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Estimation of Typhoid Fever Between Healthy Students of Wasit University

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ABSTRACT: Typhoid fever is endemic in Iraq early diagnosis is necessary to identify the carriers who are responsible for the spread of typhoid fever. our aims to trying to estimate of Salmonella typhi and Salmonella paratyphi antibodies and diagnosis of acute and chronic infection between healthy students of wasit university. Blood specimens were collected from 60 healthy students of wasit university 30 male and 30 females their age from 18-24 years. Widal test and IgG/IgM rapid test were performed for all specimens. In current study Widal test gave 31(51.7%), 20(33.3%),11(18.3%),7(11.61%),39(65%) and 15(25%) cases have antibody for antigen O, H, AO, AH, BO, BH respectively. Significant difference was found in gender showing 18 (52.9%) were female and 16 (47.1%) male of *S.typhi* . while 23 (53.5%) were female and 20(46.5%) were male of *S.paratyphi*. The IgG/IgM rapid test gave 0(0%) IgG positive and 18 (30%) IgM positive and there was significant association between positive result of Widal test (80%) and The IgG/IgM rapid test (30%).

Keywords: Typhoid fever, Salmonella typhi, Salmonella paratyphi, Widal test.

1. INTRODUCTION

Typhoid fever (T F) is systemic infection caused by *Salmonella typhi* and *Salmonella paratyphi*. The disease still an existing public health issues in many developing country [1]. Although it's occurring in all communities, it's endemic in Iraq [2].

Typhoid fever transmitted mainly by contaminated food and drink water with human feces [3]. The spread of this disease associated to unsafe water use and poor of sanitation and hygiene at personal and community levels [4], The disease is infectious for so long as the infected person release *Salmonella typhi* and *Salmonella paratyphi* in the urine or feces [5], And the intensity of infection in population dependable on the number dose of infection and virulence of organism [6].

In early presentation of sign and symptom the clinical diagnosis is not specific because it's similar to those of other common topical infection such as enteric fever, dengue, malaria, leptospirosis, and typhus fever. Non-specific and wide show of clinical features cause several problems in the diagnosis of enteric fever. Early diagnosis was essential to treat them [3][7].

Although widal test has drawbacks In Iraq is almost the most widely used in diagnosis by detection of agglutination antibodies against H (flagellar) and O (somatic) antigen [8][2]. As a result, new tests have been created Typhoid immunoglobulin M (IgM) / immunoglobulin G (IgG) rapid test is recently test looks for the existence IgM and IgG

antibodies of *Salmonella typhi* lipopolysaccharide [9]. Each year from over 25 million cases of thyphoid fever, 200,000 were deaths worldwide especially in developing countries [6].

Wasit university is located in Wasit Governorate, the center of the city of Kut, In Al Kut city determination of *Salmonella typhi* and *Salmonella paratyphi* antibodies between healthy individual has not determinated before in addition to diagnosis of acute and chronic infection in this area thus this current study conducted.

2. MATERIALS AND METHODS

The current study was carried out in department of clinical laboratory college of education for pure sciences from December 2022 to April 2023. Sixtieth blood sample were collected from healthy students of wasit university 30 male and 30 females their age from 18-24 years. 4 ml of blood was collected in clotted tube and the serum was isolated from by centrifugation at 1500 rpm for 10 min. Widal test was use the method of this diagnostic test is based upon visible agglutination (clumps) reaction on slide between antibodies of patient serum and antigen specifically prepared from salmonella.

Acute and chronic infection diagnostic by IgG/IgM rapid test according to the manufacturing company (CTK Biotech, USA). All typhoid-patients with IgM positive has been regarded as acute infection and those with positive IgG positive has been regaded as chronic infection.

Statistical analysis:

GraphPad Prism Software version 6.0.1 (GraphPad Inc., USA) was served to detect significant variation between values (percentage) of study groups. While the *t*-test was applied for comparison between the species of Salmonella, gender groups, types of antibodies, and groups of tests; One-Way ANOVA was used to compare between the types of antigens. Value was considered significant at $P<0.05$.

3. RESULT

60 healthy volunteers of wasit university students from different sex their ages from 18-24 years were tested for the agglutination against *Salmonella typhi* and *Salmonella paratyphi* A and *Salmonella paratyphi* B. In current study Widal test gave 31(51.7%), 20(33.3%),11(18.3%),7(11.61%),39(65%) and 15(25%) cases have antibody for antigen O, H, AO, AH, BO, BH respectively, and it was found to be highly significant in BO (table 1).

A 18 (52.9%) of *S.typhi* were female and 16 (47.1%) male . while 23 (53.5%) of *S.paratyphi* were female and 20(46.5%) were male. The female was found to be more significant than male among positive cases of typhoid fever (table 2).

The IgG/IgM rapid test gave more exactness result and distinguish the patients into chronic and acute infection. The studies showed 0(0%) IgG positive and 18 (30%) IgM positive from 60 sample (Table 3). There is a statistically significant association between Widal test and The IgG/IgM rapid test (P value = 0.0276) 80% and 30% gave positive result for Widal test and The IgG/IgM rapid test respectively (table 4).

Table 1. Antibodies for different Salmonella species

Antigen	Total No. of samples	Positives		p-value
		No.	%	
Typhi O	60	31	51.7	0.0108 S
Typhi H	60	20	33.3	
Para typhi AO	60	11	18.3	
Paratyphi AH	60	7	11.6	
Paratyphi BO	60	39	65 *	
Paratyphi BH	60	15	25	

Significance (S) P<0.05
Significant increase (*)

Table 2: distribution of typhi and para typhi fever according to the gender.

	S. typhi	S. paratyphi
Female	18 (52.9%) *	23 (53.5%) *
Male	16 (47.1%)	20 (46.5%)
p-value	0.0454 S	0.0376 S

Significance (S) P<0.05
Significant increase (*)

Table 3: The number and percentage of positive result for Typhoid rapid test IgM &lgG

Antibodies	Total No.	Positive		p-value
		No.	%	
IgG	60	0	0	0.0189 S
IgM	60	18	30 *	

Significance (S) P<0.05
Significant increase (*)

Table 4: Compare results betweenWidal testand IgG/IgM rapid test

Test		Positive		p-value
		No.	%	
Widle	60	48	80 *	0.0276 S
IgG-IgM	60	18	30	

Significance (S) P<0.05
Significant increase (*)

4. DISCUSSION

Typhoid fever is still an existing health issue in many developing countries like Iraq [2]. The yearly number of cases reported about 50000 with average case of last ten years of 152 per 100000 population in different Iraq provinces. Early diagnosis is necessary to identify the carriers who are responsible for the outbreak of typhoid fever [8]. Therefore, we trying to estimate the prevalence positive Widal test between young healthy.

The result of this study was found high percentage 51% and 65% in BO and O antibody respectively between positive cases and it was found to be highly significant in BO. Antibody O is more related with acute infection [4] studies done by college of medicine in Diyala university cleared that in the endemic area where the people exposed to Salmonella organisms raised an antibodies titer may be present in a significant proportion of the normal people [8].

Regarding the gender distribution the current study show females were affected significantly higher than male, this study was consistent with Abdulridh et al., (2015) in Kerbala [4] and Ishtiaq et al., (2022) in Pakistan [7]. It could be due to the immune system of female producing more antibody, Contrary to Mussa and Al Sultany (2022) [10] and Medhat and Aljanabay in Balad city of Iraq (2022) [6] reported higher prevalence rate of typhoid fever in male.

Our finding has been shown 18 (30%) IgM positive from 60 sample of healthy student, the present of IgM refers to recent infection [11]. The high percentage might be due to their young adult age group were more excessive mixing with society and eating from crowded commercial restaurants and their unhealthy lifestyle therefore, they are more susceptible to infection than others. The percentage recorded result agrees with Abdulla and Ghareeb (2024) that recorded 31% of IgM for the suspected people [11]. Population density, health education and conventionalism, virulence of pathogen and use of appropriate treatment, all of them are factors on which the spread of any disease depends [6]. In 2020 the Communicable Diseases Control Center in Iraq (CDCI) showed decrease numbers of *Salmonella typhi* infection cases that were occurring in all governorates of Iraq compared to 2019 and 2021, This may be due to start of the COVID-19 pandemic and increased hygiene and people change their behaviors like lockdowns may influence the spread of *Salmonella* [12].

The current study showed significant association between Widal test and The IgG/IgM rapid test, 80% and 30% gave positive result for Widal test and The IgG/IgM rapid test respectively, there were many limitations in diagnosis antibodies of typhoid fever by widal test make this test even more problem in diagnosis including first, positive predictive value changes with geographical areas, has low sensitivity and specificity. Second the participation of O and H antigen by other

salmonella serotyps and more of Enterobacteriaceae members [13]. This could explain the high incidence of widal test compared to The IgG/IgM rapid test.

5. CONCLUSIONS

BO antegin was found to be highly significant between healthy students. female was found to be more significant than male among positive cases of typhoid fever. high positive percentage of IgM and There is a statistically significant association between Widal test and The IgG/IgM rapid test.

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