

Status of Type 2 Diabetes Mellitus and Spectrum of Complications in Rural Areas of Telangana

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Abstract

Objective: The main aim of the study is to inspect specific state of the disease - Diabetes Mellitus by screening Glycated Hemoglobin, Fasting plasma glucose and spectrum of complications. **Study Design:** An Observational study carried out for 6 months (October 2018-March 2019) in 688 diabetic patients. **Results:** Glycated hemoglobin is $\leq 6.9\%$ in 14% of total patients and 86% of the patients are having $\geq 7\%$, 15% of total 688 diabetic patients are maintaining fasting plasma glucose levels ≤ 108 mg/dl. **Conclusion:** An abnormal maintainance of glycemic levels is responsible for the development of diabetic complications. Diabetic educators and clinical pharmacist interventions can reduce glycemic levels along with the physician aided pharmacological treatment. Proper central and local management interventions and combined efforts from all the stakeholders of the the general public is a requisite to trim down the disease burden that diabetes creates in India.

Keywords: Diabetes mellitus; Glycemic control, Glycated hemoglobin; Fasting plasma glucose; Spectrum of complications; Diabetes care and management.

Introduction

With more than 62 million individuals Diabetes is promptly gaining the condition of a latent epidemic in India presently diagnosed with the diabetes.^{1,2} India presently faces an uncertain outlook in relation to the impending burden that diabetes may enforce upon the nation. Diabetes is clinically characterized by hyperglycemia due to chronic and/or relative insulin insufficiency.³ Type 2 diabetes is the majority of the diabetes burden, peripheral insulin resistance and compensatory hypersecretion of insulin islets may pave the way for abnormal pancreatic function. Skeletal muscle, liver, and adipose tissue significantly demonstrate condensed insulin sensitivity due to requirements for glucose uptake and metabolism. However, it is regarded that in a great total of subjects the attenuation in insulin secretion leads to hyperglycemia.⁴ Diabetes greatly increases the risk of cardiovascular disease and mortality, and microvascular complications such as nephropathy, neuropathy and retinopathy strongly affect the quality of life of affected patients. The HbA1c level, which provides an average glucose level over a long period, is an established treatment target in diabetes.⁵ Ketoacidosis from exceptionally high blood glucose concentrations and coma as the result of low blood glucose are associated with mortality. In Diabetes the consequential complications are "microvascular" and "macrovascular".

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Microvascular complications include retinopathy, nephropathy and neuropathy. Cardiovascular disease resulting in myocardial infarction and cerebrovascular disease are the major macrovascular complications.³ Ultimately, the most effective way to reduce the risk for vascular complications in both Type 1 and Type 2 diabetes is to achieve optimal glycemic control with the goal of reaching normoglycemia as early as possible.^{6,7}

Objectives

To investigate the specific status of the disease - Diabetes mellitus by screening glycosylated Hemoglobin, Fasting plasma glucose and spectrum of complications and to create possible awareness on diabetic complications and maintainance of normoglycemia by providing diabetic education.

Materials & Methods

This is an observational study, carried out for 6 months (October 2018-March 2019) in 688 diabetic patients using study specific data collection form, all the parameters are collected from the latest laboratory investigations present in the case reports of diabetic patients visiting hospitals from various regions of Telangana.

Statistical Analysis

Data is analyzed using Microsoft Excel 2016 and presented using necessary graphs, Means and standard deviations wherever required.

Results

Data is collected from a totality of 688 Type 2 Diabetic patients. There are 54% of males with Mean age of 50.51087 ± 11.18422 and 46% of females with mean age of 47.22013 ± 11.8422 as shown in (Table 1 and Fig. 1). Out of 688 patients 87% are following mixed diet and 13% are vegetarians (Table 2 and Fig. 2). The mean duration of diabetes in the present study is 7.074373 ± 4.96108 . 70% of the diabetic patients are not having any significant family history, where as 30% are having family history either from both the parents or one of them (Table 3 and Fig. 3). 38% are having a sedentary life style, 30% are on irregular exercises, on the other hand 32% are following regular exercise (Table 4 and Fig. 4).

The use of alcohol and tobacco were almost similar, that is 70% and 30% of diabetic people are non-alcoholics & non-smokers (Table 5,6 and Figs. 5,6).

Table 1: Gender

Sample size (n) = 688

Gender	Number of patients	Mean \pm Standard Deviation of age	Percentage
Male	369	50.51087 ± 11.18422	54
Female	319	47.22013 ± 11.63661	46

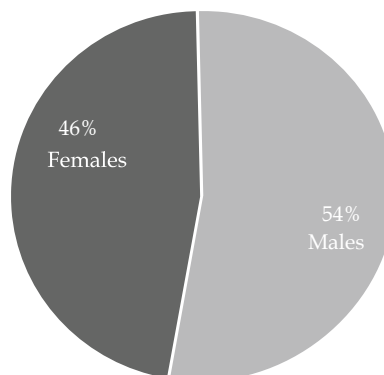


Fig. 1: Gender distribution.

Table 2: Diet

Diet	Number of patients	Percentage
Mixed	602	87
Vegetarian	86	13

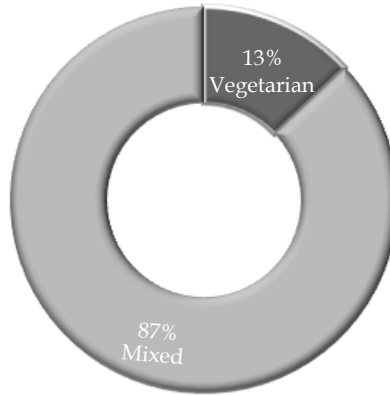


Fig. 2: Diet.

Table 3: Family History

Family History	Number of patients	Percentage
Mother	74	11
Father	89	13
Both Parents	45	6
None	480	70

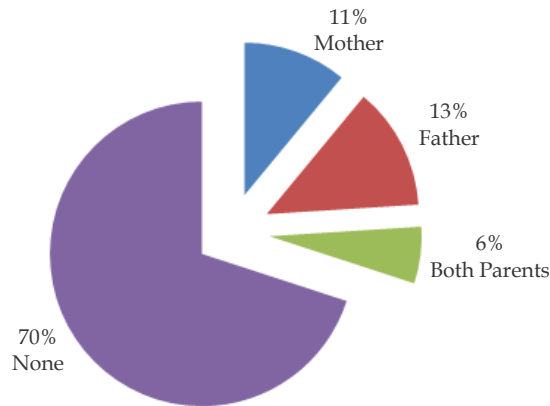


Fig. 3: Family history.

Table 4: Exercise

Exercise	Number of patients	Percentage
No	258	38
Irregular	08	30
Regular	222	32

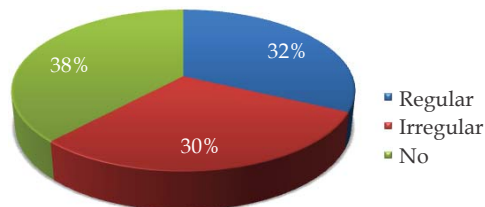
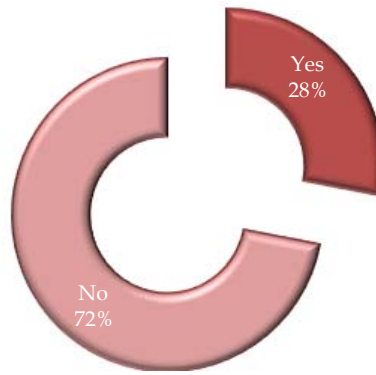


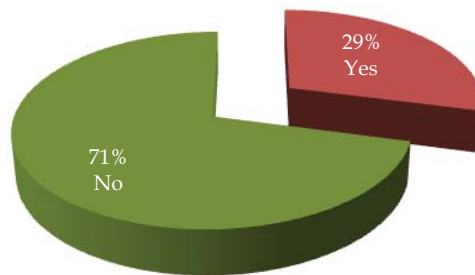
Fig. 4: Exercise.

Table 5: Tobacco Use

Tobacco Use	Number of patients	Percentage
Yes	193	28
No	495	72

**Fig. 5:** Tobacco use.**Table 6:** Alcohol Use

Alcohol Use	Number of patients	Percentage
Yes	202	29
No	486	71

**Fig. 6:** Alcohol use.

Glycemic parameters

The status of glycated hemoglobin is depicted in Table 7,8 and Figs. 7,8, 86% of patients are having abnormal glycated hemoglobin (>7%) whereas, 14 percent are normoglycemic. The average levels of Fasting plasma glucose levels are 156.1091

± 57.79427 . The spectrum of complications are presented in Table 9, along with means and standard deviations of age, duration of diabetes, glycated hemoglobin and fasting plasma glucose levels. Treatment pattern of Oral Hypoglycemic Agents and Insulin is depicted in Fig. 9.

Table 7: HbA1c

HbA1c	Number of patients	Percentage
<6.9%	96	14
7 to 7.9%	188	27
8 to 8.9%	165	24
>9%	238	35

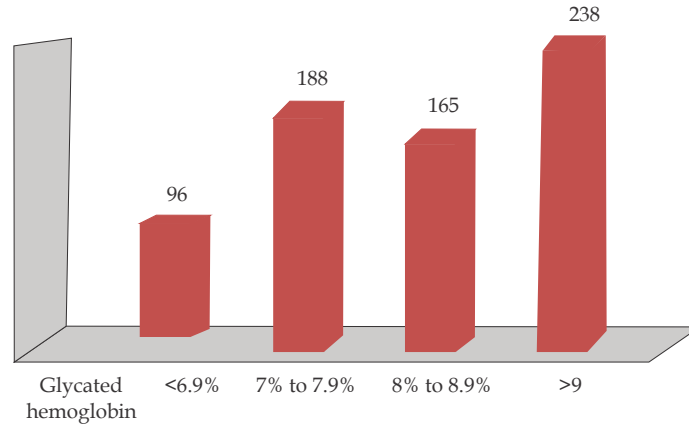


Fig. 7: Glycated hemoglobin.

Table 8: Fasting plasma glucose

Fasting plasma glucose (mg/dl)	Number of patients	Percentage
72-108	105	15
109-180	429	63
181-280	126	18
>280	28	4

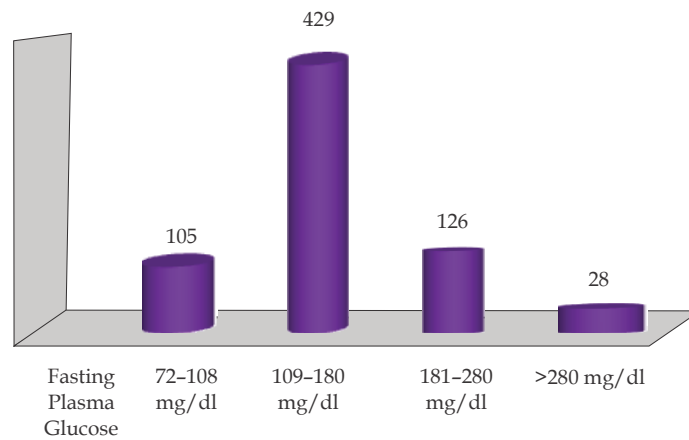


Fig. 8: Fasting plasma glucose.

Table 9: Spectrum of clinical characteristics and complications

Complications	Number of patients	Age	Duration of Diabetes Mellitus	HbA1c	Fasting plasma glucose (mg/dl)
Nephropathy	170	48.96779 ± 11.54235	7.08034 ± 4.962726	8.827258 ± 1.596993	156.0278 ± 57.93984
Retinopathy	114	48.9486 ± 11.5453	7.100029 ± 4.960659	8.82673 ± 1.593608	156.1429 ± 57.95411
Dyslipidemia	83	47.39431 ± 11.77253	7.367841 ± 5.115876	8.779913 ± 1.677742	159.7541 ± 60.87938
Infections	82	48.31863 ± 11.65958	7.146023 ± 4.98852	8.784669 ± 1.633592	157.5458 ± 60.02839
Neuropathy	78	49.03898 ± 11.5516	7.051087 ± 4.956064	8.843204 ± 1.595757	155.3088 ± 57.5613
Cardiovascular	64	49.02963 ± 11.5322	7.112789 ± 4.976841	8.829952 ± 1.596002	155.7704 ± 52.69775

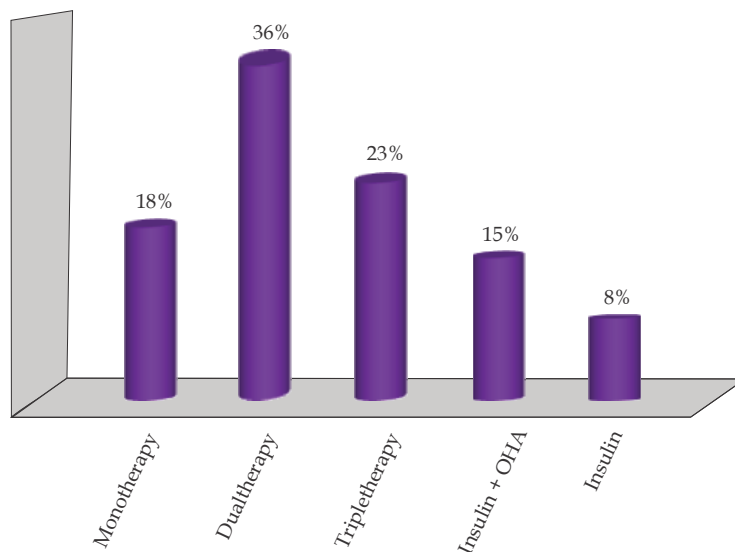


Fig. 9: Treatment patterns in diabetes.

Discussion

The incidence of complications is inappropriately elevated reflecting the low glycemic control causing damage which leads to different types of microvascular and macrovascular complications of diabetes. The Diabcare India 2011 study presented mean HbA1c of $8.97 \pm 2.2\%$ where data of greater than six thousand diabetic patients indicated poor glycemic control in India.⁸

LM Chuang et al., the condition of diabetes in Asia, a cross-sectional survey of 24,317 patients in 1998 gave Conclusions that population of the Asian patients with diabetes who are given treatment, more than half were not well controlled. The incidence of microvascular complications was higher in patients with higher HbA1c. Further restorative actions to improve glycaemic control are obligatory to prevent chronic diabetic complications.⁹

V Connolly et al., (2000) a population based study presented higher prevalence of Type 2 diabetes mellitus in underprivileged areas. In conclusion this study described, a significant contrary relativity among the prevalence of Type 2 diabetes and socioeconomic status, which is most distinct between 40–69 years of age. The elucidation for this outcome is unambiguous however augmented exposure to risk factors for Type 2 diabetes from low socioeconomic status is significantly supporting¹⁰

Kaveeshwar SA, Cornwall J, The existing status of indian diabetes concluded that Diabetes is attaining potentially epidemic magnitude in

India. The morbidity and mortality levels owing to diabetes and its impending complications are massive, and create noteworthy healthcare boon on both social order and the families. Ominously, diabetes is coupled with a range of complications and is now happening at a relatively younger age in the country. Diabetes is affected by relocation from rural to urban areas, the financial boom, and equivalent modified standard of living. Moreover, there is a dearth of evidence investigating the accurate status because of the ethnic nature, socio-economic and geography of such a varied and huge country. Known diabetes is now extremely evident across the public in India, here exists the value for critical intervention and research at national and regional levels to alleviate the potentially calamitous enhancement in diabetes that is predicted in the forthcoming years.¹¹

RP Agrawal in a hospital based study entitled Extent of hyperlipidemia and its relationship with diabetic microvascular and macrovascular complications, observed that abnormal Lipid profile are very general and it has enormous effect on Coronary Artery Disease and Peripheral Vascular Disease. Hence, suitable precautionary, pharmacological and non pharmacological management methods are to be timely considered.¹²

Conclusion

An abnormal maintenance of glycemic levels is responsible for the development of diabetic complications. Diabetic educators and clinical

pharmacist interventions can reduce glycemic levels along with the physician aided pharmacological treatment. Proper central and local management interventions and combined efforts from all the stakeholders of the the general public is a requisite to trim down the disease burden that diabetes creates in India.

Clinicians may focus to implement early detection, screening and prevention programmes, self-management along with pharmacological and non pharmacological management of diabetes based on standard guidelines there by decreasing the hyperglycemia, financial burden, morbidity and mortality.

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