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Prevalence of Nephropathy among Newly Diagnosed Diabetic Patients- A Cross-Sectional Study

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Abstract

Background:
Diabetes mellitus is a group of metabolic diseases that is considered as a silent epidemic. Patients with uncontrolled diabetes mellitus may experience many serious and long-term complications. Some of these complications begin within months of the onset of diabetes, although most tend to develop after a few years. Diabetic nephropathy (DN) is one such complication of diabetes which is an emerging clinical and public health challenge and poses a significant morbidity and mortality.

Objective:
The objective of the present study is to estimate the prevalence of nephropathy in newly diagnosed type 2 diabetic patients.

Material and Methods:
We enrolled and analyzed 450 newly diagnosed type 2 diabetic cases, between Jan 2018 to June 2019. Presence of urinary microalbuminuria in two samples from these patients during a period of six months was taken as inclusion criteria for detecting nephropathy.

Results:
Diabetic nephropathy in newly diagnosed type 2 diabetics was 12% (54/450). Incidence increased significantly with increase in age and was 30% in age group >50 years. It had statistically significant correlation with female gender and their blood pressure level as high as in 36 cases (66.67%) at BP> 160/100 mmHg. BMI was also high among nephropathy patients. The incidence also increased with increase in BMI as well as HbA1C. High cholesterol also had a significant role in nephropathy cases. Poor glycemic index produced a significant effect among these patients.

Conclusion:
Prevalence of nephropathy in newly diagnosed type 2 diabetics was high. BMI, age, female gender, hypertension and high cholesterol levels were the most important associated risk factor contributing to the development of nephropathy among newly detected diabetic cases

Keywords: Diabetic nephropathy, hypertension, prevalence

Introduction

Globally, approximately 387 million people have diabetes mellitus (DM) according to the International Diabetes Federation (IDF) update of 2014. Almost 592 million people, that is 1 in 10 people, are anticipated to have diabetes in 2035[1]. The World Health Organization (WHO) has identified diabetes as a major health problem in Asia and in this context, prevention of diabetes has become a high priority of health policies. Diabetic nephropathy (DN) is the leading cause of kidney disease among patients requiring renal replacement and affects ~40% of type 1 and type 2 diabetic patients. The estimated overall incidence rate of chronic kidney disease (CKD) and end-stage renal disease (ESRD) in India is currently 800 per million population and 150–200 per million population respectively[2].The highest magnitude of DN is associated with late diagnosis, scarcity of screening and diagnostic resources, poor control of blood sugar and other precipitating factors, and inappropriate treatment[3]. However, the dramatic increase of advanced diabetic nephropathy in type 2 diabetes requires additional measures targeted more specifically to the kidney. The prevalence of diabetic nephropathy is provoked by today's decreased cardiovascular mortality of diabetic individuals so that even more patients reach the stage of advanced nephropathy. Fortunately, in the recent years, apart from better metabolic control of diabetes, specific nephro-protective interventions have become available. For example, the relationship between hypertension and DN can be explained by the retention of concentrated sodium and subsidiary blood vessel resistance [4]. Many previous studies on the magnitude of DN remains inconsistent and unclear. Moreover, to our knowledge, there is no existing contemporary evidence on the association between DN among newly diagnosed in diabetic patients with hypertension. Thus, the aim of this study is to estimate the prevalence of DN and its associated risk factor among newly diagnosed diabetic patients in Chennai.

Methodology:

A cross-sectional study was carried out from Jan 2018 to June 2019 at Govt Hospitals in Chennai. Out of 450 cases in total who were enrolled, 275 patients were males and 175 were females. The mean age was 46 years, with 27 being the minimum age and 75 being the maximum age. The study was approved by scientific review committee and institutional ethical committee. Informed and written consent were obtained from the patients before including them in the study.

Study cases were enrolled based on the inclusion criteria, which were, age more than 18 years and detection of type 2 diabetes within 6 months at the time of enrolment in study. The criteria for diagnosing DM were FBS ≥100mg/dl and PPBS ≥140 mg/dl. Exclusion criteria were patients having type 1 diabetes and diabetes detected for more than 6 months.

Blood pressure recorded more than 140/90mmHg on 3 consecutive occasions were considered as hypertensive. Complete lipid profile was done for hypercholesterolemia. Basic anthropometry like height and weight were recorded to measure BMI. Microalbuminuria was diagnosed either from a 24-hour urine sample ranging between 30 to 299mg/24hr or from a spot sample ranging between 30 to 299mg/L. Presence of urinary microalbuminuria in two samples from the patients during a period of six months was taken as the criteria for diagnosing nephropathy. A complete history, clinical examination and investigative profile were carried out in each patient for nephropathy with particular emphasis on hypertension, hypercholesterolemia and obesity.

Results:

A total of 450 newly diagnosed cases enrolled of which 54(12%) of them had diabetic nephropathy. Fig-1 shows the prevalence of diabetic neuropathy among newly detected diabetes cases.

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Fig-1: Prevalence of DN among newly diagnosed diabetic cases

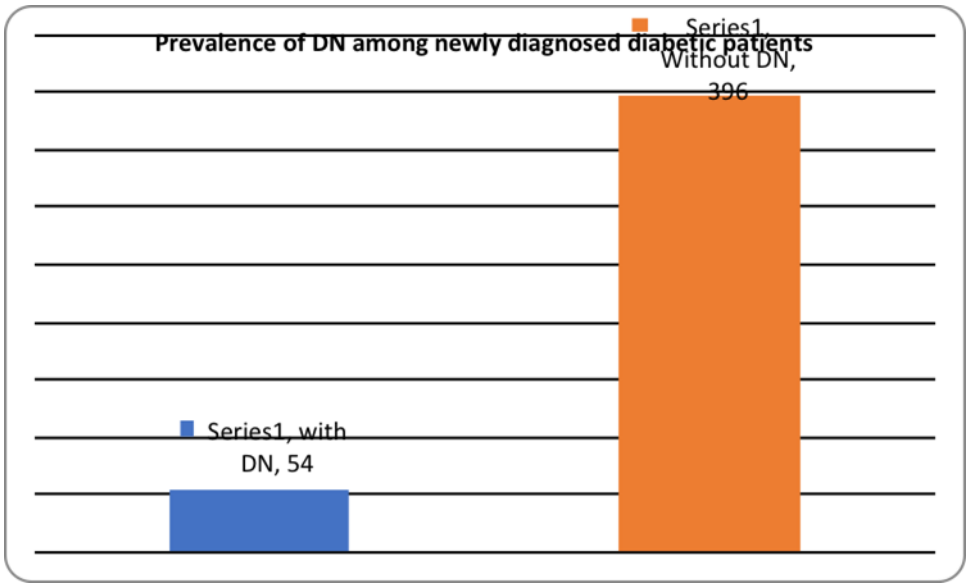

Table:1 Socio demographic characteristics of the participants

Characteristics		Number of cases	Microalbuminuric(N)
Age	<50 years	195	19
	>50 years	255	35
Gender	Male	140	18
	Female	210	36
Employment	Employed	275	21
	Unemployed	125	33
Education	School	112	13
	Graduate	201	16
	Illiterate	137	25

Table:2 Health status of the newly diagnosed diabetic cases with diabetic nephropathy

Health status		No of cases	Microalbuminuric(N)
Hypertension	Hypertensive	61	42
	Normotensive	389	12
BMI	Underweight (< 19.0)	25	3
	Normal weight (19.0 - < 25.0)	233	7

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	Over weight (25.0 - < 30.0)	125	23
	Obesity (≥ 30.0)	67	21
HbA1C	<7%	273	13
	>7%	277	41
T.Cholesterol	<180	297	19
	>180	153	35

Blood pressure showed mean significant increase ($p<0.05$) with mean diastolic BP-88.2±4.16 mmHg in those with diabetic nephropathy when comparing to 80.86±1.45 mmHg in diabetics without nephropathy and mean systolic BP- 140.48±4.66 in those with nephropathy when comparing to 132.32±3.25 in diabetics without nephropathy. BMI was also significantly increased in those with nephropathy (25.23±0.18) when comparing to diabetic volunteers without nephropathy (22.17±0.25, $p<0.05$). HbA1C was significantly high among diabetic nephropathy with hypertensive cases. Total cholesterol was significantly high (218±8.1mg/dl) in diabetics with nephropathy when comparing to diabetics without nephropathy (170±2.1mg/dl, p-value-0.08).

Conclusion:

Diabetic Nephropathy is highly prevalent among newly detected diabetic patients and this increased prevalence is significantly associated with, increased BMI, high cholesterol and hypertension. We recommend early detection of microalbuminuria, good glycemic control, blood pressure normalization and lifestyle modification as preventive measures for diabetic nephropathy.

Discussion:

Diabetic nephropathy has a 12% prevalence in this study. The findings revealed that microalbuminuria was significantly high among newly diagnosed cases, thus being a major cause for Diabetic nephropathy. In this study, the second factor associated with DN was hypertension. Among people who have DM, the occurrence of DN was significantly increased if they are hypertensive. This finding is supported by the study done by Wu B et al. which showed that hypertension is a major factor associated with CKD among diabetes patients (OR = 1.78) [5]. Likewise, another study done by Retnakaran R et al. revealed that hypertension has an important role in the occurrence of DN [6]. Furthermore, the association between increased blood pressure and DN was recognized by most of the previous studies [7]. This could be due to oxidative stress and inflammation process which is a common mechanism involved in DN pathogenesis in the presence of hypertension and DM. Furthermore, hypertension induced increased intra-glomerular pressure leads to glomerular sclerosis and different renal diseases [8]. In this study total cholesterol was high among diabetic nephropathy cases. Similarly, best et al[9] showed, Albuminuria and even microalbuminuria have been associated with increased LDL-C and decreased HDL-C. According to Attman et al. [10] lipoprotein abnormalities are more prominent among patients with high HbA1C levels. Similarly, in this study, there was also a significant relationship between microalbuminuria And T. Cholesterol, BMI, Hba1c And Blood Pressure.

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