



## **AN ASSESSMENT HEMATOLOGICAL PROFILE AND LIVER FUNCTION TEST OF CHILDREN WITH HEPATITIS TYPHOID FEVER AT Al-Batool Hospital-Diyala-Iraq**

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<p><b>Received:</b> December 4<sup>th</sup> 2021 <b>Accepted:</b> January 4<sup>th</sup> 2022 <b>Published:</b> February 13<sup>th</sup> 2022</p>	<p><b>Introduction:</b> Typhoid is one of the diseases caused by Salmonella Typhi, An estimated 200,000 people die annually out of approximately 21.6 million people who are sick with typhoid fever. Typhoid liver injury is in the form of biochemical changes although there is little evidence of liver injury due to septicemia or salmonella attack. May cause significant liver damage with few characteristic clinical signs or abnormal tests for an accompanying disease. Aim of study to: To know the characteristics and functions of blood and liver associated with typhoid fever in children diagnosed by biochemical test. Methods: 30 cases of typhoid fever , aged between (1 to 6) years, were received at Al-Batool Hospital in Diyala Governorate - Iraq. Comparing it with 30 healthy children after a clinical diagnosis was made, this was confirmed by the Widdall test, which was performed to assess liver function in sick children and hematological variables. They were diagnosed with typhoid fever recorded in hospital medical records for the period from March 2021 to August 2021. Results: The sample consisted of 30 patients, 10 boys and 20 girls. Most patients are found between 6 and 1 years of age. Blood analysis showed that 48.51% of patients had iron deficiency anemia. RBC levels in 85.22% of patients were normal. Low MCV, low MCH, was found in 47.56%, 37.22% of patients. Leukopenia was present in 17.23% of the children. All patients had normal basal values. Leukopenia, stripe neutropenia, segmented neutropenia, lymphocytosis, and leukocytosis have been found in pediatric patients. S.A.S.T was raised in 17 [50%] cases and S.A.L.T was raised in 23 [46%] cases out of a total of 30 cases. Most of the cases presented with elevated S.A.S.T and S.A.L.T in the second week of fever. Conclusion: As a result of these complications, subcutaneous hematoma, subcutaneous abscess, cutaneous ulcers, and biochemical parameters can be able to tolerate association and thus serve as indications for more reliable and diagnostic assistance for infection that could alter the necessary antibiotic therapy.</p>

**Keywords:** Typhoid, salmonella, serum aspartate aminotransferase, serum Alanin transaminase, liver function test.

### **INTRODUCTION**

Salmonella typhi is the bacteria that causes typhoid fever. This disease is common in children [Walker CL, Black RE]. Typhoid and paratyphoid fever are life-threatening infections caused by a systemic infection with Salmonella enterica serotypes 1 and 2. Out of the 21.6 million persons afflicted with typhoid fever, an estimated 200,000 people die each year. Typhoid fever affects more than 100 people per 100,000 in Central Asia, South Asia, Southeast Asia, and South Africa each year [Bandy opadhyay A, Paul]. Salmonella infection is the most prevalent food-borne disease, and it is still a public health concern today [Luby SP

,Crump JA]. The disease is spread through contaminated water or food, as well as pee or faeces from infected persons. Typhoid fever primarily affects children and young people and is a main cause of disease worldwide, with over 12.6 million cases and an estimated 6,00,000 fatalities each year. [Ahmed MS ,Abdou] The increased frequency of fever can be attributed to poor sanitation and inadequate water filtering. Contaminated water, vendor-provided food and beverages, refrigerated food, and incorrect milk and milk storage in refrigerators, use of water from sewage (vital waste) to grow fruits and vegetables, and neglect of hand washing with soap after Going to



the toilet is a risk factor [Loscalzo J, Fauci AS] Examination of these infections is done by isolating Bacillus blood, feces, urine and serum, and by Vidal test by increasing antibody titers both in asymptomatic patients as well as from carriers. Low white blood cell count is not recognized as a primary symptom of fever, and studies have indicated that it is present in just 20-25 . percent of patients[Kosla A] .The hepatic manifestations are not common in this type of enteric fever. This condition was formerly called (hepatitis typhus) and is now known as typhoid hepatitis [Osler W] [Trench W]. Liver injury may be in the form of jaundice, hepatomegaly, biochemical and histological changes. Isolated hepatomegaly is not clinically significant without the occurrence with jaundice, although rare, it indicates liver injury due to generalized septicemia or the result of invasion by Salmonella bacteria. An abnormal liver function test indicating liver injury has been reported in 23-60% by various studies [Trehan VK ,Khosla SN], [Godfrey JJ, Ramachandran S], [Pullen RI, Stuart BM]. A few studies indicated a significant increase in transaminases in all cases in the first disease [Uplaonkar ,Shilpa V]. Because the liver has a large reserve of functions, there may be significant liver damage or defect without clear clinical signs or abnormal laboratory tests.

Aim of study: To know the characteristics and functions of blood and liver associated with typhoid fever in children diagnosed by biochemical test.

### **MATERIALS AND METHODS**

30 patients ages 1-6 years made up Group I (patient group). A control group of 30 healthy children was used as a comparison group. From March 2021 to August 2021, visit AL-Batool Hospital. Cases of typhoid fever with clinical signs such as a protracted fever of 1-2 weeks, stomach pain, rose patches, and enlarged liver and spleen were included in the study. Patients with other common causes of fever, such as malaria, dengue fever, and so on, are excluded. Criteria for exclusion Children with other comorbidities, such as malaria, and children with pre-existing liver illness, are

also included. Jaundiced babies born during the last six months.

### **SAMPLE COLLECTION**

Blood samples were collected and analyzed from 30 pediatric patients suspected of having typhoid fever, for different blood parameters with Widal test, at Al-Batool Hospital, Diyala Governorate, Iraq. Using a plastic syringe and disposable needle, whole blood samples were taken with little stagnation in 5 ml EDTA and plain containers via the anti-head vein. To guarantee anticoagulation and prevent cell lysis, each sample was gently and thoroughly mixed. The total blood count was performed with EDTA anticoagulant samples, while the Widal assays were performed with serum samples. The Widal test was used to confirm that suspected patients had typhoid disease [Mandloi R4, Xess]. [Supariasa IDN, Sidiartha L). Patients were admitted to the Al-Batool Hospital, where they underwent a thorough physical examination and the results were documented. Total and differential white blood cell counts, hemoglobin estimate, urinalysis, and stool inspection were among the routine tests done. A history of prolonged fever, poisonous look, and illness led to the clinical diagnosis of typhoid, which was supported by the investigation that followed.

The Widal test [Uplaonkar ,Shilpa V] was used to evaluate blood samples from individuals with a clinical suspicion of typhoid fever for the presence of S.typhi infection. The blood sample was drained at the same time as the blood sample was collected on the first day of medication. Red blood cell (RBC), hemoglobin (Hb) concentration, total white blood cell (WBC) count, platelet count (PLT), and monocytic lymphocyte count were all measured in the blood sample [Lewis SM]. Total serum bilirubin (TSB) and serum enzyme activity (AST, ALT, ALP, and uric acid) were measured using a commercially available kit (RANDOX.UK) (Biologab reagents). [Nasnas R ,Tohme A] All tests were carried out in triplicate and were subjected to rigorous external and internal quality control procedures.

Table - 1: The incidence of various symptoms in typhoid cases.

Complaints	No. of cases	Percentage
Fever	54	10%
Cough	26	48.14%
Vomiting	28	51.85%
Loose motion	8	14.81%
Abdominal pain	36	66.66%
Loss of appetite	34	62.96%



Abdominal distension		14	25.92%
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Fever is present in almost all cases. Abdominal pain (66.66%) of cases and Loss of appetite (62.96%) seen in majority of cases.

**STATISTICAL ANALYSIS**

The Mean ±SD was used to express all of the data. The t-test was used to compare variables in the data. A p<0.05 probability value was regarded statistically significant.

**RESULTS**

In this study, there were 60 children diagnosed with typhoid fever, 20 boys and 40girls, aged 1-6 years. Table 2 shows the patient and control characteristics. Figures 2,3 and Table 3 Characteristics of children with typhoid fever in the Batool Hospital's Control and Patients Groups, ages 6-1 year, from March 2020 to August2021.

Table-2- Hematological parameters of patients and controls (mean ±SD)

Hematological Parameters	Mean ± SD		P .value
	Control (n=30)	Patients (n=30)	
Age	3 ±1.35	3 ±1.47	0.58
WBC x 103ml	8.22 ±0.44	6.59 ±2.08	0.00012
Monocyte	3.2 ±0.92	18.91 ±6.42	3.22×10 <sup>-19</sup>
Lymphocyte	20.73 ±1.59	50.46 ±19.87	3.21×10 <sup>-11</sup>
Hb gm/dl	12.52±2.11	12.3±2.31	0.70
PCV%	40.42±4.04	41.2±8.29	0.64
PLT x 10 <sup>3</sup> ml	246.36±20.65	219±103.36	0.16
RBC x10 <sup>6</sup> ml	4.38±0.60	5.78±1.44	8.95×10 <sup>-6</sup>
Widal test	-	-	

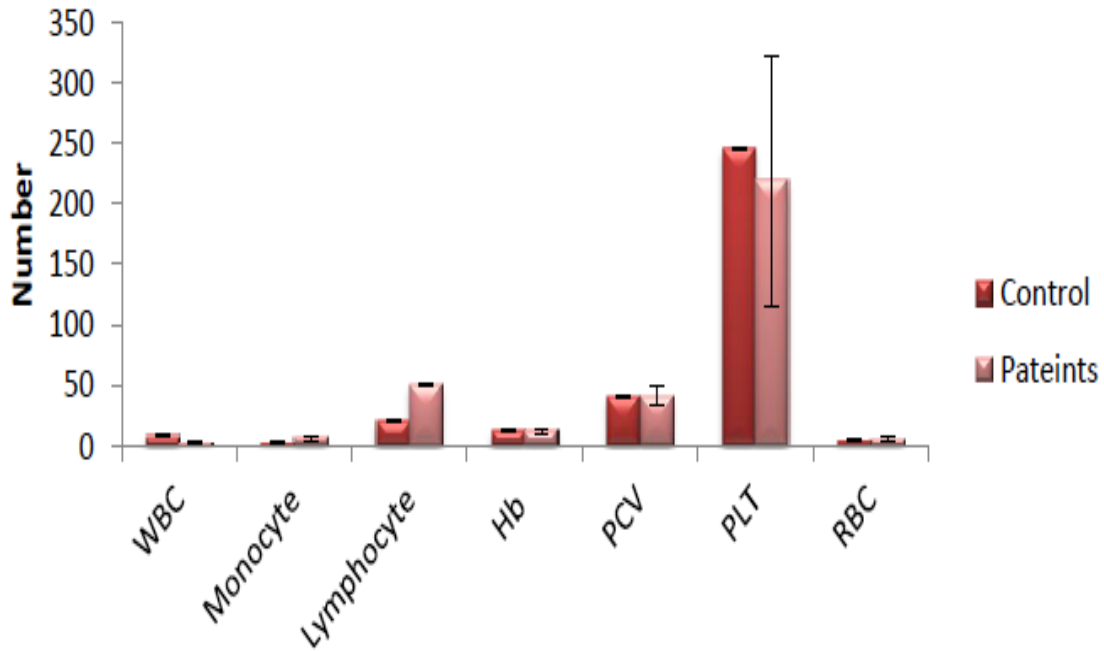


Figure-1- Hematological parameters of patients and controls (mean ±SD).

Table-3- Biochemical parameters of patients and controls (mean ±SD).

Biochemical Parameters	Mean±SD		P.value
	Control (n=30)	Patients (n=30)	
TSB mg/L	0.50±0.08	0.71±0.43	0.013
ALT U/L	6.64±0.82	38.76±12.73	5.84×10 <sup>-20</sup>
AST U/L	6.03±1	15.47±1.39	1.39×10 <sup>-22</sup>
ALP mmol/l	44.66±7.4	113.53±16.46	1.18×10 <sup>-28</sup>

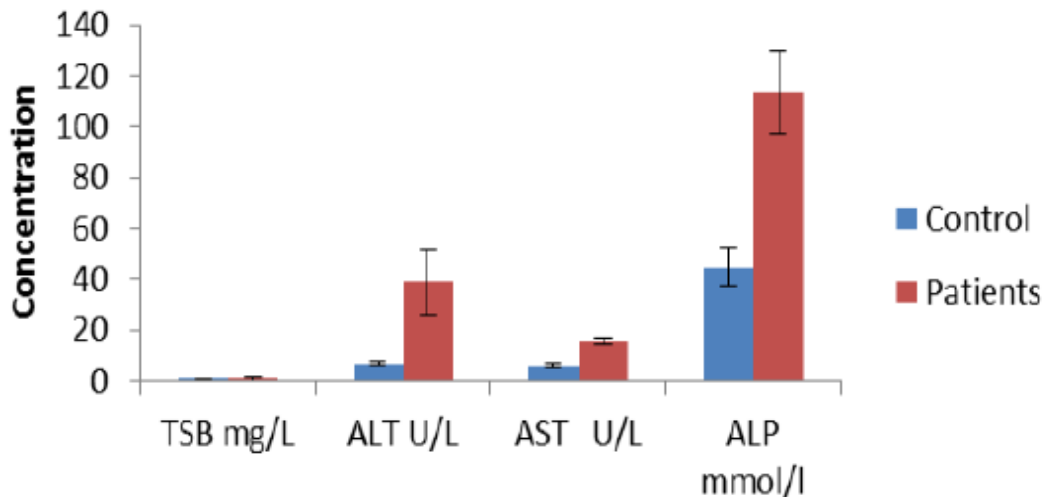


Figure-2- Mean±SD of Biochemical parameters of patients and controls.

## DISCUSSION

Typhoid fever is a common childhood infection in our country and has caught the attention of many workers. The prospective study was conducted in Al-Batool Hospital - Diyala Governorate / Iraq A total of 30 children under the age of six with intermittent fever who tested positive for Widal test were taken for the study. Typhoid fever has been investigated with regard to its clinical, biochemical, and hematological characteristics. Of the 30 typhoid cases included in this series, 10 were boy (33.4%) and 20 were girl(66.6%).

The majority of children are under the age of six. Fever was present at the time of admission in all cases, and vomiting was present in 51% of cases. Abdominal pain, loose movement, and flatulence were some of the gastrointestinal symptoms. Abdominal pain was seen in 66 %, and loose movement was seen in 14.8 per cent of cases. 3% suffer from jaundice and swelling on the body in only 7.40%. In a similar study by Thome A and Zein E et al [Hussain B, Shamim A] including 25 pediatric cases, fever was observed in

97% of cases which was similar but diarrhea was found in more children (36%) than in our study. Gastroenteritis was a common symptom in 52 percent of the youngsters in their research. Alteration In typhoid fever infection, some biochemical and hematological parameters have been examined and reported [Okafor A]. In order to detect early complications associated with acute typhoid infection, hematological and biochemical investigations must be included in the diagnosis of typhoid illness. This allows for more intensive care of the patient and the prevention of mortality from complications. The impact of typhoid fever on biochemical and hematological parameters was investigated in this study. Table(2) and Table(3).shows that Table(2) shows that :

We saw no significant for the ages between Patients and control ( 3 ±1.35),( 3 ±1.47) p>0.05 respectively. From the result statistical hematological highly significant in WBC between Patients and control (3.2 ±0.92 ),(18.91±6.42) p<0.05 respectively. highly significant in Monocyte between Patients and control (3.2 ±0.92),(18.91±6.42) p<0.05 respectively. highly



significant in between Lymphocyte Patients and control( $20.73 \pm 1.59$ ),( $50.46 \pm 19.87$ ), $p < 0.05$  respectively. no significant for the hemoglobin between Patients and control ( $12.52 \pm 2.11$ ),( $12.3 \pm 2.31$ ),  $p > 0.05$  respectively. no significant for the PCV% between Patients and control ( $40.42 \pm 4.04$ ),( $41.2 \pm 8.29$ ),  $p > 0.05$  respectively. no significant for the PLT between Patients and control ( $246.36 \pm 20.65$ ), ( $219 \pm 103.36$ ),  $p > 0.05$  respectively. no significant for the RPC between Patients and control( $246.36 \pm 20.65$ ),( $219 \pm 103.36$ ),  $p > 0.05$  respectively. Widal test was negative in all control group but positive in all Patients group. The invasion of the above organs by *S.typhi*, which can also slow down haematopoiesis, could explain the oligocythemia and thrombocytopenia found in typhoid patients[Hofmetr NG. Retief FP]. Our findings are consistent with those previously reported by [Al-Salamah AA, Arjunan M]. For biochemical parameters we showed significant in Total serum bilirubin (TSB)between Patient and control ( $0.50 \pm 0.08$ ),( $0.71 \pm 0.43$ )  $p > 0.05$ . respectively. From the result statistical highly significant in ALT between Patients and control ( $3.2 \pm 0.92$ ), ( $18.91 \pm 6.42$ )  $p < 0.05$  respectively. highly significant in AST between Patients and control( $6.03 \pm 1$ ), ( $15.47 \pm 1.39$ )  $p < 0.05$  respectively. highly significant in ALP between Patients and control( $44.66 \pm 7.4$ ),( $113.53 \pm 16.46$ )  $p < 0.05$  respectively.

Finally, typhoid fever is linked to a number of sequelae, including intestinal profanation, paralytic ileus, hepatitis, cholecystitis, and peritonitis. Encephalopathy, meningitis, chorea, cerebral bleeding, severe renal failure, and glomerulonephritis are examples of central nervous system problems. Myocarditis and peripheral circulatory insufficiency are two cardiovascular problems. Disseminated intravascular coagulation and bone marrow suppression are two hematological complications[Girgin S, Taçyıldız]. Hematological subcutaneous abscess, subphrenic abscess, cutaneous ulcers, and biochemical parameters may be correlated as a result of these complications, and so serve as indications for more reliable and accurate infection diagnosis, potentially changing antibiotic therapy[Karande S, Zaki SA].

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