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Assessment of renal complication in Type 2 diabetes mellitus patient in durg district Chhattisgarh

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Abstract
The present study was carried out to assess the renal complication in Type 2 Diabetes Mellitus patient in Durg District Chhattisgarh.

Blood samples were collected in EDTA vial. Serum was separated by centrifugation at 3000rpm for 10 min. Fasting glucose, insulin level and other biochemical parameters were measured in plasma. Plasma glucose was measured by Glucose Oxidase Peroxidase (GOD-POD) method. Total protein and albumin concentrations were estimated by direct Biuret method. Glucose, total protein and albumin were estimated using reagent kit from Agappe Diagnostic (Kerala, India), for HbA1c colorimetric method. Urine samples were collected for estimation of microalbumin, urine creatinine and routine urine analysis.

Of the 200 screened subjects, 150 Type 2 Diabetic eligible subjects were enrolled out of which 46% were females. The mean age was 49.81 years with a mean body mass index of 27.3 ±4.8 kg/m^2. We have prepared three group, group A Type 2 Diabetic patient without renal complication, group B Type 2 Diabetic patient with renal complication & group C Type 2 Diabetic patient with high renal complication and then we can compare between group A and B so we found that *p*-value of creatinine was .32848. The result was *not* significant at $p < .05$. But HbA1c, Microalbumin and (ABS) Average blood sugar were significant at P <.05 and then we can compare group A & C here P value of creatinine was < .00001. The result was significant at $p < .05$. As well as HbA1c, Microalbumin and Average blood sugar was more significant. In our study a strong correlation between creatinine and HbA1c was observed the level of creatinine was also significantly associated.

This study reported awareness of renal complications in Type 2 diabetic patient of Durg district (CG).

Keywords: Type 2 diabetes mellitus, Plasma Glucose, Renal complication, Microalbumin, Chronic Kidney disease (CKD), public health

Introduction

Diabetes mellitus is a metabolic disorder of great impact worldwide. Epidemiological data showed that in 2010 there were 285 million people affected with the disease in the world, and it is estimated that in the year of 2030 we will have about 440 million diabetics.1 The Type 2 diabetes affects about 7% of the population.2

Diabetic renal disease also known as diabetic nephropathy or diabetic kidney disease is a common microvascular complication of Type 2 diabetes mellitus (T2DM). Diabetic renal disease is considered a major public health problem for both the patient and the healthcare system. Diabetes and hypertension are two major risk factors of chronic kidney disease3. Albuminuria and proteinuria are hallmarks for CKD, which is characterized by a decline in renal function 4, 5. CKD has high global prevalence, with rates reported between 11% to 13% 6. The Start India Project, which assessed the Prevalence of CKD among Diabetic patients, has estimated that more than 40% of T2DM Patients have CKD. Likewise, one in five hypertensive subjects has CKD7. DKD was also associated with higher mortality, morbidity, and healthcare expenditure 8, 9, imparting high economic burden on DKD patients 10.

The myriad of complications engendered by DM therefore poses a consider-able health burden. Of note, diabetic nephropathy is one of the major complications of DM; it was reported that kidney complications occurred in about 25–40% of individuals with Type 2 DM (T2DM) 11. There is emerg ing literature on the development and vali-dation of risk models that predict progression of Chronic Kidney Disease (CKD). Such m odels can potentially be used for risk communications to patients to improve lifestyle and health behavior, tailoring manag ement for patients at different risk strata, and prognosticating patients for preparation of renal replacement therapy. The predictors included age, gender, body m ass index, systolic blood pressure, serum creatinine, measure of proteinuria, urinary albumin-to-creatinine ratio (uACR), and even novel biomarkers [12].

Early identification and treatments for DKD have been shown to slow, stop, or even reverse the progress of the disease and the decline of kidney function [13, 14]. Yet the majority of CKD cases are not identified early. Limited knowledge of CKD is the main barrier to the early diagnosis and prevention of disease progression {15]. A study by Chow *et al*. found there to be poor knowledge of CKD in the general public and suggested future studies in population of high-risk individuals [16].

Therefore, this study aimed to awareness and assessment of renal complication in Type 2 Diabetes Mellitus Patient in Durg District Chhattisgarh India.

Materials and Methods

Participants were recruited from Maitri College of Dentistry and Research Centre Anjora Durg Chhattisgarh. College and

Research centre heads were consulted to ensure maximum participation, after written or verbal, informed consent was obtained, informants were given a unique study identification number to de-identify the informants at the point of blood collection by expert technicians. Duration of 1st January 2017 to 31st June 2018 a total of 376 participants were 150 screened for presence of type 2 diabetics subjects were enrolled.

Inclusion Criteria
- Age above 25 years.
- Fasting for 10 hours.
- Willing to give informed consent.

Exclusion Criteria
- Known cases of type 1 diabetes.
- Secondary causes of hyperglycaemia such as pregnancy, corticosteroid therapy and other pharmacotherapy leading to hyperglycaemia.
- Patients living in rural areas.

Institutional Ethical Committee approved the present case control study. Informed written consents were obtained from all participants. Demographic records of age, sex, personal habits about smoking, and alcoholism were obtained by administering questionnaire. History of duration of diabetes, medication, complications, associated comorbidities, past and family medical history were obtained in detail. Anthropometric measures were recorded. Body mass index was calculated as weight (kg)/height (m2). After thorough clinical evaluation, all subjects were invited to give blood samples after 12 hours fast and were asked to abstain from smoking, alcohol consumption for 24 hours before investigations.

Blood samples (5mL) were collected in EDTA vial. Serum was separated by centrifugation at 3000rpm for 10 min. Fasting glucose, insulin level and other biochemical parameters were measured in plasma.

Diabetes was defined on fulfillment of criteria laid down by WHO consultation group report and international diabetes federation IDF, i.e. plasma fasting blood glucose ≥126mg/dl or 2 hour plasma post glucose value ≥200mg/dl or HbA1c >6.5% and known cases of type 2 diabetes mellitus [17].

.Plasma glucose was measured by glucose oxidase-peroxidase (GOD-POD) method. Serum creatinine were estimated using reagent creatinine kit by Mod. Jaffes Kinetic method, reference values are in male's 0.6 to 1.2 mg% and in female's 0.5 to 1.1 mg%. For HbA1c colorimetric method. To assure the accurate reflection of glycemic control, we also reviewed the patients HbA1c records. HbA1c level below 7 was considered a good glycemic control, and HbA1c ≥7 was considered a poor glycemic control. Urine samples were collected for estimation of microalbumin, urine creatinine and routine urine analysis. Microalbuminuria was measured by Turbidimetric immunoassay (TURBILYTE MA) Kit. Urinary albumin excretion between 30 to 300 mg/day (Microalbuminuria), far below the levels found in clinical Proteinurea (>300 mg/day) is a strong predictor of development of diabetic nephropathy complication. The entire tests were performed in the School of biological & chemical sciences MATS University Raipur C.G. India.

Statistical Analysis

Statistical analysis of data was performed using Statistical Package for Social Sciences version 16.0.0 Categorica variables were expressed as absolute number and percentage and continuous variables were expressed as mean and standard deviation (SD)

Results

Of the 200 screened subjects, 150 Type 2 Diabetic eligible subjects were enrolled out of which 46% were females. The mean age was 49.81 years with a mean body mass index of 27.3 ±4.8 kg/m^2. We have prepared three group, group A Type 2 Diabetic patient without renal complication, group B Type 2 Diabetic patient with renal complication & group C Type 2 Diabetic patient with high renal complication so lack of awareness in people of Durg District Chhattisgarh India.

Compare between Group A & Group B

Group A- Type 2 Diabetic patient without renal complication.
Group B- Type 2 Diabetic patient with renal complication

Table 1

Parameters	Group A		Group B		P value
	Mean	SD	Mean	SD	
HbA1c	5.358	0.294	6.396	0.31	<.00001
ABS	107.08	8.37	136.68	9.0021	<.00001
Creatinine	0.7222	0.254	0.7108	0.24	0.32848
Microalbumin	25.132	0.4913	27.376	0.637	<.00001

Creatinine- The t-value is 0.44549. The p-value is .32848. The result is not significant at $p < .05$.
Microalbumin- The t-value is -19.70905. The p-value is < .00001. The result is significant at $p < .05$.
ABS-The t-value is -17.0196. The p-value is < .00001. The result is significant at $p < .05$.
HbA1c- The t-value is -17.16335. The p-value is < .00001. The result is significant at $p < .05$.Compare between Group A & Group C
Group A- Type 2 Diabetic patient without renal complication.
Group C- Type 2 Diabetic patient of Average control group

Table 2

Parameters	Group A		Group C		P value
	Mean	SD	Mean	SD	
HbA1c	5.358	0.294	8.754	9.852	0.008223
ABS	107.08	8.37	164.86	8.618	<.00001
Creatinine	0.7222	0.254	0.695	0.236	<.00001
Microalbumin	25.132	0.4913	28.588	2.571	<.00001

Creatinine: The t-value is -11.25899. The p-value is < .00001. The result is significant at $p < .05$.
Microalbumin: The t-value is -9.39646. The p-value is < .00001. The result is significant at $p < .05$.
ABS: The t-value is -34.4236. The p-value is < .00001. The result is significant at $p < .05$.
HbA1c: The t-value is -2.4409. The p-value is .008223. The result is significant at $p < .05$.we can compare between group A and B so we found that p-value of creatinine was .32848. The result was *not* significant at $p < .05$. But HbA1c, Microalbumin and (ABS) Average blood sugar were significant at P <.05 and then we can compare group A & C here P value of creatinine was < .00001. The result was significant at $p < .05$. As well as HbA1c, Microalbumin and Average blood sugar was more significant. In our study a strong correlation between creatinine and HbA1c was observed the level of creatinine was also significantly associated

Discussion

Diabetes Mellitus has become a Major health problem in India. The Indian Council of medical research India Diabetes study (ICMR-INDIAB study) showed that India had 62.4 million people with diabetes in 2011. These numbers are projected to increase to 101.2 million by 2030 [18]. Published literature revealed that CKD can be reversible and preventable from its progression to end-stage kidney disease if it is diagnosed at an early stage [19, 20]. Previous studies found poor knowledge of CKD among the general public, however, limited studies have assessed the knowledge of CKD among high-risk patients [21, 23].

A lack of awareness about common risk factors like hypertension and diabetes is raising the alarm for the need for further action. Furthermore, this population is less likely to get proper screening, adhere to prescribed medication regimens, or take part in decision making, which may ultimately contribute to the rising prevalence of CKD and further progression of CKD to its end stages.

Our study also found that patients who had a family history of diabetes or poor glycemic control were more likely to have a higher knowledge of CKD, including the risk factors. Higher knowledge among these patients could be possibly due to poor health status (uncontrolled diabetes), or patients who have heard of CKD are more likely to have better knowledge [24]. Family income is considered to be an important factor acting the quality of life among non-dialysis CKD patients [25]. Previous studies also suggested that low income is associated with a higher prevalence of chronic conditions [26].

The study should be interpreted in light of certain limitations. Firstly, the findings of the study cannot be generalized to the entire CKD population, as the study was comprised only of patients from a single center. Secondly, the study was limited in regard to the selection of participants (selection bias); to overcome this, we consecutively selected the participants. There were several notable strengths of this study. Firstly, the study included T2DM patients and performed stratification based on CKD and stages. Secondly, the knowledge level was correlated with diabetesand status.

The present study also highlighted the needs of CKD education among T2DM patients, since a lack of knowledge about these risk factors was reflected in the study that may have resulted in late referral to the nephrologists and poor participation in the decision-making process. Future studies are warranted to assess the CKD knowledge in a large population-based sample and to frame a CKD awareness model for high-risk patients as well as the general population in order to promote earlier diagnosis, better treatment, and innovative care.

Conclusion

We found poor knowledge of renal disease among T2DM in Durg District Chhattisgarh Indian patients. The government should start a CKD awareness programme to deal with this devastating co-morbid condition, which would help in achieving cost-effective prevention.

Limitations of the Study

Main limitation of the present study is the small sample size.

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