

STUDY OF CLINICO-LABORATORY PROFILE IN ENTERIC FEVER AT TERTIARY CARE CENTRE IN RAJASTHAN

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ABSTRACT

Objective: The objective is to know the clinical profile of hospitalized patients with enteric fever and study the association of those clinical profiles with laboratory investigations.

Methods: It was a hospital-based, prospective, cross-sectional, observational study, performed in the Department of Paediatric Medicine, SMS Medical College, Jaipur, over a period of 1 year from May 2021 to November 2022 to know the clinical profile of hospitalized patients of enteric fever and study association of that clinical profile with laboratory investigations. Prior permission from the institutional ethical committee was obtained. This study included a total of 100 children diagnosed with enteric fever.

Results: Among study participants, the most common symptoms were fever (95), vomiting (39) and diarrhea (32). Other symptoms were pain abdomen (31), cough (23), anorexia (16), and headache (13). Among the signs, pallor was present in 26, icterus in 17, and hepato-splenomegaly in 16 children. Various hematological abnormalities found were as follows-leucopenia (87), leukocytosis (27), thrombocytopenia (16), pancytopenia (6), eosinopenia (66), and anemia (53). Hyponatremia and hypokalemia were found in 16 and 17 participants, respectively. Transaminitis was present in 32 participants. Mean Serum glutamic-oxaloacetic transaminase and serum glutamic-pyruvic transaminase was 48.6 ± 65.2 and 48.9 ± 71.8 IU/L, respectively. Positive C-reactive protein was found in 84 participants and blood culture was positive in 61 children. Among study participants various complications found were hepatitis, and bronchitis in 10 participants each followed by bronchopneumonia and encephalopathy in 2 participants each.

Keywords: Enteric fever, Clinical profile, Laboratory investigations.

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INTRODUCTION

Enteric fever is still the most common cause of bloodstream infection in many nations, and it remains a major global health concern in many developing countries, particularly in South East Asia, including India. Most developing countries have it, with India having a high illness burden of 214.2/100,000 people per year [1]. The low standard of living, poor hygiene habits, poor sanitation, contaminated water sources, and lack of universal vaccination are all factors that contribute to endemicity in underdeveloped nations. The most prevalent age range affected in children is 5–19 years old, however, in some endemic areas of Asia, it is also common in children as young as 2 years old [2].

Consumption of possibly contaminated food or water is the most common method of infection. The source of infection varies greatly; among the most prominent are person-to-person transmission through poor hygiene and sewage contamination of the water supply.

Clinical signs are non-specific, which can lead to a delay in diagnosis and treatment, which can lead to deadly complications. The symptoms range from minor constitutional symptoms to serious problems involving numerous organs. The importance of clinical suspicion in diagnosis cannot be overstated. Fever, vomiting, diarrhea, abdominal pain, cough, headache, and tiredness are common symptoms. Due to the vague clinical presentation, particularly in endemic locations, clinical diagnosis of enteric fever is difficult [3], necessitating reliance on laboratory professionals for definitive evidence. However, due to a lack of facilities or the availability of inadequate facilities in many countries, empiric medication is delivered on clinical suspicion of enteric fever without establishing laboratory evidence.

Blood culture, polymerase chain reaction (PCR) detection of genome, and serological reactions in detecting antigens and determining *Salmonella*-specific antibodies in serum are the main methods of microbiological diagnosis. Although blood culture remains the gold standard, culture facilities are not consistently available or poor, particularly in resource-limited endemic nations, and confirming identification takes several days [4].

Salmonella-specific genome detection by PCR is an important diagnostic laboratory test in the conclusive diagnosis of enteric fever. However, resources for performing this test are only available in higher-level centers, and it is still not considered a standard diagnostic method. Furthermore, culture followed by antimicrobial sensitivity testing is a time-consuming, labor-intensive, and costly diagnostic method. In resource-constrained endemic settings, this may result in a delay in appropriate diagnosis, resulting in consequences in timely untreated patients. As a result, laboratory diagnosis is frequently based on the identification of *Salmonella*-specific antibodies in blood samples.

Aim and objective

1. To know the clinical profile of hospitalized patients with enteric fever
2. To study the association of that clinical profile with laboratory investigations.

METHODS

Study location

The study was conducted in the Department of Paediatric Medicine, S.M.S medical college and attached group of hospitals, Jaipur.

Study design

Hospital-based, prospective, cross-sectional study.

Study duration

May 2021–November 2022.

Sample size

The sample size was calculated at 95% confidence level, α error of 0.05 expecting 68% toxic look as one of the signs present in children suffering from typhoid fever, as further reference article, at 10% absolute allowable error the required sample size will be 87 cases of typhoid fever that may be further enhance to 100 cases this sample size is large enough to include various clinico laboratory profile in children suffering from typhoid fever.

Study population

Children aged <15 years who presented with a history of fever of more than 7 days in the Paediatric Medicine Department, S.M.S medical college and attached group of hospitals, Jaipur.

Eligibility criteria

Inclusion criteria

1. Age <15 years
2. Confirmed cases of enteric fever with widal positive or blood culture positive.

Exclusion criteria

1. Refusal for consent
2. Other sources of infection such as respiratory, nervous system, cardiac, and genitourinary.

Sampling technique

A convenient sampling technique was used to enroll the patients in the study till the sample size completion and 80 patients were selected for the study.

Methodology

Clinically suspected cases of enteric fever who presented in the Paediatric Medicine Department, S.M.S medical college and attached group of hospitals, Jaipur with a history of fever of more than 7 days who were aged <15 years were provisionally included in this study after ruling out other sources of infection by detailed clinical history and relevant investigation. Among them, finally, those who were confirmed enteric fever cases either by Widal test or by positive blood culture positive were finally included.

Statistical analysis

A questionnaire was initially checked for completeness, and data were cleaned for errors and missing values. The corrected data were then entered into Microsoft Excel after preparing a Master-chart. After data entry of every ten questionnaires, one random form was picked and the data entry was re-checked. An independent person verified the data entry of two randomly chosen forms after the entry of every 5th questionnaire.

Data analysis was done using licensed SPSS software version 21.0 (Chicago, Illinois). Univariate analyses were done initially and the results were presented with the help of tables, text, bar-diagrams, and pie charts. Descriptive statistics were used to calculate frequencies of categorical variables, and measures of central tendencies and dispersion were used to describe continuous variables.

Ethical issues

Approval from Institutional Ethical Committee of SMS Medical College was taken before the start of the study. Written and informed consent was obtained from the participants before proceeding the study. Each eligible subject was explained about the purpose of the study by the investigator and informed consent was obtained before inclusion. They were assured of complete confidentiality of information, and the option of withdrawing from the study at any point in time. The study did not involve any method that puts the subjects, family members, or the investigator at risk.

RESULTS

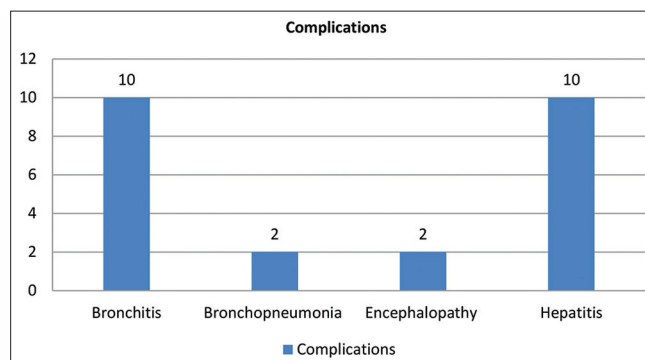
In our study, out of the 100 participants, 47 were from the age group of 6–10 years followed by 28 from the age group of ≤ 5 years. In our study, the mean age of study participants was 7.8 ± 3.5 years. Out of the 100 participants, 39 were female and 61 were male. Male:female ratio was 1.56:1.

Out of the 100 participants, 68 were from rural area and 32 were from urban area. In our study, 52 participants were from the middle class and 42 were from a lower class.

In our study, the most common symptom observed was fever and present in 95 children followed by vomiting in 39 and diarrhea in 32 children. Among signs, pallor was most commonly observed and present in 26; other signs observed were Icterus, hepatomegaly, splenomegaly, and hepatosplenomegaly and were present in 17, 17, 16 and 16 participants respectively. Among hematological abnormalities, anemia was found in 53 participants, leucopenia was found in 87 participants, leukocytosis was found in 27 participants, thrombocytopenia was found in 16 participants, pancytopenia was found in 6 participants, eosinopenia was found in 66 participants. In our study, transaminitis was found in 32 participants. Hyponatremia and hypokalaemia were electrolyte abnormalities observed in our study and were present in 16 and 17 participants respectively. In our study, out of the 100 participants, 84 were C-reactive protein (CRP) positive.

In our study, out of the 100 participants, positive blood culture was found in 61 children.

In our study, out of the 100 participants, hepatitis and bronchitis were found in 10 participants each followed by bronchopneumonia and encephalopathy in 2 participants each.



In our study, mean serum glutamic-oxaloacetic transaminase (SGOT) and serum glutamic-pyruvic transaminase (SGPT) was 48.6 ± 65.2 and 48.9 ± 71.8 IU/L, respectively.

DISCUSSION

Enteric fever is a tropical infectious disease that affects multiple organ systems. *Salmonella enterica* serotype Typhi (*Salmonella typhi*) or *S. enterica* serotype Paratyphi A, B, or C are the causative organisms. It is prevalent in the majority of developing countries, with India having a high illness burden of 214.2/100,000 people per year. The low standard of living, poor hygiene habits, poor sanitation, contaminated water sources, and lack of universal vaccination are all factors that contribute to endemicity in underdeveloped nations. The most common age group affected range affected is 5–19 years, however in some endemic parts of Asia, it is also common in youngsters as young as 2 years. Clinical signs are non-specific, which can lead to a delay in diagnosis and treatment, which can lead to deadly complications. Symptoms range from minor constitutional symptoms to serious problems involving numerous organs. The importance of clinical suspicion in diagnosis cannot be

Table 1: Blood culture results among study participants

| Blood culture | Frequency (%) |
|---------------|---------------|
| Positive | 39 (39.0) |
| Sterile | 61 (61.0) |
| Total | 100 (100.0) |

Table 2: Various complications observed among study participants

| Complications | Frequency (%) |
|------------------|---------------|
| Bronchitis | 10 (10) |
| Bronchopneumonia | 2 (2) |
| Encephalopathy | 2 (2.0) |
| Hepatitis | 10 (10.0) |

Table 3: Liver function tests among study participants

| | SGOT | SGPT |
|---------|----------|----------|
| Mean | 48.6078 | 48.9314 |
| Median | 34.0000 | 35.5000 |
| SD | 65.14617 | 71.84365 |
| Minimum | 14.00 | 14.00 |
| Maximum | 465.00 | 452.00 |

SGOT: Serum glutamic-oxaloacetic transaminase, SGPT: Serum glutamic pyruvic transaminase, SD: Standard deviation

overstated. Fever, vomiting, diarrhea, abdominal pain, cough, headache, and tiredness are common symptoms. The gold standard for diagnosis is blood culture, yet 70% of the time, the culture is negative due to the inappropriate use of antibiotics before admission.

Current study was a prospective, cross-sectional, observational study conducted in the Department of Paediatric Medicine, SMS Medical College, and attached group of hospitals, Jaipur. The present study aimed to find the clinical and laboratory profile of hospitalized enteric fever. This study included a total of 100 children diagnosed with enteric fever.

In our study, the mean age of study participants was 7.8±3.5 years, and out of the 100 participants, 47 were from the age group of 6–10 years followed by 28 from the age group of ≤5 years. In our study, 39 participants were female and 61 were male participants. In the present study, 68 participants were from rural area and 32 were from urban areas. 52 participants were from middle class followed by 42 participants were from lower class.

Socioeconomic status has a very important role to play in hygiene and sanitation and hence tends to affect the incidence of enteric fever.

In our study, among all 100 participants, the most common symptom observed was fever and present in 95 children followed by vomiting in 39 and diarrhea in 32 children. Other symptoms observed were pain abdomen (31), cough (23), anorexia (16), and headache (13).

Among the signs, pallor was most commonly observed and present in 26, Icterus in 17, hepatomegaly is seen in 17, splenomegaly in 16, and hepatosplenomegaly in 16 children, and anemia was in 53 participants.

Among haemato-biochemical parameters, various abnormalities observed were as follows-leucopenia in 87 participants, leucocytosis in 27 participants, thrombocytopenia in 16, pancytopenia in 6, eosinopenia in 66, transaminitis in 32, hyponatremia in 16 and hypokalaemia was found in 17 participants. In our study, mean SGOT and SGPT were 48.6±65.2 and 48.9±71.8 IU/L, respectively. Among 100 participants, positive CRP was found in 84 participants, and positive blood culture was found in 61 children.

Among study participants, various complications observed were hepatitis and bronchitis in 10 each followed by bronchopneumonia and encephalopathy in 2 participants each.

Devaranavadagi and Srinivasa [3] also find similar results and the most common symptom was fever, seen in 100% of cases, followed by anorexia (61%), vomiting (44%) and abdominal pain (18%). The most common sign observed was a toxic look in 68% of the cases, followed by coated tongue in 49% and hepatomegaly in 44%. Leukocytopenia was found in 34% of cases. Eosinopenia was found in 39% of cases. Anaemia was found in 16% of cases. Thrombocytopenia was found in 15% of cases. Blood culture was positive in 20% of cases.

However, Joshi *et al.*, reported that headache was the most common symptom after fever seen in 52.5% cases and abdominal pain and vomiting were the other common associated symptoms seen in 22.5% and 20% of cases, respectively.

SUMMARY AND CONCLUSION

Current study was a prospective observational study conducted in the Department of Paediatric Medicine, SMS Mmedical College and attached group of hospital Jaipur. This study aimed to find the clinical and laboratory profile of enteric fever in hospitalized children. This study included a total of 100 children diagnosed with enteric fever.

The summary of the findings are follow-

1. In our study, the mean age of study participants was 7.8±3.5 years, and out of the 100 participants, a maximum 47 were in age of 6–10 years followed by 28 in the age of ≤5 years.
2. In our study, out of the 100 participants, 39 were female and 61 were male participants.
3. In the present study, out of the 100 participants, 68 belongs to rural area and 32 belonged to urban area, maximum 52 belonged to middle class followed by 42 belongs to a lower class.
4. In our study, out of the 100 participants, the most common symptom was fever, and present in 95 children followed by vomiting in 39 and diarrhea in 32 children. Other symptoms were pain abdomen (31), cough (23), anorexia (16), and headache (13).
5. In our study, out of the 100 participants, among the signs, pallor was present in 26, icterus in 17, hepatomegaly is seen in 17, splenomegaly in 16 and Hepatosplenomegaly in 16 children and anemia was found in 53 participants.
6. In our study, out of the 100 participants, leucopenia was found in 87 participants, leucocytosis in 27 participants, thrombocytopenia in 16, pancytopenia in 6, eosinopenia in 66, transaminitis in 32, hyponatremia in 16 and hypokalaemia was found in 17 participants.
7. In our study, mean SGOT and SGPT were 48.6± 65.2 and 48.9±71.8 IU/L, respectively.
8. In our study, out of the 100 participants, CRP positive was 84 participants and blood culture positive was 61 children.
9. In our study, out of the 100 participants, among the complications, hepatitis, and bronchitis was found in 10 each followed by Bronchopneumonia and Encephalopathy in 2 participants each.

AUTHOR CONTRIBUTION

Same for all authors.

CONFLICT OF INTEREST

None declared.

FUNDING

No funding sources.

ETHICAL APPROVAL

The study was approved by the Institutional Ethics Committee

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