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Analysis of Blood Urea and Serum Creatinine in Controls and Type-2 Diabetic Patients

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Abstract

Diabetes mellitus is a chronic metabolic disorder that can lead to cardiovascular, renal, neurologic and retinal complications. Type 2 diabetes mellitus has quickly become a global health problem due to rapidly increasing population growth, ageing, urbanization and increasing prevalence of obesity and physical inactivity. A total of 40 individuals of both normal and diabetic, aged between 35 to 70 years were included in the study. Blood glucose, blood urea and serum creatinine were estimated and analyzed .Blood glucose was estimated by GOD – POD method. Estimation of serum creatinine was done by the modified Jaffe's method. Blood urea was estimated by Urease-Berthelot's method. There was significant increase in levels of blood urea and serum creatinine ($p<0.001$) in diabetic patients compared to healthy controls. Blood urea and serum creatinine are widely accepted to assess the renal functions in diabetics. Good control of blood glucose level is absolute requirement to prevent progressive renal impairment.

Keywords: *Blood urea, serum creatinine, blood glucose, Diabetes*

INTRODUCTION

Diabetes mellitus (DM) is one of the most challenging health problems in the 21st century. It is affecting millions of peoples. It is a chronic metabolic disorder that can lead to cardiovascular, renal, neurologic and retinal complications. It has become a global health problem due to rapidly increasing population growth, aging, urbanization and increasing prevalence of obesity and physical inactivity.

One fundamental aspect of diabetes is an abnormality of the metabolism of glucose, resulting in elevated blood levels. Two major types are recognized: type-I (insulin-dependent)

and type-II (non-insulin-dependent). Type-I is characterized by decreased glucose tolerance due to decreased secretion of insulin in response to the glucose challenge. Type-II diabetes is often associated with obesity and raised levels of plasma free fatty acids[1]. Type-II DM constitutes about 85% to 95% of all DM cases.

Diabetes is the leading cause of chronic kidney failure, or end-stage renal disease (ESRD). Uncontrolled high glucose levels can damage the nephrons- the filtering units of the kidney that remove excess fluids and waste products from the bloodstream. Regular screening for early signs of kidney problems is an essential part of diabetes care.

Urea is the waste product that is filtered from the blood by the kidneys. Urea is generated in the liver by metabolized protein. Elevated Blood urea levels indicate a slowdown in kidney function.

Creatinine is a metabolic by-product of creatine, the acid that supplies energy for muscle contractions. Creatinine is filtered out of the bloodstream by the kidneys. Elevated serum creatinine levels indicate inadequate filtering by the kidneys (renal impairment).

About 30 percent of patients with Type 1 diabetes and 10 to 40 percent of those with Type -II diabetes eventually will suffer from kidney failure.

The aim of this study was to assess the blood glucose, blood urea and serum creatinine levels in type 2 diabetic patients.

MATERIALS AND METHODS

A total of 40 individuals of both sex aged between 35 to 70 years were included in the study. Diabetes was diagnosed based on laboratory and clinical co-relation.

Patients with acute illness, renal stones, dehydration, muscle dystrophy, glomerulone-phritis, pyelonephritis, malignancy, hypertension and congestive cardiac failure were excluded from the study. The patients taking drugs like amino glycosides, cimetidine, cefoxitin etc. were excluded from the study.

A twenty non diabetic and twenty type-II diabetic persons were taken as controls and cases for our study. 5 ml of fasting venous blood sample was collected. Blood glucose was estimated by GOD – POD method. Estimation of serum creatinine was done by the modified Jaffe's method. Blood urea was estimated by Urease-Berthelot's method

RESULTS

A total of 20 cases of Type- II diabetes and 20 cases controls were studied. Out of total 20 Type II diabetes patients there were 13 males and 7 females. The male to female ratio is 1.85:1. The age of the patients ranged from 35 years to 70 years. The mean age of patients was 52 years. Males have higher values of fasting blood sugar levels than the females indicating poor glycemic control which is an indicator of diabetic nephropathy.

Both serum creatinine and blood urea were higher in males as compared to females. This could be correlated with high blood sugar levels in males.

In the analysis of these results, there was significant increase in levels of blood urea, serum creatinine and fating blood glucose ($p<0.001$) in diabetic patients compared to healthy controls.

Table 1: Blood glucose, Blood urea and Serum creatinine levels in diabetics compared to controls.

	Controls (n=20)	Cases (n=20)
Blood glucose (mg/dl)	86.05 ± 9.96	172.35± 59.96
Blood urea (mg/dl)	25± 4.01	92.9 ± 42.5
Serum creatinine (mg/dl)	0.79 ±0.24	2.83 ± 1.14

DISCUSSION

Impairment of renal function due to type-II diabetes mellitus was assessed by measurement of blood urea and serum creatinine. In our study, we found an increase in levels of blood urea and serum creatinine when compared with controls. These findings revel that there is strong relationship of blood sugar level with urea level. As there is increase in blood sugar level an increase in urea level has been detected. The serum creatinine and blood urea are established markers of GFR, though serum creatinine is a more sensitive index of kidney function.

An increase in urea level is seen when there is damage to the kidney or the kidney is not functioning properly. Increment of blood urea level with the increment of blood sugar level clearly indicates that the increase blood sugar level causes damage to the kidney. Our observations were in accordance with various studies which showed raised plasma creatinine and urea levels in diabetic patients.

CONCLUSION

Blood urea and creatinine is widely accepted to assess the renal functions. Elevated blood glucose levels leads to elevated blood urea and serum Creatinine levels indicating renal impairment. Good control of blood glucose level is absolute requirement to prevent progressive renal impairment.

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