = 39) of the patients in our research were drinking company water. Tanker water (5.76%) and candle filter water (11.53%) were used by the remaining patients. Significant anemia, thrombocytopenia (46.15% and 51.92%, respectively), and less often leukocytosis, neutropenia, and eosinophilia were found in the laboratory analysis (Table 4). Prior research has also shown these hematological changes [15]. Elevated bilirubin and liver enzymes were another noteworthy discovery.

Figure 3: lab parameter



The most frequent clinical manifestation in all (100%) of our patients was fever. The most prevalent clinical symptoms after fever were vomiting (53.84%), anorexia (78.84%), and stomach discomfort (69.23%). Children under the age of five in our research presented clinically differently from those over five. Children under five years old were more likely to have stomach distension (33.33%), coughing (25%), and diarrhea (25%), while those over five years old were more likely to experience anorexia (82.5%), weakness (82.5%), abdominal discomfort (77.5%), headache (75%), and vomiting (57.5%). Data on the varied clinical presentation in various age groups is scarce. Anorexia and diarrhea were the most prevalent symptoms in children under five years old, whereas coughing was more common in those older than five years old, according to a research by Chandrashekar et al. [14]. The average length of hospital stay in our research was 7.17 days, whereas it was 6.5 days in a study by Ganesh R. et al. [13].

Once the causal agents have been isolated, enteric fever may be definitively diagnosed. However, in areas where enteric fever is prevalent, there are often little facilities available for microbiological culture. Additionally, if antibiotics are given prior to blood collection for culture, the results may be negative. Typhoid fever was first treated with ampicillin and chloramphenicol. Resistance to these medications started to appear in the 1980s, and ciprofloxacin was being used at the time, which led to the development of resistance later. However, some investigations have shown a resurgence of susceptibility to the traditional medications ampicillin and chloramphenicol in recent years [6]. Ceftriaxone is the first-line treatment for complex typhoid fever, according to the Indian Academy of Pediatrics. The ceftriaxone sensitivity in our research is 100%. Meropenem and Ofloxacin were the other twomedications that shown great sensitivity (96.66% and 86.66%, respectively). Additionally, the ciprofloxacin sensitivity was high (86.66%). Additionally, our investigation revealed a resurgence of classical drug sensitivity, which was consistent with earlier research.

Chloramphenicol and ampicillin sensitivity in our research were 73.33% and 60%, respectively. Despite the fact that fluoroquinolones were the first antibiotics used for enteric fever, the high incidence of NARST calls into question their use. The kit was difficult to get, thus we were unable to test for nalidixic acid sensitivity.

CONCLUSION

The manifestation of enteric fever varies; younger children are more likely to have stomach distension, whereas older children are more likely to experience headaches and abdominal discomfort. S. typhi's sensitivity to ampicillin and chloramphenicol has returned.

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