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RAPID DIAGNOSIS OF TYPHOID FEVER-A COMPARATIVE STUDY OF TYPHIDOT AND WIDAL TEST

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Abstract: Typhoid fever is a major public health problem in Asia Pacific region. It is endemic in Indian subcontinent. Conventional methods for its diagnosis are blood culture and Widal test. Typhidot is a new rapid serological test which is now commercially available and reliable in diagnosis of typhoid fever even with limited resources. The study included 100 patients of all age groups who presented with fever in the outpatient departments (OPD). Blood culture, widal test and typhidot test were performed in all the patients. Typhidot test is an immunodot ELISA which detects outer membrane protein specific for Salmonella typhi within an hour. It separately identifies IgM and IgG antibodies. Typhidot and widal tests results were then compared in clinically suspected cases of typhoid fever (62 Group-1) and non typhoidal fever (38 Group-2). Seven (11.29%) patients of Group-1 were blood culture positive, 45(72.58%) were widal test positive and 52 (83.8%) were positive in typhidot test. All patients of Group-2 were sterile on blood culture, 25 (65.78%) were widal positive, while 3 (7.89%) tested positive for Typhidot. The difference in the sensitivity of widal and typhidot test in both the groups (1 & 2) was found to be statistically significant (group-1: p value = 0.023; group-2: p value < 0.05). Typhidot test is a rapid, easy to perform and reliable test for the diagnosis and early institution of therapy in typhoid fever. It might be a practical alternative to widal test due to its higher sensitivity and specificity.

Key Words: Typhoid fever, rapid serological test, widal

INTRODUCTION

Typhoid fever is a life threatening systemic infection occurring in less developed countries of the world. The disease is endemic in Indian subcontinent. There are at least 16 million new cases of typhoid globally.[1]The annual incidence of typhoid fever has been reported as more than 13 million cases in Asia, causing more than 6 lakh deaths worldwide annually[2]. Therefore, its rapid and accurate diagnosis is imperative to initiate proper management, to prevent unnecessary use of antibiotics and to control the disease. Blood culture is the gold standard test for the diagnosis of typhoid fever but it may not be always available or may not be done properly in many recourse poor laboratories. Widespread and indiscriminate use of antibiotics also make the isolation of the causative organism difficult from blood[3]. On the other hand, Widal, a serological test is readily available, inexpensive and has been in use in all clinical settings for many years. But doubts have been raised regarding its validity as the titers of diagnostic significance in this test differ in different geographical areas, in different populations and in the presence of other febrile illnesses. Currently, another serological test by the name of 'Typhidot' is commercially available for the diagnosis of typhoid fever. This has been reported as a fast, reliable, and easy to perform serodiagnostic test with higher sensitivity and specificity then widal test[4]. Studies from other Countries of Asia and India have found it to be of practical alternative to widal test in the diagnosis of typhoid fever[4-9]. Therefore, the present study was undertaken to determine the utility of this test in rapid diagnosis of tyhoid in the Malwa region Punjab where there is paucity of such studies.

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MATERIALS AND METHODS

The study was carried out in the Department of Microbiology, GGSMC, Faridkot. A total of 100 blood samples were collected from the same number of patients of acute febrile illnesses who presented to various out patients departments (OPD) of our hospital. Blood culture was done by conventional method using the trypticase soya broth. A parallel clotted blood sample was used for putting up Widal test and Typhidot test. The Typhidot test was done according to the procedure stipulated by the manufacturer. It is a dot ELISA test that detects IgM and IgG antibodies against the 50 KD outer membrane protein (OMP) of Salmonella typhi. It becomes positive within 2-3 days of infection. A positive IgM test was interpreted clinically as acute typhoidal illness. The study population (100 patients) was divided into 2 groups. Group-1 included 62 patients with clinical diagnosis of typhoid fever and Group-2 comprised of 38 patients of non typhoidal illnesses. Routine investigations like blood counts, blood and urine culture, X- ray chest, liver function tests, test for malarial parasite, dengue fever, widal, typhidot tests and tests for viral markers (HBsAg, Antibodies against HCV, HIV) were done in all the patients.

RESULTS

Comparative evaluation of blood culture, widal test and typhidot (table 1) showed that blood culture had sensitivity of 11.29% and specificity of 100%, whereas widal test had a sensitivity of 72.58% and specificity of 34.22%. In typhidot test, 47% patients were positive for IgM antibodies and 5% for IgM/IgG antibodies (Table 2). In all 52 of the 62 clinically suspected of typhoid fever were positive for IgM antibodies. This resulted in sensitivity of the test as 83.8% (52/62) and specificity

92.11%. Statistically, the difference in the sensitivity of widal & typhidot tests in both groups 1 and Group 2 patients was found to be significant with p value 0.023 & < 0.05 respectively.

Table 1: Comparison of Blood culture, widal test and typhidot test

Test	No. of +ve in clinically suspected typhoid cases- group 1 (n=62)	No. of +ve in Non-typhoid cases- group2 (n=38)
Blood culture	7 (11.29%)	0
Widal test	45 (72.58%)	25(65.78%)
Typhidot	52 (83.8%)	3(7.89%)

Table 2: Result of Typhidot test in 100 cases of febrile illness

Test Result	Positive (%)
IgM +	47%
IgM+/ IgG+	5%
IgG+	3%
IgM-/ IgG-	45%

DISCUSSION

Typhoid fever is a systemic illness with significant morbidity and mortality in developing countries. Poor sanitation, overcrowding, lack of medical facilities, and indiscriminate use of antibiotics lead to endemicity of typhoid fever and multi-resistant strains of *Salmonella typhi* in these countries.[1-3]

Isolation of the causative agent by culture has remained the gold standard for diagnosis of typhoid fever. However, it is well recognized that facilities for blood culture are not readily available everywhere. Moreover, it is time consuming, expensive and the number of cultures showing positive results is also small. In the present study, out of 62 clinically diagnosed cases of typhoid fever, only 7 (11.29%) were found to be culture positive for *S. typhi*. The reported figure from other studies vary from 6.92% to 26.7%[7-11] Two investigators from Bangladesh reported isolation rates of *S. typhi* as 16.67% and 26.7%.[8,9] In contrast, others, reported isolation rates of only 8.4% and 6.92%.[10,11] The relative low sensitivity of the blood culture in diagnosing typhoid fever is due to widespread use of antibiotics and the difficulties in obtaining adequate volume of blood for culture.[12,13]

In developing countries, Widal test appears to be the only laboratory means employed for the diagnosis of typhoid fever. As the causative agent (*Salmonella typhi*) suffers from serious cross reactivity with other infectious agents prevalent in that population, it may produce false-positive results leading to over diagnosis of typhoid fever. Moreover, it has low sensitivity and specificity. In developed countries, its use has largely been abandoned in view of low prevalence of this infection.[14] In our study, Widal test showed sensitivity of 72.58% and specificity of 34.22% (table 1). In a study from Pakistan, it had a sensitivity and specificity of 63% and 83% respectively.[10] In another study done on 80 clinically suspected cases of enteric fever from north India, widal test was reported to have a sensitivity of 74% and specificity of 83%.[4]

Typhidot is an inexpensive, and reliable serodiagnostic test recently made available commercially with reports of high sensitivity and specificity.[7-12] We studied this test for its usefulness in clinically suspected cases of typhoid fever and observed that it had a sensitivity of 83.8% and specificity of 92.11% (table 1). This is higher than that of widal test and comparable to studies done elsewhere in India and abroad. [4-8] A similar study carried out in the southern part of India reported that typhidot had a sensitivity of 92.3% and specificity of 98.8%.[11] With sensitivity of 94% and specificity of 77%, a study from Pakistan showed that typhidot was significantly superior to widal test in terms of diagnostic predictive value.[12] Authors from Malaysia reported that typhidot could replace the widal test when used in conjunction with blood culture. [15-16]

CONCLUSION

Typhidot is a rapid, highly sensitive and specific test in diagnosing typhoid fever and in the early institution of antimicrobial therapy. It is useful for small less equipped as well as for the laboratories with better facilities However, blood culture should not be neglected as isolation of the causative organisms and study of their antimicrobial susceptibility is essential in formulation of hospital antibiotic policy.

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