



To study haematological profile of Enteric fever patients.

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Abstract

Introduction: Typhoid fever is a major health problem in developing countries. It is caused by *Salmonella typhi* and *S. paratyphi*. In India annual incidence is nearly 1%. Blood culture for *Salmonella* is the gold standard to diagnose typhoid fever. Hematological profile of these patients is affected by this infection. We took this study to establish the significance of hematological profile in blood culture proven Typhoid fever patients.

Material and Methods : We did a cross sectional study on 100 patients attending OPD and IPD of Department of Pediatrics, with history of fever of $>38^{\circ}\text{C}$ for 3 days aged 1-14 years. Previously antibiotic treated patients and patients with proven localised infection were excluded. Panel of tests including blood culture and haematological profile (Hemoglobin, TLC, DLC, Platelet count, ESR) were done on these patients.

Results: In our study 46% of our patients were blood culture proven typhoid fever patients. Male children of school going age group were most commonly affected by typhoid fever. We found anemia, leucopenia, thrombocytopenia in 47.8%, 6.5% and 21.5% of patients. Lymphocytosis was seen in 10.9% of patients. ESR was high in 52.2% of patients. Results were comparable to studies done in past but we found that out of all these parameters only ESR was significantly associated with blood culture positivity.

Conclusion : Anemia in typhoid fever patients is not because of the salmonella infection. It can be because of other reasons for which detailed blood indices are required to be investigated. Total leucocyte count, eosinophil count and platelet count are also not contributory to diagnosis of enteric fever. High ESR is associated with typhoid fever. Further studies are needed to study the blood indices in detail in patients with typhoid fever in India.

Keywords: Typhoid fever, Hematological profile, leucopenia

Introduction

The term enteric fever includes typhoid fever caused by *S.typhi* and paratyphoid fever caused by *S.paratyphi* A, B and C. Detailed study of enteric fever was presented by Bretonneau (1826) who identified intestinal lesions .The name typhoid fever was given by Louis (1829) to distinguish it from typhus fever. Eberth (1880) described typhoid bacillus .¹ According to WHO Confirmed case of typhoid fever is defined, as a patient with fever (> 38°C) that has lasted for at least three days, with a laboratory confirmed positive culture of *S. typhi*.² Probable case of typhoid fever is a patient with fever (> 38°C) that has lasted for > 3 days, with a positive serodiagnosis or antigen detection test but without *S. typhi* isolation.² The world sees approximately 22 million new typhoid cases occur each year⁶. In India in disease-endemic areas, the annual incidence of enteric fever is about 1%.³ Complete blood counts in enteric fever are found to be unremarkable. The hemoglobin is normal in the initial stages but drops with progressing illness. Severe anemia is unusual and should make one suspect intestinal hemorrhage or hemolysis or an alternative diagnosis like malaria. The WBC count is normal in most cases and leucocytosis makes the diagnosis less probable. Leukopenia is perceived to be an important feature of typhoid fever and has been reported in only 20-25% cases.⁴ The differential count is usually unremarkable except for eosinopenia. Eosinopenia often absolute may be present in 70-80% cases.⁵ Presence of absolute eosinopenia offers a clue to diagnosis but does not differentiate enteric fever from other acute bacterial or viral infections. A normal eosinophil count does make typhoid fever a less likely possibility. Platelet counts are normal to begin with and fall in some cases by the second week of illness. Overall prevalence of thrombocytopenia is around 10-15%⁴. We did this study to evaluate the blood indices in culture proven enteric fever patients.

Aims and objectives

To study haematological profile of Typhoid fever patients.

Study design

The present study was a hospital based cross-sectional study. 100 Patients with fever were evaluated by doing a panel of tests for typhoid fever and complete blood count of these patients were done.

Inclusion criteria

1. Age:1-14yrs
2. Both sexes
3. Both Indoor and outdoor patients
4. Duration of fever of more >3days.
5. Fever>38⁰C

Exclusion criteria

1. Previously antibiotic treated patients.
2. Proven localized infection.

Materials and Methods

100 patients from opd and indoor admission with fever of greater than 3 days duration were included in the study. Complete blood count ,blood culture for typhoid fever and other tests to rule out other causes of fever were done .Blood culture of these patients was done by BacT/ALERT Microbial Detection System. Hemoglobin, TLC, DLC, Eosinophil Count, Platelet count, and ESR samples were sent to the biochemistry department .

Results

Total of 100 Patients with fever for more than 3 days attending OPD and IPD were evaluated by doing blood culture and blood counts (Hemoglobin, TLC, DLC, Eosinophil count, Platelet count, ESR) .

Demographic, clinical data, laboratory Parameter details were noted and analysed using SPSS software version 17(SPSS Inc., Chicago, IL, USA).

Table1:Gender distribution of patients

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|-------|--------|-----------|---------|---------------|--------------------|
| Valid | FEMALE | 43 | 43.0 | 43.0 | 43.0 |
| | MALE | 57 | 57.0 | 57.0 | 100.0 |
| | Total | 100 | 100.0 | 100.0 | |
| | | | | SEX | |

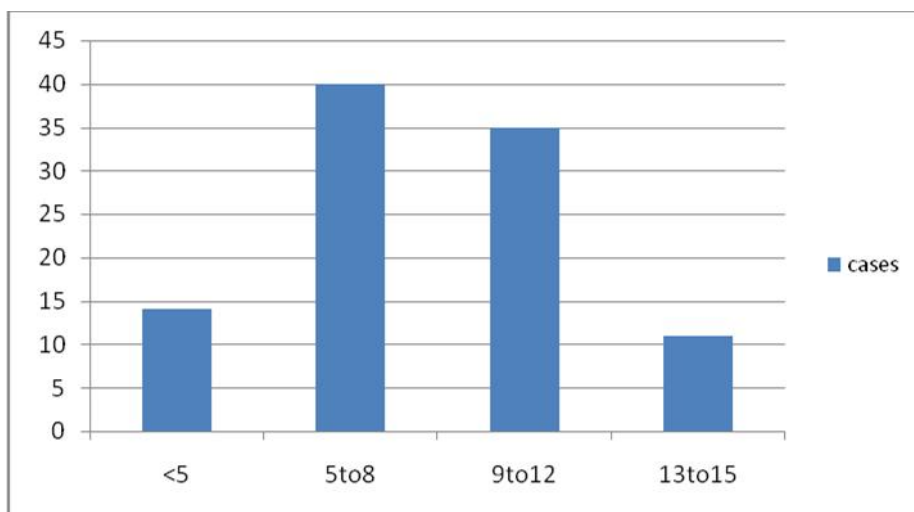


Fig 1:Age wise distribution of patients

In our study age ranged from 1.5 yrs to14 yrs with mean age of 8.2 yrs +/-3.3SD.

Patients in age group 5-8yrs were maximally affected by typhoid fever followed by 9-12 yr age group.

In this age group males were affected more than the females.Blood culture positivity ranged from 1.5 yrs to 14 yrs with mean age 7.880+-3.24SD and its association with age distribution is found to be statistically not significant($p>0.05$).

Table2 : Frequency table for Blood culture test.

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|-------|----------|-----------|---------|---------------|--------------------|
| Valid | POSITIVE | 46 | 46.0 | 46.0 | 46.0 |
| | NEGATIVE | 54 | 54.0 | 54.0 | 100.0 |
| | Total | 100 | 100.0 | 100.0 | |

When we compared blood culture results in both genders then blood culture positivity in male gender was found to be statistically significant($p<0.05$)

Table 3:Hematological test results in Blood culture Positive and negative patients

| Blood tests | Blood culture positive | Blood culture negative | P value |
|--|------------------------|------------------------|---------|
| Hb<11gm% | 22(47.8%) | 29(53.7%) | .558 |
| Leucopenia(TLC<4000) | 3(6.5%) | 3(5.6%) | .598 |
| Lymphocytosis (TLC>11000) | 5(10.9%) | 3(5.6%) | .598 |
| Eosinophil count(<1%) | 3(6.5%) | 2(3.7%) | .763 |
| Thrombocytopenia (Platelet count<1.5lac) | 10(21.7%) | 10(18.55) | .688 |
| ESR>20 | 24(52.2%) | 39(72.2%) | .038 |

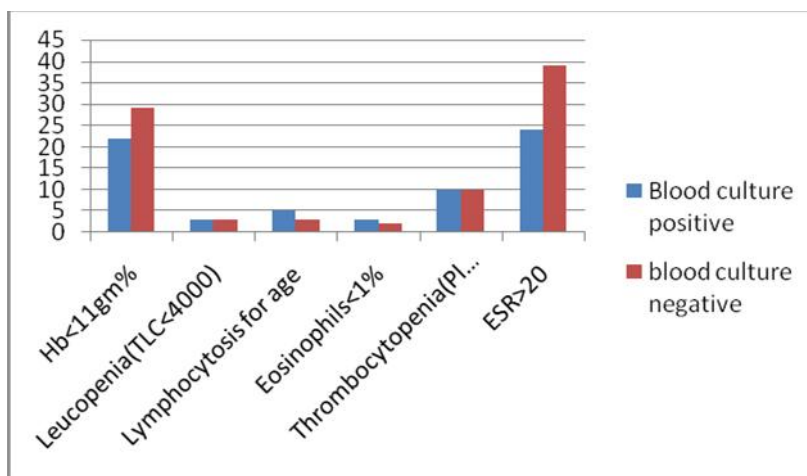


Fig 2: Graph showing the haematological indices

Discussion

A total of 100 patients of age group 1-14 years of both gender were studied, who attended OPD and IPD with 3 or more days of fever of >38 C as per inclusion criteria. Previously antibiotic treated patients and patients with localised infection were excluded from the study. This study was carried out for a period of one year. Out of 100 patients 57 patients were male and 43 were female. In our study group Male to female ratio is 1.3:1 i.e. males are more affected than females. 40% patients belonged to age group 5-8 years followed by 35% in 9-12 yrs and 14% were

<5yrs, with range of 1.5-14 yrs and mean age of presentation 8.2+/-3.3SD.

Amongst the definitive cases of typhoid fever i.e. Blood culture positive for S.typhi, 39% belonged to 5-8yr age group followed by 37% in 9-12 yr and 15.2% in <5year age group. Age distribution of definite and probable cases of typhoid fever was maximum in 5-8 yrs followed by 9-12 yrs. Similar results are seen in earlier studies that typhoid fever is prevalent in 2-5 and school going children aged 5-15 yrs^{6,7}. In our study, 15.2% of all patients with typhoid fever were under 5 years, which is close to the figure in other studies.^{9,10,18}

Blood culture was positive in 46% of cases which was comparable to other studies by Bhutta et al¹¹, Dheer et al¹³ and Sanjeev et al.¹⁵ Krishna et al showed 64% blood culture positivity in their trials.¹⁶

Hemoglobin is normal in the initial stages but drops with progressing illness. Kakaria et al reported Anemia in 42.9% in their prospective study. Shilpa et al observed anemia in 34% of their enteric fever patients.¹² Our results of anemia were comparable to these studies. Severe anemia is unusual in typhoid fever and should make one suspect intestinal haemorrhage or hemolysis or an alternative diagnosis like malaria.^{17,18} Our Results for anemia were comparable to these studies but they were statistically not significant. It has been attributed to the maturational arrest of the cell lines in salmonella infection in bone marrow.

6.5% of our blood culture positive patients had leucopenia. Kakaria et al reported leucopenia in 10 % of their patients with typhoid fever.¹⁹ Dheer et al also reported leucopenia in 7.5% of typhoid fever patients.¹³ Most of our cases had normal total leucocyte counts similar to earlier reports.^{11,17,18.}

Eosinopenia was seen in 6.5% of patients of definitive typhoid fever. It is seen that eosinopenia often absolute may be present in 70-80% of cases.^{4,5} Presence of absolute eosinopenia offers a clue to diagnosis but does not differentiate it from other acute bacterial or viral infections.^{11,17,18} In Our study eosinopenia is not a significant finding.

Thrombocytopenia was seen in 21.7% of blood culture positive patients of typhoid fever in our study. Dheer et al reported thrombocytopenia in 29.9% cases.¹³ It is seen that overall prevalence of thrombocytopenia is around 10-15%.¹⁸ I Nayar et al had seen Isolated thrombocytopenia in 43% of cases typhoid fever in their study.¹⁴ Shilpa et al had shown thrombocytopenia in 17.24% of patients with enteric fever in their trial.¹² Srivastava et al observed Thrombocytopenia in 39.7% in their study.⁷ Malik et al found thrombocytopenia in 26% of typhoid fever cases

in their trial.⁸ Our results were comparable to these studies but it was not statistically significant.

ESR was high in 52.2% of blood culture positive and 72.2% in blood culture negative patients and it is statistically significantly associated with blood culture positivity. Darton and Cames et al had shown significant association of raised ESR in typhoid fever patients.^{3,20}

Conclusion

Anemia in typhoid fever patients is not because of the salmonella infection .It can be because of other reasons for which detailed blood indices are required to be investigated. Total leucocyte count, eosinophil count and platelet count are also not contributory to diagnosis of enteric fever. High ESR is associated with typhoid fever. Further studies are needed to study the blood indices in patients with typhoid fever in India.

Abbreviations

TLC: Total Leucocyte Count
DLC: Differential Leucocyte Count
ESR: Erythrocyte Sedimentation Rate
Hb: Hemoglobin

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