

Frequency of Enteric Fever Among Children Presenting with Acute Febrile Illness

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Abstract

Objective: To determine the prevalence of enteric fever in children with acute febrile illness.

Material and Method: From June 1st, 2023 to December 31st, 2023, researchers from the Department of Paediatrics at Aziz Bhatti Shaheed Teaching Hospital in Gujrat gathered data in a cross-sectional study. The study comprised a total of 150 children who were experiencing an acute febrile illness. Capillary and venous blood samples totaling around 5 ml were taken from individuals in a sterile manner. Enteric fever was considered positive when blood culture for *S. Typhi* (Wilson and Blair bismuth sulphite agar showed jet black colony with a metallic sheen). Data were entered and analyzed with statistical analysis program v25. We stratified by age, gender, duration of fever, and body mass index to examine the impact of these factors on the development of enteric fever. The Chi-square test was used for post-sorting the data. When the p-value was less than 0.05, it was determined to be significant.

Results: The frequency distribution results of gender showed that 66(44.0%) were male and 84(56.0%) were female patients in our study. The mean age of patients in our study was 6.58 ± 3.11 year with minimum value was 1 years and maximum value was 12 years. In our study, the frequency distribution results of enteric fever showed that, 34(22.7%) had enteric fever.

Conclusion: Acute fevers often result from typhoid. Acute fever is often caused by typhoid because of improper hygiene.

Key words: Acute Febrile Illness, Enteric Fever.

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Introduction

Salmonella enterica subsp. *Enterica* serovar Typhi is the causative agent of typhoid fever. Because of the widespread lack of infrastructure to provide clean water and toilets in poor communities. In 2010, it was predicted that there were 12 million cases of typhoid fever and 130,000 fatalities worldwide. Pakistan has one of the highest burden rates in the world, with more

than 100 new cases per 100,000 people each year. The incidence of laboratory confirmed typhoid and paratyphoid infections in India was estimated to be 9.7 and 0.9%, respectively, in a recent systematic review and meta-analysis.¹⁻³

Typhoid is still quite common, but there have been fewer confirmed cases in recent years. Blood or bone marrow culture confirmation is necessary for a final diagnosis of typhoid fever. Due to low levels of bacteremia and previous antibiotic usage, blood culture has a number of drawbacks, including the volume of blood needed. Particularly in resource-poor nations where laboratory diagnostic facilities are inadequate, the detection of bacterial febrile diseases presents a significant difficulty.^{4,6}

Clinical differentiation between malaria and other bacterial febrile infections can be challenging since their symptoms overlap significantly. The similarity in clinical presentation between diverse bacterial febrile infections

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makes laboratory detection of these diseases challenging outside of emergency situations. A study by Chipwaza B, et al. showed that frequency of enteric fever was 10.3% among children presenting with acute febrile illness. Another study by Sandhya T, et al. has shown that frequency of enteric fever was 32.40% among children presenting with acute febrile illness.⁷⁻⁸

Limited data is available on this subject in Pakistan. Moreover results of different studies in different populations have shown variability in results, so these results cannot be generalized on all populations due to this variability. Therefore, it is my intention to assess the prevalence of enteric fever in children with acute febrile illness. A verified diagnosis is necessary for a conclusive diagnosis of typhoid fever. Patients with typhoid fever can be better managed with antibiotic treatment if the disease is identified and diagnosed quickly and accurately.

Material And Method

The cross-sectional study was conducted at Department of Pediatrics, Aziz Bhatti Shaheed Teaching Hospital, Gujrat from June 1st, 2023 to December 31st, 2023. Children having ages between 1-12 years of either gender and presenting with acute febrile illness were included in this study. Children with H/o tuberculosis on medical record, H/o malaria on medical record and H/o diarrhea on medical record (during last 2 weeks) were excluded from study. Sample size was 150 which was calculated by using WHO sample size calculator with margin of error as 5%, 95% confidence level and anticipated frequency of enteric fever as 10.3%.⁷

After receiving approval from the hospital's ethics council, the research enrolled a total of 150 children from the paediatrics department at Aziz Bhatti Shaheed Teaching Hospital in Gujrat. Each parent gave their agreement after being assured of the study's confidentiality and the lack of harm to their child. Capillary and venous blood samples totaling around 5 ml were taken from individuals in a sterile manner. After that, the collected sample was sent to same hospital laboratory. Enteric fever was considered positive when blood culture for S. Typhi (Wilson and Blair bismuth sulphite agar showed jet black colony with a metallic sheen).

Acute febrile illness was defined as when children presented with temperature >101°F (by thermometer) for last 4 days. Enteric fever was defined as when positive blood culture for S. Typhi (Wilson and Blair bismuth sulphite agar showed jet black colony with a metallic

sheen) by laboratory test. Data were entered and analyzed with statistical analysis program v25.0. Quantitative factors such as age, duration of fever, and weight were provided as means and standard deviations. For qualitative factors such as gender and enteric fever, frequencies and percentages were calculated. We stratified by age, gender, duration of fever, and body mass index to examine the impact of these factors on the development of enteric fever. The Chi-square test was used for post-sorting the data. When the p-value was less than 0.05, it was determined to be significant.

Results

The frequency distribution results of gender showed that 66(44.0%) were male and 84 (56.0%) were female patients in our study. Female patients were more than male patients. The mean age of patients in our study was 6.58±3.11 year with minimum value of 1 years and maximum value of 12 years. In our study 84(56.0%) patients were from 1-6 years age groups and 66(44.0%) patients were from 7-12 years age group. Most of the patients were from 1-6 years age group. The mean weight of patients in our study was 19.74±9.33 kg, the minimum value was 6 kg and maximum value was 36 kg. The frequency distribution results of weight showed that 99(66.0%) patients were from <25 kg weight group and 51(34.0%) were from >25 kg weight group. The mean value of duration of fever of patients in our study was

Table 1: Frequency distribution of different variables

Gender	Frequency	Percent
Male	66	44.0
Female	84	56.0
Total	150	100.0
Age groups		
1-6 years	84	56.0
7-12 years	66	44.0
Total	150	100.0
Weight of child		
<25 kg	99	66.0
>25 kg	51	34.0
Total	150	100.0
Duration of fever		
≤3 days	73	48.7
>3 days	77	51.3
Total	150	100.0
Enteric fever		
Yes	34	22.7
No	116	77.3
Total	150	100.0

3.49±1.16 days with minimum value of 2 days and maximum value of 5 days. In our study the duration of fever (days) results showed that 73(48.7%) patients had <3 days of duration of fever and 77(51.3%) had >3 days duration of fever. In our study, the frequency distribution results of enteric fever showed that, 34(22.7%) had enteric fever. By stratification of enteric fever with respect to different variables, it was found that, both genders, age groups, weight groups and duration of fever have equal chances to have enteric fever (p>0.05).

Table 2: Stratification of enteric fever with respect to different variables

Variables	Enteric fever		p-value	
	Yes	No		
Gender	Male	18(27.3%)	48(72.7%)	0.232
	Female	16(19.0%)	68(81.0%)	
Age groups	1-6 years	24(28.6%)	60(71.4%)	0.051
	7-12 years	10(15.2%)	56(84.8%)	
Weight	≤25 kg	24(24.2%)	75(75.8%)	0.521
	>25 kg	10(19.6%)	41(80.4%)	
Duration of fever	≤3 days	15(20.5%)	58(79.5%)	0.546
	>3 days	19(24.7%)	58(75.3%)	

Discussion

Infections with typhoid fever remain a serious public health concern. About 17 million people are infected with typhoid fever each year, and more than 600,000 die as a result. The annual typhoid case count in England and Wales is between 150 and 200. Africa and Latin America account for the bulk of new cases and fatalities. In the United Kingdom, the incidence of typhoid fever is among the lowest in the world, with just around one case for every one million people.⁹ Antibiotic resistance has been an issue since at least 1950; by 1989, it has been documented in several countries, most notably in Asia and the Middle East. Disease outbreaks induced by resistant strains have recently occurred in India and Pakistan. Rainfall, moderate temperatures, and stagnant waterways offer environments perfect for mosquito larva, making tropical regions like Sub-Saharan Africa particularly vulnerable to the disease. Nearly a quarter of all infant fatalities in Africa can be attributed to cerebral malaria and anaemia.⁹⁻¹⁰ In 2010, there were likely 219 million confirmed cases of malaria, according to the World Health Organisation. Young children are particularly vulnerable to the health consequences of malaria. It's a key cause of poverty and a barrier to progress in the economy. Clinical differentiation between malaria and other bacterial febrile infections can be challenging

since their symptoms overlap significantly. The similarity in clinical presentation between diverse bacterial febrile infections makes laboratory detection of these diseases challenging outside of emergency situations.¹⁰ A study by Chipwaza B, et al. showed that frequency of enteric fever was 10.3% among children presenting with acute febrile illness.⁷ Another study by Sandhya T, et al. has shown that frequency of enteric fever was 32.40% among children presenting with acute febrile illness.⁸ This research indicates that paediatric instances of typhoid fever are more prevalent than previously thought. Typhoid fever was shown to be more prevalent among children ages 5-9, which is in line with previous findings from Nigeria and Pakistan.¹¹⁻¹² Since these are school-aged youngsters, it is reasonable to assume that they are consuming dangerous locally-made chilled beverages and ice creams at school. Breiman et al. found the highest prevalence of typhoid fever in children ages 2-4 and 5-9, which runs counter to our own research.¹³ In addition, similar to findings from studies conducted in Pemba, Zanzibar, and Nigeria, females were more likely to contract typhoid than males.¹⁴⁻¹⁶

Conclusion

Acute fevers often result from typhoid. Acute fever is often caused by typhoid because of improper hygiene.

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Source of Funding: none

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Authors Contribution

MS: Conceptualization of Project

AM: Data Collection

AZ: Literature Search

AH: Statistical Analysis

MUK: Drafting, Revision

L: Writing of Manuscript