



COMPARISON OF TYPHIDOT IgM TEST AND BLOOD CULTURE IN CHILDREN WITH CLINICALLY COMPATIBLE ENTERIC FEVER

Paediatrics

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ABSTRACT

Background: The objectives of this study were to study to compare Typhidot IgM and blood culture for diagnosis of enteric fever in clinically compatible children. **Methods:** This was retrospective observational study done in Department of Pediatrics and Department of Microbiology at Jawahar Lal Nehru Medical College and Hospital, Bhagalpur. 72 children (aged 6 months to 18 years); with clinically compatible enteric fever (with blood leukocyte counts are frequently low in relation to the fever and toxicity) with either Typhidot IgM or blood culture positive for Salmonella species were sampled and analyzed. **Results:** Age ranged from 6 months to 18 years, with mean age of 5.58 ± 6.48 years. Mean weight of patients was 28.57 ± 13.11 Kgs. Typhi dot sensitivity was found to be 100.00% with positive predictive value of 53.3%. **Conclusions:** Typhidot IgM is a highly sensitive quick diagnostic tool for diagnosing enteric fever in children as compared to blood culture.

KEYWORDS

Blood Culture, Children, Enteric Fever, Typhoid Fever, Typhidot IgM

INTRODUCTION

Typhoid fever is a life-threatening disease occurring more frequently in under developed areas of the world and it continues to pose a major public health problem. There are around 16 million new enteric fever cases reported globally.¹ The annual incidence of enteric fever has been reported as more than 13 million cases in Asia alone and it causes annual deaths of more than 0.6 million across the world.² The incidence of Typhoid fever in India is 2.14 per thousand populations.³ The incidence of typhoid fever in the younger age group is also on the increase and the disease which was reported to be very rare below the age of three years is not correct and now there is documented evidence that enteric fever will not spare any age.⁴ In endemic areas such as India, traditional signs and symptoms in enteric fever are not often observed. Unusual presentations lead to diagnostic dilemma and may delay the diagnosis of typhoid fever.

The Typhoid F immunoglobulin M flow assay (IgMFA) is a typhoid-specific rapid diagnostic test for use on human serum or whole-blood samples, which was developed by the Royal Tropical Institute (KIT) in Amsterdam, that detects S. Typhi lipopolysaccharide (LPS)-specific IgM antibodies using a one-step immunochromatographic lateral flow assay.^{4,5} Evaluations in India have suggested a sensitivity of 59% compared with blood culture, with a range from 41% to 90%, depending on the stage of illness, and a specificity of 98% based on results obtained for patients with clinical suspicion of typhoid fever when typhoid fever was later excluded.⁶

Methods

This study was done in Department of Pediatrics and Department of Microbiology at Jawahar Lal Nehru Medical College and Hospital, Bhagalpur from June 2022 to December 2022. 72 children (aged 6 months to 18 years); with clinically compatible enteric fever (with blood leukocyte counts are frequently low in relation to the fever and toxicity) with either Typhidot IgM or blood culture positive for Salmonella species were sampled and analyzed.

Children with alternative proven diagnosis or incomplete details were excluded.

Blood Culture and Bacterial Identification

The blood culture bottles were incubated at $35-37^\circ\text{C}$ under aerobic conditions for 24 h and inspected daily for 7 days until growth detected. Bottles were observed macroscopically daily for visible evidence of bacterial growth such as hemolysis, turbidity, and gas production. Subculture was done on MacConkey agar and blood agar incubated aerobically at $35-37^\circ\text{C}$ for 24. The same procedure was repeated until the seventh day before the blood cultures considered to

be negative. Colonies are identified by gram staining, motility test and biochemical tests.

Typhidot IgM test It is a lateral flow immunochromatographic assay. The test can be done using serum and plasma. A drop serum/plasma was added to the sample well and then 1 drop of sample diluent was added. Results were read after 15 minutes.

Epidemiological data, clinical features, blood culture, Typhidot IgM test and other laboratory parameters from all the patients were collected and it was analyzed by using the Epi-info statistical software Fisher's exact test. P-value of less than 0.05 was considered as statistically significant.

RESULTS

In the study, 72 children with clinically compatibility for enteric fever, aged 6 months to 18 years; with either Typhidot IgM or blood culture positive for Salmonella species were sampled in the Department of Paediatrics. Age ranged from 6 months to 18 years, with mean age of 5.58 ± 6.48 years.

Table 1 : Total Sex Wise Distribution

Sex	Number of children	Percentage
Male	49	68.05%
Female	23	31.95%
Total	72	100%

There is male preponderance with 68.05% (N= 49/72)

Table 2: Weight Wise Distribution

Weight	
Mean weight	28.57
SD	13.11

Mean weight of patients was 28.57 ± 13.11 Kgs.

Table 3. Typhidot IgM Distribution of Patients

Typhidot IgM	No. of patient	percentage
Positive	60	83.3%
Negative	12	16.6%

60 cases were positive and 12 negative for Typhidot IgM test

Table 4. Blood Culture Wise Distribution of Patients

Blood culture	No. of patients	Percentage
No growth	40	55.56%
Salmonella typhi present	28	38.89%

Salmonella paratyphi present	04	5.55%
Total	72	100%

38.89% patients were present blood culture positive for Salmonella typhi and 5.55% were positive for Salmonella paratyphi.

Table 5. Comparison of Blood Culture and Typhoid IgM Test

Typhidot IgM	Blood culture Salmonella growth	Blood culture sterile	Total
Positive	32	28	60
Negative	0	12	12
Total	32	40	72

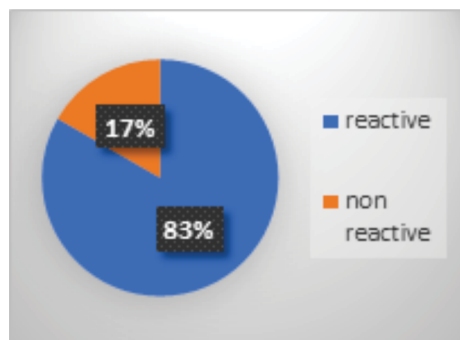
Hence Typhi dot sensitivity was found to be 100.00% with positive predictive value of 53.3%.

DISCUSSION

Enteric fever is endemic disease and is a major public health problem in developing countries including India. It has non-specific presentation, which makes clinical diagnosis difficult as it may be confused with a wide range of other common febrile illnesses in regions where typhoid fever is endemic. There is no 100% sensitive or ideal test available for enteric fever. The sensitivity of a single blood culture is approximately 60% and is affected by volume of blood obtained for culture, common practice of starting treatment with antibiotics prior to confirmation of the diagnosis.⁷ Many rural places, they are not available, and even if available, delayed results cause delayed and inappropriate treatment. The serological tests like Typhidot IgM can give quick results but universal acceptance and recommendations are lacking in children. Hence present study aimed to compare Typhidot IgM test and blood culture as a diagnostic tool in children with clinically compatible enteric fever in urban setting.

In our study Typhi dot sensitivity was found to be 100.00% with positive predictive value of 52.83%. Typhidot test study from RIMS hospital also found its usefulness in clinically suspected cases of typhoid fever and has observed the sensitivity of 93.75%, PPV of 75%.⁸

A systematic literature review published in 2016 observed that blood culture sensitivity was 66 % (95% CI 56-75 %) when compared with bone marrow culture results and it underestimated the burden of disease.⁹



CONCLUSION

Typhidot IgM is a highly sensitive quick diagnostic tool for diagnosing enteric fever in children as compared to blood culture.

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