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SERUM UREA, CREATININE IN RELATION TO FASTING PLASMA GLUCOSE LEVELS IN TYPE 2 DIABETIC PATIENTS

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ABSTRACT

India as a developing country has more prevelance of diabetes and now has more people with type 2 diabetes (more than 50 million) than any other nation. Diabetes mellitus is a chronic metabolic disorder that can lead to cardiovascular, renal, neurologic and retinal complications. Type 2 diabetes has quickly become a global health problem due to rapidly increasing population growth, aging, urbanization and increasing prevalence of obesity and physical inactivity. A total of 40 diabetic patients of both sexes aged between 35 to 75 years attending medicine OPD were included in the study.After obtaining informed consent from the study group 5 ml of fasting venous blood sample was collected. Plasma glucose was estimated by GOD – POD method. Estimation of plasma creatinine was done by the modified Jaffe's method. Serum urea was estimated by Urease-Berthelot's method. There was significant increase in levels of serum urea, creatinine and FPG (p<0.001) in diabetic patients compared to healthy controls. On applying Pearson's correlation serum urea correlated positively with creatinine (p<0.001, r = 0.910) in cases and also in contorls (p<0.001, r = 0.868). Blood urea and creatinine is widely accepted to assess the renal functions. Good control of blood glucose level is absolute requirement to prevent progressive renal impairment.

KEYWORDS: Blood urea, Creatinine, Glucose, Diabetes

Introduction

India as a developing country has more prevalence of diabetes and now has more people with type 2 diabetes (more than 50 million) than any other nation. Diabetes mellitus is a chronic metabolic disorder that can lead to cardiovascular, renal, neurologic and retinal complications [1, 2]. Type 2 diabetes mellitus has quickly become a global health problem due to rapidly increasing population growth, aging, urbanization and increasing prevalence of obesity and physical inactivity. There is, therefore, an urgent need to prevent diabetes and its complications. In a study on Type 2 diabetic subjects having poor metabolic control a prevalence of renal damage approximates 20% and is associated with components of the metabolic syndrome [3]. Diabetic nephropathy affects more than 30% of type 1 diabetic patients and it is a leading cause of end stage renal disease [4]. A number of risk factors have been associated with the metabolic syndrome, including hypertension, poor glycemic control, central obesity, smoking, dyslipidemia and glycated end products [5]. Diabetic nephropathy occurs approximately in one third type 2 diabetic patients [6] and is on rise. In diabetic nephropathy a number of serum markers are

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known to be deranged with significant morbidity and mortality [7].

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

Materials and Methods:
A total of 40 diabetic patients of both sex aged between 35 to 75 years attending medicine OPD were included in the study. Diabetes was diagonsed based on laboratory and clinical co-relation. Patients with dehydration,muscle dystrophy, glomerulonephritis, pyelonephritis, hypertension and congestive cardiac failure were excluded from the study.The patient drug history was elucidated to avoid false positive results due to nephrotoxic drugs effect, such as aminoglycosides, cimetidine, cefoxitin etc. A fifty age and sex matched non diabetic persons attending medicine department were taken as controls.

After obtaining informed consent from the study group 5 ml of fasting venous blood sample was collected. Plasma glucose was

estimated by GOD – POD method [8]. Estimation of plasma creatinine was done by the modified Jaffe's method [9-10]. Serum urea was estimated by Urease-Berthelot's method [11].

Statstical analysis:

The results were expressed as mean ± standard deviation. A $p<0.05$ was considered statistically significant. Statistical analysis was performed using the statistical package for social sciences (SPSS-13). Student 't' test was used to compare between the groups. Pearson correlation was applied to correlate between the parameters.

Results:

As shown in **Table 1** there was significant increase in levels of serum urea, creatinine and FPG ($p<0.001$) in diabetic patients compared to healthy controls. As depicted in **Figure 1**, on applying Pearson's correlation serum urea correlated positively with creatinine ($p<0.001$, r = 0.910) in cases and also in contorls ($p<0.001$, r = 0.868).

Table 1: Serum creatinine, urea and fasting plasma glucose levels in patients with diabetic patients compared to healthy controls. (Values are expressed in mean ± SD)

	Controls (n=50) Mean± SD	Cases (n=40) Mean± SD
Age (Years)	45.96±18.22	53.79±21.80
FPG (mg/dl)	83.30±13.15	169.29±138.32***
Blood urea (mg/dl)	33.62±27.17	69.69±69.71***
Plasma creatinine (mg/dl)	1.11±1.18	2.23±3.03***

P<0.001=*

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Figure 1:
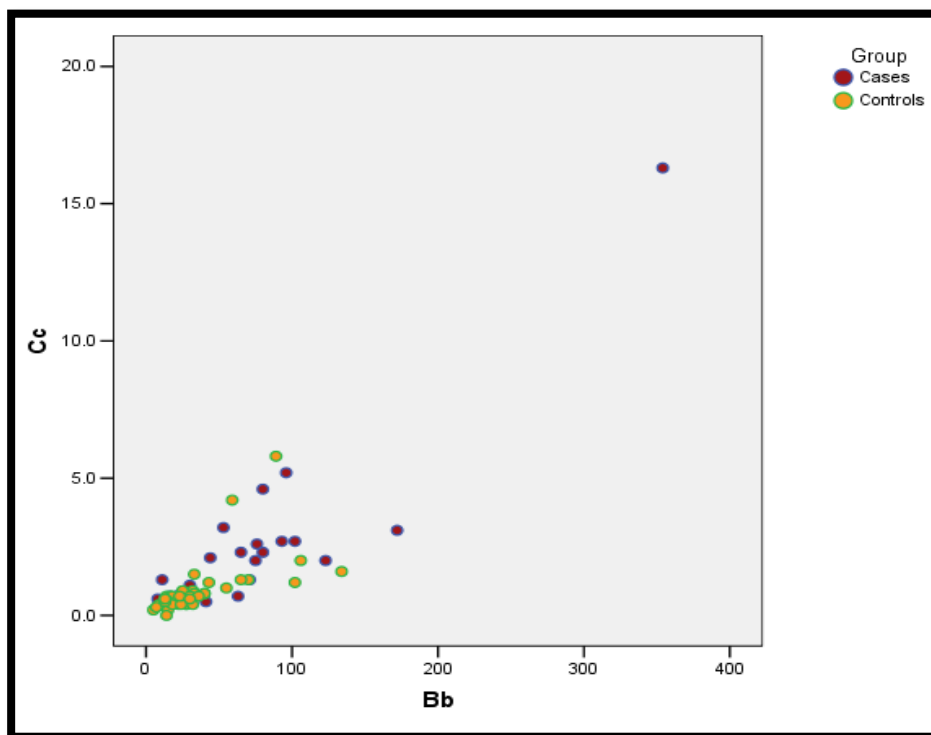
➢ *Bb: Blood Urea;Cc: Plasma Creatinine*

Discussion

Impairment of renal function due to type 2 diabetes mellitus was assesed by measurement of plasma concentration of urea and creatinine. In our study we found an increase in levels of FPG, blood urea and plasma creatinine when compared with normal contorls. 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 plasma creatinine and urea are estabished markers of GFR, though plasma creatinine is a more sensitive index of kideny 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. A research has found that increase urea and serum creatinine in diabetic rats indicates progressive renal damage [12].

Our observations were in accordance with various studies [13, 14] which showed raised plasma creatinine and urea levels in diabetic patients may indicate a pre-renal problem.

Conclusion

Blood urea and creatinine is widely accepted to assess the renal functions. Good control of blood glucose level is absolute requirement to prevent progressive renal impairment.

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