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Original Research Article

A Retrospective Assessment of the Range of Diabetic Nephropathy in Individuals with Type II Diabetes Mellitus

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Abstract

Aim: To examine the range of diabetic nephropathy in individuals with type II diabetes mellitus.

Material and Methods: This retrospective study was conducted in the department of Medicine, JNKTMCH, Madhepura, Bihar, India for 20 months. A total 30 patients were male and 20 were female. The mean age was 47.2. Informed and written consent was obtained from patient or a responsible attendant before including the patient in the study. We have divided the patients in 2 groups of 25 patients each. Group A: Diabetic patients with hypertension or obesity or hypercholesterolemia. Group B: Diabetic patients without any of comorbidities.

Results: A total 30 patients were male and 20 were female. The mean age was 47.2. Out of 50 total patients, 8 patients were detected to have Diabetic Nephropathy. In group A, out of 25 patients 6 (24%) patients had diabetic nephropathy, while in group B, out of 25 patients 2 (8%) patients had diabetic nephropathy. A subgroup analysis was done with regards to multiple co-morbidities, showing increasing number of patients affected with increasing comorbidities of with diabetic nephropathy patients.

Conclusion: We conclude that S. Creatinine is a very poor marker of Nephropathy and maybe medical fraternity needs to stop depending on it as screening tool for Diabetic Nephropathy. Hypertension, obesity and hypercholesterolemia can contribute to development of nephropathy, and also, urinary microalbuminuria appears to be much more sensitive than serum creatinine.

Keywords: Type II DM, Nephropathy, S. Creatinine

Introduction

Diabetic nephropathy is a major complication of diabetes mellitus and a leading cause of end-stage renal disease (ESRD) globally. Characterized by albuminuria, reduced glomerular filtration rate (GFR), and increased cardiovascular risk, diabetic nephropathy significantly impacts the morbidity and mortality of patients with type II diabetes mellitus (T2DM) . The progression of diabetic nephropathy follows a well-defined clinical course, typically categorized into stages ranging from hyperfiltration to overt proteinuria and ultimately ESRD. [1,2] The pathogenesis of diabetic nephropathy is multifactorial, involving metabolic and hemodynamic abnormalities. Hyperglycaemia plays a central role by inducing oxidative stress, inflammation, and the accumulation of advanced glycation end-products (AGEs) in renal tissues. These changes contribute to glomerular hypertrophy, basement membrane thickening, and mesangial expansion, hallmark features of diabetic nephropathy. [3] Additionally, systemic hypertension and intraglomerular hypertension exacerbate glomerular damage, further accelerating the progression of renal disease. In the early stages of diabetic nephropathy, patients often exhibit glomerular hyperfiltration, characterized by an elevated GFR. This stage is typically asymptomatic and may precede the onset of microalbuminuria by several years. Microalbuminuria, defined as urinary albumin excretion of 30-300 mg/day, is an early indicator of renal damage and is associated with an increased risk of cardiovascular events. As diabetic nephropathy progresses, patients develop overt proteinuria (albumin excretion >300 mg/day), signifying significant glomerular injury. [4,5] This stage is often accompanied by a decline in GFR, which may be gradual initially but becomes more pronounced over time. Histologically, advanced diabetic nephropathy is characterized by nodular glomerulosclerosis (Kimmelstiel-Wilson lesions),

diffuse glomerulosclerosis, and tubulointerstitial fibrosis. In the late stages of diabetic nephropathy, severe proteinuria and marked reductions in GFR lead to the development of chronic kidney disease (CKD) and ultimately ESRD. Patients in this stage often require renal replacement therapies, such as dialysis or kidney transplantation, to manage their renal failure. [6] The burden of ESRD in diabetic patients is substantial, contributing to significant healthcare costs and reduced quality of life. Managing diabetic nephropathy involves a multifaceted approach aimed at controlling hyperglycaemia, hypertension, and proteinuria to slow the progression of renal damage . The use of renin-angiotensin-aldosterone system (RAAS) inhibitors, such as ACE inhibitors or angiotensin II receptor blockers (ARBs), has been shown to be effective in reducing albuminuria and preserving renal function . Recent advancements in diabetes management, including the use of sodium-glucose co-transporter 2 (SGLT2) inhibitors and glucagon-like peptide-1 (GLP-1) receptor agonists, have also demonstrated renal protective effects. [7]

Material and Methods

This retrospective study was conducted in the department of Medicine, JNKTMCH, Madhepura, Bihar, India for 20 months. A total 30 patients were male and 20 were female. The mean age was 47.2. Informed and written consent was obtained from patient or a responsible attendant before including the patient in the study.

• Fasting Blood glucose- ≥126mg/dl (12 Hours fasting).

• Postprandial Blood glucose- ≥200 mg/dl. (2 hours after taking meal)

• Microalbuminuria can be diagnosed from a 24-hour urine collection (between 30-299mg/24 hours) or, more commonly, from elevated concentrations in a spot sample (30 to 299mg/L). We have divided the patients in 2 groups of 25 patients each.

Group A: Diabetic patients with hypertension or obesity or hypercholesterolemia.

Group B: Diabetic patients without any of comorbidities.

Inclusion Criteria

Age more than 20 years.
Detection of diabetes within 6 months at the time of enrolment in study.

Exclusion Criteria

Type 1 diabetes mellitus.
Diabetes for more than 6 months.

History of Hypertension, blood pressure was recorded more than 140/90mmHg Complete lipid profile was done for hypercholesterolemia. both the groups for prevalence of diabetic nephropathy and analyzed if there was a statistical difference in between these groups.

Results

Table 1: Age sex distribution of study subject

Age group	**Group A =25**				**GROUP B=25**			
	Male	**%**	**Female**	**%**	**Male**	**%**	**Female**	**%**
20-30	2	8	1	4	1	4	0	0
31-40	3	12	3	12	4	16	2	8
41-50	6	24	5	20	8	32	5	20
>50	3	12	2	8	3	12	2	8
Total	**14**	**56**	**11**	**44**	**16**	**64**	**9**	**36**

A total 30 patients were male and 20 were female. The mean age was 47.2.

Table 2: Patients detected with nephropathy in both groups

	Group A(n=25)		**Group B (n=25)**	
	Present	**Absent**	**Present**	**Absent**
Diabetic Nephropathy	6(24 %)	19(76%)	2(8%)	23 (92%)

In this study, out of 50 total patients, 8 patients were detected to have Diabetic Nephropathy. In group A, out of 25 patients 6 (24%) patients had diabetic nephropathy, while in group B, out of 25 patients 2 (8%) patients had diabetic nephropathy.

Table: 3: Comorbidities

	With Nephropathy N=8		Without Nephropathy N=42	
	Present	Absent	Present	Absent
Hypertension	7(87.5%)	1(12.5%)	9(21.5%)	33(78.5%)
Hypercholesterolemia	6(75.0%)	2(25.0%)	8(19.0%)	34(81.0%)

Hypertension+ Hypercholesterolemia	6(75.0%)	2(25.0%)	7(16.7%)	35(73.3%)
Obesity	7(87.5%)	1(12.5%)	5(11.9%)	37(88.1%)
Hypercholesterolemia+ Obesity	6(75.0%)	2(25.0%)	5(11.9%)	37(88.1%)
Hypertension + Obesity	6(75.0%)	2(25.0%)	5(11.9%)	37(88.1%)

A subgroup analysis was done with regards to multiple co-morbidities, showing increasing number of patients affected with increasing comorbidities of with diabetic nephropathy patients.

Table 4: Prevalence of microalbuminuria among diabetic nephropathy patients

		With Nephropathy N=8	Without Nephropathy N=42
		Present	Present
Normoalbuminuric	<20 mg/24hours urine	0	40
Microalbuminuria	Mild (20 - 50 mg/24hours urine)	4	2
	Moderate (>50-100 mg/24hours urine)	3	0
	Severe (>100 mg/24hours urine)	1	0

Discussion

Diabetic nephropathy is a dreaded complication of DM and early detection is of paramount importance. Earlier, it has been shown that Nephropathy is present in about 15-18% of patients with newly diagnosed type 2 Diabetes. [9] In this study, out of 50 total patients, total 08 patients were detected to have Diabetic Nephropathy. In group A, out of 25 patients 6 (24%) patients had diabetic nephropathy, while in group B, out of 25 patients 2 (8%) patients had diabetic nephropathy. Study of development and progression of nephropathy in type 2 Diabetes by Amanda I. [10] Adler, Stevens RJ in United Kingdom showed the prevalence of nephropathy in recently detected type 2 DM to be 7.3%. Study by Ghai et al on microalbuminuria showed the prevalence of Nephropathy in type 2 DM at onset to be 25%. [11] Chowta NK and Pant's P study on relation of microalbuminuria in type 2 DM with relation to age, sex weight and creatinine clearance showed prevalence of nephropathy at onset to be 37%. [12] Study by Agarwal N, Sengar NS has shown that there is 17.34% prevalence of diabetic nephropathy in recently detected type 2 DM, but with hypertension this prevalence was shown to be as high as 60%. [13] The higher prevalence of diabetic nephropathy found in this study could be attributed to a variety of factors. The overall prevalence of microalbuminuria and macroalbuminuria in both types of diabetes is approximately 30-35%. Microal buminuria independently predicts cardiovascular morbidity, and microalbuminuria and macroalbu minuria increase mortality from any cause in diabetes mellitus. Microalbuminuria is also associated with increased risk of coronary and peripheral vascular disease and death from cardiovascular disease in the general nondiabetic population. Patients in whom proteinuria has not developed have a low and stable relative mortality rate, whereas patients with proteinuria have a 40-fold higher relative mortality rate. Patients with type 1 DM and proteinuria have the characteristic bell- shaped relationship between diabetes duration/age and relative mortality, with maximal relative mortality in the age interval of 34-38 years (as reported in 110 females and 80 males). In this study, author detected 6 out of 25 patients in Group A (those having hypertension and/or hypercholesterolemia and/or obesity) to have diabetic nephropathy. While in Group B (without any of the 3 factors), only 2 out of 25 patients were detected to have diabetic nephropathy. Author analyzed this data using Chi2 method and found that association of nephropathy in group A was highly significant at P value < 0.0001.

Conclusion

Urinary Albumin is much more sensitive test to detect Nephropathy. And measurement for urine microalbuminuria on two separate occasions (especially in presence of another cause for albuminuria) or measuring the creatinine clearance for the earlier diagnosis of nephropathy. We conclude that S. Creatinine is a very poor marker of Nephropathy and maybe medical fraternity needs to stop depending on it as screening tool for Diabetic Nephropathy. Hypertension, obesity and hypercholesterolemia can contribute to development of nephropathy, and also, urinary microalbuminuria appears to be much more sensitive than serum creatinine.

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