Original Research Article

J. Funct. Mater. Biomol. 4(2) (2020) pp 399 – 402

SACRED HEART RESEARCH PUBLICATIONS

Journal of Functional Materials and Biomolecules

Journal homepage: www.shcpub.edu.in

ISSN: 2456-9429

Haematological Profile of Typhoid Patients in and around Tirupattur District of Tamil Nadu

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Received on 9 September 2020, accepted on 12 December 2020,
Published online on 31 December 2020

Abstract

This study evaluated the haematological parameters of Typhoid patients. Blood sample of the patients (N=100) was collected from Ganesh laboratory, Tirupattur. Widal test was performed to confirm the typhoid patients using the standard kit method. Totally 100 patients were confirmed as Typhoid positive by Widal test. High level of hemoglobin was recorded in the age group between 26 to 35 years whereas, low level of WBC count was found in the age group between 56 to 65 and 76 to 85 years. High value of differential count was found in the age group between 5 to 15 and 16 to 25 years. A low level of platelet was found in the age group between 66 to 75 and 26 to 35 years. It was noted that the haematological parameters evaluated showed normal levels in the patients though they are tested positive by Widal test.

Keywords: Typhoid patients, Widal test, hemoglobin, Platelet, immune system.

1 Introduction

Typhoid fever is a systemic infection caused by Salmonella typhi significantly endemic in under-developed countries of both Asia and Africa [1,2,3]. Its mode of transmission is through oral/ fecal route. Upon entering into the host, these bacteria colonize in the small intestine and start multiplying vigorously then invades the gastrointestinal tract and spread to different vital organs includes spleen, liver and bone marrow [4,5,6]. The severity of typhoid infection is characterized by initial infective dose, virulence and the host immune response. Typhoid and paratyphoid fever tend to pose similar kind of acute clinical manifestation with an incubation period ranging from 5 to 12 days [7,8,9]. However, characteristic symptoms associated with typhoid fever; general malaise abdominal manifestations, roseola, sweating, headache, anorexia, cough, weakness, sore throat, dizziness and muscle pain, neuropsychiatric manifestations [10,11,12]. In severe cases, patients will suffer from bradycardia, splenomegaly, and hepatomegaly [13,14,15]. After 3-4 weeks of pro infection 10-15% of infected patients, in some untreated case S. typhi infection subsequently leads to gastrointestinal bleeding, intestinal perforation, and encephalopathy, finally patients will experience shock. Even some reports indicate some severe complications like pneumonia, arthritis/arthralgia, and complications such as disseminated intravascular coagulation, hepatitis, and meningitis [16,17,18].

Mary Mallon was the first person affected by the typhoid fever in United States and she is commonly called as Typhoid Mary. In 1880, Karal Joseph Eberth was the first scientist, discovered that Bacillus species causes typhoid fever. Then in 1884, George Graffky a pathologist confirmed Bacillus causing typhoid and he named it as Bacillus eberthella typhi, and later it was known as Salmonella enterica. The majority of the persons were affected by this infection in the military and warfare environment. To prevent this infection, Almroth Edward Wright developed an effective vaccine for the first time and he introduced for military use in 1896. The vaccine was introduced approximately one year later from the infected year. Edward wright introduced the vaccine which reduced the mortality rate in the 20th century. In the developing years, typhoid fever is considered as a common one and easily curable. In a developing country like India managing the water resources is of greater challenge. Waters are stored in many ways in rivers, dams and ponds. Keeping the water resources unpolluted is very difficult. Approximately 75% of the people in India are poor hygienic. The Indian populations are mostly affected by water borne diseases. Microbes play a major role in causing these waters borne diseases. In this, Salmonella typhi and paratyphi are playing a major role in causing disease through contaminated water. Salmonella typhi is a Gram-negative bacterium that causes typhoid fever in the humans. Salmonella typhi spread through the fecal of the infected person to an individual. Humans are the carrier of the Salmonella species. Salmonella bacteria enter in to the small intestine and blood stream through the ingestion of contaminated water or food. It is carried to liver, spleen, and bone marrow by white blood cells. It gets multiplied and reenters into blood stream. Bacteria fill the gall bladder, biliary system, and the lymphatic tissue of the bowel and multiply in higher number and then pass into intestinal tract. Disease may be spread by washing fruit and vegetables using contaminated water. Some people affected by Salmonella typhi have

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no illness. In some cases, the disease may reappear [19].

Typhoid can be identified for diagnosis in culture from the stool tested in the laboratory. It showed symptoms like rose sports, aches and pain, high fever, diarrhea and meningitis. Various antibiotics are used for treating typhoid namely Ampicillin, Chloramphenicol, Sulfamethoxazole and Ciprofloxican. Widal test is commonly used to diagnose typhoid patients. In this test, the patient's serum sample is checked for the reaction of agglutination. Considering the above facts in view, this study evaluated the haematological parameters of Typhoid patients.

2 Experimental

2.1 Specimen collection

Blood sample of the patients (N=100) is collected from Ganesh laboratory, Tirupattur and the samples were preserved in EDTA tube for further Widal and haematological test.

2.2 Widal test

Widal test was performed to confirm the typhoid patients. A widal test was performed using the standard kit method. Totally 100 patients were confirmed as Typhoid positive by Widal test.

2.3 Haematological parameters

2.3.1 Estimation of Hb

The calibrated tube of the hemoglobinometer was filled up to the mark (0.3 g/100 mL) with 0.1N hydrochloric acid. The blood specimen was drawn into the Sahli pipette (20 µL) from anticoagulated venous blood. The blood was blow into the acid solution inside graduated tube. The specimen mixture was allowed to stand for 10 minutes at 37ºC. The color of the diluted blood in the tube was compared with the reference tube. The hemoglobin concentration was calculated in g/dL.

2.3.2 Estimation of total WBC count

Pipetted out 0.4 mL of the WBC diluting fluid into the test tube and 20 µL of capillary blood was sucked in it. The blood sample was filled in the counting chamber. "W" marked areas were counted in all four squares. WBC (cells/mm3) was counted using the following formula: Number of WBC X ¼ X depth factor (0.1 mm) X dilution factor (20).

2.3.3 Estimation of differential count

A blood smear was made using glass slide. Leishman's stain was added to the blood smear and kept for 2 minutes and washed with distilled water. The slide was dried and a particular portion in the slide was examined under microscope and the blood cells were counted and expressed in percentage.

2.3.4 Estimation of total platelet count

The blood was drawn in the RBC pipette up to 0.5 mark and diluted with platelet diluting fluid up to 10 mark and mixed thoroughly. The counting chamber was cleaned and a glass cover was placed over it and a drop of this mixture was added and counting.

3 Results and Discussion

3.1 Widal test

Widal test was performed to confirm the typhoid patients. A widal test was performed using the standard kit method. Totally 100 patients were confirmed as Typhoid positive by Widal test.

3.2 Haemoglobin level of the typhoid patients

Male patients in the age group 5 to 15 years recorded 9.6 gms% whereas, female patients recorded 9.0 respectively. High level of hemoglobin was recorded in the age group between 26 to 35 years and lower level of hemoglobin was found in the age group between 76 to 85 years and 5 to 15 years (Table 1).

Table 1. Average Hb (gms%) of the typhoid patients.

Age group (Years)	Male	Female
5 to 15	9.6	9.0
16 to 25	10.7	9.5
26 to 35	14.0	9.5
36 to 45	10.0	9.0
46 to 55	9.7	8.9
56 to 65	10.8	10.0
66 to 75	10.6	9.0
76 to 85	9.4	7.0

3.3 Total WBC Count of the typhoid patients

Male patients in the age group 5 to15 years recorded 13,000 WBC cells whereas; female patients recorded 11,000 cells respectively. In the age group 16 to 25 years, male patients recorded 12,000 WBC cells whereas female patients recorded 5,400 cells respectively. The high value of WBC was found in the age group between 5 to15 and 16 to 25 years and the low level of total count was found in the age group between 56 to 65 and 76 to 85 years (Table 2).

Table 2. Average WBC (cells/cu.mm) of the typhoid patients.

Age group (Years)	Male	Female
5 to 15	13,000	11,000
16 to 25	12,000	5,400
26 to 35	7,500	12,500
36 to 45	11,000	5,300
46 to 55	8,660	4,500
56 to 65	5,800	7,800
66 to 75	7,600	9,000
76 to 85	6,400	6,700

3.4 Differential Count of the typhoid patients

Male patients in the age group 5 to15 years N-74%, L-20% and E-6% whereas female patients recorded N-60%, L-36% and E-4% respectively. In the age group 16 to 25 years, male patients recorded N-63%, L-34% and E-3% whereas female patients recorded N-56%, L-35% and E-9% respectively. Therefore, the higher value of differential count was found in the age group between 5 to 15 and 16

to 25 years and the low level of differential count were found in the age group between 36 to 45 and 66 to 75 years.

Table 3. Differential count of the typhoid patients.

Age group (Years)	Male	Female
5 to 15	N-74% L-20% E-6%	N-60% L-36% E-4%
16 to 25	N-63% L-34% E-3%	N-56% L-35% E-9%
26 to 35	N-54% L-44% E-2%	N-83% L-10% E-7%
36 to 45	N-43% L-47% E-10%	N-74% L-21% E-5%
46 to 55	N-56% L-40% E-4%	N-67% L-28% E-5%
56 to 65	N-54% L-38% E-8%	N-54% L-38% E-8%
66 to 75	N-54% L-40% E-6%	N-56% L-39% E-5%
76 to 85	N-54% L-36% E-10%	N-66% L-28% E-6%

3.5 Total Platelet Count of the typhoid patients

The average platelet count in the male patients in the age group 5 to15 years recorded 1.8 lakhs respectively whereas; female patients also recorded 1.8 lakhs respectively. In the age group 16 to 25 years, male patients recorded 3.9 lakhs whereas female patients recorded 2.9 lakhs respectively. The high value of platelet count was found in the age group between 16 to 25 and 56 to 65 years and low level of platelet was found in the age group between 66 to 75 and 26 to 35 years (Table 4).

Table 4. Total Platelet Count of the typhoid patients.

Age group (Years)	Male	Female
5 to 15	1.8 lakhs	1.8 lakhs
16 to 25	3.9 lakhs	2.9 lakhs
26 to 35	2.0 lakhs	3.9 lakhs
36 to 45	2.6 lakhs	2.0 lakhs
46 to 55	2.8 lakhs	1.8 lakhs
56 to 65	2.9 lakhs	1.3 lakhs
66 to 75	1.6 lakhs	2.0 lakhs
76 to 85	2.5 lakhs	1.0 lakhs

4 Conclusions

Totally 100 patients were confirmed as Typhoid positive by Widal test. High level of hemoglobin was recorded in the age group between 26 to 35 years and lower level of hemoglobin was found in the age group between 76 to 85 years and 5 to 15 years. The high value of WBC was found in the age group between 5 to15 and 16 to 25 years and the low level of total count was found in the age group between 56 to 65 and 76 to 85 years. High value of differential count was found in the age group between 5 to 15 and 16 to 25 years and the low level of differential count were found in the age group between 36 to 45 and 66 to 75 years. High value of platelet count was found in the age group between 16 to 25 and 56 to 65 years and low level of platelet was found in the age group between 66 to 75 and 26 to 35 years. From the present study it was noted that the haematological parameters evaluated showed normal levels in the patients though they are tested positive by Widal test. But in some patients the WBC level was found low which may be due to poor immune system of the typhoid systems.

Acknowledgements

Authors acknowledge the Management of Sacred Heart College (Autonomous), Tirupattur-635601, Tamil Nadu for their constant encouragement.

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