IJBI 2 (2), (DECEMBER 2020) 83-87

International Journal of Biological Innovations

Available online: http://ijbi.org.in | http://www.gesa.org.in/journals.php

DOI:https://doi.org/10.46505/IJBI.2020.2201

Research Article

E-ISSN: 2582-1032

FREQUENCY OF TYPHOID FEVER IN HEALTHY PEOPLE OF DODA REGION OF JAMMU AND KASHMIR, INDIA: FIRST REPORT FROM AREA

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Received: 25.06.2020 **Accepted:** 15.07.2020 **Published:** 20.07.2020

Abstract: Typhoid fever (or enteric fever) remains a deadly disease in developing countries, particularly in India. Although, the paediatric population is mainly affected by this disease, however, the disease is one of the main causes of morbidity and mortality in adult populations as well. Typhoid fever is an orally transmitted infectious disease caused by the Gram negative bacterium, *Salmonella typhi*. The aim of the study was to examine pathogens that cause typhoid fever among healthy people in the Doda region of Jammu and Kashmir, India. Blood was collected from 150 healthy people for testing. A total of 85 (56.7%) healthy people showed positive results that they had typhoid fever based on a clinical examination and serological test, while 65 (43.3%) showed negative results of the total of 150 patients. The Widal test was found to be suitable test for enteric fever. Typhoid fever remains common in the Doda region, even among those with a high level of education. The study conducted during March 2020 to May 2020, is the first of its kind in the Doda region of Jammu and Kashmir.

Keywords: Enteric Fever, Gram negative, *Salmonella typhi*, Typhoid Fever, Widal Test.

INTRODUCTION

Typhoid fever was one of the leading causes of morbidity and mortality in the Western world (Ochman and Groisman, 1994). But due to improvements in sanitation situations in general, conditions have greatly improved now and the deadly disease of yester years is very rare now in the United States and Europe. However, typhoid fever remains a deadly disease in developing countries, particularly in India (Joshua and Guiney, 2001). The disease is one of the main causes of morbidity and mortality even in the general adult human population (Van and Stockenbrugger, 1994) but it affects mainly the paediatric population. The pathogenesis of enteric fever depends on a number of factors including the infecting species and infectious dose. Ingested organisms survive exposure to gastric acid before gaining access to the small bowel, where they penetrate the epithelium, enter the lymphoid tissue and disseminate via the lymphatic or hematogenous route.

Typhoid fever, also known as enteric fever, is caused by the Gram negative bacterium *Salmonella typhi*. The disease is mainly associated with low socio-economic status and poor hygiene, with human beings, the only natural host, and reservoir of infection (Mussa, 2011). Estimates for the year 2000 suggest that there are approximately 21.5 million infections and 2,00,000 deaths from typhoid fever globally each year (Bhutta, 2006; Crump *et al*., 2004; Mweu and English, 2008). The fever is also common in the current epidemic Covid-19 (Verma and Prakash, 2020; Kumari and Shukla, 2020) but that is different from the enteric fever.

In recent years there have been some changes in epidemiological patterns of typhoid and related diseases in the third world countries involving basically most of the countries in Africa, Asia and Latin America (Crump *et al*., 2004; House *et al*., 2001). More than 20 million cases a year occur in the hygienically compromised areas of developing countries and out of them Pakistan, India and Bangladesh together bear the brunt of the attack accounting for 85% of the cases occurring globally (Tupasi *et al*., 1991). Obviously, the highest age specific rates of typhoid and allied diseases are borne by children and young adults. Studies in Pakistan and Bangladesh showed the mean age of patients affected with typhoid fever is 7 years (Kadappu *et al*., 2002; Rahman *et al*., 2001). Typhoid is found to be a seasonal disease; in the monsoon itself there is occurrence of 45% of the total annual reported cases. In South Asia, the disease occurrence is highest during July to October because of heavy rainfall during that period (Rahman *et al*., 2001). Proper standardization of the methods of epidemiological studies on typhoid is therefore deemed necessary (Kadappu *et al*., 2002).

Typhoid fever is not a genetic disease rather purely an infectious disease. Inheritance of typhoid fever refers to whether the condition is inherited from your parents or runs in families. Strongly genetic diseases are usually inherited, partially genetic diseases are sometimes inherited, and non-genetic diseases are not inherited. But at present there is no report of inheritance of non-genetic diseases including the typhoid fever (Wahied and Gupta, 2012).

Widal a serological diagnosis test of enteric fever was founded in 1896 by Georges Fernand Isidore Widal (Rahman *et al*., 2001). It is an agglutination reaction demonstrating the presence of lipopolysaccharide somatic (O) and flagella (H) agglutinins to *S. typhi* in the serum of a patient using suspension of O and *H antigens* (Shukla *et al*., 1997). Commercial kits are available for antigens of *Salmonella paratyphi* A, B, and C. The recommended method of performing the Widal test is by the tube agglutination technique was serial two-fold dilutions of the subject's serum from 1:20 to 1:1280 are tested (Kadappu *et al*., 2002). Isolation of *Salmonella typhi* from the blood, feces, urine, bone marrow, or other body fluids is an important diagnostic tool. In addition, unavailability of microbiological facilities and the long waiting time for culture results have been identified as reasons for the preference for the Widal test (Cheashbrough, 1998).

MATERIALS AND METHODS

Study Area and Duration

The study was conducted on Salmonella typhi isolates that obtained from blood sample from March 2020 to May 2020 at Doda region of Jammu and Kashmir, India.

Table 1: Personal profile and clinical details of the subjects.

Characteristics	Values
Number (N)	85
Age (Years)	3-28
Male (%)	49 (57.7)
Female (%)	36 (42.3)

Table 2: Distribution of samples with antibody titer slide Widal test against different serotypes among 85 individuals.

Types of Widal Test	1:20	1:40	1:60	1:80	1:160	1:320	1:640
Antibody titers against O antigen of *S. typhi* Slide test	32	08	26	09	7	3	0
Antibody titers against H antigen of *S. typhi* Slide test	09	17	30	05	18	6	0
Antibody titers against H antigen of *S. typhi* Slide test	10	12	11	44	8	0	0
Antibody titers against H antigen of *S. typhi* Slide test	13	38	14	14	6	0	0

Study Population

Blood sample was collected from a total of 150 healthy people. All these healthy people were outpatients visiting hospital and clinics.

Blood Sample Collection

Peripheral venous blood from the all the subjects under study was drawn and allowed to coagulate at room temperature for 30-45 min, followed by centrifugation at x2500g for 5 min.

Laboratory Investigation

The serum was subjected to semi-quantitative slide Widal test using standardized suspension of *Salmonella enteric* serotype Typhi 'O' and 'H' and *Salmonella enteric* serotype paratyphi A 'H' and *Salmonella enteric* serotype paratyphi B 'H' antigen test reagents.

Widal Test (Semi-quantitative Method)

Clean glass slides supplied in the kit were used for the test. About 5 μl (corresponding to the titer of 1:320), 10 μl (corresponding to the titer of 1:160), 20 μl (corresponding to the titer of 1:80), 40 μl (corresponding to the titer of 1:40), and 80 μl (corresponding to the titer of 1:20) of undiluted serum were dispensed in respective circles using calibrated micropipette. One drop of antigen suspension was added to each circle and mixed using separate stick and rotated for one minute to take the readings (Lunette *et al*., 1985).

RESULTS

A total of 85 (56.7%) individuals showed positive result who had typhoid fever based on clinical examination and serological test while 65 (43.3%) showed negative results from the total 150 patients (Table 1 and 2).

DISCUSSION

Widal test, widely used diagnostic test for enteric fever in developing countries, has been an exclusive choice either due to the non-availability of blood culture or other reasons such as cost, technical demands, and time consumption (Pandey *et al*., 2012, Adias *et al*., 2010). However, the majority of the normal healthy individual in the endemic region also carry detectable antibodies due to the repeated prior exposure with low inoculums of typhoid bacilli, the knowledge of baseline titer is important for using the Widal test as diagnostic tool for enteric fever in endemic area. Since these antibody titers vary with age and geographical area, so the present study was aimed to determine the baseline titer of different antibodies of enteric fever (Mohanty and Ramana, 2007).

The highest titer for O and H obtained using semiquantitative slide Widal test were 1:640 and 1:320.

In the present study, authors found 1:320 titer for O and H in 3 and 6 of healthy people. In another study, Mussa (2011) have reported titer of 1:320 for O and H in 7 (8.7%) and 11 (13.7%) of 80 healthy individuals from the endemic area of Iraq. In India, one study of Bahadur and Peerapur (2005) have reported a titer of 1:320 for O and H in 2 (1.86%) of 107 apparently healthy blood donors in the regions of Raichur, Karnataka, India.

Based on another study in north Karnataka, India, Madhusudhan and Manjunath (2012) have found that antibody titer of 1:40 for O, 1:80 for H and 1:40 for AH antigen considered a baseline titer in this region. Further, large-scale studies using titer

of more than 1:640 may be required to address the issue of cutoff titer in slide Widal test. Many studies which have used slide Widal test for evaluation of endemic titer have reported higher endemic titer compared to studies which have used the tube Widal test (Bahadur and Peerapur, 2005; Bhan *et al*., 2005; Bhutta, 2006; Joshua *et al*., 2001; Roxas and Mendoza, 1989; Shukla *et al*., 1997; Tupasi *et al*., 1991).

CONCLUSION

Based on the above findings, it may be concluded that higher incidence of typhoid fever was found among the healthy people who consumed unsafe water and food from sources other than home. Widal test and typhoid test may be suitable test to detect the enteric fever after one week of fever when blood culture is negative. Typhoid fever, when properly treated, is not fatal in most cases. In order to treat the typhoid patients, antibiotics such as trimethoprim-sulfamethoxazole, ampicillin, chloramphenicol, amoxicillin and ciprofloxacin have been commonly used.

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