



COMPARATIVE ASSESSMENT OF ICT, WIDAL WITH BLOOD CULTURE FOR THE DIAGNOSIS OF TYPHOID FEVER AMONG PUO CASES IN A TERTIARY CARE: A HOSPITAL BASED STUDY OF NORTH EAST.

Banti Das*

Microbiologist , Culture and DST lab , Deptat of Microbiology , Agartala Government Medical College . *Corresponding Author

Dr Niladri Sekhar Das

Assistant Professor , Microbiology. TMC and Dr BRAM Teaching Hospital, Agartala.

ABSTRACT

Background: Disease burden of acute febrile illness due to infectious etiologies is under reported in various parts of India including North east due to lack of laboratory confirmation. Undifferentiated febrile illnesses common in tropical areas of Asia and enteric fever is one of them

Aims: This study was conducted to determine the best investigative procedures for the diagnosis of enteric fever .

Setting and Design: This was a hospital based study among 205 patients including paediatric patients admitted with acute febrile illness were evaluated by ICT, Widal and Blood culture

Materials and Methods: ICT , Widal and blood culture were performed according to manufacturer instruction

Results: When ICT was compared to blood culture concordance rate was found to be 92% where as discrepacy was just 8% and sensitivity and specificity was found to be 100 % and 90.24%.

KEYWORDS :

INTRODUCTION:

Enteric fever caused by *Salmonella Typhi* or *S. Paratyphi-A* is a major health problem in India. Most of the salmonella infections are diagnosed primarily on clinical grounds and treated presumptively leading to delayed diagnosis and emergence of drug resistance. Moreover during the first week of fever, enteric fever cannot be easily distinguished from other illnesses also. Gold standard for diagnosing enteric fever is the blood culture¹ However, its positivity rate is only 50-70%². In most of the developing countries, irrational and widespread use of antibiotics is the prime reason for the low sensitivity of blood cultures³. The causative agent of *Salmonella typhi* is most frequently isolated from blood during the first week of illness but can also be isolated during the second or third week of illness, during the first week of antimicrobial therapy and during clinical relapse. For early diagnosis, a rapid and reliable method for the detection of *S. typhi* is essential though blood cultures carry 70-75% of diagnostic yield in the first week of illness and are still regarded as the gold standard for diagnosis⁽⁴⁾. The widely used serological test, i.e. Widal test for the diagnosis of typhoid fever lacks sensitivity and specificity and reliance on it alone in areas where enteric fever is endemic leads to errors in diagnosis⁵. Moreover, it takes more than 1 week for the significant titers of antibodies to appear.^[5] IJMM. Newer serological which directly detect IgM or IgG antibodies against specific *S. Typhi* antigens have been developed. Detectable levels of IgM antibodies against *S. Typhi* can be detected as early as within 4-5 days of fever⁶. Initial studies done in Asian countries like Malaysia, Indonesia, Philippines, Pakistan, Bangladesh and India have shown variable sensitivity (73-95%) and specificity (68-95%) of these tests⁷. Hence to widen the clinical awareness a study was undertaken with the objective to compare the ICT , widal test and blood culture for the diagnosis of typhoid fever though.

MATERIALS AND METHODS:

This study was conducted in a tertiary care teaching hospital of north east India between May 2013 and October 2013. A total of 205 patients who were admitted with acute febrile illness were included in this study . Acute febrile illness was defined as at least 2 consecutive days of fever $\geq 38^{\circ}\text{C}$. Consecutive febrile episodes separated by a symptom free interval of more than 14 days were regarded as separate episode and not included and confirmed cases of tuberculosis were excluded from the study. Samples from 205 patients were evaluated by three different methods ICT for IgM , widal and blood culture which is a gold standard for the diagnosis .

RESULT:

Among 205 clinically suspected patients 50 patients were diagnosed to have enteric fever and among these 28 (56 %) were male and 22 (44 %) were female. Most commonly affected age group was found to be 21 years to 40 years (Table 1). Total culture positives were detected 09 in number. When ICT was compared to blood culture 46/50 concordance rate was 92% where as discrepacy was just 8% among 4 cases where ICT came positive . While widal test was compared with blood culture discordant result was found to be 24%. However the sensitivity and specificity of ICT was found to be 100 % and 90.24% as compared to widal which was 100% and 70.73% . Tests duration of ICT was just 10- 15 minutes as compared to culture system which need minimum 48 hrs.

Table-1 Age and Sex wise distribution

Age group (Yrs)	Male	Female	Total
0-20	3	2	05
21-40	13	11	24
41-60	8	6	14
61-70	4	3	07
Total	28	22	50

Table 2: Comparison of ICT with Blood culture system

	Culture positive	Culture negative	Total
ICT positive	9	4	13
ICT negative	0	37	37
Total	09	41	50

Table 3: Comparison of Widal and Blood culture:

	Culture positive	Culture negative	Total
Widal Test positive	9	12	21
Widal Test negative	0	29	29
Total	9	41	50

DISCUSSION:

We have evaluated two different technologies for early diagnosis of enteric fever. The results of these two serological tests and blood culture as gold standard have been analyzed for 6 months in 205 patients. Out of which, only 50 samples, for whom request for both blood culture and serological test were received, were included in this study. The overall sensitivity, specificity of immunochromatographic test were 100 % and 90.24%. Similar results were reported by a study carried out by Jesudason and Shivakumar⁸ at CMC, Vellore, i.e. sensitivity =

92.3% and specificity = 98.8%. Similarly, a sensitivity of 90.3% and specificity of 91.9% have been reported by Choo *et al*⁹ from Malaysia. Sherwal *et al.*¹⁰ at Lady Harding Medical College, Delhi have also shown high sensitivity (92%) but comparatively low specificity (87.5%). Our results are also comparable to that of other studies carried out in India and abroad^{6,10}. On other hand While widal test was compared with blood culture discordant result was found to be 24%. and specificity was low 70.73%. Though the gold standard test in the diagnosis of Enteric fever is Blood culture, but it is difficult to isolate in early phase of illness because of limited utility. and in most of the developing countries, irrational and widespread use of antibiotics is the prime reason for the low sensitivity of blood cultures¹¹. In case of emergency especially during odd hours one can rely on rapid point of care that is ICT with reasonable diagnostic accuracy of 90.24% in our setup. Among blood culture-negative patients 7.8% of cases were additionally detected by using ICT. Similarly, Baig *et al*¹² picked up 63% more cases of true typhoid fever by Typhidot-IgM as compared to blood culture. This can be explained by the fact that sensitivity of blood culture is low, i.e. 50–70%² and the sensitivity of blood culture decreases after the first week of illness and antibiotic therapy¹³. Moreover, rapid tests can detect IgM antibodies as early as two days of fever and also up to second week of fever. Rapid Salmonella-IgM tests offer increased sensitivity, rapidity, early diagnosis and simplicity over blood culture and can replace the Widal test, the most commonly used serological test. Positive Salmonella-IgM tests among blood culture negative patients should always be correlated with clinical picture of the patient. Many a times, blood culture may be negative due to other reasons like prior intake of antibiotics, etc.,. However, culture isolation of *Salmonella* remains essential, especially for antibiotic susceptibility testing and these serological tests should be used in conjunction with culture for the early diagnosis of enteric fever.

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