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Research Article

Comparative study of blood parameters among widal positive and negative cases of enteric fever in a tertiary care teaching hospital in Maharashtra, India

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ABSTRACT

Background: Enteric fever is very common and serious infectious disease in tropical country like India. There is need for research in prognosis of enteric fever on the basis of locality of patient's i.e. urban or rural area. Also, there is scope for research on fever on the basis of OPD (out patient department) or IPD (In patient department) setting.
Methods: We have taken widal positive and negative cases from January to December 2014 and they were compared on the hematological and prognostic parameters. Widal positive cases were grouped into IPD and OPD cases as well as those hailing from rural and urban area. These were also compared on the hematological and prognostic parameters.
Results: Widal positive group has significantly higher leucocyte count than widal negative group. Also, widal positive group has more chances of having neutrophilia than widal negative group. Lymphocytes were higher in widal negative group. It is also found that lymphocyte count was significantly lower in widal positive group. We got more platelet count in widal positive cases. We compared IPD versus OPD patients; it was found that IPD patients took lesser time for fever to subside. There was no significant difference in fever duration at admission and duration of fever to subside.
Conclusions: IPD care is better than OPD care in enteric patients. Apart from leukocyte count, haemoglobin and platelet count in enteric fever should be analyzed in enteric fever.

Keywords: Enteric fever, Widal test, Rural area, Urban area

INTRODUCTION

Enteric fever is a serious, systemic infection resulting in nearly 22 million cases and 216,500 deaths annually, primarily in Asia.[1] Enteric fever is caused by the bacterium *Salmonella enterica serovar Typhi*. Infection is transmitted via the faeco-oral route with most cases and deaths occurring among populations that lack access to safe drinking water and adequate sanitation and hygiene. The illness manifests with nonspecific symptoms, making it difficult to distinguish clinically from other febrile illnesses that might be endemic or cause epidemics in the same geographic areas, such as paraenteric fever, dengue, and malaria.[2] Severe systemic complications, including intestinal perforation and neurologic manifestations, have been well documented, and intestinal perforation is the most common cause of death from enteric fever.[3]

Bacterial culture (of blood, bone marrow, or other sterile sites) is the gold standard for laboratory confirmation and antimicrobial susceptibility testing. Rapid antibody-based serologic tests are available (e.g. widal test, tubex TF,

and typhiDot), but lacks in sensitivity and specificity as compared to bacterial culture.[4] Appropriate antibiotics shorten the duration of fever and bacterial shedding and reduce the case-fatality rate. However, resistance to available antibiotics is common, and the prevalence of resistance is increasing. Humans are the only reservoir for Typhi, and a long-term carrier state occurs. Widal tube agglutination test which is almost 100 years old has been widely used in the serological diagnosis of enteric fever in India.[5] While the widal test has played a major role in the diagnosis of enteric fever in the past. Classically, a fourfold rise of antibody in paired sera is considered diagnostic of enteric fever.[6] However, paired sera are often difficult to obtain and specific antimicrobial therapy is instituted on the basis of clinical suspicion alone.[7] However, there is paucity of research in the endemic country like India about prognosis of enteric fever on the basis of locality of patients that is urban or rural area. Also, there is scope for research on fever on the basis of OPD or IPD setting. So we have decided to compare above mentioned factors.

METHODS

This is retrospective, case-control study, was carried out at Indian Institute of Medical Science and Research, Medical College and Noor Hospital, Badnapur, Jalna district of Maharashtra, India, during January to December 2014, after taking ethical clearance from Institution's ethical clearance committee. Noor hospital is a tertiary care teaching hospital in Marathwada region of Maharashtra state, India.

Inclusion criteria

Patients presented with fever with duration of four days to fourteen days were included in the study. Adults of either sex, aged between 15 and 65 were considered. The serological criteria for inclusion were a positive agglutination titer (widal test) 1/80 or more. These patients were further grouped into IPD and OPD patients. These patients were further classified according to their residing area that is rural area and urban area (Those patients hailing from taluka and above were included in urban area).

Exclusion criteria

Patients were excluded if; they refused consent, had evidence of progressive or complicated disease. Those who have past history of hypersensitivity with cephalosporins drug treatment were also excluded.

Additionally, patients who gave a history of prior treatment with a fluoro-quinolone, a third generation cephalosporin or a macrolide within one week of hospital admission were also excluded.

Statistical analysis

Analysis is done with the help of widal test, duration of fever cessation in IPD and OPD patients with respect to urban and rural area. Statistical analysis is done with the help of unpaired t-test. Widal positive cases were grouped into IPD and OPD cases as well as those hailing from rural and urban area. These were also compared on the hematological and prognostic parameters. Widal positive and negative were compared on the hematological and prognostic parameters.

RESULTS

The mean age group in this study was 36.27±14.57.

As shown in Table 1 that study had more females i.e. 56.30% as compared to males. As our medical college is located in rural area, we had 63% patients from rural area. There was no significant difference in the fever duration in widal positive (7.27±2.27 days) and negative (7.93±2.73 days) cases i.e. both groups were statistically comparable. However, fever in widal negative cases subsided later than widal positive cases. It may be due to more specific treatment in widal positive group. Widal positive group has significantly higher leucocyte count than widal negative group. Also, widal positive group has more chances of having neutrophila than widal negative group. Lymphocytes were higher in widal negative group. It is also found that lymphocyte count was significantly lower in widal positive group (as shown in Table 2).

When, we compared IPD verses OPD patients, it was found that IPD patients took lesser time for fever to subside. In IPD patients, there was higher leucocyte count as well as neutrophil count as compared to OPD group. However, lymphocyte count was higher in OPD patients. There was significant difference in platelet count in widal positive and widal negative patients. Although we got more platelet count in widal positive cases (as shown in Table 3).

When, we compared patients from rural and urban area, there was no significant difference in fever duration at admission and duration of fever to subside (as shown in Table 4).

Table 1: Baseline characteristics of cases.

Demographic profile	No. of persons	Percentage
Sex		
Male	52	43.70
Female	67	56.30
Residence		
Rural	75	63.03
Urban	44	36.97

Table 2: Comparison of widal positive and widal negative cases.

Characteristics	Widal Positive	Widal Negative	P-value
	Mean±SD	Mean±SD	
Fever duration	7.27±2.27	7.93±2.73	0.156
Fever subsides	3.69±1.61	4.64±1.50	0.002
HB	13.30±1.169	11.71±1.658	0.374
TLC	9176.22±2547.46	7311.36±2606.18	0.0002
Neutro Philes	64.66±9.17	58.09±9.12	0.0003
Lymphosites	29.45±8.73	34.82±8.51	0.002
Eosinophiles	2.68±1.27	2.98±1.17	0.203
Monocyte	3.23±1.52	3.84±1.71	0.046
Platelate Count	276280±77934	208297.92±115847.48	0.0002

Table 3: Comparison of IPD patients and OPD patients.

Characteristics	IPD	OPD	P-value
	Mean±SD	**Mean±SD**	
Fever duration	7.19±2.14	8.04±2.86	0.066
Fever subsides	3.51±1.42	4.91±1.59	0.0001
HB	13.16±11.71	11.94±1.70	0.491
TLC	8907.30±2720.62	7751.11±2547.96	0.023
Neutrophiles	64.39±9.44	58.76±8.97	0.002
Lymphosites	29.49±8.79	34.60±8.41	0.002
Eosinophiles	2.74±1.24	2.87±1.24	0.599
Monocyte	3.41±1.60	3.51±1.65	0.731
Platelate count	262973.33±84271.44	229089.58±118174.35	0.066

Table 4: Fever duration and recovery in rural patients and urban patients.

Characteristics	Rural	Urban	P-value
	Mean±SD	**Mean±SD**	
Fever duration	7.33±2.45	7.82±2.49	0.302
Fever subsides	4.01±1.55	4.09±1.78	0.803

DISCUSSION

Enteric fever caused by Salmonella species is one of the most common causes of systemic infections in India. It is widely used as a diagnostic test for enteric fever. Though, there are significant research works done on enteric fever worldwide, there is paucity of research in tropical countries like India. Moreover, enteric fever was not assessed on the basis of outcome that is duration taken to subside the fever. We found that widal positive cases fever subsided earlier than negative cases. The reason for more duration may be due to non-specificity in diagnosis of widal negative fever.

Although, leucopenia, the classic laboratory finding described in enteric fever, we found that the mean total leucocyte count was in the normal range. It also matches with other studies which are done in India. Though some studies show anemia is common manifestation in tropical country like India8, we got normal mean Haemoglobin levels. That indicates haemoglobin levels in enteric fever should be studied in detail. There was significant difference in platelet count in widal positive and widal negative patients. Although we got more platelet count in widal positive cases, similar study done in Mumbai observed thrombocytopenia (platelet count <1.5 lacs/ cumm) was seen in 25.9% enteric fever cases.[9]

Although the patients admitted in ward having higher total leukocyte count compared to OPD patient, it is observed that fever subside in IPD patients is earlier compared to OPD patients. It may be attributed to administration of intravenous antibiotics and better inpatient care as compared to OPD patients.

Neutrophil count was significantly higher in IPD patients, which may be the reason for their IPD admission owing to their more serious presentation. There is no significant difference between those patients hailing from rural area and those hailing from urban area for time taken to subsides the fever.

Besides this, the unavailability of microbiologic facilities and the long waiting time for culture results (7 to 10 days) have been identified as reasons for the preference for the widal test.[10]

CONCLUSION

Enteric fever is common infectious disease in tropical country like India. The definitive diagnosis of enteric fever requires the isolation of *Salmonella typhi* or paraTyphi from the patient. However, since patients often receive antibiotics prior to a laboratory diagnosis, bacteria are isolated from the blood cultures in very few cases. Apart from leucocyte count, hemoglobin levels and platelet count levels in enteric fever should be studied further. Patients admitted to indoor recovered earlier than OPD patients. A regional difference that is rural and urban area does not affect recovery from enteric fever significantly.

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