

Research Journal of Pharmaceutical, Biological and Chemical Sciences

Estimation Of Blood (TG, TC and LDL) As Markers Of Lipid Profile And Urea, Uric Acid And Creatinine As Markers Of Kidney Function In Diabetic Patients (Type 2).

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ABSTRACT

The present study was carried out on a total of 50 diabetic patient (type2) to evaluate fasting blood sugar level (F.B.S) , Lipid profile tests (Triglyceride (TG) , Total cholesterol (TC) and low density lipoprotein (LDL) and renal function tests (urea , uric acid and creatinine).The patients (male) were divided into two groups , 25 patients with duration of disease (1– 10) year (group 1) , 25 patients with duration of disease (11 – 30)year (group 2) and compared with 25 persons as control(healthy group) (group 3) .From the data collected , it found there are a significant($P \leq 0.05$) increase in the mean value of serum F.B.S , TG , TC , LDL in diabetic patients in two duration of disease and there were no significant differences between group 1 and group 2 . Our results appear a high significant levels ($P \leq 0.05$) of renal function tests urea , uric acid and creatinine for two groups compared with control .There were no significant differences between two groups (1 , 2). In this study, we evaluated the relationship between markers of lipid profile ,renal function tests and diabetes mellitus (type 2) .

Keywords: lipid profile tests , type 2 diabetes mellitus , renal function tests , dyslipidaemia.

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INTRODUCTION

Diabetes mellitus (Dm) is a Condition in which the B - Cells in the pancreas no longer produces insulin or cells stop responding to the insulin that is produced , so that glucose in the blood cannot be absorbed into the cells of the body . Diabetes mellitus has two type 1 and 2 , type 2 is a state which presents with different degrees of resistance to insulin and glucose production [1] .Type 2 is highly associated with decreasing levels of physical activity, increasing obesity rates and unhealthy lifestyle [2].Lipid abnormalities associated with diabetes are terms as dyslipidaemia rather than hyperlipidaemia because there may be changes in both quantity and quality of the lipoproteins [3]. Glomerular injury caused by elevated lipoproteins and lipids in DM and contribute to the progression of diabetic nephropathy [4] .High levels of serum cholesterol as a main risk for coronary heart disease and stroke[5] . The clinical tests of renal functions including uric acid, urea and creatinine are important to identify renal dysfunction and high uric acid level reduced kidney perfusion [6] . Elevated uric acid levels are predisposed to more chronic tubulointerstitial disorder, often indicate to as gouty nephropathy [7] . A number of filtered substances may be measured to evaluate of glomerular filtration rat (GFR) such as blood urea and creatinine levels [8] . serum creatinine level is one of the basic markers for renal function examination and the poor clearance of creatinine could also be linked with longer duration of the diabetes [9] . serum urea and creatinine are known to be raised with hyperglycemia in uncontrolled diabetics and usually correlate severity of kidney damage [10]. The aim of this study was to assess serum glucose , triglyceride , Total cholesterol , low density lipoprotein , urea , uric acid and creatnine in type 2 diabetics patients.

MATERIALS AND METHODS

This study was carried out in Baghdad medical city\ laboratory department . Seventy five males subjects were divided into three groups :

Group 1 : 25 patients of diabetes mellitus (type 2) with duration of disease (1 – 10) year , age range (41 – 70).

Group 2 : 25 patients of diabetes mellitus (type 2) with duration of disease (11 – 30) year , age range (49 – 69) year.

Group 3 : 25 subjects healthy adults as control , age range (30 – 71) year .

Sample collection: All of the subjects were having blood to measure fasting blood sugar (F.B.S) , serum lipid profile tests (triglyceride (TG) , total cholesterol (TC) and low density lipoprotein (LDL) and renal function tests (uric acid , urea and creatinine) levels . 3ml of the persons intra-venous blood was obtained and centrifuged at 3000 rpm for 10 minutes to obtain serum sample .

The separated serum samples were analyzed for F.B.S by using glucose oxidase method and lipid profile tests (TG , TC and LDL) . TG was determined by using enzymatic (lipoprotein lipase) kinetic method and TC was done using enzymatic (cholesterase) method .

Serum LDL was determined using the fried Wald method [11] . Serum samples were also analyzed for renal function tests (uric acid , urea and creatinine) . Serum uric acid was determined by uricase method , urea by urease hypochlorite method and for the estimation of serum creatinine by the alkaline picrate method .

Statistical Analysis

The results were analyzed statistically by using statistical analyses system (SAS)(2012) program to study the effect of two duration of the disease on parameters studied . least significant difference (LSD) test was used to compare among the mean values of the parameters in this study[12].

RESULTS AND DISCUSSION

Fasting blood sugar in diabetic patients

-Effect of duration of diabetes mellitus on F.B.S level

In table.(1) showed the significant differences ($P \leq 0.005$) in the mean value of fasting blood sugar (F.B.S) in two duration of disease . The mean value of F.B.S level was reached (215 ± 18.09)mg/dl in group 2 and (222.4 ± 16.54)mg/dl in group 1 compared with control (86.45 ± 3.23)mg/dl . On the other hand , there was no significant differences in the mean value of F.B.S between two patients groups .

Table 1: Effect of duration of disease on F.B.S level

Parameters	Mean \pm standard error (mean \pm SE)
Groups	F.B.S (mg/dl)
Control	86.45 ± 3.23 B
Duration of diabetes (1 – 10) year	222.40 ± 16.54 A
Duration of diabetes (11 – 30) year	215.0 ± 18.09 A
LSD Value	40.432 *
($P \leq 0.05$) *	

***Different letters A , B significant differences as comparison between column Comparison of F.B.S level between diabetic patients and control group.**

This results in table (2) indicate , there is a significant difference ($P \leq 0.05$) in F.B.S value between all patients and control group . The mean value of F.B.S reached (218.70 ± 12.11) mg/dl in diabetic cases compared with control (86.45 ± 3.23) mg/dl .

Table 2: Comparison of F.B.S level between diabetic patients and control group

Groups	Mean \pm standard error (mean \pm SE)
	F.B.S (mg / dl)
Control	86.45 ± 3.23 B
Patients	218.70 ± 12.11 A
LSD value	34.74 *
($P \leq 0.05$) *	

***Different letters A , B significant differences as comparison between column**

Type 2 diabetes is a disease associated with abnormal carbohydrate metabolism , which a rises due to insulin deficiency , insulin is a key hormon responsible for glucose homeostasis in blood , high levels of blood glucose due to lack of or resistance to insulin [13] . Diabetic patients are characterized by abnormalities in glucose metabolism in several organs , glucose disposal is reduced, hepatic glucose production is increased and insulin independent glucose uptake into the lens and neural tissues are increased [14].

Lipid profile tests

Comparison of TC , TG and LDL levels between diabetic patients and healthy group .The results in table (3) showed a significant differences ($P \leq 0.05$) in TC , TG and LDL levels between all patients and healthy group (control) .

Table 3: Comparison of lipid profile levels between diabetic patients and control group

Parameters	Mean ± standard error (mean ± SE)		
	TC (mg / dl)	TG (mg / dl)	LDL (mg / dl)
Control	149.1 ± 5.61 B	93.65 ± 4.75 B	78.85 ± 2.3 B
Diabetic cases	206.95 ± 8.97 A	189.08 ± 12.53 A	118.62 ± 5.21 A
LSD value	26.693 *	36.260 *	15.177 *
(P ≤ 0.05) *			

***Different letters A , B significant differences as comparison between column**

-Effect of duration of disease on TC , TG and LDL levels in diabetic patients

Data in table (4) shows that there is a significant difference (P ≤ 0.05) in TC , TG and LDL levels in two duration of disease compared with control group . Also, the results indicate there were no significant differences between two duration of disease.

Table 4: Effect of two duration of diabetes mellitus disease on TC, TG and LDL levels

Parameters	Mean ± standard error (mean ± SE)		
	TC (mg/dl)	TG (mg/dl)	LDL (mg/dl)
Control	149.1 ± 5.61 B	93.65 ± 4.75 B	78.85 ± 2.3 B
Duration of diabetes (1 – 10) year	212.56 ± 12.22 A	182.05 ± 16.37 A	116.0 ± 8.02 A
Duration of diabetes (11 – 30) year	201.35 ± 13.33 A	196.10 ± 19.28 A	121.25 ± 6.82 A
LSD value	30.961 *	42.086 *	17.629 *
(P ≤ 0.05) *			

***Different letters A , B significant differences as comparison between column**

According to our results , the serum lipid profile tests are raised in patients with diabetes mellitus . Both lipid profile and diabetes have been shown to be the important predictors for metabolic disturbance including dyslipidaemia, hypertension and cardiovascular disease [15] . Lipid play a vital role in the pathogenesis of diabetes mellitus , Abnormalities in lipid metabolism have been reported in patients with diabetes mellitus accompanied by the risk of cardiovascular and atherosclerosis [16] . Our results agree with Aclan [17] . Who reported that level of serum total cholesterol , Triglycerides and LDL were elevated in type 2 diabetes when compared with control group . In diabetes many factors affect blood lipid levels , because of interrelationship between carbohydrates and lipid metabolism , any disorder in carbohydrates metabolism leads to disorder in lipid metabolism [18] . Hyperglycemia reading is the commonest metabolic abnormality in people with type 2 diabetes mellitus accompanied by lower HDL , elevated LDL , TG and TC . Dyslipidemia management in people with diabetes mellitus contribute to the abnormal lipid profile [19] .

Renal function tests

-Comparison of renal function tests between diabetic patients (type 2) and healthy group

The comparison of serum urea , uric acid and creatinine value as markers of kidney function with control group . The differences between these parameters between all patients and control group . The results present an evidence that the mean value of urea , uric acid and creatinine in patients reached (38.31±2.03 , 4.77±0.26 and 1.375±0.10) mg/dl respectively compared with the mean value of control (27.45±1.15 , 2.78±0.12 and 0.713±0.03) mg/dl respectively as show in table (5) .

Table 5: Comparison of renal function tests between diabetic patients and control group

Parameters	Mean ± standard error (mean ± SE)		
Groups	Urea (mg/dl)	Uric acid (mg/dl)	Creatinine (mg/dl)
Control	27.45 ± 1.15 B	2.78 ± 0.12 B	0.713 ± 0.03 B
Patients	38.3 ± 2.03 A	4.77 ± 0.26 A	1.375 ± 0.10 A
LSD value	6.045 *	0.784 *	0.293 *
(P ≤ 0.05) *			

***Different letters A , B significant differences as comparison between column**

- Study the effect of two duration of diabetes disease on urea , uric acid and creatinine levels.

The statistical results in table (5) shows the effect of duration of disease in diabetic patients on renal function levels . Mean ± SD of urea in patients with diabetes (41.13 ± 3.44) mg/dl in group 2 compared with the control group (27.45 ± 1.15) mg/dl , while the mean value of serum uric acid was significantly higher in the diabetic patients (5.59 ± 0.24) mg/dl in group 2 compared with control group (2.78 ± 0.12) mg/dl (P ≤ 0.05) and comparison of serum creatinine level with control group showed there were significantly higher than control group in two groups .

Table 6: Effect of duration of diabetes mellitus disease on urea, uric acid and creatinine levels

Parameters	Mean ± standard error (mean ± SE)		
Groups	Urea (mg/dl)	Uric acid (mg/dl)	Creatinine (mg/dl)
Control	27.45 ± 1.15 B	2.78 ± 0.12 B	0.713 ± 0.03 B
Duration of diabetes (1 – 10) year	35.50 ± 1.53 A	3.95 ± 0.41 A	1.28 ± 0.16 A
Duration of diabetes (11 – 30) year	41.13 ± 3.44 A	5.59 ± 0.24 A	1.47 ± 0.018 A
LSD value	6.455 *	0.805 *	0.337 *
(P ≤ 0.05) *			

***Different letters A , B significant differences as comparison column**

The abnormal levels of urea , uric acid and creatinine in diabetic patients type 2 can be attributed to damage millions of nephrons resulting in inability of kidneys to maintain fluid and electrolyte homeostasis . Creatinine is filtered by glomerulus and diminished of glomerular filtration rate results in rise of plasma concentration of serum creatinine and urea [20] . An elevated serum creatinine level is also a late sign of renal damage in essential hypertension [21] . Serum urea and creatinine are most widely accepted parameters to assess chronic renal disease [22] . An increase in serum urea observed might be due to important in its synthesis as a result of impaired hepatic function or due to disturbance in protein metabolism [23] . Khaled et al were found , there is a positive association between high serum uric acid and diabetes [24] . Amartey et al [25] . were found a strongly positive correlation between F.B.S and uric acid in diabetic patients . High uric acid levels in diabetes mellitus patients could be attributed to a fall in the filtering capacity of the kidney thus leading to accumulation of waste products within the system [26] .

CONCLUSION

Our results on the parameters showed that on association between lipid profile levels , renal function levels and type 2 diabetes mellitus. Thus these parameters can be used as a biomarker for the assessment of type 2 diabetes .

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