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Seropositivity of Widal Test in Febrile Illness Cases–A Study at a Tertiary Care Hospital in Rural Area.

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ABSTRACT

Background: Typhoid fever, caused by the bacterium *Salmonella* typhi, remains an important health problem in developing countries including India. Human beings are the only reservoir and host for typhoid fever, which is transmitted by faeco-oral route. The Widal agglutination test is the diagnostic test, commonly used to diagnose typhoid fever. The interpretation of the Widal test depends upon the baseline titre of that area. Aims and objectives: 1.T o know the positivity rate of widal test, 2. To know the titres for both 'O' & 'H' antibodies in typhoid fever. **Methods:** Widal test was done for 1525 serum samples for detection of antibodies of S. typhi. A titre of more than 1 in 80 for 'O' antibody and 1 in 160 for 'H' antibody was taken as positive in the diagnosis of typhoid fever. **Results:** 44.78% of samples (683/1525) were from 11-30 years age group. The rate of positivity was increased as the age increases except in the age group of 21- 30 yrs. Widal test was positive in 43.01% of samples. Positivity rate was high among females (50.73%) when compared to males (32.34%). **Conclusion:** 1. The percentage of positivity was 43.01% .2. The rate of positivity was increased as the age increases except in the age group of 21- 30 yrs. 3. Positivity rate was high among females (50.73%) when compared to males (32.34%). 4. Highest positivity rate was seen in males in the age group of 51- 60 yrs (80.39%) and in females in the age group of above 60 yrs (72.85%).

Keywords: Slide agglutination, Seropositivity, Typhoid fever, Antibody titre.

INTRODUCTION

Enteric fever is endemic in the Indian subcontinent with high prevalence rates.[1] It is caused by *Salmonella* typhi (*S.* Typhi) as typhoid fever and *Salmonella para*typhi A,B & C as para typhoid fever. Typhoid fever, caused by the bacterium *Salmonella enterica* serovar Typhi (*S.* Typhi), remains an important health problem throughout the developing world.[1-4] It is a systemic illness with a significant morbidity and mortality especially in developing countries.[5,6].

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Human beings are the only reservoir and host for typhoid fever, the disease is transmitted by feacally contaminated water and food in endemic areas, especially by carriers handling food.[7] The signs and symptoms of uncomplicated typhoid fever are nonspecific, and an accurate diagnosis on clinical grounds alone is difficult.[8] The definitive diagnosis of enteric fever depends on the isolation of salmonellae from blood, stool, urine, bone marrow, vomitus, pus, bile or other body fluids.[3, 9] One has to rely on serological diagnosis, since many diagnostic laboratories in the developing countries, especially in the rural areas, do not have facilities for blood culture and thus the serological diagnosis becomes an important diagnostic tool. The Widal test was developed by F. Widal in 1896. The Widal agglutination test is the diagnostic test, which is mostly commonly used for the diagnosis of enteric fever, ever since its introduction 100 years back. The interpretation of the Widal test depends upon the baseline titre which is prevalent amongst the healthy individuals in a particular geographical area.[10]The Widal agglutination test usually detects the IgM and Ig G antibodies to Salmonella typhi in the patient's serum from the second week of the onset of the symptoms of typhoid fever. The Widal test has been used very extensively in the serodiagnosis of typhoid fever and, in developing countries, remains the only practical test available. Even today, the Widal test remains one of the best, easily accessible, cheap and simple method for the diagnosis of typhoid fever.[11, 12] The present study was done to know the positivity rate of widal test in our hospital.

Aims and objectives:

1. To know the percentage of positivity of widal test

2. To know the titres for both 'O' & 'H' antibodies in typhoid fever
3. To know the common age group affected

MATERIALS AND METHODS

A total of 1525 serum samples were received in the serology section of department of Microbiology for the serological diagnosis of typhoid fever from January 2015 to December 2015. Widal test was done for all samples for detection of "O" and "H" antibodies of Salmonella typhi by using commercially available slide agglutination test kits. Test results were read within one minute. A titre of more than 1 in 80 for 'O' antibody and 1 in 160 for 'H' antibody was taken as positive in the diagnosis of typhoid fever.

Study design: It is a retrospective study.

RESULTS

Out of total samples, 44.78% of samples (683/1525) were from 11-30 years age group. The rate of positivity was increased as the age increases except in the age group of 21- 30 yrs. 43.01% of samples yielded a titre of more than 1 in 80 for 'O' antibody and 1 in 160 for 'H' antibody as shown in the [Table 1].

Table 1: Showing antibodies titres of Widal test in various age groups.

Age in Years	No. of cases	'O':'H' 20:40	O':'H' 40:80	O':'H' 80:160	O':'H' 160:320	O':'H' 320:640	Positive cases (%)
1-10	186	121	10	39	13	03	55 (29.56)
11-20	334	195	12	102	25	-	127 (38.02)
21-30	349	184	45	101	17	02	120 (34.38)
31-40	189	73	27	85	04	-	89 (47.08)
41-50	128	60	06	60	02	-	62 (48.43)
51-60	204	46	47	93	14	04	111 (54.41)
>60	135	37	06	90	02	-	92 (68.14)
Total	1525 (100%)	716 (46.95%)	153 (10.03%)	570 (37.37%)	77 (5.05%)	09 (0.59%)	656 (43.01)

Among total samples, 41.96% were from males and 58.03% were from females. In 1-10 yrs age group positivity rate was high among male children (37.11%) than female children (21.34%). Highest positivity rate was seen in males in the age group of 51- 60 yrs (80.39%) as shown in [Table 2].

Positivity rate was high among females (50.73%) when compared to males (32.34%) as shown in [Table 3].

Table 2: Showing gender vise distribution of positive results in Widal test.

Age in Years	Males		Females	
	No. of cases	Positive (%)	No. of cases	Positive (%)
1-10	97	36(37.11%)	89	19(21.34%)
11-20	131	22(16.79%)	203	105(51.72%)
21-30	162	25(15.43%)	187	94(50.26%)
31-40	84	24(29.76%)	105	66(62.85%)
41-50	50	18(36%)	78	44(56.41%)
51-60	51	41(80.39%)	153	70(45.75%)
>60	65	41(63.07%)	70	51(72.85%)
Total	640	207(32.34%)	885	449(50.73%)
	41.96%		58.03%	

Table 3: Showing gender vise distribution of significant titres in Widal test.

Age in Years	Males 'O':'H' titres				Female 'O':'H' titres			
	80:160	160:320	320:640	Total	80:160	160:320	320:640	Total
1-10	24	09	03	36	15	04	-	19
11-20	16	06	-	22	86	19	-	104
21-30	19	06	-	25	81	11	02	94
31-40	22	02	-	24	64	02	-	66
41-50	17	01	-	18	43	01	-	44
51-60	34	06	01	41	59	08	03	70
>60	41	00	-	41	49	02	-	51
Total				207 (32.34%)				449 (50.73%)

DISCUSSION

The real impact of typhoid fever is difficult to estimate as the clinical picture is confused with those of many other febrile infections. The definitive diagnosis of typhoid fever depends on the isolation of S. typhi from samples.[13] But it takes 2 to 3 days, results in delayed diagnosis and treatment. For this reason, in developing countries typhoid rapid antibody tests can facilitate diagnosis and disease management.[14,15]The rapid diagnostic tests are more sensitive than blood culture. The Widal test has been used very extensively in the serodiagnosis of typhoid fever and, in developing countries, remains the only practical test available.[9]

Ideally, the Widal test should be run on both acute- and convalescent-phase sera[16] with a fourfold rise of antibody. However, paired sera are often difficult to obtain and specific chemotherapy has to be instituted on the basis of a single Widal test. For infections like typhoid fever, early diagnosis and treatment can have an important role in preventing the development of long-term complications or in interrupting transmission of the infectious agent.[17] Hence in our laboratory we considered single widal test with antibody titres of >80 for 'O' antigen and >160 for 'H' antigen as positive for typhoid fever. Abraham G et al opined that a single Widal test in an unvaccinated patient showing H and/or O titres greater than or equal to 1:160 and typhoid-like symptoms was strongly suggestive of typhoid fever. [18]

In the present study widal test was done on samples collected from febrile cases, to diagnose typhoid fever by detecting 'O' & 'H' an bodies of *S. typhi.* But some performed widal test to know the base line titres.[1,3,19] The baseline titres of anti-TO and anti-TH were found to be 40 and those of anti-AH & anti-BH, <20 in a study by Gufran et al. [1] Endemic titre for the O and H antibodies of *S.typhi* was found to be 1:40 and 1:80 in Hemangi et al study.[3] Some performed widal test for the blood culture positive samples within the subsequent 6 months.[14]

In our study, we found 43.01% of samples were positive for antibodies in widal test. In the study of Kulkarni et al 73.3% of typhoid fever cases and 6% of non-typhoidal fever cases showed positivity.[9]In Kiran Yadav et al study widal test was positive in 68% (48/70) of the patients[4] and in Sanjeev et al study it was 66% (33/50) of clinically diagnosed typhoid fever cases. [6]. Sanjeev, In some studies it was much lower, at 8% at a titer of 160.[2] and in some it was high. BL Sherwal et al found 32 of 56 clinically suspected typhoid cases (74%) and 4 of 24 of non typhoid febrile cases were positive for widal test (17%).[5]

Positivity rate was more in females when compared to males in all age groups except in 1-10yrs & 51-60yrs age groups in our study in disagreement with some studies. Ramyil et al stated that the Food and Agriculture Organization also opined that several studies indicated that men seem to be more affected by this disease than the females which is in line with the observed finding in their study. The Widal test showed that 30 (62.5%) were positive among which were 17 (53.1%) males and 13 (46.9%) females, while for children, out of 13 (30.2%) who were positive, 8 were males and 5 were female children in their study. [7]

The high percentage of positivity in females might be due to some social factors - like females are always treated as secondary citizens especially in rural areas, are often overlooked, and viewed as economic burdens[20]and they are taken to hospital when their illness is severe. So they would be taken to hospital only after sometime elapses after their illness. Lack of treatment in the early stages of illness gives positive results when they are tested later in their illness.

In a study by Alfred Young Itah and Comfort J Akpan 48.75% of serum samples were tested positive for the Widal agglutination reaction with titers ranging from 1:80 to 1:320 and 26-30 years age group had the highest combined incidence of 7 (17.95%), followed by the age groups 21-25 and 31-35 years with a combined total of 6 (15.38%) cases each.[21] In our study positivity rate was high as the age increases.

The reason might be, old people does not seek medical aid for mild febrile illnesses as they depend on some house hold remedies and if they were not cured with these remedies then they seek medical intervention.

CONCLUSION

1. Most of the samples (683/1525) were from 11-30 years age group.
2. 43.01% of samples yielded a titre of more than 1 in 80 for 'O' antibody and 1 in 160 for 'H' antibody.
3. The rate of positivity was increased as the age increases except in the age group of 21- 30 yrs.
4. Positivity rate was high among females (50.73%) when compared to males (32.34%).
5. Highest positivity rate was seen in males in the age group of 51- 60 yrs (80.39%).
6. Among females highest positivity rate was seen in the age group of above 60 yrs (72.85%).

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