Original Article

Correlation between Onset of Renal Disease with Diabetes

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Abstract: Diabetes is associated with number of vascular and nonvascular complications, and the vascular complications which include Cardiovascular Disease (CVD), peripheral vascular disease (PVD), stroke, retinopathy, neuropathy, and Diabetic Kidney Diseases (DKD are responsible for most of the morbidity and mortality attributable to diabetes. **Objective:** The aim of this study was to determine the correlation of onset of any renal disease with diabetes in Pakistani population. **Methods:** A cross sectional study was conducted at Medicine and Nephrology Departments of the Sir Ganga Ram Hospital, Lahore, over a period of 3 months, after obtaining the ethical approval from the The University of Lahore. A total number of 100 Diabetic patients were selected through non probability convenient sampling technique. Patients of both sexes and all age groups were included. **Results:** In this study 60% were male and 40% were female. Most of the patients belonged to lower socioeconomic status. Frequency of onset of diabetes with age showed that patients between age of 41-50 years (33%) were more susceptible to diabetes and its complications whereas onset of diabetes was relatively higher in males as compared to females. Frequency distribution of CVD among diabetic patients was 19%. **Conclusions:** Results of current findings showed that diabetes mellitus also leads toward further microvascular complications and co-exist with different diseases.

Key words: Diabetes mellitus, CVD, Microvascular complications

Introduction:

Diabetes mellitus is linked with number of nonvascular complexity and the vascular complication which comprises cardiovascular disease (CVD), peripheral vascular disease (PVD), stroke, retinopathy, neuropathy and diabetic kidney disease (DKD) and are responsible for most of the morbidity and mortality attributable to diabetes. Diabetic nephropathy has been occurred to cluster in families to an extent that cannot be defined by shared environmental factors alone. In inclusion the majority of studies had resulted an overburdens of high blood pressure (hypertension) [1] and cardiovascular disease (CVD) in patients with type 2 diabetes mellitus with additional complication nephropathy [2]. Accordingly, substantial proof suggested a role of genetic factor in the development of diabetic nephropathy [3]. The incident of disability development among type 2 diabetic patients offers an alternative mean to assess the morbidity correlated with several vascular disorders. Ischemic heart disease, peripheral vascular disease (PVD) and stroke increases the risk of mobility related disabilities in older adults with type 2 diabetes in United States (US) by two to three folds related to non diabetic patients [2]. Recent National Health and Nutrition Examination Survey (NHANES III) explored that about 25% of older diabetic adults (aged above 60 years) cannot walk even one one-fourth of mile, nor can climb and about more than half of them had trouble to perform these tasks in United States [4]. Peripheral neuropathy not only leads toward morbidity but also increases mortality rate. In developed countries visual impairments among younger adults is very common [5], and this ocular impairment also effects the activities of daily routine [6].

In United States diabetes is the 9th leading cause of morbidity. Diabetes triggers many other health

complications which directly affect the social and economic status of a state [7]. It is very hard to manage chronic kidney disease (CKD) because it requires more prevention, care and expenses. Growing evidence shows that early diagnose and management can prevent the progression of CKD [8]. According to National Kidney Foundation-Kidney Disease Outcomes Quality Initiative™ (NKF-KDOQI™) it has been estimated that Eleven percent (11%) of US population is affected by Kidney diseases (KD) caused by increase glucose level. While 1% population also suffering from kidney failure [10] and relative incidence of kidney failure treated by transplantation/dialysis is proposed to increase from 453,000 in 2003 to 651,000 in 2010 [10].

Diabetic kidney diseases (DKD) is designed to diagnose kidney diseases caused by Diabetes mellitus. Glomerulopathy due to diabetes requires proper screening and kidney biopsy for diagnosis. That's why Glomerulopathy sometimes named as biopsy-proven kidney disease caused by diabetes [11]. In some clinical trials KD is characterized by poor glomerular filtration rate and elevated protein levels in urine. Although a few number of patients have biopsy-confirmed Diabetic Kidney Diseases. So it is very useful to differentiate between patients with CKD and DKD [12]. Historically DKD is based on elevated proteins excretion in a diabetic patient but with the advancement of highly sensitive trials limited to albumin, Diabetic Kidney Diseases are now identified by increased albumin excretion in urine [13], some diabetic patients may also have CKD with the absence of DKD [14]. Therefore additional testing, proper diagnosis and management is required to access DKD in patients with diabetes [15]. Diabetes is the major risk factor of Cardiovascular Diseases. People with albuminuria and diabetes are more prone toward cardiovascular complications [16,17].

Methods:

A cross sectional study was conducted at Renal and Diabetic Departments of the Sir Ganga Ram Hospital, Lahore, over a period of 3 months, after obtaining the ethical approval from the The University of Lahore, Lahore, Pakistan. A total number of 100 diabetic patients were selected through non probability convenient sampling technique. Diabetic Patients of both sexes and all age groups were included. Data were collected through pre-tested data collection tool (questionnaire/ Proforma). Blood samples were collected from diabetic people for chemical analysis to determine the protein and Urea which diagnosed the kidney problems. Data were analyzed with the help of SPSS version 17.0. Frequency distributions were calculated while Pearson chi-square test was applied to evaluate the association between different factors.

Blood samples were centrifuged on 300RPM for 3min to separate the serum. Three tubes labelled as blank, standard were taken and tested in rack. 500ul of creatinine reagent 1 in all three test tubes were added. Then 500ul of creatinine reagent 2 in all three tubes were added. 100ul of creatinine standard solution in standard tube and 100ul of serum in test tube was added. Then it was incubated at 37c for 10secconds. Instrument was set on 490 wavelength against standard and the required test was selected. First the absorbance of blank solution was measured then factor of standard solution was noted that had to be 32 and in last the reading of creatinine was taken. Normal value is 0.5-1.4 mg%.

Results:

In this study out of 100 patients 60% were male and 40% were female as shown in Table 1. Majority of patients belonged to lower class about 73% (Table 2). Frequency of onset of diabetes with age showed that patients between age of 41-50 years are more susceptible to diabetes and its complications whereas onset of diabetes is relatively higher in males as compare to females as shown in table 3 and 4 respectively.

Gender	Frequency	Percent
Male	60	60.0
Female	40	40.0
Total	100	100.0

Table 1: Frequency distribution of Gender

Socioeconomic status	Frequency	Percent	Cumulative Percent
Upper class	2	2.0	2.0
Middle class	25	25.0	27.0
Lower class	73	73.0	100.0
Total	100	100.0	

Table 2: Distribution of Socioeconomic status

Age range	Onset of Diabetes					Total
	1-5 yr	6-10 yr	11-15 yr	16-20 yr	21-25 yr	
21-30 yr	3	0	0	0	0	3
31-40 yr	8	2	3	1	0	14
41-50 yr	16	10	4	3	0	33
51-60 yr	4	10	8	5	2	29
61-70 yr	1	2	8	4	2	17
>70 yr	3	1	0	0	0	4
Total	35	25	23	13	4	100

Table 3: Age group * Onset of Diabetes

Gender	Onset of Diabetes					Total
	1-5 yr	6-10 yr	11-15 yr	16-20 yr	21-25 yr	
Male	17	19	13	8	3	60
Female	18	6	10	5	1	40
Total	35	25	23	13	4	100

Table 4: Gender of Patient * Onset of Diabetes

In this study frequency of correlation between diabetes and other diseases was also determined. According to current analysis 19% diabetic patients had CVD and 4% were suffering from respiratory disorders while 63% patients were without any other complication as shown in table 5. Frequency distribution of creatinine levels showed that most of patients had creatinine levels between 2.0- 5.9mg%, as shown in table 6.

Comorbidities	Frequency	Percent
Heart Disease	19	19.0
Multiple myeloma	1	1.0
Multiple bone lesion	1	1.0
ESRD	1	1.0
Hepatic encephalitis	1	1.0
Gout	1	1.0
Respiratory disorder	4	4.0
Hepatitis C	9	9.0
None	63	63.0
Total	100	100.0

Table 5: Co-morbidities among the patients

Creatinine	Frequency	Percent
2.0-5.9 mg%	46	46.0
6.0-9.9 mg%	33	33.0
10.0-13.9 mg%	8	8.0
14.0-17.9 mg%	2	2.0
18.0-21.9 mg%	2	2.0
0.5-1.4 mg%	9	9.0
Total	100	100.0

Table 6: Creatinine levels among the patients

Discussion:

Diabetes is the metabolic disorder that effects all the vital organs where the minute capillaries are for example, brain, eyes, heart and kidneys. It is the multi-complicated disease that is most rapidly becoming the primary cause of death in developed countries [11]. Current findings revealed that most of the patients have heart diseases and respiratory disorders. Diabetes mellitus and cardiovascular disease together very common among patients. Diabetes also affects hear muscles causing systolic and diastolic heart failure. About 15% of diabetic patients are suffering from coronary heart disease [18]. Present study showed about 19% patients suffering from diabetes mellitus are also suffering from cardiovascular diseases.

Lower creatinine was related with increased risk of diabetes mellitus type 2 about 12.3% were suffering from low creatinine level below 0.6 mg/dl [19]. In current study about 55% of diabetic patients were having serum creatinine levels below 0.6 mg/dl as it is shown in table 6. Moreover, in Pakistani study patient with type 2 diabetes mellitus had seroprevalence of hepatitis C (HCV) about 13.7% [20]. In contemporary study the diabetes mellitus type 2 patients have virus infection hepatitis C (HCV) about 9% among them as shown in table 5. In an Indian study they studied the incident of end stage renal disease among diabetic and non diabetic patients from their research they concluded that about 0.1% population without diabetes suffered from end stage renal disease whereas more than 9% end stage renal disease occurred in diabetic patients [21]. In current study about 20% diabetic patients had end stage renal disease (ESRD).

Conclusions:

Diabetes mellitus is associated with many vascular and non-vascular diseases which contributes a significant increase in morbidity and mortality rate.

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