Measurement of Urea, Creatinine and Blood Complete Blood Count for Patients with Diabetes Type 2 in Fallujah City/ Anbar Province

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Abstract: Diabetes mellitus is a metabolic disorder that leads to an increase in the level of blood sugar as a result of many factors due to insulin resistance or deficiency, which leads to high levels of glucose in the blood so that it contributes to affecting the body’s organs and functions and thus infecting them with various diseases. This study has aimed to measure kidney function and some blood functions in the serum of people with diabetes type 2 and to compare the values of the variables with those of healthy controls. This study has included (48) participants (27 males and 21 females as samples), divided into two groups (experimental and control). The results showed that in the group of patients there was an increase in the rate of fasting blood sugar concentration FBS, cumulative sugar HbA1c and Urea, while the levels of S. Creatinine were normal. The statistical analysis through the correlation relationship between the two groups of patients and the control showed that the variables were significant. Moreover, the results showed a significant increase in the concentration of fasting blood sugar, cumulative sugar, urea and creatinine in the blood of patients with diabetes type 2 compared to the control group due to metabolic disorder and insulin resistance. The results also showed a significant increase in the rate of white blood cells, lymphocytes, red blood cells and hemoglobin for their defensive and immune functions against foreign bodies and pathogens, while the granular white blood cells and the volume of compacted blood cells and platelets decreased due to diabetes, which leads to various diseases.

Keywords: Diabetes Type 2, Creatinine, Urea, Blood.

1. Introduction

Diabetes mellitus Type 2 is one of the types of diabetes that leads to a high level of glucose in the blood. It has been occurred as a result of resistance in the body’s cells to the hormone insulin or insufficient amount of insulin produced in the pancreas. This is a result of several factors, the most important of which are genetic factors, weight gain and lack of physical activity. It is called non-insulin-dependent or adult-onset diabetes.

This type of diabetes in which the pancreas produces a normal quantity of insulin, and it may be more than usual, but it is not enough for the body, or the cells are resistant to insulin, so it is no longer able to affect it and thus enter glucose from the blood to pancreas, and this leads to the accumulation of glucose in the blood and its levels rise. This type differs from diabetes type 1, in which the pancreas stops producing insulin as a result of the body’s immune system destroying the hormone-producing beta cells in the pancreas (WHO, 2021).

Diabetes affects the functions of the kidneys and impairs its performance, thus causing kidney disease. The level of glucose is a factor of risk in the development of diabetic kidneys (Stojimirović et al., 2008) where high sugar in blood causes blood filtered in large quantities and over time, which causes stressful to the kidneys and the delay in the function. It is not necessary that all persons with diabetes get kidney diseas. There are many factors that affect the progression of kidney disease, including genetic factors and control blood sugar in addition to obesity (Shouip, 2014). Accordingly, this study aimed to measure kidney function and some blood functions in the serum of people with diabetes type 2 and to compare the values of the variables with healthy controls in Fallujah city/ Anbar Province.

2. Materials and Working Methods

This study included (48) participants male and female samples, including (24) for people with diabetes / type II (experimental group) and (24) samples for healthy people (control group) for the age group (27-86) years, blood was drawn from samples Study with a syringe 5 ml. Then the blood is divided into two parts, the first was placed in a tube containing Ethylene diamine tetra acetic acid (EDTA) to take tests CBC AndHbA1c, while the other part has been in a Gel tube to obtain blood serum, and then conduct biochemical tests. The FBS glucose level, cumulative sugar HbA1curea in the blood serum Blood, creatinine serum and general blood analysis have been estimated for both groups (patients and control) and finding correlations between them and their relationship to diabetes type 2.
Biochemical Examinations

1. **Estimation the glucose concentration in the blood serum** Fasting Blood Glucose: The concentration of glucose in the serum was determined using the enzymatic colorimetric method Enzymatic Calorimetric method Using the ready-made kit (Kit. 19)

2. **Estimation of cumulative blood glucose level HbA1c**: The cumulative glucose concentration was estimated according to the process of measuring glucose for immune suppression TINIA turbid metric inhibits immunnoassay for whole blood as per manufacturer's instructions (Elecsys Roche Cobase 111) Germany.

3. **Determination of urea in the blood serum**: The concentration of urea in the blood serum was estimated as indicated by (Al-Khayyat, 1992) using a measuring kit manufactured by (Spinreact, SA, Espain) Company

4. **Determination of creatinine in blood serum**: The concentration of creatine in the blood serum was determined based on the method supplied with the measuring kit supplied by the company (AGAPPE 2020)Creatinine C.(mg/dl)=(A2-A1)sample/((A2-A1) Standard)

5. **Complete blood count**: The level of red and white blood cells, the percentage of granulocytes and platelets, and the volume of the red blood cells are measured using a device (Complet blood count cbc), according to the (manufacturer's instructions Mindray Haematoanalyzer-China)

Statistical Analysis

The averages and standard error values were extracted using the excel program that came with the system window 2010 at a probability level less than 0.05 (Al-Mohammadi and Al-Mohammadi, 2012).

3. Results and Discussion

The results of Table (1) indicate significant differences in the average fasting blood sugar concentration FBS In the serum of patients with diabetes type 2 mellitus with a concentration of (149.83mg/dl) at the level of significance (P ≤ 005) compared to healthy with an average concentration of (98.78mg/dl). The results also showed significant superiority in concentration (hemoglobin glucose) (HbA1c) In the serum of patients, with an average of (8.51%) at a significant level of (P ≤ 005) compared to an average concentration (4.9%) in the serum of healthy.

Glucose level is a risk factor for the development of diabetic kidney disease (Stojimirović et al., 2008; Risović, & Popović–Pejičić, 2011). The results showed significant differences in the average concentration of urea nitrogen in the blood B. urea in the serum of patients at a concentration rate (49.99 mg/dl) at the level of significance (P ≤ 005) whereas, it decreased significantly in the serum of healthy with an average of (32.51 mg/dl). Moreover, the results of the statistical analysis showed significant differences in the mean creatinine concentration. S. crea. in the blood serum of the infected, it was (0.92 mg/dl) at the level of significance (P ≤ 005) compared to healthy, it was recorded with a concentration rate of (0.82 mg/dl) This is consistent with what (Al Shehri, 2017) explored.

Table 1. shows the average kidney function in diabetic type 2 patients and healthy controls (mean ± standard error)

<table>
<thead>
<tr>
<th>Markers</th>
<th>Treat</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>61.83±2.31 a</td>
<td>38.38±2.04 b</td>
</tr>
<tr>
<td>FBS</td>
<td>149.83±11.20 a</td>
<td>98.78±1.72 b</td>
</tr>
<tr>
<td>HbA1C</td>
<td>8.51±0.38 a</td>
<td>4.91±0.10 b</td>
</tr>
<tr>
<td>B. urea</td>
<td>49.99±3.42 a</td>
<td>32.51±0.77 b</td>
</tr>
<tr>
<td>S. crea</td>
<td>0.92±0.06 a</td>
<td>0.82±0.02 b</td>
</tr>
</tbody>
</table>

Different lowercase letters indicate a significant difference

As a result, creatinine increased in patients compared to healthy controls. Low levels of creatinine in the blood are associated with an increased risk of T2DM as a Japanese study on middle-aged non-obese males showed (Harita et al., 2009), which led the authors to believe that low creatinine reflects decreased muscle mass, and glomerular hyper filtration, which is associated with low creatinine levels, and associated with an increased metabolic risk (Tomaszewski et al., 2007) and later diabetes (Lorenzo and et al., 2009).

The results of the statistical analysis in Table (2) showed significant differences in the results of the comprehensive blood analysis between patients and healthy subjects at the level of significance (P ≤ 005) has recorded an increase in patients and a value of 61.83 years, while the healthy have been recorded less values
The results showed that the number of white blood cells WBC reached in patients with diabetes type 2 (7.12 mm$^3$) at the level of significance ($P \leq 0.05$) compared to healthy controls, 5.88 mm$^3$.

The results of white blood cells and lymphocytes showed Lymph Significant differences in patients and its value was (35.70%) at the level of significance ($P \leq 0.05$) while it decreased in healthy, reaching (29.03%). The results showed a significant decrease in granular white blood cells Gran in patients with a value (55.67%) at a significant level ($P \leq 0.05$). However, it was significantly superior to the healthy and reached (61.47%). The results also showed a significant increase in the number of red blood cells RBC in patients, it reach (6.19 mm$^3$) at the level of significance ($P \leq 0.05$) while it decreased in the healthy (5.72 mm$^3$).

Also the results of statistical analysis have been recorded a significant decrease of the volume ratios Monolithec blood cells HCT for patients, at a rate of (37%) but for healthy people, it was a significant increase with a value of (43.86%) and in hemoglobin percentages HGB, the results have not been showed any significant differences between patients and healthy, as the values of (13.21% and 13.97%) were recorded, respectively. The results showed a significant decrease in hemoglobin in patients, which was (255.46%), while the results of healthy people, increased significantly (269.88).

The low concentration of blood cells and platelets and even the level of hemoglobin is due to pathological conditions. Lymph cells play an essential role in cellular immunity, as it stimulates the formation of antibodies to fight germs (George-Gay & Parker, 2003). Lymph cells are important in the immune response to disease, where monitors the internal environment and produces antibodies against pathogens. Gran cells have defensive function against foreign bodies and allergic conditions (Ashton, 2007). Anemia is a common condition among patients with diabetes type 2, and the iron load is increased in patients with diabetes type 2 (Thomas and et al., 2003), insulin sensitivity improves when blood donation is repeated (Hua, 2001).

The study of (Al - Mohammad et al., 2017) has dropped Hb and they pointed out the existence of a correlation mechanism between hepatic iron and liver weakness and insulin resistance.

Table 2. Shows the average blood functions for type 2 diabetic patients and healthy controls (mean ± standard error)

<table>
<thead>
<tr>
<th>Markers</th>
<th>Treat</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>61.83 ± 2.31 a</td>
<td>38.38 ± 2.04 b</td>
</tr>
<tr>
<td>WBC</td>
<td>7.12 ± 0.29 a</td>
<td>5.88 ± 0.15 b</td>
</tr>
<tr>
<td>Lymph%</td>
<td>35.70 ± 1.4 a</td>
<td>29.03 ± 0.89 b</td>
</tr>
<tr>
<td>Gran %</td>
<td>55.67 ± 1.64 b</td>
<td>61.47 ± 0.91 a</td>
</tr>
<tr>
<td>RBC</td>
<td>6.10 ± 4.57 a</td>
<td>5.72 ± 0.06 a</td>
</tr>
<tr>
<td>HCT</td>
<td>37 ± 0.98 b</td>
<td>43.86 ± 0.63 a</td>
</tr>
<tr>
<td>HGB</td>
<td>13.21 ± 0.90 a</td>
<td>13.97 ± 0.15 a</td>
</tr>
<tr>
<td>PLT</td>
<td>255.46 ± 11.39 b</td>
<td>269.88 ± 13.23 a</td>
</tr>
</tbody>
</table>

Through the study, the following results were obtained

1. High blood sugar concentration of fasting blood (FBS) in the serum of patients with diabetes type 2 compared to the control group, and this is consistent with studies (Abdul-Ridha, 1998; Perry et al., 2001; Rohlfing et al, 2002; Schrot, 2004). An increase in the level of glucose (sugar) in the blood occurs due to a decrease in insulin and a lack of its secretion from the pancreas gland, or a decrease in its mechanical action mechanism due to the deficiency or weakness of β-cells (American Association of Clinical Endocrinologists, 2000) or a disturbance in the insulin receptors (bop, 2000), the reasons are genetic or due to abnormalities in the work of carbohydrates, especially glucose metabolism (Khalil & Marbut, 2008).

2. High glycosylated hemoglobin concentration (HbA1c) in the sera of patients with diabetes type 2 compared to the control group, and the results agreed with the study (Abdel-Gawad, 2020; HADI & RADDAM, 2020). The HbA1c is considered most and widely used in diagnosing diabetes because it is a retrospective indicator of the average glucose level, and it identifies the groups at risk of developing diabetes in the future (Gillette, 2009).

3. High concentration of urea nitrogen (B. urea) in the blood serum of patients with diabetes type 2, compared to the control group, high blood sugar is accompanied by many diseases in the long term, failure and dysfunction of several organs (American Diabetes Association, 2009).
4. High creatinine concentration (S. crea) in the blood serum of patients with diabetes type 2 compared to the healthy group, and this agrees with what was stated by (Hamid et al., 2008), that the low level of creatinine in the blood is related to an increased risk of developing T2DM as a Japanese study on middle-aged non-obese males showed (Harita et al., 2009) which led the authors to believe that low creatinine reflects decreased muscle mass, and glomerular hyperfiltration, which is associated with low creatinine levels, is associated with an increased risk of metabolism later (Lorenzo et al., 2009).

5. There is a significant direct relationship between the level of glucose and hemoglobin in the blood of patients with diabetes type 2, and insignificant in the control group.

6. The relationship between glucose and age was positively significant in patients with diabetes type 2, and not significant in the control group.

7. High levels of white and red blood cells (WBC, RBC) in the blood serum of patients with diabetes type 2 compared to its level in the control group, and the percentage of white lymphocytes increased lymph in the blood serum of patients with diabetes type 2 compared to its percentage in the control group, which plays a key role in cellular immunity by stimulating anti-microbial antibodies (Ashton, 2007) and the percentage of granular white blood cells was significantly reduced Gran in the blood serum of patients compared to its level in the blood serum of the control group which compared to the level of the volume of compacted blood cells HCT Within the normal level in the blood serum of patients with diabetes type 2 and the control group, the hemoglobin level was recorded HB A significant increase in the blood serum of diabetic type 2 patients compared to the control group, and the iron load increases in the case of diabetes type 2 patients (Thomas et al., 2003). As for the level of platelets, it recorded a significant decrease in the blood serum of patients with diabetes type 2 compared to the control group.

4. Conclusion

Kidney function disorders in general coincide with diabetes type 2, the period of infection and the age of the patient, in addition to the pattern of nutrition have an important role in influencing the various vital activities of the body, which leads to insulin resistance, and then a variation in the levels of physical indicators, where we note the high levels of morning blood sugar and hemoglobin The patients’ glucose, urea levels, and some blood chemistry indicators increased, and this consequently affects the physical health of patients with diabetes type 2 and lowers immunity as a result.

References


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