4th International Conference on Molecular Medicine and Diagnostics
26th Cancer Genomics Congress: New Era for Cancer Prevention
&
International Conference on Biomarkers and Clinical Research
July 15-16, 2019 Abu Dhabi, UAE

Study of various laboratory methods for an early diagnosis of enteric fever

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Background: The clinical diagnosis of enteric fever is difficult due to the similarity of symptoms to the other febrile illnesses. Laboratory diagnostic tools currently in use are either not reliable or take time contrary to the requirements. Bacterial culture with its inherent limitation of poor sensitivity is still used as the gold standard, but this facility may not be available in many laboratories more so in endemic areas. Serological tests for detection of antigen and antibody as well as molecular detection test have variable results.

Aim: The aim is to develop a strategy for rapid and reliable laboratory diagnosis in a suspected case of enteric fever, by detection of anti-Salmonella antibody, especially IgM from patients' serum and antigens as well as S. Typhi genome from enriched bile broth.

Methods: The study included patients with fever for maximum duration of 10 days. A total number of 117 samples of such patients were subjected to blood culture (BacT/Alert ®PF Culture Bottles) and/or clot culture (in bile broth). Patients' serum was used for antibody detection by IgM-ELISA as well as Widal test and enriched bile broth was used for flagellar H antigens detection by latex agglutination test and bacterial genome detection by nested PCR. Both IgM ELISA and nested PCR methods were specifically designed for detection of S. Typhi infection. Latex particles coated with specific Salmonella H antibody were used for detection of flagellar H antigens from bile broth. Widal test was also performed as a routinely used method in diagnosis of enteric fever. Sensitivity, specificity, positive predictive value and negative predictive value of tests were calculated against blood and/or clot culture as a gold standard. Keeping in mind the low sensitivity of blood/clot culture, as an alternative strategy, a combination of a battery of three or more tests were evaluated for laboratory confirmation against blood culture. Agreement between the results of more than one test other than blood/clot culture was also evaluated. Excel 2007 and SPSS 15.0 were statistical software used for data analysis of the tests.

Results: Out of 44 culture isolates, S. Typhi was found in 73%, S. Paratyphi A in 23% and S. Paratyphi B in 4%. The most common age affected was between 6 to 15 years. In comparison to the blood culture as gold standard, nested PCR was found to be 100% sensitive, with specificity of only 9.6%. Widal test had maximum positive predictive value (46.9%) followed by IgM-ELISA (40.4%). Latex agglutination test showed maximum specificity of 70.45% against gold standard. Blood culture sensitivity was 43.3% with 5.5% negative predictive value when compared with three or more battery tests.

Conclusion: Battery of two or three rapid tests like, IgM-ELISA, latex agglutination and nested PCR can be used as a good strategy for rapid diagnosis of enteric fever. However, nested PCR must be studied further to evaluate it as gold standard for an early diagnosis of enteric fever.

Biography

Eissa Ali Saad Saeed is currently pursuing PhD from Pramukhswami Medical College, India. He Completed his BSc in Medical laboratory Science and MSc Medical laboratory Technology. He participated in University course "Research writing in language & communication", Seminar on "Application of next generation sequencing", National conference on health professional's education at P S medical college (bioethics workshop) "Ethical issues in patient care". His PhD work was accepted for publish in UGC approval International Journal with 4.9 impact factor.

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