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Research Article

Evaluation of Renal Function Status in Type II Diabetic Patients at Khartoum State, Sudan

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Abstract

Background: Type II Diabetes mellitus is the most common type of DM which constitute about 85-95% of all Diabetes mellitus cases. Diabetic nephropathy is the kidney disease that occurs as a result of diabetes complication. The aim of this study was to evaluate the renal function status in Sudanese type 2 diabetic patients at Khartoum state, Sudan.

Materials and Method: This study was analytical case control hospital-based study conducted at International University of Africa Hospital, Khartoum state, Sudan, during the period from February to May 2022. Type II diabetic patients who attended at International University of Africa Hospital during aforementioned period were included. In addition to that, healthy participants were selected as control group. A total of 2.5 ml of whole blood was collected from each participant and dispensed into heparin anticoagulated containers for Blood urea and serum creatinine measurement. Measurement of blood urea and serum creatinine was done by using Biochemistry analyzer (Myndray-BS200).

Results: When compared some renal function parameters between cases and control group, the results revealed that the mean blood urea, serum creatinine levels and blood glucose (random) concentration of the case group were significantly high when compared with the control group (0.000). In Gender-wise correlation of renal function tests (RFT) in the cases, the results showed that male patients had higher blood urea and serum creatinine levels when compared with female patients.

Conclusion: Our results of the renal function tests examined; showed significant increase in blood urea, serum creatinine and blood sugar when compared with non-diabetic patients, which indicates abnormality in renal function status.

Keywords: Blood urea, creatinine, diabetes, type II diabetes, DM, renal failure, kidney, hyperglycemia, renal function tests, glucose, random blood glucose

INTRODUCTION

Diabetic mellitus (DM) is a chronic disease and is considered one of the common metabolic disorders, which is caused by multiple factors and etiologies. Diabetes mellitus is characterized by chronic hyperglycemia due to derangement in carbohydrate, fat and protein metabolism. ¹ There are two types of diabetes mellitus (type I DM and Type II). Type I DM is mainly due to insufficient or inefficient production of insulin in the body, ¹ which in turn damages major systems of human body particularly blood vessels and nerves. ² Less glycemic control, sedentary lifestyle, dietary modifications, genetic mutations, smoking, high blood pressure, elevated cholesterol levels, obesity and lack of regular exercise are considered to be risk factors that have led to a dramatic increase in the incidence of diabetes. Type II Diabetes mellitus is the most common type of DM which constitute about 85-95% of all Diabetes mellitus cases. ³

Diabetic nephropathy is the kidney disease that occurs as a result of diabetes. The impact of diabetes on renal impairment

can be helpfully detected by the increase of blood urea and serum creatinine. ⁴

Diabetes mellitus (DM) is one of the most common health problems in affecting about 6-7% of the world's population ⁵ According to WHO, diabetes affects more than 170 million people worldwide. ⁶ Obesity, hyperlipidemia, dyslipidemia, hypertension and visceral adiposity, are the suggestive risk factors that increases the comorbid risk of developing chronic kidney disease and cardiovascular diseases. ⁷

Some studies have shown that measurement of blood urea and serum creatinine are easily available tests which can assist in detection and prevention of diabetic kidney diseases at an early stage thereby, limit the progression to end stage renal disease. ^{8,9}

Since renal complications are very common in diabetics, and there is lack of data published in Sudanese type II diabetic patients, this study was designed to evaluate the renal function status by measuring blood urea and serum creatinine in Sudanese type II diabetic patients attending at the

International University of Africa Hospital, Khartoum state, Sudan.

MATERIALS AND METHODS

This study was analytical case control hospital-based study conducted at International University of Africa Hospital, Khartoum state, Sudan, during the period from February to May 2022. Type II diabetic patients who attended at International University of Africa Hospital during aforementioned period were included. In addition to that, health participants were selected as control group. A total of 2.5 ml of whole blood was collected from each participant and dispensed into heparin anticoagulated containers for Blood urea and serum creatinine measurement. Measurement of blood urea and serum creatinine was done by using Biochemistry analyzer (Myndray-BS200). The data was

gathered using pre-designed structural questionnaire and the SPSS 23.0 statistical software (SPSS Inc., USA) was used for statistical analysis. Finally, the study was licensed by the ethical committee of International University of Africa.

RESULTS

Socio- demographic data

A total of 100 samples were collected from the study population, 50 blood samples were type 2 diabetic patients and selected as case group, where 50 of them were healthy participants and selected as control group. In the case group; the mean age was 52.19 ± 5.53 years, 66% were male and 34% of them were female, where in the control group; the mean age was 35.54 ± 17.82 years, 64% of them were female and 36% were male. The mean duration of the disease in the case group was 13.54 ± 7.76 years. (Tables 1, 2,3).

Table (1): Comparison of study population according to age

	Type 2 DM patients	N	Mean	SD	P-value
Age	Case	50	52.19	5.53	0.013
	Control	50	35.54	17.82	

Table (2): Distribution of gender in the study population

			Type 2 diabetes mellites	
			Yes	No
Gender	Male	Count	33	18
		% Within Gender	66%	36%
	female	Count	17	32
		% Within Gender	34%	64%
Total		Count	50	50
		% Within Gender	50.0%	50.0%

Table (3): Age and duration of type 2 diabetic patients' descriptive statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Age (years)	50	37.34	67.32	52.19	5.53
Duration of disease (years)	50	6.43	19.34	13.54	7.76

Renal tests data finding

When compared some renal function parameters between cases and control group, the results revealed that the mean blood urea, serum creatinine levels and blood glucose (random) concentration of the case group were significantly

high when compared with the control group (0.000). In Gender-wise correlation of renal function test (RFT) in the cases, the results showed that male patients had higher blood urea and serum creatinine levels when compared with female patients. (Table 4,5)

Table (4): Comparison of blood urea, serum creatinine levels and glucose concentration in type 2 diabetic and non-diabetic control subjects

Parameter (mg/dl)	Type 2 DM	Mean $\pm$ SD	p-value
Urea	Case	39.6 ± 6.3	0.000*
	Control	27.2 ± 3.3	
Creatinine	Case	1.85 ± 0.79	0.000*
	Control	0.78 ± 0.41	
Glucose (Random)	Case	245 ± 99	0.000*
	Control	134 ± 53	

Table (5): Gender-wise correlation of renal function test (RFT) in the case group

Parameters (mg/dl)	Male (n=33)	Female (n=17)	P-value
Blood urea	43.72 ± 7.83	39.82 ± 5.46	0.018
Serum creatinine	1.92 ± 0.97	1.89 ± 0.51	0.023

DISCUSSION

Type II Diabetes mellitus is the most common type of DM which constitute about 85-95% of all Diabetes mellitus cases. Diabetic nephropathy is the kidney disease that occurs as a result of diabetes complication. The present study was analytical case control hospital-based study conducted at International University of Africa Hospital, for the measurement of blood urea and Serum creatinine in Sudanese type 2 diabetic patients, at Khartoum state, Sudan, 2022.

The sociodemographic data findings in our study revealed that in the case group; the mean age was 52.19 ± 5.53 years, 66% were male and 34% of them were female, where in the control group; the mean age was 35.54 ± 17.82 years, 64% of them were female and 36% were male. These findings agree with a study done by SA Bamanikar, et al, which found that the mean age of the diabetics was high when compared with the control, where the males were highly distributed than females.¹⁰ In contrast, A study done by N.A.A amartey, et al found that there was no significant statistical difference between the ages of cases and the control group.¹¹ The mean duration of the disease in our study was 13.54 ± 7.76 years, this finding agrees with a study done by K.P. MISHRA, et al which reported that serum urea and serum creatinine in diabetic patients were significantly increased with increasing duration of diabetes which showed that increase in duration of diabetes was the risk factor for the kidney damage progression.¹²

Regarding to the blood urea, serum creatinine and the glucose concentration, the results of our study revealed that; the mean blood urea, serum creatinine levels and blood glucose (random) concentration of the case group were significantly high when compared with the control group (0.000). In Gender-wise correlation of renal function test (RFT) in the cases, the results of our study showed that male patients had higher blood urea and serum creatinine levels when compared with female patients. These findings agree with a study done by Dr. Madhusudan Rao sirivole and Sadvimani Eturi which found that the mean blood sugar, blood urea and serum creatinine levels were significantly ($p \leq 0.05$) higher in the diabetic subjects compared to controls. And they reported that according to Sex wise blood sugar level status and renal function parameters, blood urea and serum creatinine in diabetic subjects was significantly higher in male over female subjects. And stated also, that strong relationship of blood urea and serum creatinine levels was found with blood sugar levels.¹³ Also a study done by Arun Chutani, and Sonali Pande found similar results and reported that There was statistically significant increase in serum urea and creatinine levels in both Type 1 and Type 2 diabetic subjects compared to non-diabetic subjects.¹⁴ Also, our study showed similar results with a study done by Blessing O. Idonije, et al which showed that in addition to elevated blood sugar level in type 2 diabetes mellitus, plasma creatinine and urea concentration are also significantly increased in male and female diabetics compared with their levels in apparently healthy non-diabetic male and female controls.¹⁵

CONCLUSION

Our results on the renal function tests examined in Type 2 diabetic patients, showed significant increase in blood urea,

serum creatinine and blood sugar when compared with non-diabetic patients, which indicates abnormality in renal function status. The measurement of these tests would be a beneficial effect on renal complications and may be diagnostic markers for the progression of diabetic nephropathy

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