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Risk factors of diabetic chronic kidney disease hospitalized in the clinic of diabetes patients: a study in Shaheed Ziaur Rahman medical college hospital, Bogra, Bangladesh

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Abstract
Introduction: Diabetic chronic kidney disease (CKD) is a clinical syndrome documented with persistent albuminuria> 300 mg / day or> 200 µgm / minute, which confirms in at least twice times within 3-6 months, constant decline in glomerular filtration rate (GFR) and increased blood pressure. CKD affects about 10-13% of the general population where a small proportion with end stage renal diseases are required renal replacement therapy and kidney transplantation.
Objective: To find out the Risk factors of diabetic chronic kidney disease hospitalized in the Clinic of Diabetes Patients.
Material and methods: The study was conducted for three years from January 2016 to January 2018. The Study subjects was 600.Patients who were admitted in hospital with diabetes and metabolic diseases are included in the study subject and unselected patients without diabetes registered at Shaheed Ziaur Rahman Medical College Hospital, Bogra, Bangladesh. During study, demographic data (age, sex), anthropometric data (weight, height, body mass index, waist circumference, and hip circumference), clinical data (retinopathy, diabetic neuropathy, and diabetic nephropathy), treatment of comorbidities, family history (diabetes, hypertension, dyslipidemia, stroke, heart attack, obesity, autoimmune diseases, etc.), and smoking data were collected and analyzed.
Results: We conducted a study of 600 subjects (295 women and 305 men), divided into 3 groups. Sex ratio of 3 groups are have relatively balanced, as it follows: the patients integrated in the study in Grroup 1 were 32 (32%) women, 68 (68%) men, in Group 2 were 101 (50%) women and 99 (50%) men, and in the controlling Group 162 (54%) women and 138 (46%) men. The analyzed subjects were distributed on age groups, as it was shown in table 1. It was observed that, as expected, the patients from the insulin-dependent group had a younger age.
Conclusions: The study, including individual and comparative analysis of clinical and preclinical parameters incriminated as potential risk factors in the development of chronic kidney disease in diabetes development has led to the development of conclusions that may be of importance and practical application in the prevention and delay disease progression. Diabetes is identified as a disease with a strong impact on health in association with micro-and macro vascular complications.

Keywords: diabetic chronic kidney disease, risk factors, diabetes duration

1. Introduction

Chronic kidney disease (CKD) is a consistent damage in renal function more than a period of three months or years. Kidneys can be damaged for different causes like from a physical injury or non-communicable diseases particularly diabetes mellitus (DM) or high blood pressure. It usually reduces in glomerular filtration rate (GFR) and proteinuria [1, 2]. Diabetic chronic kidney disease (CKD) is a clinical syndrome documented with persistent albuminuria> 300 mg / day or> 200 µgm / minute, which confirms in at least twice times within 3-6 months, constant decline in glomerular filtration rate (GFR) and increased blood pressure. CKD affects about 10-13% of the general population where a small proportion with end stage renal diseases are required renal replacement therapy and kidney transplantation. CKD is the most dangerous public health problem worldwide, both for the increasing quantity of patients and also huge cost of its treatment. Due to CKD, in USA 409,000 death was occurred in 1990 and 956,000 deaths in 2013, respectively. Of those deaths, 46,000 (1990) and 173,000 (2013) were happened by CKD due to DM [3]. CKD prevalence is increasing with comply with age. Diabetes is responsible for 50% of cases of CKD which considers the most common cause. Renal replacement therapy worldwide is mostly needed especially patients with type 2 diabetes mellitus (T2DM) in line with CKD. Globally, Diseases of the kidney and urinary tract together are the 12th cause of death and the 17th cause of disability [4]. There are 30-40% of cases of end-stage renal disease coming from DM in the United States. In the past 30 years, improved treatment strategies has significantly decreased the renal substitution therapy requirements for patients with type 1 diabetes mellitus (T1DM) and hypertension. Around 10-13% of general population are affected by CKD [5].

Risk factors associated with the presence of diabetic CKD

Diabetic nephropathy is key components of the CKD, where majority of the risk associated with diabetes diseases. The others risk factor are also details below:

- Demographic factors: age, sex, ethnicity,
- Metabolic factors: hyperglycemia (age of onset of diabetes, duration of diabetes), dyslipidemia, hyperuricemia, obesity
- Hemodynamic factors: anemia, hypertension
- Family factors: family history of CKD, family history of DM, degree relatives with premature cardiovascular disease
- Intrauterine and perinatal factors: low birth weight
- lifestyle: smoking, increased protein intake, physical activity, inactivity, viral and occupational exposures
- Genetic factors

2. Objectives

1. General Objective

a) To find out the Risk factors of diabetic chronic kidney disease hospitalized in the Clinic of Diabetes Patients.

2. Specific Objective

a) To determine the prevalence of CKD in patients with T1DM
b) To determine the prevalence of CKD in patients with T2DM
c) To determine the prevalence in the general population CKD
d) To assess the degree of renal impairment in patients with diabetes and the general population
e) To identify risk factors associated with the presence of diabetic CKD
f) To establish some correlations between risk factors and the presence of CKD
g) To evaluate the CKD prognosis
h) To elaborate conclusions

3. Material and Methods

The study was conducted for three years from January, 2016 to January 2018. The Study subjects was 600. Patients who were admitted in hospital with diabetes and metabolic diseases are included in the study subject and unselected patients without diabetes registered at Shaheed Ziaur Rahman Medical College Hospital, Bogra, Bangladesh. The study is an epidemiological, transversal, non-interventional type, with unselected patients and it has been conducted by analyzing 600 subjects divided into three groups, as it follows:

- Group 1 included 100 patients with type 1 DM
- Group 2 included 200 patients with type 2 DM
- Group 3 (control) included 300 subjects, randomized, without DM

Inclusion criteria

Patients who were admitted into hospital through diagnosed with T1DM who are permanent insulin treatment initiated in the first year after diagnosis of DM before the age of 40 years; patients diagnosed with T2DM by ADA criteria 2010 (minimum two fasting blood glucose ≥ 126mg / dl, glucose ≥ 200 mg / dl at any time of the day in the presence of specific clinical signs: polyuria, polydipsia, polyphagia, HbA1c ≥ 6.5 % glucose 2 hours after glucose load ≥ 200 mg / dl); subjects were informed regarding the research objective and signed informed consent.

Exclusion Criteria

Patients with acute metabolic imbalance; receives potentially nephrotoxic drugs and also others considerable contagious diseases which consultants of the study does not consider to include.

Ethical Consideration

Informed consent was signed by each participant in the study, in full knowledge, having been informed of all relevant aspects in the decision. The study was conducted in accordance with the ethical principles in the medical college ethical review committee.

Sampling Methodology

Study participants were selected by systematic random sampling technique.

Blood sample was collected by periphery venipuncture in EDTA vacutainers of 3 ml and the following analyzes were performed: serum creatinine, total cholesterol, HDL-cholesterol, LDL-cholesterol calculated using the Fried Wald formula, triglycerides, uric acid, hemoglobin levels. Sampling was done in the morning after at least 12 hours of fasting. From urine sample it was determined albumin and creatinine and then it was calculate the albumin/creatinine ratio

Data Collection

The Study team has collected several data by filling up prescribed questionnaire. Questionnaire included the following variables specially :Demographic data (age, sex), anthropometric data (weight, height, body mass index, waist circumference, hip circumference), physiological personal history (menarche, births, abortions, fetal macrosomia, menopause), pathological personal history (age of diabetes onset, age, time from diagnosis to the occurrence of CKD), data about blood pressure, cardiovascular disease (chronic ischemic heart disease, stroke, myocardial infarction, peripheral venous disease, dyslipidemia), cardiovascular risk, other microvascular complications of diabetes (retinopathy, diabetic neuropathy, diabetic nephropathy), treatment of comorbidities, family history (diabetes, hypertension, dyslipidemia, stroke, heart attack, obesity, autoimmune diseases, etc.), smoking.

4. Results

We conducted a study of 600 subjects (295 women and 305 men), divided into 3 groups. The distribution on sex of the subjects from the 3 lots has been relatively balanced, as it follows: the patients integrated in the study in lot 1 were 32 (32%) women, 68 (68%) men, in lot 2 were 101 (50%) women and 99 (50%) men, and in the controlling lot 162 (54%) women and 138 (46%) men. The analyzed subjects were distributed on age groups, as it is shown in table 1. It may be observed that, as expected, the patients from the insulin-dependent group had a younger age.

Table 1: The distribution on age groups of the 3 lots (n=600)

Age	Group 1	Group 2	Controlling group
0 - 19 years old	4 (4%)	-	-
20-39 years old	51 (51%)	3 (1.5%)	34 (17%)
40-59 years old	40 (40%)	60 (30%)	74 (37%)
60-79 years old	5 (5%)	134 (67%)	91(45.5%)
Over 80 years old	-	3 (1.5%)	1(0.5%)

The duration of DM comes under the presented intervals in table 2, observing a longer duration of type 1 DM compared to type 2 DM.

Table 2: The duration of diabetes mellitus (n=600)

Duration	Group 1	Group 2
0-9 years	31 (31%)	131(65.5%)
10-19 years	30 (30%)	56 (28%)
20-29 years	26 (26%)	11(5.5%)
30-39 years	7 (7%)	2 (1%)
Over 40 years	6 (6%)	-

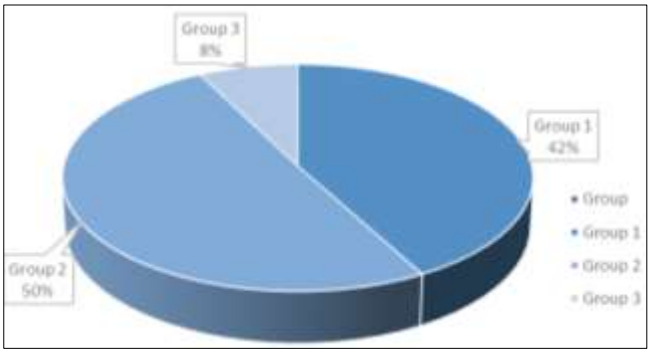

Fig 1: The presence of diabetic renal disease of patients groups

We evaluated the presence of renal disease in each of the 3 groups. Based on the 2018 KDIGO criteria I had three choices of patients diagnosed with BCR. In group 1, patients with type 1 diabetes, diabetic CKD was found in 44. 5%; in group 2, patients with type 2 diabetes, diabetic CKD was found in a proportion of 53.5% and in the control group was 8%.

Table 3: Degree of renal impairment group of stage in outcome (n=600)

Group 1	Percentage	Group 2	Percentage	Control Group	Percentage
Stage 1	25.85	Stage 1	20.57	Stage 1	50.0
Stage 2	53.93	Stage 2	42.99	Stage 2	18.75
Stage 3	11.23	Stage 3	7.48	Stage 3	12.5
Stage 3b and 4G	3.37	Stage 4	0.94	Stage 4	12.5
Stage 5	2.25	Stage 5	1.86	Stage 5	6.25

Patients analyzed were found in varying degrees of CKD after the 2012 KDIGO classification. Thus, in group 1, most patients were in stage 2 of the CKD (53.93%), followed by stage 1 (25.85%), stage 3 (11.23%), stage 3b and G4 (3.37%), stage 5 representing 2.25%.In group 2, most patients were in stage 2 of CKD (42.99%), followed by the third stage (26.16%), then stage 1 (20.57%), stage 3b (7, 48%), stage 4 0,94% and 1,86% in stage 5. In the control group, half of the patients were in the third stage (50%), followed by stage 2 (18.75%), stage 3b and stage 4 each in proportion of 12.5% and stage 5 (6.25%).

5. Discussion

Chronic kidney disease is generally seen in common population as like as diabetes patients. Similar presence of diabetes type 1 and type 2 was visible in this experiment.The study has a significant relation between CKD and older age. In the study, we have identified that renal insufficiency (eGFR <60 mL/min/1.73 m2) and albuminuria become more prevalent in older age [8]. Similarly, some of the study suggested that renal insufficiency and proteinuria is the common consequences of any CKD [9]. That's why in any old age group, screening for identifying CKD is an important strategy to take an appropriate initiation. The incidence and prevalence of chronic kidney disease increases with age. Old age seems to be a negative predictor for the occurrence of end stage BCR. In our study we encountered a predominance of chronic kidney disease in men with type 1 diabetes. Chronic kidney disease occurs 5-10 years after diagnosis of type 1 diabetes, but can be present at diagnosis of type 2 diabetes development duration of diabetes correlated with the presence of chronic kidney disease is higher in type 1 diabetes with an average of 19.69 years, compared with patients with type 2 diabetes with a mean disease duration of 8.23 years in the study groups. Family history of cardiovascular disease risk was not associated with increased risk of CKD in the present study. The literature suggests that heredity influences the development and progression of CKD. Current smoking status in our study did not correlate with the presence of chronic kidney disease in patients with diabetes, but was smoking status in patients with type 1 diabetes, raising suspicion necessary interruption of smoking when major complication. Smoking has been found in several studies as an independent risk factor for different degrees of CKD. Patients with type 1 diabetes and chronic kidney disease have a higher incidence of microvascular complications. In our study, patients with type 1 diabetes and diabetic peripheral sensorimotor neuropathy had a 5.5 times higher risk of associated chronic kidney disease, those with diabetic retinopathy at any stage risk 9.5 times high at 11.6 times when associated with proliferative diabetic retinopathy. Hypertension, dyslipidemia, hyperuricemia are important risk factors associated with the presence of chronic kidney disease. Dyslipidemia has been incriminated in numerous studies to play an important role in the initiation and progression of diabetic renal disease. In our study, patients with type 1 diabetes and dyslipidemia risk 6.4 times greater than aprezenta chronic kidney disease or in type 2 diabetes risk 2.2 times higher. Hyperuricemia may contribute to the onset and progression of chronic kidney disease. In our study, patients with type 1 diabetes and anemia risk 5.3 times more likely to associate chronic kidney disease, a correlation was not observed this in the group of patients with type 2 diabetes Anemia is a common complication of CKD but several studies have shown that it is also an independent predictor of risk of kidney disease. Although the literature recognize obesity as a risk factor for impaired renal function in our study did not reveal a link between obesity and chronic kidney disease.

6. Conclusion

The study has identified some analysis of clinical and non-clinical risk factors which was associated with CKD and Diabetes. Diabetes generally know with some other impact in the health which was clearly defined significant micro or macro vascular

complication. CKD is the diseases which was actually defined on many more diseases and a significant relation or association with premature mortality, decreased quality of life, and increased costs necessary patient care. These causes compelled the urgent requirements of prevention, early identification and treatment of associated risk factors. That's why diabetes screening is mostly needed and also need to screen out CKD complications. A screening of chronic kidney disease should be done to diagnose diabetes and at least once a year of diagnosis. Diabetes was considered one of the dangerous risk factors which was directly associated with CKD. Patients with Type 1 diabetes can be prevented thrugh different preventive mechanism but incase of type 2 diabetes, It is very difficult to asses the prognosis and also total cure is very difficult and continuously performed a dangerous situations. Along with diabetes, many more risk factors like Hypertension, Dyslipidemia and hyperuricemia, and anemia is also very concerning issue for CKD and its associated complications.

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