International Journal of Medical and Health Research
ISSN: 2454-9142
Impact Factor: RJIF 5.54
www.medicalsciencejournal.com
Volume 3; Issue 9; September 2017; Page No. 11-14

Biochemical changes in patients infected with typhoid fever: A clinical study

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Abstract
Background: Typhoid fever, also known simply as typhoid, is a bacterial infection due to Salmonella typhi that causes symptoms which may vary from mild to severe and usually begin six to thirty days after exposure. There is variety of biochemical changes occur in patients with typhoid fever. This study was conducted to determine biochemical changes in typhoid fever patients.
Materials & Methods: This study was conducted in the department of biochemistry in year 2015. It included 60 patients diagnosed with typhi positive. Equal number of controls was also involved in the study. Physical examination was done and weight, height, blood pressure, fever or vomiting was recorded. Blood samples were collected in a gel and anticoagulant tubes from normal and typhoid infected patients. Serum glucose level, Cholesterol level, Triglycerides level, Serum proteins, albumin, globulin, ALT and AST test was performed by commercially available kits.
Results: Group I had 60 patients and group II had also 60 patients. The difference was non- significant (P-1). Graph I shows that mean weight in group I patients was 77.4 kg and in group II was 70.1 kg. Mean SBP in group I patients was 108.2 mm Hg and in group II was 138.6 mm Hg. Mean DP in group I patients was 88.6 mm Hg and in group II was 74.2 mm Hg. Mean temperature in group I patients was 98.6 degree F and in group II was 98.9 degree F. The difference was significant ($P < 0.05$). Mean serum glucose concentration in group I was 170.4 mg/dL and in group II was 84.8 mg/dL. Serum cholesterol concentration in both groups was 180 mg/dL and 148 mg/dL respectively. The difference was significant ($P< 0.05$). Triglyceride level in group I was 116 mg/dL and in group II was 162 mg/dL. HDL level in both groups was 50.2 mg/dL and 36.2 mg/dL respectively. LDL level in both groups was 112.4 and 76.2 mg/dL in both groups respectively. Total protein was 7.62 g/dL and 8.6 g/dL in both groups respectively. Albumin level was 5.8 g/dL and 4.2 g/dL in both groups. AST level was 52.24 U/L and 56.65 U/L in both groups respectively. ALT level was 48.82 U/L and 58.36 U/L in both groups respectively. The difference was significant ($P< 0.05$).
Conclusion: Typoid fever causes variety of biochemical and enzymatic changes in patients. Early diagnoses through these tests are useful in detection and management of patients.

Keywords: salmonella, serum glucose, typoid fever

Introduction

Typhoid fever, also known simply as typhoid, is a bacterial infection due to Salmonella typhi that causes symptoms which may vary from mild to severe and usually begin six to thirty days after exposure. In humans and animals, Salmonella infections are a significant cause of morbidity and mortality. Typhoid fever is transmitted by contaminated food and water by feces and urine of patients and carriers. Risk factors include poor sanitation and poor hygiene. Those who travel to the developing world are also at risk and only humans can be infected [1].

Developing nations, such as those found in parts of Asia and Africa, have the highest rates of typhoid fever. These areas have a lack of access to clean water, proper sanitation systems, and proper health care facilities. For these areas, such access to basic public health needs is not in the near future [2].

In clinical features, there is a gradual onset of a high fever over several days. Patient complains of weakness, abdominal pain, constipation, vomiting and headaches. Some people develop a skin rash with rose colored spots. In severe cases there may be confusion. Without treatment symptoms may last weeks or months. Other people may carry the bacterium without being affected; however, they are still able to spread the disease to others. Typhoid fever is a type of enteric fever along with paratyphoid fever. Typhoid fever is a systemic disease caused by Salmonella typhi, affecting only humans [3].

There is variety of biochemical changes occur in patients with typhoid fever. This study was conducted to determine biochemical changes in typhoid fever patients.

Materials & Methods

This study was conducted in the department of biochemistry in year 2015. It included 60 patients diagnosed with typhi positive. Equal number of controls was also involved in the study. All were informed regarding the study and written consent was obtained. Ethical approval was taken from institutional ethical committee. General information such as name, age, gender etc was recorded in case history performa. Physical examination was done and weight, height, blood pressure, fever or vomiting was recorded.

Blood samples were collected in a gel and anticoagulant tubes from normal and typhoid infected patients. Serum glucose level, Cholesterol level, Triglycerides level, Serum proteins, albumin, globulin, ALT and AST test was performed by commercially available kits. Results were subjected to statistical analysis. P value < 0.05 was considered significant.

Results

Table I shows that group I had 60 patients and group II had also 60 patients. The difference was non- significant (P-1). Fig 1 shows that mean weight in group I patients was 77.4 kg and in group II was 70.1 kg. Mean SBP in group I patients was 108.2 mm Hg and in group II was 138.6 mm Hg. Mean DP in group I patients was 88.6 mm Hg and in group II was 74.2 mm Hg. Mean temperature in group I patients was 98.6 degree F and in group II was 98.9 degree F. The difference was significant (P < 0.05). fig 2 shows that mean serum glucose concentration in group I was 170.4 mg/dL and in group II was 84.8 mg/dL. Serum cholesterol concentration in both groups was 180 mg/dL and 148 mg/dL respectively. The difference was significant (P< 0.05). fig 3 shows that triglyceride level in group I was 116 mg/dL and in group II was 162 mg/dL. HDL level in both groups was 50.2 mg/dL and 36.2 mg/dL respectively. LDL level in both groups was 112.4 and 76.2 mg/dL in both groups respectively. Total protein was 7.62 g/dL and 8.6 g/dL in both groups respectively. Albumin level was 5.8 g/dL and 4.2 g/dL in both groups. AST level was 52.24 U/L and 56.65 U/L in both groups respectively. ALT level was 48.82 U/L and 58.36 U/L in both groups respectively. The difference was significant (P< 0.05).

Table 1: Distribution of patients

Total- 120		
Group I (Control)	Group II (Typhoid)	P value
60	60	1

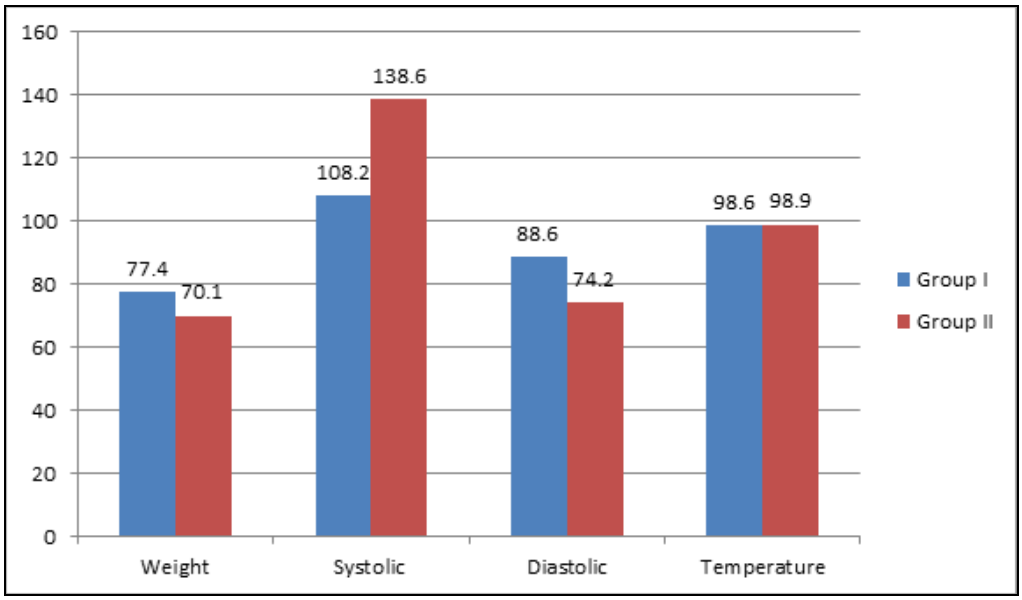

Fig 1: Profile of patients

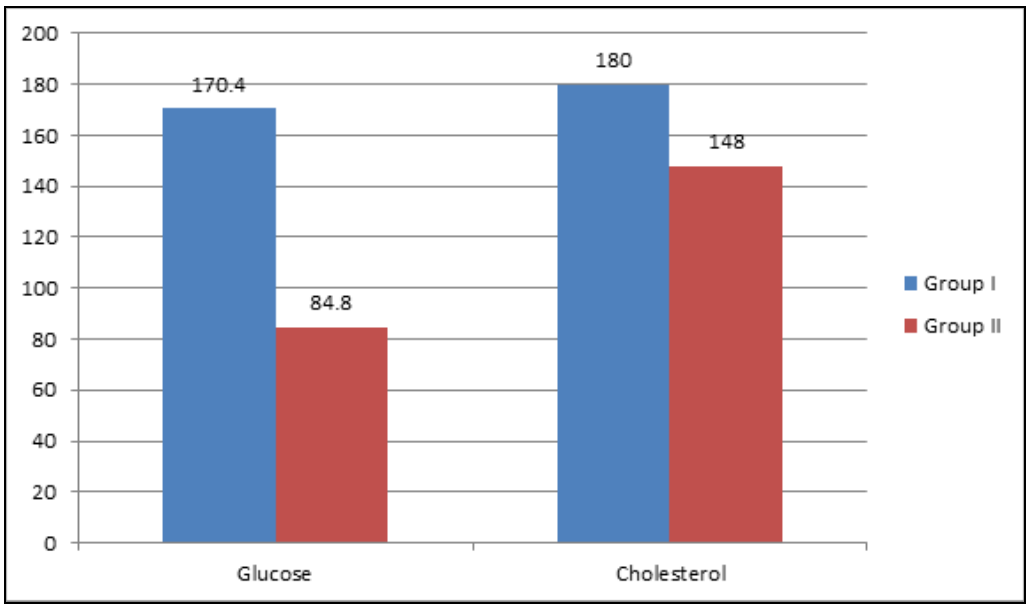

Fig 2: The mean serum glucose (mg/dL) concentration and serum cholesterol (mg/dL) concentration in both groups

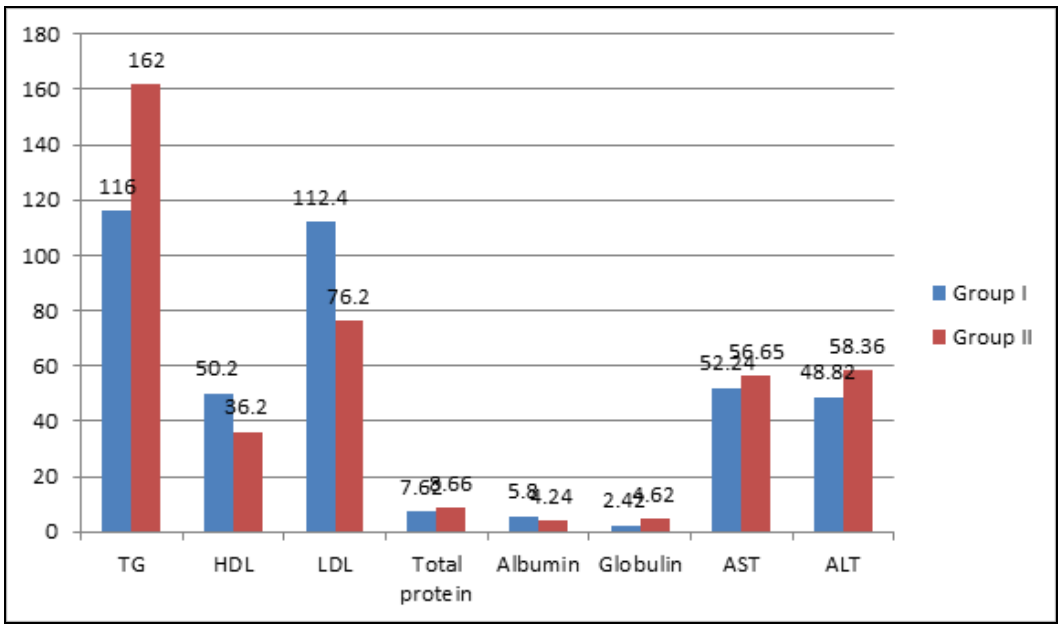

Fig 3: Serum biochemical profiles in both groups

Discussion

Thyphoid fever has long clinical manifestations. In the first week, the body temperature rises slowly, and fever fluctuations are seen with relative bradycardia (Faget sign), malaise, headache, and cough. A bloody nose (epistaxis) is seen in a quarter of cases, and abdominal pain is also possible. A decrease in the number of circulating white blood cells (leukopenia) occurs with eosinopenia and relative lymphocytosis; blood cultures are positive for Salmonella Typhi or S. paratyphi. The Widal test is usually negative in the first week [4].

This study was conducted to determine biochemical changes in typhoid fever patients. In this study, we included 60 subjects (control) in group I and group II (typhoid) had also 60 patients. Similar study was performed by Chin J in year 2000 [5]

We found that mean weight in group I patients was 77.4 kg and in group II was 70.1 kg. Mean SBP in group I patients was 108.2 mm Hg and in group II was 138.6 mm Hg. Mean DP in group I patients was 88.6 mm Hg and in group II was 74.2 mm Hg. Mean temperature in group I patients was 98.6 degree F and in group II was 98.9 degree F. We found that SBP in group II patients was more as compared to group I while diastolic BP was lower in group II patients. This is similar to Ezeigbo *et al.*[6]

In present study, we observed that mean serum glucose concentration and serum cholesterol in group I was more than group II. Triglyceride level in group I was 116 mg/dL and in group II was 162 mg/dL. HDL level in both groups was 50.2 mg/dL and 36.2 mg/dL respectively. This is in accordance to Faucher *et al.*[7]

WE found that LDL and albumin level in group I was more as compared to group II patients. Total protein, AST level and ALT level were low in group I as compared to group II patients. This is in accordance to Forbes [8]

Two typhoid vaccines are licensed for use for the prevention of typhoid. The live, oral Ty21a vaccine and the injectable typhoid polysaccharide vaccine. Both are recommended for travellers to areas where typhoid is endemic. Boosters are recommended every five years for the oral vaccine and every two years for the injectable form [9].

Conclusion

Typoid fever causes variety of biochemical and enzymatic changes in patients. Early diagnoses through these tests are useful in detection and management of patients.

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