

Prevalence of Widal Positivity in a Tertiary Care Hospital

Bala Murali Krishna Perala¹, Rama Lakshmi Koripella²,
Sulakshana Sony Cheemala³

¹Professor and HOD, ²Assistant Professor, ³Post Graduate,
Department of Microbiology, Andhra Medical College, Visakhapatnam, Andhra Pradesh, India.

Corresponding Author: Sulakshana Sony Cheemala

Received: 12/08/2016

Revised: 17/08/2016

Accepted: 20/08/2016

ABSTRACT

Introduction: Enteric fever which includes typhoid and paratyphoid fever is a systemic febrile illness caused by the bacterium *Salmonella enterica* serovar typhi and *Salmonella enterica* serovar paratyphi A, B or C respectively. The definitive diagnosis of typhoid fever requires the isolation of *Salmonella typhi* but in developing countries, facilities for isolation and culture are often not available and diagnosis relies upon the clinical features of the disease and detection of agglutinating antibodies to *Salmonella typhi* by the Widal test.

Widal test has been widely used for the diagnosis of typhoid fever, simply owing to the fact that no other sero-diagnostic test of sufficient sensitivity and specificity along with cost effectiveness has been developed till date, especially in typhoid endemic regions.

The present study was conducted with the aim to determine the prevalence of seropositivity of *Salmonella typhi* infections in a tertiary care hospital in South India.

Materials and Methods: A total of 270 blood samples received in the Microbiology department, Andhra Medical College, Visakhapatnam from January to May 2016 were tested by conventional rapid slide agglutination test. Positive and negative controls were included in each batch of the test. Diagnostic titres of 1:80 and above were taken as positive.

Results: Out of 270 samples 84 (31.1%) were positive. Out of the total samples 124 (46%) samples were from males and 146 (54%) females. Most of the samples 128(47.7%) were from 1-20 years age group followed by 58 (21.48%) from 21-30 years. Maximum positive cases 43(15.8%) were from females and 41(15.2%) from males.

Conclusions: The disease remains an important public health problem in developing countries. Proper sanitation, public health education and vaccination are the long term preventive measures to decrease or control the disease. Updated data on the incidence or prevalence of typhoid fever is essential before introducing the vaccines into regular programmes.

Key words: Widal test, *Salmonella typhi*, Slide agglutination, Antibody titre, Enteric fever.

INTRODUCTION

Enteric fever which includes typhoid and paratyphoid fever is a systemic febrile illness caused by the bacterium *Salmonella enterica* serovar typhi and *Salmonella enterica* serovar paratyphi A, B or C respectively.

The disease has been described as endemic in tropical and subtropical

countries, with estimated annual incidence of 540 per 1 lakh. [1] The worldwide incidence was estimated to reach up to 17 million cases [2] and about 6 lakh deaths per annum. [3] Areas with high disease burden include South and East Asia, Africa, south of the Sahara and Latin America with growing population and poor sanitary conditions.

Typhi is found to be associated with over 90% cases of enteric fever. [4] There is a dearth of available epidemiological data to project the actual situation in India, though a few hospital and large population based studies have demonstrated substantial changes in the incidence of typhoid fever. [5]

The definitive diagnosis of typhoid fever requires the isolation of Salmonella typhi from the blood, feaces, urine or other body fluids. In developing countries, facilities for isolation and culture are often not available especially in smaller hospitals and diagnosis relies upon the clinical features of the disease and detection of agglutinating antibodies to Salmonella typhi by the Widal test. [6]

Over 100 years since its introduction, the Widal test has been and is still being widely used for the diagnosis of typhoid fever, simply owing to the fact that no other sero - diagnostic test of sufficient sensitivity and specificity along with cost effectiveness has been developed, especially in typhoid endemic regions. [7]

Several commercial rapid diagnostic tests namely Typhidot and Tubex have also shown sensitivity and specificity of 70 and 80% respectively in most of the surveillance studies worldwide, apart from being costlier than the agglutination tests. [8]

The Enteric fevers are diagnosed clinically without proper laboratory evidence and consequently treated presumptively with antibiotics. [9] The real concern is that though the gold standard technique of culture isolation of Salmonella typhi provides a definitive diagnosis in 73-97% of cases prior to medications, excessive antibiotic use have reduced this isolation rate to 40-60%. Isolation of Salmonella typhi or paratyphi is time taking and the facilities for blood cultures are not always feasible in resource poor regions. All these limitations have made Widal test (a rapid slide agglutination test) the most utilized test for enteric fever.

The present study was conducted with the aim to determine the prevalence of

seropositivity of Salmonella typhi infections in a tertiary care hospital in South India.

MATERIALS AND METHODS

The present study was conducted in the serology section of Microbiology department, Andhra Medical College, Visakhapatnam, Andhra Pradesh. The samples were received from King George Hospital, AMC, and Visakhapatnam.

A total of 270 blood samples received in the lab from January 2016 to May 2016 were tested by conventional rapid slide agglutination, tube agglutination test using commercially available antigens (SPAN diagnostic private limited).

0.4 ml of two fold serially diluted patients sera (dilution from 1:20 to 1:320) in 0.9% normal saline were tested by adding an equal volume of antigen.

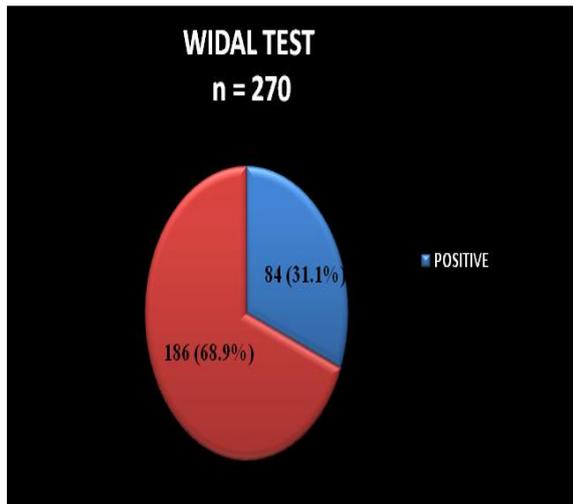
Positive and negative controls were included in each batch of the test. Diagnostic titres of 1:80 and above were taken as positive. Interpretations of the results were done as per the kit literature.

RESULTS

In the present study out of 270 samples 84 (31.1%) were positive (GRAPH 1). Out of the total samples 124 (46%) samples were from males and 146 (54%) were from females. Most of the samples 128 (47.7%) were from 1-20 years age group followed by 58 (21.48%) from 21 -30 years. Maximum positive cases 43 (15.8%) were from females and 41 (15.2%) were from males. Most of the positive cases, 48 (17.7%) were from the age group of 11 to 30 years followed by 22 (8.14%) from 1- 10 years of age. (TABLE 1)

Table 1: Age and gender wise distribution

Age	Males		Females	
	Total	Positives	Total	Positives
1 - 10 years	35	13	27	9
11 - 20 years	30	12	36	12
21 - 30 years	24	12	34	12
31 - 40 years	13	1	19	3
41 - 50 years	12	3	9	3
51 - 60 years	5	0	11	2
> 60 years	5	0	10	2
Total	124	41	146	43



Graph 1: Picture depicting seropositivity

DISCUSSION

The Widal test has been used very extensively in the diagnosis of typhoid fever and in developing countries; it remains as the only practical test available. [10-14] Isolation of *Salmonella enteric serotype typhi* from blood, urine or stool is the most reliable means of confirming an infection. Most serotype typhi infections are diagnosed purely on clinical grounds and treated presumptively. As a result, the diagnosis may be delayed or missed while other febrile illnesses are considered and patients without typhoid fever may receive unnecessary and inappropriate antimicrobial therapy. [9] Classically, a fourfold rise of antibody in paired sera is considered diagnostic of typhoid fever. [15] However paired sera are often difficult to obtain and specific chemotherapy has to be instituted on the basis of single Widal test. [16]

The earliest serological response in acute typhoid fever is a rise in the titre of the 'O' antibody, with a gradual elevation of 'H' antibody titre, but persisting longer than the 'O' antibody cut off titre. Usually upto 70% of the adults show an early rise of antibody titre in the first week of infection. [17]

In developing countries it remains as one of the best, easily accessible, economic and simple method for the diagnosis of typhoid fever. [18] This test is based on the demonstration of the agglutinin in the serum of the infected patient against the 'H'

(flagellar) and 'O' (somatic) antigens of the *Salmonella typhi*, during the acute and convalescent period of infection. [19]

In the present study the prevalence of seropositivity was 31.1% which correlates with Vallab Ganesh Bharadwaj B et al [20] who reported 27.3 %, M.A. Isa et al [21] reported 20.6% where as Akanksha Sharma et al [22] reported 12.1% and R Shyamala et al [23] reported 8.57% in their studies.

In our study 46% of the samples were from males and 54% were from females where as R Shyamala et al [23] reported 59% from males and 41% from females. In our study maximum positive cases were from females 15.8% followed by males 15.2% which correlates with Vallab Ganesh Bharadwaj B et al. [20]

Most of the positive cases in the present study were from the age group of 11- 30 years (17.7%) followed by 1-10 years (8.14%) which correlates with Vallab Ganesh Bharadwaj B et al who reported 36 % in the age group 21-40 years followed by 30.4% in < 20 years age group.

CONCLUSION

The disease remains an important public health problem in developing countries. Proper sanitation, public health education and vaccination are the long term preventive measures to decrease or control the disease. Updated data on the incidence or prevalence of typhoid fever is essential before introducing the vaccines into regular programmes.

REFERENCES

1. Okonko IO, Soley FA, Eyarefe OD, Amusan TA, Abubakar MJ, Adeyi AO, Ojezele MO, Fadeyi A. 2010. Prevalence of *Salmonella typhi* among Patients in Abeokuta, South-Western Nigeria. *British Journal of Pharmacology and Toxicology* 1(1):6-14
2. World Health Organization, A report prepared from World Health Day, 2008
3. Udeze AO, Abdulrahman F, Okonko I O, and Anibijuwon I I. Seroprevalence of *Salmonella typhi* and *Salmonella paratyphi* among the first year students of university of Ilorin, Ilorin Nigeria. *Middle-east journal*

- of scientific research 2010; 6(3):257-262.
4. Pandey D, Rijal KR, Sharma B, Kandel SR, Tiwari BR. Baseline titer and diagnostic cut off value for Widal test: A comparative study in healthy blood donors and clinically suspected of enteric fever. *JHAS* 2012; 2(1):22-26.
 5. Banerjee T, Shukla BN, Filgona J, Anupurba S, Sen MR. Trends of typhoid fever seropositivity over ten years in north India. *Indian J Med Res* 2014; 140:310-313.
 6. J. Shanthi et al, A brief study of diagnosis and frequency of typhoid fever incidence by Widal test. Scholars Research library, *Annals of Biological Research*, 2012, 3(4) 1847-1851
 7. Olopoenia LA, King AL. Widal agglutination test - 100 years later: still plagued by controversy. *Postgrad Med J*. 2000; 76:80-4.
 8. Ley B, Mtove G, Thriemer K, Amos B, von Seidlein L, Hendriksen I, et al. Evaluation of the Widal tube agglutination test for the diagnosis of typhoid fever among children admitted to a rural hospital in Tanzania and a comparison with previous studies. *BMC Infect Dis*. 2010; 10:180.
 9. Olsen SJ, Pruckler J, Bibb W, Than NT, Trinh TM, Minh NT, et al. Evaluation of rapid diagnostic tests for typhoid fever. *J Clin Microbiol*. 2004; 42:1885-1890.
 10. SA Schroeder. Interpretation of Serologic Tests for Typhoid Fever. *JAMA* 1968, 206: 839-840.
 11. A. Sen, SN. Saxena . Critical assessment of the conventional Widal test in diagnosis of typhoid fever. *Indian J Med Res* 1969, 57: 1813-1819.
 12. DW Reynolds, et al. Diagnostic specificity of Widal's reaction for typhoid fever. *JAMA* 1970, 204: 2192-2193.
 13. ACB Wicks, et al, Endemic typhoid fever: a diagnostic pitfall. *Q J Med* 1971, 40: 341-354
 14. Anonymous. Typhoid and its serology. *Br Med J* 1978, 1:389-390.
 15. MT Parker, et al Typhoid and para typhoid fever. In: Topley and Wilson's Principles of Bacteriology, Virology and Immunity, Vol III, 7th edn. Eds Wilson GS, Miles AS, Parker MT. London, Edward Arnold Publishers Limited, 1984, pp 424-442.
 16. M.J. Kulkarni, S.J. Rego, Value of single Widal test in the diagnosis of typhoid fever. *Indian Pediatr*. 1994 Nov; 31(11):1373-7.
 17. Mittal S, Bala K, Singh R, Sharma S, Chaudhary U, Sehgal PK. Baseline titer for Widal test in Haryana, India. *Int. J. Curr. Microbiol. App. Sci* 2014; 3 (10):93-96.
 18. Kulkarni, M. L, Rego, S. J. Value of single Widal test in the diagnosis of typhoid fever. *Indian paediatrics* 1993; 31(11):1373-1377
 19. Washington, J.A. Henry JB: Medical Microbiology in clinical diagnosis and management by laboratory methods. Philadelphia, WB Saunders; 1984:1102.
 20. Vallab Ganesh Bharadwaj B, Vazhavandal G, Uma A, Chitra Rajalakshmi P. Prevalence of Enteric fever in patients with Pyrexia of Unknown origin. *Asian Journal of Biomedical and Pharmaceutical Sciences*; 4(28) 2014, 39-42.
 21. M. A. Isa.1, I. I. Kubo.2, H. Y. Ismail.1, I. A. Allamin1 and A. Shettimal. Prevalence of salmonella agglutinins among patients attending hospitals in biu, Borno State, Nigeria. *Arch. Appl. Sci. Res.*, 2013, 5 (1):83-87.
 22. Aakanksha Sharma, Kiran Bala, Shipra Agarwal and Uma Chaudhary. Seroprevalence of *Salmonella typhi* in a Tertiary Care Facility in North India. *Int. J. Curr. Microbiol. App. Sci* (2015) ISSN: 2319-7706 Volume 4 Number 5 (2015) pp. 946-949.
 23. R. Shyamala Prevalence of Widal positivity in a tertiary care hospital in South India. *Der Pharmacia Lettre*, 2012, 4 (5): 1486 - 1489 (<http://scholarsresearchlibrary.com/archive.html>).

How to cite this article: Perala BMK, Koripella RL, Cheemala SS. Prevalence of widal positivity in a tertiary care hospital. *Int J Res Rev*. 2016; 3(8):32-35.
