



ORIGINAL RESEARCH PAPER

Medicine

FACTORS AFFECTING GLYCEMIC CONTROL IN TYPE 2 DIABETES PATIENTS IN RURAL POPULATION OF VINDHYA REGION

KEY WORDS: Type 2 Diabetes Mellitus, Glycemic Control

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ABSTRACT

Background: Poor glycemic control amongst patients with type 2 diabetes mellitus indicates a major public health problem and common cause of hospital admission and complications caused by diabetes. Good glycemic control is the main objective for the prevention of organ damage and other complications arising from diabetes. The objective of this study was to assess the magnitude of good and poor glycemic control and factors affecting glycemic control in type 2 diabetic patients at Shyam Shah Medical College and SGMH Rewa, Madhya Pradesh, India.

Material & Method: This is hospital based cross sectional study conducted on 500 type 2 diabetes mellitus patients from April 2016 to July 2017. Detailed history, thorough clinical examination and anthropometric measurement was done. Good glycemic control was defined as the three-month average fasting blood sugar (FBS) 80-130 mg/dl.

Results: Out of 500 patients 156 (31.2%) have good glycemic control and 344 (68.8%) patients have poor glycemic control. Patients in the poor glycemic control group have greater duration of diabetes, lack of adherence to treatment, family history of diabetes, illiteracy, obesity and dyslipidemia. (p value<0.05)

Conclusion: Prevalence of poor glycemic control is very high in this population. Further studies are needed to explore the effect of these and other characteristics on glycemic control among rural population of Vindhya region and to develop appropriate interventions to improve diabetes outcomes and increase life-expectancy.

Introduction:

Diabetes mellitus (DM) refers to a group of common metabolic disorders that share the phenotype of hyperglycaemia with disturbance of carbohydrate, fat and protein metabolism resulting from defects in insulin secretion, insulin action or both. Several distinct types of DM are caused by a complex interaction of genetics and environmental factors. Depending on the aetiology of the DM, factors contributing to hyperglycaemia include reduced insulin secretion, decreased glucose utilization and increased glucose production.¹

Diabetes mellitus is accepted as a worldwide epidemic with an estimated increase in prevalence from 2.8% in 2000 to 4.4% by 2030.² The Indian Council of Medical Research India Diabetes Study (ICMR-INDIAB study) showed that India had 62.4 million people with diabetes in 2011. These numbers are projected to increase to 101.2 million by 2030.³ There is no cure for this disease and it requires continuing medical care and achieving good glycemic control to prevent acute complications and to reduce the risk of long-term complications because poor glycemic control is the most common cause of hospital admissions and complications in diabetic patients.⁴ However, large no of the diabetic patients did not maintain their blood glucose at optimum level, that's why the factors that affect the glycemic control significantly, should identify individually.

Materials and Methods:

The present cross-sectional study was carried out in patients from rural area attending MOPD and those admitted in Department of Medicine, S.S. Medical College and associated S.G.M. Hospital, Rewa (M.P.) from April 2016 to July 2017. A total of 500 Type 2 diabetes patients from rural population of Vindhya region were included in the study.

Inclusion Criteria

1. Type 2 diabetic patients living in rural area.
2. Age > 30 years.
3. Giving consent for study.

Exclusion Criteria

1. Type 1 diabetic patients.
2. Diabetic, but belong to urban area.
3. Not giving consent.

Diabetes was defined by ADA 2011 criteria- Plasma fasting blood glucose ≥ 126 mg/dL or 2-hour plasma post-glucose value ≥ 200

mg/dL or patients with classical symptoms of hyperglycaemia or hyperglycaemic crisis plus random blood glucose concentration ≥200 mg/dL (≥11.1 mmol/L) or bA1c ≥6.5%. Hypertension was diagnosed according to JNC-7 criteria, those with systolic blood pressure ≥140 mmHg and diastolic blood pressure ≥90 mmHg or who were taking anti-hypertensive medication were considered to 6 have hypertension. Dyslipidaemia was defined if patient had total cholesterol ≥200 mg/dL, serum triglyceride ≥150 mg/dL, serum HDL < 40 mg/dL in males, < 50 mg/dL in female and serum LDL ≥100 mg/dL.

Glycemic control:

It is managing blood glucose level of diabetic patients at optimum level. Good glycemic control is defined as the three-month average fasting blood glucose 80-130 mg/dl and poor glycemic control is defined as the three-month average fasting blood glucose >130 mg/dl.⁸

The following data were obtained directly from the patients: age, gender, marital status, educational stages, adherence to treatment, family history, time from onset of diabetes (considered the approximate date of diagnosis), type of treatment, addiction and history of high blood pressure. They underwent a thorough physical examination which included weight, height, waist circumference and BMI which were calculated. Data were completed by consulting medical reports of patients.

Data was at first arranged in Microsoft Excel 2016 Worksheet, developed by Microsoft, Redmond, Washington. Data is expressed as mean ± standard deviation for continuously distributed variables and in absolute numbers and percentages for the discrete variables.

Results:

Out of 500 patients, 156 (31.2%) have good glycemic control and 344 (68.8%) patients have poor glycemic control.

Table 1: Socio-Demographic and Clinical Characteristic

Variable	Frequency (n=500)	Good glycemic control (FBG 80-130mg/dl) (n=156)	Poor glycemic control (FBG>130 mg/dl) (n=344)	P value
Sex				
Male	277	80(28.88%)	197(71.11%)	0.2122
Female	223	76(34.08%)	147(65.91%)	

Age group (years)				
31-40	30	13(43.33%)	17(56.66%)	0.3039
41-50	150	50(33.33%)	100(66.66%)	
51-60	153	44(28.75%)	109(71.24%)	
61-70	90	26(28.88%)	64(4.9%)	
>70	73	23(31.50%)	50(68.49%)	
Educational status				
Illiterate	280	71(25.35%)	209(74.64%)	0.0015
Literate	220	85(38.63%)	135(61.36%)	
Family History of Diabetes				
Present	187	48(25.66%)	139(74.33%)	0.0391
Absent	313	108(34.50%)	205(65.49%)	
Duration of Diabetes (years)				
<5	87	33(37.93%)	54(62.06%)	0.0253
5-10	309	99(32.03%)	210(67.96%)	
>10	104	24(23.07%)	80(76.92%)	
Type of Treatment				
OHA	334	113(33.83%)	221(66.16%)	<0.0001
Insulin	82	32(39.02%)	50(60.97%)	
OHA+ Insulin	15	6(40%)	9(60%)	
No Treatment	69	5(7.2%)	64(92.75%)	
Medication Adherence				
Yes	335	133(39.70%)	202(60.29%)	<0.0001
No	165	23(13.93%)	142(86.66%)	
Addiction (Tobacco chewing/smoking/Alcohol)				
Yes	221	63(28.50%)	158(71.49%)	0.2473
No	279	93(33.33%)	186(66.66%)	
Hypertension				
Present	83	20(24.09%)	63(75.90%)	0.1261
Absent	417	136(32.61%)	281(67.38%)	
Body Mass Index (kg/m2)				
<18.5	11	5(45.45%)	6(54.54%)	0.0202
18.5-24.9	145	53(36.55%)	92(63.44%)	
25-29.9	318	96(30.18%)	222(69.81%)	
>30	26	2(7.65%)	24(92.30%)	

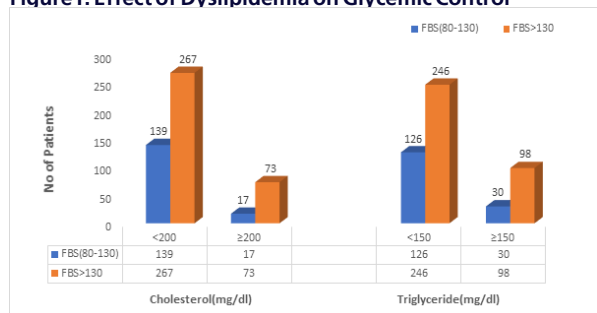
In our study female patients have more good glycemic control than male patients (34.08% vs 28.88%). Patients age not significantly associated with glycemic control and literate patients have more good glycemic control as compared to illiterate patients (38.63% vs 25.35%).

In our study as duration of diabetes increases glycemic control decreases. Patients on OHA + Insulin have more good glycemic control as compared to OHA/Insulin alone. Patients who were on regular treatment have better glycemic control than irregular treatment (p<0.05).

Non-hypertensive patients and patients with no addiction have better glycemic control but association is not significant (p>0.05). There is a significant association (p<0.05) between lower Body Mass Index and glycemic control. As BMI increases good glycemic control decreases.

In our study there is substantially greater risk of poor glycemic control amongst patients with family history of diabetes mellitus (p<0.05).

Figure1: Effect of Dyslipidemia on Glycemic Control



In our study patients with dyslipidemia have poor glycemic control as compared to patients with normal lipid profile (p value<0.05).

Table 2- Distribution of patients according to Diabetic complication

Complication	Good glycemic control (FBG 80-130mg/dl)	Poor glycemic control (FBG>130 mg/dl)	P value
Diabetic Retinopathy (n=86)	15	71	0.0025
Diabetic Nephropathy(n=117)	24	93	0.0044

In our study there is a significant association between diabetic complication and glycemic control (p value<0.05).

Discussion:

This study falls in line with the existing research that suggests that poor glycemic control among diabetic patients is largely prevalent in Indian scenario. In our study the proportion of diabetic patients having good glycemic control (31.2%) is similar to another study in which good glycemic control 30% of the patients⁹

However, there was no significant association between gender, age group, addiction, hypertension and glycemic control.

Meanwhile, in our study there was a significant association between family history of diabetes mellitus and poor glycemic control. Similar results were observed in study conducted by Lee YH et al.¹⁰

In our study patients with poor glycemic control was found to increase with increase in disease duration. Longer duration of diabetes is known to be associated with poor control, possibly because of progressive impairment of insulin secretion with time because of cell failure, which makes the response to diet alone or oral agents unlikely (UK Prospective Diabetes Study (UKPDS) Group,1998).¹¹

In our study higher BMI was significantly associated with poor glycemic control (p value=0.0202). Similarly, a higher proportion of patients with poor glycemic control was observed in patients whom were obese, followed by overweight.¹²⁻¹³

In Our study literate patients have good glycemic control as compared to illiterate patients (p=0.0015) which is similar to Goudswaard et al in which lower level of education was associated with poor glycemic control.¹⁴

In our study patients who were on regular treatment have good glycemic control as compared to patients who were on irregular treatment (p<0.0001). Similar result was observed in study conducted by Fshea B et al.¹⁵

In our study there is a significant association between lipid profile and glycemic control (p<0.05). Patients with hypertriglyceridemia and hypercholesterolemia have poor glycemic control as compared to patients with normal triglyceride and cholesterol level. Similar results were observed in study conducted by Mullugeta Y et al¹⁶.

In our study Patients on OHA + Insulin have more good glycemic control as compared to OHA/Insulin alone (p<0.0001). This finding is inconsistent with study conducted by Haghghatpanah M et al¹⁷ in which patients receiving insulin + OHA or insulin as monotherapy were more likely to have poor glycemic control compared to patients who were on oral diabetes medication.

In our study patients with diabetic retinopathy and diabetic nephropathy were significantly associated with poor glycemic control as compared to patients with no complication (p<0.05).

Conclusion:

In our study the proportion of good glycemic control in rural type 2

diabetic patients is very low. The present study showed that there was a significant association between glycemic control and educational status, BMI, family history, duration of diabetes, medication history, adherence to treatment, triglyceride level and cholesterol level. Based on these factors, patients at risk of poor glycemic control can be identified, and targeted interventions can be implemented for optimal outcomes.

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