

Comparative Evaluation of Glycemic Status in Chronic Kidney Disease Patients With and Without Type 2 Diabetes Mellitus

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ABSTRACT

Background: Glycemic status means blood glucose level in an individual is measure by using the term hyperglycemic and hypoglycemia. The aim of the present study was to evaluate the glycemic status among chronic kidney disease patients from stages (3-5) with and without type 2 DM.

Materials and methods: A cross sectional study was conducted at BIRDEM General Hospital from July 2021 to June 2022. According to the inclusion criteria, a total 100 participants were selected. The study subjects were considered as Group I and Group II. 50 patients included into Group I, who were diagnosed CKD with DM. On the other hand Group II included 50 patients diagnosed CKD without DM. Statistical software for social science 26 (SPSS) was used to analyzed the collected data.

Results: The mean age in Group I and Group II was 52.86 ± 13.12 and 51.70 ± 14.59 years, respectively ($p=0.800$). The mean BMI was 25.14 ± 4.19 kg/m² in Group I and 22.00 ± 4.03 kg/m² in Group II ($p=0.310$). There was no significant difference in age and BMI between the two groups. Fasting blood sugar (FBS) and HbA1c levels were significantly higher in Group I compared to Group II. Estimated Glomerular Filtration Rate (eGFR) showed a negative correlation with HbA1c and FBS among all study subjects.

Conclusions: CKD patients with type 2 diabetes mellitus demonstrated significantly higher FBS and HbA1c levels compared to non-diabetic CKD patients.

KEY WORDS

CKD; DM; Glycemic status.

INTRODUCTION

Chronic Kidney Disease (CKD) is a worldwide public health problem. The National Kidney Foundation defines CKD as damage or a Glomerular Filtration Rate (GFR) of less than 60ml/min/1.73 m² of body surface area for longer than 3 months.¹ The global prevalence of CKD is estimated to be 13%.² Between 1990 and 2017, the global all age death rate from CKD climbed

by 41.5% (Global burden of disease in 2017). The prevalence of CKD was 22.48% in Bangladeshi population which was higher than the global prevalence of CKD.^{3,4} Diabetes Mellitus (DM) is one of the major causes of CKD and End Stage Renal Disease (ESRD). DM affect more than 422 million persons worldwide, with 40% of those affected developing CKD.^{5,6} A recent systematic review found that overall prevalence of CKD among type 2 diabetic patients in Bangladesh is 21.3%.^{7,8} The aim of the present study was to evaluate the glycemic status among chronic kidney disease patients from stages (3-5) with and without type 2 DM.

MATERIALS AND METHODS

A cross sectional study was conducted at BIRDEM General Hospital from July 2021 to June 2022 after approval by the Institutional Review Board. According to the inclusion criteria, a total 100 participants were selected. Patients with stage 5 CKD on dialysis, pregnant women, those with known hematological disorders and patients receiving treatment for anemia were excluded from this study. The study subjects were considered as Group I and Group II. 50 patients included into Group I, who were diagnosed CKD with DM. On the other hand Group II included 50 patients diagnosed CKD without DM. Convenient sampling

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technique was done according to availability of patients. A structured questionnaire was filled out after obtaining informed written consent from the study subjects. Statistical software for social science 26 (SPSS) was used to analyzed the collected data. Statistical tests were considered as test of significance when $p < 0.05$.

RESULTS

Among study subjects 56% were male and 44% were female. The majority of the study participants about 53% were in CKD stage 4, 27% were in CKD stage 3 and 20% were in CKD stage 5. Sixty-seven percent of patients had Chronic Kidney Disease (CKD) for 0–5 years, while 37% of patients in the diabetic group (Group I) had Diabetes Mellitus (DM) for more than 10 years.

Table I Demographic and clinical characteristics of the study population (n=100)

Parameter	Frequencies	Percentage (%)
Gender distribution		
Male	56	56%
Female	44	44%
Duration of CKD		
0-5 years	67	67%
6-10 years	21	21%
More than 10 years	12	12%
Stages of CKD		
Stage-3	27	27%
Stage-4	53	53%
Stage-5	20	20%
Duration of DM		
Non diabetic	50	50%
0-5 years	05	05%
6-10 years	08	08%
More than 10 years	37	37%

In this study, the mean age of study subjects in Group I and Group II was 52.86 ± 13.12 and 51.70 ± 14.59 years and p value was 0.800. The mean BMI of study subjects in Group I and Group II was 25.14 ± 4.19 and 22.00 ± 4.03 kg/m² and p value was 0.310. No significant difference of Age and BMI between Group I and Group II were observed.

Table II Comparison of Anthropometric parameters between groups

Variables	Group I (n=50)	Group II (n=50)	p value
	Mean $\pm$ SD	Mean $\pm$ SD	
Age (Year)	52.86 ± 13.12	51.70 ± 14.59	0.800
BMI (kg/m ²)	25.14 ± 4.19	22.00 ± 4.03	0.310

Table III represents the FBS and HbA1c level were significantly higher in group I compared to group II.

Table III Comparison of glycemic and renal status between groups

Variables	Group I (n=50)	Group II (n=50)	p value
	Mean $\pm$ SD	Mean $\pm$ SD	
FBS (mmol/l)	12.24 ± 4.98	4.71 ± 0.67	0.001
HbA1c(%)	8.77 ± 1.82	5.39 ± 0.46	0.001
Serum creatinine (mg/dl)	3.01 ± 1.55	3.27 ± 1.69	0.455
e GFR (ml/min/m ²)	24.33 ± 11.50	24.58 ± 11.70	0.532

Table IV showed correlation between eGFR and other variables in all study subjects. eGFR showed negative correlation with HbA1c and FBS.

Table IV Correlation of different variables with eGFR

Variables	r	p-value
FBS	-0.305	0.732
HbA1c	-0.052	0.609

DISCUSSION

In this study, the mean age of study subjects in Group I and Group II was 52.86 ± 13.12 and 51.70 ± 14.59 years, 70% patients in the age group were above 40 years. Among study subjects 56% were male and 44% were female. The USRDS 2004 Annual Data report showed that the incidence of ESRD was higher for male and the age and gender distribution of this present study correspond with the epidemiology of CKD. But the mean age gap between two groups was not found statistically significant, which is quite similar to other study. The mean BMI of diabetic CKD patients was slightly higher when compared with non-diabetic CKD patients, which was 25.14 ± 4.19 and 22.00 ± 4.03 . Similar result observed in other studies done by Zaman, Hossain and Rahman, which was 25.30 kg/m² vs. 24.30 kg/m².⁹ In our study majority of the participants about 53% were in CKD stage 4, 27% were in CKD stage 3 and 20% were in CKD stage 5. Another study conducted by Fatema et al. found that majority of the participants about 35% were in CKD stage 5, 33% were in CKD stage 4 and 32% were in CKD stage 3.¹⁰

CONCLUSION

Glycemic parameters showed a negative correlation with eGFR, indicating that poorer glycemic control is associated with worsening renal function. However, age and BMI did not differ significantly between the two groups.

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DISCLOSURE

All of the authors declared no competing interests.

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