Explaining the effect of the level for some vital Indicators in people with DM2 and comparing them with healthy people

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ABSTRACT

The work of collecting samples began from 11/13/2024 from Shirqat General Hospital, Salah al-Din Governorate until 2/14/2025, The study included collecting (50) samples from the people of Sharqat city, and these samples included (40) samples of people with type 2 diabetes and (10) samples of individual person who were considered as a healthy people. The study showed through the results that there is a significant increase (P≤0.05) in the level of urea concentration (45.7±6.2) mg/dl In patients with DM2 when compared with healthy individuals (29.7±4.1). The study showed through the results that there is a significant (P≤0.05) increase of creatinine concentration level (0.95±0.21) mg/dl in the in patients with DM2 when compared with healthy individuals (0.27±0.33). There were no differences significantly (P≤0.05) in the level of total protein concentration (8.2±1.34) g/dl in people with DM2 when compared with healthy individuals (7.3±0.97).

Keywords: DM type 2, Urea, Creatinine, Total protein

1- Introduction

DM is known as one of the metabolic disorders that lead to a high blood sugar concentration in blood over a long period due to the absence or decrease of the insulin hormone or the lack of response to it by the target tissues [1]. It is a common disease among people because it affects children, young people and the elderly, and the rate of diabetes in the elderly is higher than in young people [2], so it has become imperative for researchers to pay attention to diabetes because it is one of the most widespread diseases and because of the seriousness of its complications that may develop into serious diseases, such as kidney diseases, blood vessels and heart diseases [3].

Urea is a colorless, solid crystalline substance soluble in water and alcohol but insoluble in ether. It is found in the blood and tissue fluids of all vertebrates and some invertebrates. It is the major nitrogenous component of urine in humans and mammals in general and is the end product of protein metabolism. Urea is produced in the liver, and the mechanism of its formation is uncertain [4]. However, the ornithine cycle theory has gained

some acceptance. In this process, arginine is converted by the enzyme arginase to ornithine, and urea. The urea cycle contains five enzymatic reactions and is enzymatically controlled, with the first two steps occurring in the mitochondria and the remaining steps occurring in the cytosol [5].

Creatinine is a compound formed in the liver, kidney, and pancreas. Three amino acids participate in its synthesis: glycine, methionine, and arginine. After its formation, it travels through the blood vessels, where it is distributed to many cells in the body [6]. Creatinine is consumed mainly in the muscles, where it is in the form of creatine phosphate. Creatinine is insoluble and is formed mainly in the muscles through the process of removing a water molecule in an irreversible reaction with creatine phosphate. Creatinine is filtered freely in the renal glomerulus, and does not undergo reabsorption in the renal tubules. It is of great importance in detecting kidney function [7].

Total protein is a complex consisting of long-chain polypeptides, formed by linking amino acids to each other by peptide bonds [8], and works to provide the body with amino acids and nitrogen necessary for the maintenance and synthesis of tissues and wound healing. Therefore, it is necessary to obtain a sufficient percentage of protein in the diet in order to obtain a good protein metabolism and to prevent damage and waste in the body's protein [9].

2- Materials and methods

The work of collecting samples began from 11/13/2024 from Al-Sharqat General Hospital, Salah Al-Din Governorate, until 2/14/2025, where (50) blood samples were collected in this study from the people of Al-Sharqat city. These samples included (40) samples of people with type 2 diabetes and (10) samples as a control. Approximately 5 cc of venous blood was drawn, and then the samples were placed in test tubes that do not contain anticoagulant materials, then left for a period of approximately 15 minutes at room temperature. After that, the samples were centrifuged using a centrifuge for 10 minutes in order to obtain blood serum. Then, this serum was kept frozen inside special test tubes at a temperature of -20°C for the purpose of using it later to conduct special tests within the current study project, where the ready-made analysis kit from the company biolabo was used and using Spectrophotometer for measuring the concentrations of vital indicators (urea, creatinine and total protein) within the subject of the current study.

3- Statistical Analysis

Minitab program was applied to analyze the study results statistically using the (F) and (t) tests, and the arithmetic means between groups were compared using Duncan's multiple range test at a probability level of ($p<0.05$) [10].

4- Results and discussion

4-1 Urea concentration level

The data and results of the current study, as shown in Table (1), show a significant increase at the probability level ($P\leq0.05$), as the urea concentration level was higher (45.7±6.2) mg/dl in patients with DM2 diabetes compared to healthy people (29.7±4.1).

table (1): Serum urea level in persons with DM2 compared to healthy individual

	Patients	Healthy	P value
Urea mg/dl	Mean± SD	Mean± SD	
	(45.7±6.2)	(29.7±4.1)	P≤0.05

The results of the current study showed that they did not agree with the study conducted by [11], Wile agreement with the study conducted by [12], who showed that the level of urea had increased significantly in the level of urea concentration in the serum of patients with type 2 diabetes when compared with healthy individuals. The reason may be attributed to the fact that abnormal blood sugar levels that are not controlled abnormally may lead to increased blood urea levels and thus increase the patient's chances of developing diabetic nephropathy. Also, the results of other studies have shown that high blood sugar is one of the main causes of kidney damage and gradually, it causes kidney damage over time [13]. Kidney damage or injury leads to an increase in urea concentration. Some studies have shown that in

diabetic patients, high blood sugar and increased urea levels can lead to kidney damage. A study conducted on diabetic rats showed that increased serum urea and creatinine levels gradually caused kidney damage (Anjaneyulu and Chopra, 2004). Measuring both urea and creatinine concentrations can be used to screen for kidney disease and kidney failure in diabetics, as well as to monitor kidney function [14]. Maintaining kidney health in diabetics is achieved by maintaining normal blood sugar levels, as controlling blood sugar concentration in diabetics contributes to the process of stopping kidney damage and disease, in addition to the kidneys performing their vital functions. Therefore, blood sugar levels play a major role in kidney health, as an increase in it causes damage and destruction of kidney tissue, and thus an increase in urea and creatinine in the blood [15].

4-2 Creatinine concentration level

Through the results of the current study, as shown in table (2), the creatinine level (0.95±0.21) mg/dl increased significantly (P≤0.05) in people with DM2 compared with healthy persons (0.27±0.33).

table (2): Level creatinine concentration in persons with DM2 compared to control

	patients	control	P value
creatinine mg/dl	mean±SD	mean±SD	
	(0.95±0.21)	(0.27±0.33)	P≤0.05

The results of the current study are consistent with the results of the study conducted by [12], the study conducted by [16]. They showed that there were non-significant differences in the level of creatinine concentration when comparing people with type 2 diabetes and people without diabetes. Serum creatinine levels can be used as useful prognostic indicators and predictors of kidney damage in diabetic patients, i.e. creatinine level is an important measure of kidney health. Although creatinine is the most responsive indicator of kidney dysfunction, creatinine and blood urea are well-known markers of general kidney function (GFR), and it has been observed that high serum creatinine levels in diabetic rats indicate progressive kidney damage. Studies have shown that blood glucose and creatinine concentrations are higher in type 2 diabetes patients [17].

4-3 Total protein concentration level

The results showed, as shown in Table (3), that no significant differences (P≤0.05) were recorded when compared with the total protein concentration (8.2±1.34) g/dl in person with DM2 compared with healthy individuals (7.3±0.97).

Table (3): Serum creatinine concentration in person with DM2 compared to control

	Patients	control	P value
Total protein g/dl	Mean± SD	Mean± SD	
	(8.2±1.34)	(7.3±0.97)	P≤0.05

The results of the current study were similar and consistent with the study conducted by [18]. However, some reports have indicated an increase in the concentration of some proteins in people with diabetes, such as an increase in the level of acute phase proteins, complement plasminogen C3 proteins, ceruloplasmin, and CRP protein [19], as well as an increase in fibrinogen protein in person with DM2 due to its increased synthesis. The increase in total protein concentration may also because the increase in acute phase proteins, globulin, fibrinogen and its complications due to the decrease the rate of partial synthesis of albumin due to insulin resistance and its decrease, as all of the above increases in proteins explain their increase in patients with DM2 [20].

Conclusion:

The study indicates that individuals with type 2 diabetes exhibit significantly elevated levels of urea and creatinine compared to a control group, suggesting impaired kidney function or altered metabolic processes associated with the disease. In contrast, total

protein concentrations did not show differences significant between the diabetic patients and the healthy persons, indicating that protein levels may remain unaffected in this context.

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قياس مستوى تركيز بعض المؤشرات الحيوية لدى المصابين بداء السكري من النوع الثاني والمقارنة مع الاشخاص الاصحاء

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الملخص

بدأ العمل بجمع العينات من تاريخ 13\11\2024 من مستشفى الشرقاط العام محافظة صلاح الدين لغاية 14/2/2025 حيث تم جمع (50) عينة دمية ضمن هذه الدراسة من أبناء مدينة الشرقاط، وتضمنت هذه العينات (40) عينة مصابين بداء السكر DM2 و(10) عينات من الأشخاص الأصحاء التي تم اعتبارها مجموعة سيطرة. اوضحت نتائج الدراسة الحالية وجود ارتفاع معنوي (P≤0.05) في مستوى تركيز اليوريا (6.2±45.7) mg/dl لدى الأشخاص المصابين بداء السكر من النوع الثاني عند المقارنة مع السيطرة (4.1±29.7). ومن خلال نتائج الدراسة الحالية تبين وجود ارتفاع معنوي (P≤0.05) في مستوى تركيز الكرياتينين (0.21±0.95) mg/dl لدى الأشخاص المصابين بداء السكر من النوع الثاني عند المقارنة مع السيطرة (0.33±0.27). واوضحت النتائج بانه لم تسجل فرق معنوي (P≤0.05) في مستوى تركيز البروتين الكلي (1.34±8.2) g/dl لدى المرضى المصابين بداء السكري DM2 عند المقارنة مع الاشخاص الاصحاء (0.97±7.3).

الكلمات المفتاحية/ مرض السكري النوع الثاني, يوريا, كرياتينين, البروتين الكلي