Biochemical effects of liver enzymes and lipid levels in patients with Hepatorenal syndrome that affected from cutaneous edema in Karbala city

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Abstract

Background: Cutaneous edema is a benign tumor that results from the retention of excess fluid within the tissues of the body and may appear in any place in the body such as the feet, leg, arm, or ankle.

Objective of the study: Observation of the effect of abnormal action of liver enzymes and lipid levels in patients with Hepatorenal syndrome accompanying with cutaneous edema.

Methodology: The requirements of the research were conducted on 45 patients with Hepatorenal syndrome who are in the intensive care unit and who regularly visit the consultant of cardiovascular diseases at Al-Hussein Teaching Hospital in Karbala city. It was confirmed that all research samples from patients suffering from cutaneous edema in different parts of the body such as the leg arm, ankle and other places, as 27 healthy people participated in the study to compare the required results. A set of clinical tests were conducted for both groups of patients and healthy people within the study, such as measuring liver enzymes and glucose level, in addition to measuring protein level, calculating blood picture, measuring triglycerides and cholesterol, in addition to uric acid concentration. All the tests were done by taking a blood sample of 5 ml, taking into account that all patients were in a fasting state.

Results: After conducting statistical analyzes of the hematological and biochemical parameters of ascites heart failure, the following was found: The results of the blood picture showed that there was a decrease in the number of red blood cells, platelets and hemoglobin. As for the metabolic variables, significant changes were found, such as an increase in the level of sugar, triglycerides and cholesterol among people with edema of the skin when compared to the healthy group, as well as a decrease in the concentration of total proteins. And significant increase in liver enzyme
Conclusion: It was noted through the study that there are significant differences between people with cutaneous edema as a result of Hepatorenal syndrome and healthy people. The edema may be the result of taking certain medications, or as a result of renal failure associated with IHD, or as a result of the use of diabetes medications such as thiazolidinediones, and the reasons may be due to a defect in the lymphatic system so that.

Keywords: Edema, liver enzymes, lipid profile, Hepatorenal syndrome

Introduction:
Edema is a fluid leaks from tiny blood vessels in your body (capillaries)(1). Fluid accumulates in the surrounding tissues; this causes swelling. Minor edema may result from sitting or staying in one position for too long excessive intake of salty foods premenstrual signs and symptoms Being pregnant. Edema may also be a side effect of some medications, including high blood pressure medications Non-steroidal anti-inflammatory drugs (NSAIDs) Steroid drugs Estrogen Some diabetes medications are called thiazolidinediones.(2) However, in some cases, edema may be a sign of a more serious underlying medical condition. Edema can be caused by a number of diseases and conditions, including: Congestive heart failure, where one or both chambers of the heart lose the ability to pump and distribute blood normally, which causes blood to return to certain places such as the legs, ankles and feet, causing edema.(3) If fluid collects in the abdominal area, it may cause shortness of breath. In cases of cirrhosis of the liver resulting from the accumulation of fat on it, it may cause fluid to accumulate in the legs as a result of liver damage. Moreover, kidney patients in general may be at risk of developing edema of the skin as a result of the accumulation of sodium in the circulatory system.(4) Researchers have found other causes of edema of the skin, for example, damage to the lymphatic system resulting from some cancers, and a severe lack of protein in the diet for a long time leads to the accumulation of fluid And the appearance of edema.(5) Edema also can be found in the hepatorenal syndrome .the last is known to date as a type of functional renal failure in patients with liver disease and portal hypertension and constitutes the culmination of systemic hemodynamic changes associated with portal hypertension.(6) Although in the diagnosis, the kidneys appear morphologically intact, but there is a decrease in kidney function. Caused by renal failure following hepatic failure in cirrhosis. The kidneys are normal in internal structure, and renal failure is believed to be due to a systemic blood flow disorder including deterioration of renal blood flow. (7)Hepatorenal syndrome occurs in advanced stages of cirrhosis always associated with ascites, and is characterized by the absence of proteinuria or abnormal sedimentation of the urine, urinary sodium excretion rate less than 10 mmol per day and the ratio of urine osmolality to plasma osmolality greater than 1.5 (8).It is important to exclude Decreased volume by measuring central venous pressure and infusion of colloidal solutions such as human albumin solutions to maintain it within 0-5 cm water.(2,9). A severe hepatic lesion, whatever its cause, may be compounded specifically by functional renal insufficiency, and this condition is called hepatorenal syndrome. This syndrome is accompanied in almost all cases by the presence of ascites.(10) The kidneys remain histologically normal in typical cases and retain their ability to fully restore their function if the liver function recovers. Renal dysfunction is
characterized by decreased glomerular filtration rate, oliguria, low urine sodium (<10 mEq/L), azotemia, and an elevated blood urea nitrogen to creatinine ratio (11). Hepatorenal Syndrome is a serious, life-threatening condition. But the immediate causes are rapid deterioration in kidney function and individuals with cirrhosis or fulminant liver failure (liver failure)(4,12). Despite the various treatments for the symptoms and causes of this syndrome, such as dialysis and drug therapy, hepatorenal syndrome has severe complications, usually fatal unless a liver transplant is performed, because the causes of this condition are a malfunction in sensitive and important organs in the body. For example, acute renal failure occurs due to cirrhosis of the liver, decreased level of kidney function, and high blood pressure, which leads to a reduction in urine production, as a result of reduced urine elimination, discoloration and accumulation of nitrogen in the blood(13). This disease is characterized by primitive symptoms such as yellowing of the skin, weight gain, flatulence, changes in mental status, dementia, tension, involuntary movements, nausea, and vomiting. These symptoms progress to cirrhosis, alcoholic hepatitis, acute liver failure, infection and gastrointestinal bleeding, hypotension(14).

Methodology:

45 patients with ascites heart failure participated in the research sample, distributed among 18 women and 27 men, and compared them with 27 healthy people in the same proportions, men and women. Five ml of blood was drawn from both groups in a fasting state. Complete information about the patient’s condition, such as weight, age, gender and lifestyle, was taken and recorded for laboratory analysis.

Blood collection:

Five ml of venous blood was drawn from each of the participants in this study in the morning before breakfast and collected in special test tubes containing the anticoagulant substance EDTA to determine the hematological parameters. An additional amount of five ml was withdrawn for biochemical analyzes and after blood clotting, a procedure was performed Centrifuge for 20 minutes at a speed of 3000 revolutions per minute to obtain the blood serum, then take the serum to keep it at -20 temperature until the analysis.

Set hematological variables

Hematological variables were determined from red and white blood cells and platelets in the laboratories of Al-Hussein Teaching Hospital using a hemocytometer according to the wong method(15). As for the biochemical variables in the blood serum, they were as follows:

The biochemical parameters were measured in the blood serum of the subjects participating in the study in the clinical chemistry laboratory.

Measuring the concentration of glucose in the blood serum was done using materials from the company Bicon according to the TRENDER method, which is based on the GOD-PAP method(16), and the total protein concentration was measured by using the Biuret method, the level of light absorption was done by a spectrophotometer. The measurement of the concentration of triglycerides in the blood serum was done by the
GOP-PAP method according to Yunck and Pestaner. The serum cholesterol concentration was measured using the CHOD-PAP method according to Richmond(17), and the high-density lipids were measured according to the method of Burstein and others. The concentration of low-density lipids was done by using the Friedewald equation(18) and Fossatti method was used to measure the concentration of uric acid in relation to the concentration of the activity of the enzyme aspartate aminotransferase and alanine aminotransferase enzyme in the blood serum according to the method of Rittmann S and Frankel(19).

**Statistical analysis**

The results were expressed as the mean plus minus the standard deviation, and the results were statistically analyzed using the SPSS computer program. The differences between the mean values and the standard deviation of people with cutaneous edema and healthy people were compared by T-test at (p<0.05) in all statistical tests significantly.

**Results:**

After conducting a statistical analysis of hematological and biochemical parameters in patients with hepatorenal who suffer appearance of cutaneous edema, the following was found:

1- Blood changes

A severe decrease in the number of red and white blood cells and platelets was observed in patients with ascites heart failure when compared with the healthy group. According to the table (1).

**Table (1)** showing the blood picture changes associated with edema of the skin

<table>
<thead>
<tr>
<th>study groups</th>
<th>RBCs Num. (10^6)/mm³</th>
<th>WBCs Num. (10^6)/mm³</th>
<th>Platelet Num. (10^6)/mm³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthy group mean ±Std.</td>
<td>0.38±4.63</td>
<td>0.6±7.9</td>
<td>30.9±305.4</td>
</tr>
<tr>
<td>Patient group</td>
<td>*0.29±3.73</td>
<td>*0.5±6.1</td>
<td>*21.4±157.3</td>
</tr>
</tbody>
</table>

**Table (2)** showing the metabolic changes of a group of healthy and sick people

<table>
<thead>
<tr>
<th>Study groipes</th>
<th>Glucose con. Mg/dl</th>
<th>TG con. Mg/dl</th>
<th>Cholesterol con. Mg/dl</th>
<th>HDL con. Mg/dl</th>
<th>Total Protein con. g/dl</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthy group mean ±Std.</td>
<td>8.2±99.2</td>
<td>6.61±134.6</td>
<td>9.5±146</td>
<td>7.5±11</td>
<td>0.32±7.46</td>
</tr>
<tr>
<td>Patient group</td>
<td>*10.6±245</td>
<td>*7.5±176</td>
<td>*8.2±184</td>
<td>*4±127</td>
<td>*0.28±3.4</td>
</tr>
</tbody>
</table>

**Liver functions**
The results showed a significant and significant increase in all aminotransferase enzymes and alkaline phosphatase in serum compared to healthy controls. Table No. 3 shows the changes that occurred in liver function in both groups of patients and healthy subjects

**Table (3)** showing the changes that occurred in liver function in both groups of patients and healthy subjects

<table>
<thead>
<tr>
<th>Study groups</th>
<th>(ALT) con. (U/L)</th>
<th>(AST) con. (U/L)</th>
<th>(ALP) con. (U/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthy group</td>
<td>2.14±20.7</td>
<td>2.23±24.9</td>
<td>3.87±85.7</td>
</tr>
<tr>
<td>mean ± Std.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient group</td>
<td>*5.12±38.45</td>
<td>*3.27±34.53</td>
<td>*35.0±56</td>
</tr>
</tbody>
</table>

A comparison was also made on the levels of all measurements under study between women and men, where significant differences were found among men in the level of triglycerides for ages over fifty years, as well as Cholesterol in men compared to men, while the percentage of total protein concentration was higher in women than in men in the same age group.

**Table (4)** comparison between men and women of patient group for all biochemical parameters of the study

<table>
<thead>
<tr>
<th>Patient groups</th>
<th>Glucose con. Mg/dl</th>
<th>TG con. Mg/dl</th>
<th>HDL con. Mg/dl</th>
<th>Cholesterol con. Mg/dl</th>
<th>Total Protein con. g/dl</th>
<th>(ALT) con. (U/L)</th>
<th>(AST) con. (U/L)</th>
<th>(ALP) con. (U/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>male</td>
<td>10.6±245</td>
<td>*7.5±176</td>
<td>4.32±124</td>
<td>*10.2±184</td>
<td>2.88±3.3</td>
<td>7.17±08.45</td>
<td>4.29±14.53</td>
<td>42.0±36</td>
</tr>
<tr>
<td>female</td>
<td>9.8±176</td>
<td>6.1±46</td>
<td>4.01±18</td>
<td>7.45±158</td>
<td>*5.59±49</td>
<td>7.98±8</td>
<td>3.78±8</td>
<td>39.6±0.45</td>
</tr>
</tbody>
</table>

**Discussion:**

It is clear from this study that cutaneous edema associated with Hepatorenal syndrome is accompanied by a decrease in the number of red and white blood cells, and this result is consistent with other studies that showed cutaneous edema to be associated with a variety of blood disorders that cause anemia and impaired white blood cell function (6). The reason may be due to a defect in the production of the hormone erythropoietin, which is secreted from the paraglomerular system in the kidney, or a deficiency of iron and folic acid, an increase in the breakdown of red blood cells, or other factors such as the presence of nitrogenous waste and toxic substances that the kidneys cannot excrete in case of renal failure accompanying ascites heart failure. Which affects the production of red blood cells from the bone marrow and leads to a short life of the cells (20,21). As for the decrease in the number of platelets, it is due to the lack of secretion of erythropoietin, which leads to a decrease in the number of platelets, because the levels of erythropoietin can affect the level of platelets and because of the similarity between erythropoietin and thrombopoietin and the action of erythropoietin as a major regulator of platelet mass (22,23). A study published in southern India agreed with what we observed in our study of
an increase in the level of total proteins in patients (24, 25). High levels of triglycerides and cholesterol were observed among patients with Hepatorenal syndrome in this study, and this result is consistent with studies recorded in 2006 and 2013 in India (26, 27, 28). Family history of high cholesterol or triglycerides; obesity; Excessive consumption of fatty and sugary foods. Poorly controlled type 2 diabetes. Thyroid hormone imbalance. Some diseases of the liver or kidneys. A side effect of some medications (such as: steroids, etc.). Having metabolic syndrome (metabolic syndrome). All of these reasons lead to an increase in the level of triglycerides and cholesterol in patients, and these results are consistent with other studies in the same context (29). The cause of high levels of liver enzymes in patients may be due to the presence of cirrhosis of the liver or due to liver damage, which leads to an increase in the level of liver enzymes, of course, as well as the possibility of the patient suffering from alcoholic hepatitis, and this was indicated by previous studies (30, 31). as well as the presence of gastrointestinal bleeding that raises enzyme measurements (32).

References:

22. Fan AL, Fenske JN, Harrison RV, Jackson EA, Marcelino MA. Screening and Management of Lipids [update], 2014.


