Original Research Article

Clinical Study of Microvascular Complications in Type 2 Diabetics Less Than 50 Years of Age With Reference To the Glycated Hemoglobin Level in a Tertiary Care Centre in Rewa

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Abstract: Diabetes mellitus ranks twelfth in all-cause mortality worldwide. Many of preventable complications of Diabetes flare up in young but due to the silent nature of the disease these are diagnosed late. These complications are attributed to the involvement of microvasculature of target organs. Hence we decided to explore relation of glycemic control and frequency of various complications among the young diabetic population which is useful in preventing Diabetes related complications. Relevant history was taken and directed physical examination was performed. All patients underwent routine blood investigations, OGTT, $HbA1_c$ and were screened for retinopathy, nephropathy and neuropathy. Those with deranged values were followed and counselled and advised for further management. Of the 187 patients studied, 53.47% were males and 46.53% were females. Most of the patients(~83%) were in the age group 30-50 years with mean age of 46yrs. Around 45% patients had positive family history of DM of which ~25% had positive history of DM in both parents and ~20% with single parent history. Positive family history of Hypertension was found in 40.1% and positive family history of both hypertension and T_2DM in 12.29% subjects. Microvascular complications like Neuropathy was observed in 25.13%, Nephropathy in 25.13%, Retinopathy in 24.06% of subjects. With poor glycemic control conferred higher risk of complications. Nephropathy, Retinopathy and Neuropathy were present in 60%, 46.6%, 13.3% subjects respectively when $HbA1_c$ was between 8.51-9.5%. Strict glycemic control does count even in newly diagnosed type 2 diabetics to prevent and minimize the occurrence of complications.
Keywords: Diabetes mellitus, Complications , Nephropathy, Retinopathy.

INTRODUCTION

Diabetes mellitus ranks twelfth in all-cause mortality worldwide [1].The incidence of this disease continues to rise all over the world. Diabetes is recognized to be common in Asian Indians. The magnitude of problem is further compounded by various catastrophic microvascular and macrovascular complications targeting the vital organs in the body. The microvascular complications include Diabetic Retinopathy, Neuropathy (sensory, motor and autonomic) and Nephropathy whereas macrovascular complications include Coronary artery disease, Peripheral arterial disease, Cerebrovascular disease. Other complications include Gastrointestinal (gastroparesis and diabetic diarrhea), Genitourinary (uropathy and sexual dysfunction), Dermatologic and various recurrent Infections. Even in newly diagnosed

T_2DM patients who had poor glycemic control, frequency of microvascular complications is much higher as compared to those who had average glycemic control [2].Young-onset T_2DM is the more lethal phenotype of diabetes and is associated with a greater mortality and more diabetes related complications including unfavorable cardiovascular disease [3]. Many of preventable complications of T_2DM flare up in young but due to the silent nature of the disease the diagnosis is often made late. Hence we decided to explore glycemic control, frequency of complication morbidity and mortality among this young diabetic population which is useful in preventing Diabetes related complications.

MATERIAL AND METHODS

The study was conducted in the Department of Medicine S.S. Medical College and associated S.G.M. Hospital, Rewa from March 2015 to August 2016. It included all the Diabetics, who were 50 years of age or younger, either attending MOPD or admitted in department of medicine, SGMHRewa, between March 2015 to August 2016 and excluded those with age >50 yrs or <14yrs, on chronic steroid therapy and patients with Type1 DM. Relevant history was taken and recorded in a well designedproforma. A thorough general and systemic physical examination was performed. All patients underwent routine blood investigations including complete blood count, liver and kidney function test, urine routine and microscopic examination, fasting and post prandial blood sugar level, OGTT, HbA1$_c$ and were screened for retinopathy on the basis of the findings on dilated Fundoscopic examination, nephropathy on the basis of the presence or absence of urine microalbumin or macroalbumin and ultrasound findings of kidneys and neuropathy on the presence of symptoms and signs. Those with deranged values were followed and counselled and advised for further management.

OBSERVATIONS

Of the 187 patients studied, 53.47% were males and 46.53% were females. Most of the patients (~83%) were in the age group 30-50 years with mean age of 46yrs. Around 45% patients had positive family history of DM of which ~25% had positive history of DM in both parents and ~20% with single parent history. Positive family history of Hypertension was found in 40.1% and positive family history of both hypertension and T$_2$DM in 12.29% subjects. Microvascular complications like Neuropathy were observed in 25.13%, Nephropathy in 25.13%, Retinopathy in 24.06% of subjects. With poor glycemic control conferred higher risk of complications. Nephropathy, Retinopathy and Neuropathy were present in 60%, 46.6%, 13.3% subjects respectively when HbA1$_c$ was between 8.51-9.5%.

Table-1 shows that out of 187 diagnosed diabetic cases, 155 (82.89%) had mean age of46.16 years and 32 (17.11%) cases had mean age of 24.79 years.

In the present study, most patients (35.82%) had BMI between 23-27.5kg/m^2 followed by BMI ≥27.5 (32.08%) and only 6 cases (3.2%) had <18.5kg/m^2.(Table-2).

Table-3 shows that, out of 187 diabetic cases, 84 (44.91%) patients reported positive family history of DM. 47 (25.13%) cases and both parents history of DM and 37 (19.78%) cases with single parent history.

In present study, most of patients (60%) with nephropathy hadHbA$_{1C}$ between 8.51-9.5% . Similarly most cases(46.6%) with retinopathy had HbA$_{1C}$ 8.51-9.5%. However most patients with Neuropathy had HbA$_{1C}$in the range of 6.51-7.5%. (Table-4)

Table-1: Distribution of cases according to age groups

S. No.	Age groups	Type2 Diabetes mellitus cases	
		No.	%
1	14-29 yrs	32	17.11
2	30-50 yrs	155	82.89
	Total	187	100.0

Table-2: Distribution of cases according to BMI

S. No.	BMI(Kg/m^2)	Type-2 Diabetes mellitus	
		No.	%
1	**<18.5**	6	3.2
2	**18.6-22.9**	54	28.87
3	**23-27.5**	67	35.82
4	**≥27.5**	60	32.08
	Total	187	100.0

Table-3: Distribution of cases according to family history of diabetes

S. No.	Family history of DM	Type-2 Diabetes mellitus	
		No.	%age
1	None	103	55.08
2	Single Parent History positive	37	19.78
3	Both Parent History positive	47	25.13
	Total	187	100.0

Table-4: Distribution of cases according to HbA$_{1C}$ level with microvascular complications

HbA$_{1C}$ (%)	Number	Retinopathy	Neuropathy	Nephropathy
<6.5	03	0(0%)	0(0%)	1(33.33%)
6.51-7.5	108	15(13.88%)	34(31.48%)	17(15.74%)
7.51-8.5	46	16(34.78%)	9(19.56%)	16(34.78%)
8.51-9.5	30	14(46.6%)	4(13.33%)	18(60%)
TOTAL	187	45(24.06%)	47(25.13%)	47(25.13%)

DISCUSSION

Age wise distribution

In present study out of 187 diagnosed diabetic cases 155 (82.89%) were in the age group 30-40 years and 32 (17.11%) cases belonged to age group of 20-29 years. This study was comparable to study by Patel M *et al* [4] who carried out study on 622 newly diagnosed type 2 diabetic patients & reported the mean age of 47.7 ± 10.9 years. Abdollahi *et al* [5] reported Mean age 48.8 ± 11.8 years.

In the present study also out of 187 diagnosed diabetic cases 155 (82.89%) were in the 30-40 years age group. In spite of this, diabetes is usually diagnosed in the later part of fourth decade instead. So there should be combined approach including screening and primary prevention programs to identify diabetic patients at the earliest.

Distribution of patients according to BMI

In present study, highest number of cases 67 (35.82%) had BMI between 23-27.5kg/m^2 and least 6 (3.2%) had <18.5kg/m^2, among 187 diagnosed diabetics. In present study, average BMI of diabetics was 24.73kg/m². Metriveli *et al* [6] observed average BMI was 30±5.34 kg/m² in 648 newly diagnosed diabetics. In studies done by Mishra *et al* [7] and Wang *et al* [8] average BMI was 22.75±4.03kg/m²and 25kg/m² respectively among newly diagnosed diabetic patients which was almost similar to average BMI (24.73 kg/m^2) in present study. Krahulec *et al* [9] reported average BMI of 25-30kg/m² in 43.9% and >30kg/m² in 43.8% of 3424 newly diagnosed diabetic

patients. Zaheer A.K. *et al* [10] also found the similar results stating higher BMI and WHR are independent risk factors for Diabetes. Hillier T *et al* [11] reported average BMI of 39kg/m² in 18-44 year age group and 33kg/m² in >45 year age group among 2437 newly diagnosed diabetic patients.

According to M A. Rahim [12] age, body mass index (BMI), waist circumference (WC) and waist to hip ratio (WHR) were higher in glucose intolerant subjects than in normal glucose tolerant (NGT) group Although obesity is one of the risk factor for diabetes, it is observed that obesity is more prevalent in newly detected diabetics in western countries as compared to developing countries like India where lean diabetics are more common.

Analysis of family history of Diabetes

Above table shows that, out of 187 diabetic cases 84 (44.91%) patients reported positive family history of DM. 47 (25.13%) cases showed both parental history of DM and 37 (19.78%) cases with single parental history.

Similar studies had following observation

Abdollahi *et al* [5] who observed 152 newly detected diabetic patients andreported family history in 63 patients (41.4%). Ranganayakulu *et al* [13] reported that positive family history was present in 1/3 of newly detected diabetics.

Krahulecet *et al* [9] reported that 44.7% newly detected diabetics had first degree relative with diabetes.

According to all these studies, there was strong relationship between family history and diabetes mellitus. Relationship of family history with type 2 Diabetes Mellitus is due to strong genetic component. Family history of diabetes is important in the Indians. The lifetime risk of T2DM is about 7% in a general population, about 40% in offspring of one parent with T2DM, and about 70% if both parents had diabetes (Yi Lin and Zhongjie Sun)[14]

In present study of 187 diabetic cases 84 (44.91%) patients reported positive family history of DM. 47 (25.13%) cases showed both parental history of DM and 37 (19.78%) cases with single parental history. These observation were comparable with study by Athanasia Papazafiropoulou *et al* [15] in a sample of Greek diabetic patientswho found that the prevalence of diabetes in mother and father were 27.7% and 11.0% respectively.

In study done by David G. Bruce *et al* [16] in 1,294 cases, in which maternal family history of diabetes was reported in 20.4% and 8.3% reported paternal family history. Study done by Kelly *et al* [17] found that increases in fasting glucose were significantly influenced by a maternal history of type 2 diabetes (beta = 0.60, P < 0.05).

According to all these studies, it suggests that maternal history of type 2diabetes associated with prediction of diabetes mellitus. Several potential genetic and environmental factors have been proposed to explain the excess maternal transmission of T2DM. It is known that the intrauterine environment in mothers with diabetes during pregnancy is associated with insulin resistance and adult T2DM. Furthermore, genetic factors, including mitochondrial inheritance, genetic imprinting, and behavioral risk factors passed on preferentially by the mother (Athanasia Papazafiroplouou *et al* [15].

HbA$_{1C}$ percentage with microvascular complications:-

In present study, most of patients (60%) with nephropathy hadHbA$_{1C}$ between 8.51-9.5% .similarly most cases(46.6%) with retinopathy had HbA$_{1C}$ 8.51-9.5% However most patients with Neuropathy had HbA$_{1C}$ in the range of 6.51-7.5%.Our study is comparable to study by Alia *et al* [2] who reported that with poor glycemic control (HbA$_{1C}$>6.5%)Neuropathy,

Nephropathy and retinopathy were present in 68.5%,56.2% and 31.4% cases respectively.

CONCLUSION

1. In present study, the prevalence of T2DM in age group of 18-50years is 3.46%.T2DM is also more prevalent among the 30-50 years age group.
2. In present study, most of the cases 67 (35.82%) had BMI between 23-27.5kg/m^2 and least 6 (3.2%) had <18.5kg/m^2, among 187 diagnosed diabetics.137 (73.26%) cases had BMI of >22.9 and 63(33.68%) cases having BMI of <22.9.So lean diabetics are more common in our region as in other parts of India.
3. In present study prevalence of diabetes is more in population with positive family history of Diabetes Mellitus.
4. Retinopathy and Nephropathy is more prevalent in the cases with poor glycemic control.

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