Duration Of Diabetes Mellitus And Vascular Complications

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Abstract: Background: Type 2 diabetes mellitus (DM) is associated with disabling and potentially life-threatening micro-vascular and macro-vascular complications. Common risk factors for vascular complications in people with type 2 diabetes include hyperglycemia, insulin resistance, dyslipidemia, hypertension, tobacco use and obesity. This study aimed to determine the incidence of macro- and micro-vascular complications and risk factors among patients with type 2 diabetes mellitus. Material And Methods: 100 Patients with type 2 DM attending the medicine opd at Shardaben General Hospital, were included in this observational study who fulfilled inclusion criteria. Detailed history of all patients was recorded including the duration of DM, risk factors for DM and complications of DM. Result: Incidence of DM was higher in males (56%). Maximum patients with diabetes were between 51 - 70 years. 31% patients were newly diagnosed having DM, 36% had DM of <5 years, 24% had DM duration of 5- 10 years and 9% had DM duration of >10 years. Mean fasting Blood sugar was 186mg/dL. 78% had one or more micro vascular complications. Retinopathy was the most common micro-vascular complication (35%). The most common macro-vascular complication was coronary artery disease (44%). Conclusion: Retinopathy was the most common micro-vascular and coronary artery disease is most common macro vascular complication. Incidence of micro-vascular complication increases with duration of diabetes, while macro-vascular complications doesn't correlate with the duration of diabetes mellitus. [Chauhan H Natl J Integr Res Med, 2022; 13(1): 27-30, Published on 26/01/2022]

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Introduction: Diabetes Mellitus (DM) comprises a group of metabolic disorder characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both. The chronic hyperglycemia of diabetes is associated with long term damage, dysfuntion and failure of different organs, specially the kidneys, nerves, heart, and blood vessels[1]. The chronic complications of DM are responsible for the majority of morbidity and mortality associated with the disease.

The vascular complications of DM are further subdivided into micro-vascular (retinopathy, neuropathy, nephropathy) and macro-vascular (coronary artery disease, peripheral arterial disease and cerebrovascular disease). Since type 2 DM often has a long asymptomatic period of hyperglycemia, many individuals with Type 2 DM have complications at the time of diagnosis.

The evidence implicating a causative role of chronic hyperglycemia in macrovascular complications is less conclusive. Once cardiovascular disease develops, diabetes mellitus exacerbates progression and worsens outcome. Coronary heart disease events and mortality are two to four times greater in patients with Type 2 DM[2]. Other factors like dyslipidemia and hypertension play an important role in macro vascular complications. This study is aimed to identify micro and macro-vascular complications and risk factors for it in relation to duration of DM type 2.

Material & Methods: 100 Patients with type 2 DM attending the medicine opd for their treatment at Shardaben General Hospital were included in this study after taking ethical committee permission. Duration of study was January 2017 to December 2018.

Detailed history all patients was recorded, including the duration of DM, risk factors for DM and complications of DM etc. Diagnosis of Diabetes and complications were done according to standard guidelines[1].

Inclusion criteria for study were age more than or equal to 35 years, patient with confirmed diagnosis of Type 2 Diabetes mellitus and Diabetes mellitus type 2 patient with micro-vascular and macro-vascular complications.

Patients age less than 35 years, type 1 DM and patients with DM admitted for any surgical intervention were excluded.

Results: Out of 100 patients 56% were male and 44% were female. Mean Age of Patients was 51 Years. Maximum patients with diabetes were between 51 - 70 years followed by 41-50 year age group. (table1). 31% patients were newly diagnosed having DM, 36% had DM of <5 years, 24% had DM duration of 5- 10 years and 9% had DM duration of >10 years.

Mean fasting Blood sugar was 186mg/dL. 58% Patients had poor sugar control. Positive Family History of DM found in 32% of Patients. 25% were newly diagnosed patients with hypertension out of total 62% patients with Hypertension in diabetes in our study.

53% patients had high body mass index (BMI), out of which 42(79.25%) were overweight and 11 (20.75%) were obese. 72% had hypercholesterolemia and 24% had smoking as risk factors. In smokers, all were male.

Out of 100, 78% had one or more micro vascular complications. Retinopathy was the most common micro-vascular complication (35%) followed by Nephropathy (23%) and neuropathy (20%), (Table 2). Incidence of micro-vascular complications increases as duration of diabetes increases except of peripheral neuropathy.

Table 1: Age Distribution Of Patients With Diabetes

Age (Years)	Male (N=56)	Female (N=44)	Total (N=100)
35 - 40	3	1	4 (4%)
41 - 50	14	12	26 (26%)
51 - 60	22	14	36 (36%)
61 - 70	17	13	30 (30%)
> 70	2	2	4 (4%)

Table 2: Microvascular Complications And Duration Of DM

Microvascular Complication	Newly Diagnosed Dm (N = 31)	< 5 Years (N = 36)	5 – 10 Years (N = 24)	>10 Years (N = 9)	Total (N =100)
Retinopathy	10(32.24%)	12(33.34%)	9(37.5%)	4(44.45%)	35 (35%)
Neuropathy	8 (25.80%)	5(13.88%)	4(16.67%)	3(33.34%)	20 (20%)
Nephropathy	6 (19.35%)	8(22.23%)	5(20.83%)	4(44.45%)	23 (23%)

Table 3: Types Of Diabetic Retinopathy

Types	Total (N = 35)
Non Proliferative Retinopathy	28 (80%)
Proliferative Retinopathy	4(11.42%)
Maculopathy	3 (8.57%)

Non-Proliferative Retinopathy was the most common complication in Retinopathy (80%), (table-3). 20% patients had peripheral neuropathy affecting feet and hands, out of which distal symmetric polyneuropathy was most common (11 patients,55%).

Incidence of peripheral neuropathy was higher in patients with DM for more than 10 year(Table 2). 47.82% of DM Patients with chronic kidney disease (CKD) were in stage 2. No Patients with DM were found in Stages 4 & 5 in this study (Table-4).

Table 4: Stages Of Chronic Kidney Disease In DM

GFR	Stages Of CKD	Total N=23
90-120	Stage 1	4 (17.39%)
60– 89	Stage 2	11(47.82%)
30– 59	Stage 3	7 (30.43%)
< 30	Stages 4 & 5	Nil

Table 5: Coronary Artery Disease And DM Type 2

Duration	Total N = 44
Newly Diagnosed	13 (29.54%)
< 5 Years	19 (43.18%)
5-10 Years	6 (13.63%)
>10 Years	6 (13.63%)

The most common macro-vascular complication is coronary artery disease (44%), (table 5). Out of which24 (54.54%) were symptomatic and 20 (45.45%) were asymptomatic. No correlation was found with duration of DM.

Other macro-vascular complications were cerebrovascular accident (11%) and peripheral vascular disease(7%). In cerebrovascular disease, high incidence was found in patients who had DM of more than 10 years (36.36%) but was not associated with duration DM.

Discussion: The mean age of patients found in the study was 51 years. These findings correlate with other studies[3,4]. In the present study, incidence of DM was high in 51 to 70 year age group that correlates with other study[5]. High BMI found in 53%of patients. Asian Indians generally have a lower BMI than many other ethnic groups, but the association between BMI and glucose intolerance is as strong as in any other population[6].

Insulin resistance is one of the major etiological factors for diabetes and the risk association between obesity and diabetes is mediated through insulin resistance. As mean fasting sugar is 186 mg/dl in study, our majority patients had poorly controlled DM that may be responsible factor for high BMI in our patients.

Many Indian studies show strong association of positive family history in DM type 2 and obesity[7,8]. 24% of patients in the present study were smokers and all of them were males. Few studies support our finding of hypercholesterolemia[9,10]. Alteration in micro-vascular function may arise even before overt hyperglycemia and vascular pathologic changes manifest. Diabetes induces pathognomonic changes in the microvasculature, affecting the capillary basement membrane including arterioles in the glomeruli, retina, myocardium, skin, and muscle, by increasing their thickness, leading to the development of diabetic micro-angiopathy. Thickening eventually leads to abnormality in vessel function, inducing multiple clinical problems such as hypertension[11]. This may be responsible for high incidence of hypertension in our study (62%). Another study also found high incidence of hypertension in diabetes[12].

The prevalence of retinopathy increases according to the duration of diabetes. Non-Proliferative Retinopathy was the most common complication. That correlates with the studies done in urban South Indian Population and North Indian population[13,14].In the UKPDS[15], T2DM patients showed a 2.0% incidence of micro-albuminuria per year, which reached up to 25% in 10 years postdiagnosis that support our finding of increase incidence of nephropathy as duration of DM increases. Various studies also support our findings related to neuropathy [13,16,17].

Coronary Artery Disease was the most common Macro-vascular complication in the study. In patients with type 2 diabetes, age or age at diagnosis and diabetes duration are independently associated with macro-vascular events and death[18].

It support our finding that incidence of CAD is not correlated with duration of DM. Peripheral Vascular Disease was present in 6% of patients in the study. This correlates with the study by Premlatha G[13] which showed 4%.

Cerebrovascular disease was found in 10% of patients in the study. This correlates with the International Study CDC – National Diabetes Surveillance System, 2020, USA[19] which showed 13.6% prevalence of stroke in DM type 2.

Process of atherosclerosis leads to narrowing of arterial wall throughout body. Atherosclerosis is thought to result from chronic inflammation and injury to the arterial wall in the peripheral or coronary vascular system. In addition to atheroma formation, increased platelet adhesion and hypercoagulability in type 2, impaired nitric oxide generation and increased free radical formation in platelets are responsible for development of macro-vascular complications over the time.

Conclusion: Incidence of DM is higher in males. Positive family history, hypercholesterolemia, obesity, smoking are associated risk factors. Hypertension is commonly found comorbidity. Retinopathy is the most common micro-vascular

and coronary artery disease is the most common macro-vascular complication.

Incidence of micro-vascular complication increases with duration of diabetes, while macro-vascular complication doesn't show such association with duration of DM.

Diabetic patients should be screened regularly to identify chronic complications as early as possible.

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