

## Original Research

### Clinical and laboratory markers in diagnosis of culture positive enteric fever in children

Arifat Jabeen

DNB, Microbiology, Medanta The Medicity, Gurgaon, Haryana, India

#### ABSTRACT:

**Background:** Enteric fever is a multi-systemic tropical infectious disease. The present study was conducted to assess utility of clinical and laboratory markers in diagnosis of culture positive enteric fever in children. **Materials & Methods:** 82 patients of enteric fever of age ranged 2-10 years of both genders were examined clinically. Blood culture results were compared to the laboratory parameters. **Results:** There were 50 culture positive and 32 culture negative patient. Cough was seen among 30 culture positive and 14 culture negative, vomiting in 42 culture positive and 10 culture negative and abdominal pain in 16 culture positive and 20 culture negative patients, loose stools in 15 culture positive and 14 culture negative and constipation in 21 culture positive and 10 culture negative patients. The mean Hb was 11.2 and 11.8, TLC was 8215.7 and 10226.4, neutrophils was 63.2 and 58.7, eosinophil was 0.22 and 1.9, monocyte was 4.72 and 4.31 and platelets was 2.54 and 2.72 in culture positive and culture negative patients. **Conclusion:** Clinical and laboratory findings can help the clinician to diagnose enteric fever in children.

**Key words:** Clinical, enteric fever, laboratory findings

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**Corresponding author:** Arifat Jabeen, DNB, Microbiology, Medanta The Medicity, Gurgaon, Haryana, India

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#### INTRODUCTION

Enteric fever is a multi-systemic tropical infectious disease. Causative organisms are *Salmonella enterica* serotype Typhi (S.typhi) or *Salmonella enterica* serotype Paratyphi A, B, or C.<sup>1</sup> It is prevalent in most underdeveloped countries, with India having a high disease burden of 214.2 per 100,000 individuals per year. Endemicity in developing countries is attributed to the low standard of living, poor hygiene practices, poor sanitation, contaminated water sources, and lack of universal vaccination.<sup>2</sup> In children, the common age group affected is between five to 19 years, but in some endemic areas of Asia, it is also common in children less than two years.<sup>3</sup> Clinical manifestations are non-specific, which may delay the diagnosis and treatment leading to fatal complications. Presenting complaints vary from mild constitutional symptoms to severe complications involving multiple organs.<sup>4</sup> Clinical sign of enteric fever are diverse that can be observed with other infectious diseases. This leads to unnecessary use of antibiotics in some other diseases which cause fever.<sup>5</sup> The definitive diagnosis of enteric fever is possible with the isolation of the

causative agent.

However, the availability of microbiological culturing facilities is often limited in regions in which enteric fever is endemic.<sup>6</sup> In addition, cultures can be negative when patients used antibiotic therapy prior to diagnosis.<sup>7</sup> The present study was conducted to assess utility of clinical and laboratory markers in diagnosis of culture positive enteric fever in children.

#### MATERIALS & METHODS

The present study comprised of 82 patients of enteric fever of age ranged 2-10 years of both genders. The consent was obtained from parents of all enrolled patients.

Data such as name, age, gender etc. was recorded. Children were examined clinically and findings such as hepatomegaly, splenomegaly, coated tongue and skin rash, abdominal tenderness were evaluated. Blood investigations such as CBC, CRP, LFT, SE, blood urea, serum creatinine, Typhi-dot, WIDAL, Blood culture were done. Blood culture results were compared to the laboratory parameters. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

**RESULTS**

**Table I Distribution of patients**

Fever	Number	P value
Culture positive	50	0.05
Culture negative	32	

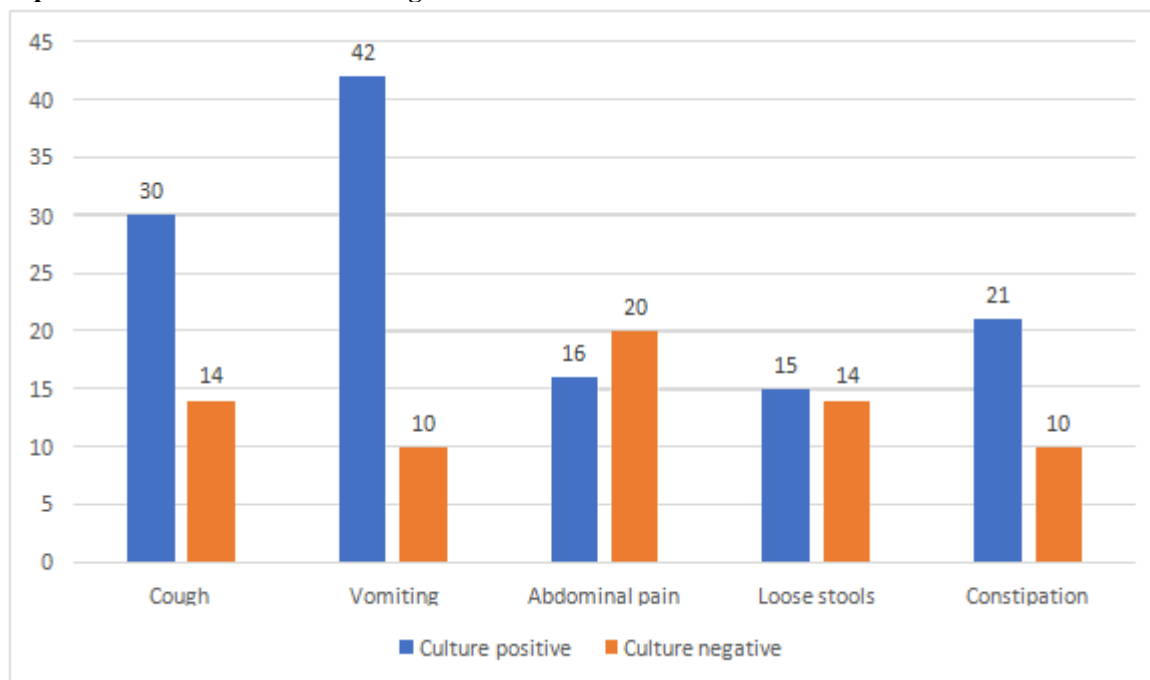
Table I shows that there were 50 culture positive and 32 culture negative patient. The difference was significant (P< 0.05).

**Table II Assessment of clinical findings**

Clinical findings	Culture positive	Culture negative	P value
Cough	30	14	0.01
Vomiting	42	10	
Abdominal pain	16	20	
Loose stools	15	14	
Constipation	21	10	

Table II, graph I shows that cough was seen among 30 culture positive and 14 culture negative, vomiting in 42 culture positive and 10 culture negative and abdominal pain in 16 culture positive and 20 culture negative patients, loose stools in 15 culture positive and 14 culture negative and constipation in 21 culture positive and 10 culture negative patients. The difference was significant (P< 0.05).

**Graph I Assessment of clinical findings**



**Table III Laboratory markers with diagnosis of enteric fever**

Laboratory markers	Culture positive	Culture negative	P value
Hb	11.2	11.8	0.11
TLC	8215.7	10226.4	0.02
Neutrophils	63.2	58.7	0.32
Eosinophil	0.22	1.9	0.01
Monocyte	4.72	4.31	0.81
Platelets	2.54	2.72	0.90

Table III shows that mean Hb was 11.2 and 11.8, TLC was 8215.7 and 10226.4, neutrophils was 63.2 and 58.7, eosinophil was 0.22 and 1.9, monocyte was 4.72 and 4.31 and platelets was 2.54 and 2.72 in culture positive and culture negative patients. The difference was significant (P< 0.05).

**DISCUSSION**

In developing countries, enteric fever causes significant morbidity in children. Blood culture is the

gold standard for diagnosis; however, culture technique, which is done in resource limited settings, with administration of prior antibiotics, leads to low

yield of growth.<sup>8</sup> In addition, it is ordinarily cultured from 5 to 10 ml of blood in 30-50 ml of broth, which limits the probability of recovering organisms in children. The Widal test which is a commonly performed serological test.<sup>9</sup>

Patients present with a gradual onset of fever which typically rises to a plateau of 39-40°C (102-104°F) towards the end of a week. This slow rise in fever contrasts with the intermittent high fever and rigors seen in malaria. Abdominal symptoms such as diarrhoea, nausea, vomiting, and abdominal pain are common as per a systematic review on clinical profile of enteric fever.<sup>10</sup> Abdominal pain is diffuse and poorly localised but occasionally intense in the right iliac fossa, mimicking appendicitis. Patients may also have headache, cough, and malaise. Children under 5 years old frequently present with only fever, and the diagnosis may be missed unless they have complications.<sup>11</sup> The present study was conducted to assess utility of clinical and laboratory markers in diagnosis of culture positive enteric fever in children. We found that there were 50 culture positive and 32 culture negative patient. Shah et al<sup>12</sup> found that 40 children with blood culture proven were enrolled in the study. All children had fever with the mean duration of 5.3 days. The most common associated symptoms were gastrointestinal which included anorexia (47.5%), pain abdomen (37.5%), vomiting (37.5%), diarrhoea (15%) and constipation (5 %). Splenomegaly (25%) and hepatomegaly (17.5%) were the commonest signs. The majority of children (80%) had normal total leucocyte count and 32.5% of them had anaemia. There were no children with thrombocytopenia. *Salmonella typhi* and *Salmonella paratyphi A* were isolated in 70% and 30% of children respectively. None of the isolates showed drug resistance against ceftriaxone, chloramphenicol, cotrimoxazole, gentamicin, norfloxacin and ofloxacin. There was no mortality.

We observed that cough was seen among 30 culture positive and 14 culture negative, vomiting in 42 culture positive and 10 culture negative and abdominal pain in 16 culture positive and 20 culture negative patients, loose stools in 15 culture positive and 14 culture negative and constipation in 21 culture positive and 10 culture negative patients. Shanker et al<sup>13</sup> in their study blood culture positive fever had a statistically significant correlation with abdominal pain, vomiting and loose stools. Blood culture positive enteric fever was significantly associated with coated tongue, hepatomegaly, splenomegaly and abdomen tenderness. 70 (61.9%) of culture positive patients had positive widal. Typhi dot was positive among 70(61.9%) of blood culture positive Enteric fever. Eosinopenia has a high sensitivity (92.9%) but low specificity (25%) in diagnosis of Enteric fever. CRP has a high sensitivity (93.8%) but low specificity (17%) in diagnosis of Enteric fever. Best AUC was observed for Widal test 0.719. The mean Hb was 11.2 and 11.8, TLC was 8215.7 and 10226.4,

neutrophils was 63.2 and 58.7, eosinophil was 0.22 and 1.9, monocyte was 4.72 and 4.31 and platelets was 2.54 and 2.72 in culture positive and culture negative patients. Many recent studies have shown increasing trend of *Salmonella Paratyphi A* infections in the endemic regions however with not much variation in clinical presentation from *Salmonella typhi* infection. This has been attributed to immunisation with the Vi antigen vaccine that does not protect against *S. paratyphi*, according to numerous researches.<sup>14</sup>

## CONCLUSION

Authors found that clinical and laboratory findings can help the clinician to diagnose enteric fever in children.

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