

Diabetes Care in India: A Descriptive Study

Jagannath V. Dixit, Rashmi S. Kulkarni, Shraddha Y. Badgujar

Department of Community Medicine, Government Medical College, Maharashtra, India

Abstract

Context: Diabetes is a chronic illness that requires continuing medical care and patient self-management education to prevent and reduce the risk of long-term complications. It requires an array of investigations to provide an accurate picture of the condition and its management accordingly by a qualified doctor. **Aims:** This study was conducted to understand the treatment received by type 2 diabetes (T2DM) patients from various categories of health care professionals and awareness about diabetes reversal by lifestyle modification and prevention of complications. **Settings and Design:** This was a community-based cross-sectional study. **Subjects and Methods:** The link of the semi-structured questionnaire in Google form with e-consent was sent to all members in the selected groups of “World free of obesity and diabetes” campaign on their personal WhatsApp account. **Statistical Analysis Used:** A total of 3082 participants were included, and the data obtained were analyzed using SPSS v26. **Results:** The mean age of the participants was 50.26 ± 9.78 years ranging from 18 to 81 years. A total of 35.8% of the study population was diabetic for 1–5 years. A total of 54.9% were started with antidiabetic medication on the same day of diagnosis. Only 1.5% of the patients had complete investigation profile for T2DM, 50.2% of the patients were briefed about hypoglycemia, and only 15.8% of the patients were checked for retinopathy. **Conclusions:** Most doctors, qualified as well as nonqualified, did not follow the standard guidelines for diagnosis, treatment, and patient education regarding T2DM; therefore, it is necessary to train all medical practitioners regarding these guidelines. Diabetes reversal by lifestyle modification must be prescribed as the first line of treatment in patients with T2DM.

Keywords: Diabetes reversal, endocrinologist, lifestyle modification, Type 2 diabetes mellitus

INTRODUCTION

Diabetes mellitus (DM) is a chronic metabolic disorder characterized by persistent hyperglycemia, due to impaired insulin secretion, resistance to peripheral actions of insulin, or both. The prevalence of type 2 diabetes (T2DM) in India is around 7.3%.^[1] Diabetes control in India is supposed to be $\leq 7\%$ as suggested by the current Indian Council of Medical Research (ICMR) guidelines;^[2] however Joshi *et al.*^[3] states that, diabetes control in India is far from ideal with a mean HbA1c of 9.0%, which is at least 2.0% higher than global standards.^[3,4] Nearly half of the people with diabetes remain undetected, accounting for complications at the time of diagnosis. Once diabetes develops, it is a costly disease to manage because of its chronic nature and severity of complications. Over 70% of diabetes-related cost is attributed to its complications, particularly for macro-vascular diseases that most commonly occur in type 2 diabetics.^[5,6]

It is seen that commonly patients take consultation from general practitioners, mostly MBBS and AYUSH doctors. Also, doctors qualified to treat T2DM, who possess either of

the following degrees, i.e., MD Medicine, DNB Medicine, DM Endocrinology, or Diploma/Fellowship in Diabetology are expected to follow the guidelines given by various professional bodies like the American Diabetes Association.^[7] “World free of obesity and diabetes” campaign started by the principal investigator of this study has prescribed a holistic and preventive approach. More than 65000 members from 41 countries are directly connected with this campaign through WhatsApp groups. Simple lifestyle modification with “two meals a day” and “walking at least 4.5 km for 45 min” is advised for weight loss and diabetes reversal.^[8-10]

Looking at the present epidemiology of T2DM in different geographic locations of India and the scarcity of qualified

Address for correspondence: Dr. Shraddha Y. Badgujar,
Government Medical College, Panchakki Road, Aurangabad - 431 001,
Maharashtra, India.
E-mail: shraddhabadgujar94@gmail.com

Submitted: 10-Jun-2021

Published: 15-Dec-2021

Accepted: 30-Aug-2021

Access this article online

Quick Response Code:



Website:
www.ijem.in

DOI:
10.4103/ijem.ijem_260_21

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How to cite this article: Dixit JV, Kulkarni RS, Badgujar SY. Diabetes care in India: A descriptive study. Indian J Endocr Metab 2021;25:342-7.

diabetologists, it is likely that care received by the patients may vary in quality. The present study was conducted with an objective to understand the symptoms of T2DM at diagnosis, treatment protocols followed by various categories of medical practitioners, and awareness among the patients regarding diabetes reversal by lifestyle modification in India. The rationale of this study was to provide an analysis of the quality of diabetes care received by the patients.

SUBJECTS AND METHODS

Study design: This was a community-based cross-sectional study conducted at a government medical college in Aurangabad.

Ethical considerations: The study was approved by Institutional Ethics Committee.

Sample size: Considering 7.3% prevalence of diabetes mellitus, a minimum required sample size of 3000 was calculated using Cochran's formula with 1% allowable error.^[11]

Selection Procedure: There were 280 WhatsApp groups of the campaign which had around 65000 members connected with "World free of obesity and diabetes campaign," their participation in this campaign was completely voluntary and irrespective of their diabetes status. The members were connected to this campaign with the idea of following the lifestyle modification of "two only meals a day and exercise in the form of walking for at least 4.5 km within 45 min daily." These groups were created as Diabetes group, Prediabetes group, and Weight-loss group.

- **Diabetes group:** Members taking antidiabetic medications and/or with HbA1c ≥ 6.5
- **Prediabetes group:** Members not taking any anti-diabetic medications and/or with HbA1c- 5.7 to 6.4
- **Weight-loss group:** Members not taking any anti-diabetic medications and/or with HbA1c ≤ 5.6 .

Out of these, 100 groups were of patients with T2DM. Each group consisted of 150 to 200 members. To achieve a desired sample size of 3000, 20 groups were selected by systematic random sampling. Each group was having a unique serial number. The first group was selected randomly from the group numbers 1 to 5. Subsequently, every fifth group was selected. All members in the selected groups, who were willing to participate, were included in the study.

Data collection: A pre-formed, semi-structured questionnaire was prepared following the guidelines provided by the American Diabetes Association (ADA) in Google forms.^[12] Link of this Google form with e-consent was sent to all members in the selected groups on their personal WhatsApp account. Total 3150 completely filled Google forms were received out of which 68 (2.1%) were filled by the participants residing in countries other than India. This 2.1% were excluded from the analysis.

Data analysis: All the data of 3082 participants were extracted to Microsoft Excel 2019 and analyzed using online statistical software- Open Epi and IBM SPSS v26.

Operational definition: A "Qualified doctor" treating T2DM was defined as a doctor who was having a degree of either of the following: DM Endocrinology, MD Medicine, DNB Medicine, Diploma in Diabetology, and Fellowship in Diabetology.^[13-15]

RESULTS

A sample of 3082 participants was analyzed. The mean age was 50.26 ± 9.78 years ranging from 18 to 81 years. A total of 75.52% were males and 27.48% were females. About one-third of the participants belonged to the age group 41 to 50 years and 51 to 60 years each followed by 17.52% belonging to the age group of 31 to 40 years [Figure 1]. The mean age of the onset of diabetes was 42.96 ± 9.16 years.

As per geographical distribution, 89% were from Maharashtra, 3.1% from Karnataka, 2.1% from Gujarat, 1.2% from Goa, and 4.3% from other states and union territories. A total of 86.7% were residing in metro cities and 13.6% were in non-metro cities. Of these, 52.5% from metro cities and 8.5% from nonmetro cities preferred a qualified doctor, whereas 26.6% of the metro city residents and 4.1% of the non-metro city residents chose a nonqualified doctor.

A total of 35.8% of the study population was diabetic for 1–5 years followed by 26% of the population being diabetic for 5–10 years [Figure 2]. A total of 35.9% of the subjects were diagnosed to have diabetes as a coincidental finding without having any obvious symptoms, whereas weakness and polyuria were reported by 28.6% and 27.9%, respectively. A total of 71.2% reported not having any complications of diabetes, whereas 12.1% and 5% of the population had retinopathy and cardiovascular events, respectively [Table 1].

A total of 19.3% of the study participants received care from doctors having specialization in Diabetology/Endocrinology, whereas 41.5% received diabetes care from an adequately qualified doctor who is either MD or DNB medicine.

Table 1: Disease profile of study population (n=3082)

Parameters	Symptoms/Signs	N (%)
Symptoms at the time of diagnosis*	No symptoms	1107 (35.9)**
	Weakness	881 (28.6)
	Polyuria	861 (27.9)
	Polydipsia	643 (20.9)
	Polyphagia	623 (20.2)
	Loss of weight	428 (13.9)
	Other	468 (15.2)
Complications*	None	2195 (71.2)
	Retinopathy	373 (12.1)
	Skin lesions	297 (9.6)
	Cardiovascular events	154 (5.0)
	Neuropathy	145 (4.7)
	Nephropathy	80 (2.6)
	CNS involvement	35 (1.1)

(**Figures in parenthesis are percentage). (*Multiple responses are considered)

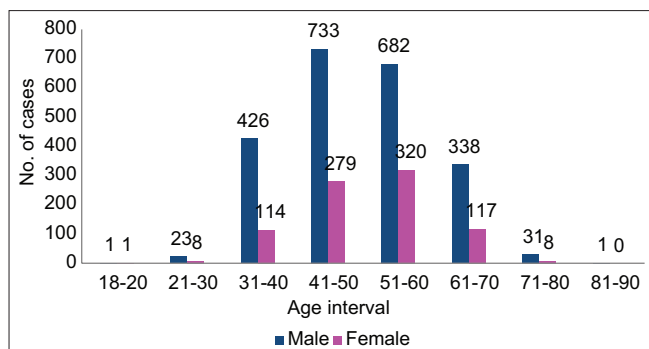


Figure 1: Age and sex-wise distribution of study population ($n = 3082$)

A total of 30.7% received diabetes care from non-qualified doctors (MBBS/Ayurvedic/Homeopathic). A total of 8.3% were unaware of the qualification of their treating doctor [Table 2].

A total of 48.2% of the participants were tested for HbA1c at the time of diagnosis. The essential investigations to be done at the time of diagnosis as given by the ADA guidelines, which are both fasting and post-prandial blood sugar and HbA1c were done by 38.1%. A total of 3% and 2.7% of the participants were diagnosed to have diabetes only on the basis of only post-prandial and fasting blood sugar, respectively. Before starting antidiabetic medications, 45.7% got their lipid profile done; 28.7%, 26.1%, 14.8%, and 18.3% got their serum creatinine, blood urea, urine micro albumin, and serum glutamic-pyruvic transaminase (SGPT) checked, respectively. A total of 15.8% were evaluated for retinopathy, 14.5% for vitamin B12, and 13.5% for vitamin D levels. After being diagnosed with diabetes, 54.9% were started with antidiabetic medication on the same day, whereas 16.4% had not started any antidiabetic medication yet [Table 2].

A total of 25.3% reported that their doctors had briefed them about reversal of diabetes through lifestyle modification. A total of 59.3% were having glucometer at their home. A total of 50.2% reported that their doctors briefed them about hypoglycemia. A total of 40.2% were visiting their doctor once in 3 months, 26.6% once in 6 months, 24.3% yearly, and 8.9% monthly [Table 2].

A Chi-square test of independence was performed to examine the qualification of treating doctors and the multiple factors associated with it. The association between these variables was significant, $\chi^2 (d. f. = 4, N = 3082) = 53.7338, P < 0.0001$ [Table 3].

DISCUSSION

A sample of 3082 participants with a mean age of 50.21 ± 9.79 years was found to have the mean age at the onset of diabetes mellitus as 42.96 ± 9.16 . The mean age of patients with new-onset of diabetes was reported to be 37.6 ± 12.7 as per a study by Rajiv Singla *et al.*,^[16] which might be due to the fact that it was conducted only among the urban population.

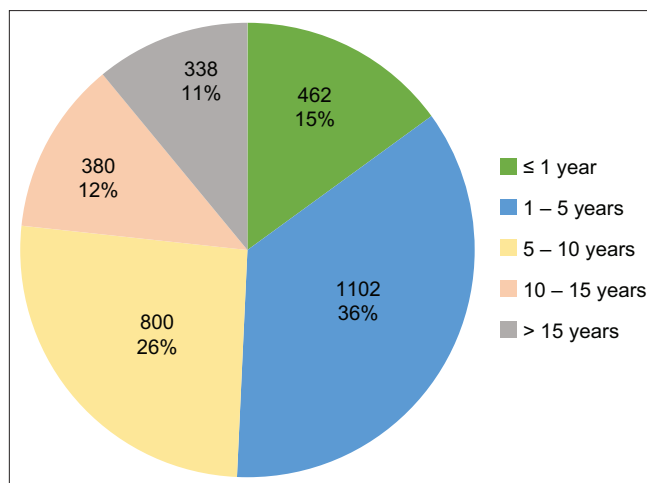


Figure 2: Population distribution with reference to period since diagnosis ($n = 3082$)

The most recent position statement issued by the ADA regarding standards of medical care in diabetes and a consensus statement by the American College of Endocrinology (ACE) and the American Association of Clinical Endocrinologists (AACE) recommend lifestyle intervention as the preferred treatment option for prediabetes and newly diagnosed diabetes up to 3 months, as it has been shown to be safe and highly effective, reducing the progression to type 2 diabetes by more than 40%.^[17,18] Although in the present study, only 25.3% of the participants were briefed about lifestyle modification by their treating doctors, 71.2% of the study population was asymptomatic, and 54.9% was started on anti-diabetic medications on the same day of diagnosis. As reported by our study, 39% of the diabetics were treated by a doctor who was not adequately qualified to treat diabetes or whose qualification was not known by them. A statistically significant association ($P < 0.0001$) was found between the qualification of treating doctor and initiation of antidiabetic medications within 3 months of diagnosis, which is against the standard guidelines. This is the condition of diabetes care given in cities where health care facilities are easily accessible and shows that lifestyle modification is not a preferred treatment offered by medical practitioners. A study by Kishore *et al.*^[19] revealed that 29% of the patients in urban and 7.5% of the patients in rural areas were not taking any treatment for diabetes. In our study, it was observed that 16.4% of the patients were not taking any antidiabetic medication, which might be due to the fact that they were following the campaign guidelines for diabetes reversal by lifestyle modification.

The ADA recommends comprehensive diabetes medical evaluation at diagnosis, follow-up every 3 months, and annual visits for investigating the complications.^[20] In this study, 40.82% of the population was investigated for HbA1c, less than half participants were evaluated for lipid profile, less than a third were evaluated for serum urea/serum creatinine, and less than a fifth were evaluated for urine microalbumin, LFT, and retinopathy, before starting antidiabetic medications.

Table 2: Treatment profile of study participants (n=3082)

Category	Parameters	N (%)	
Qualification of treating doctor	DM Endocrinology	176 (5.7)**	
	Diploma/Fellowship in diabetology	421 (13.7)	
	MD Medicine	1248 (40.5)	
	DNB Medicine	34 (1.1)	
	General practitioner: MBBS/Ayurvedic/Homeopathic	947 (30.7)	
	Don't know	256 (8.3)	
Test done at the time of diagnosis*	Fasting blood sugar only	83 (2.7)	
	Post-prandial blood sugar only	92 (3)	
	HbA1c only	104 (3.4)	
	Fasting Blood Sugar + HbA1c	65 (2.1)	
	Fasting blood sugar + HbA1c + Fasting insulin	231 (7.5)	
	Post-prandial blood sugar + HbA1c	9 (0.3)	
	Post-prandial blood sugar + HbA1c + Fasting insulin	1 (0.03)	
	Both fasting and post-prandial blood sugar + HbA1c	1174 (38.1)	
Tests done before starting medications*	Serum Creatinine/Kidney function test	883 (28.7)	
	Blood urea	805 (26.1)	
	Lipid profile	1410 (45.7)	
	Urine microalbumin	457 (14.8)	
	Eye checkup for retinopathy	487 (15.8)	
	SGPT/Liver function test	565 (18.3)	
	Serum vit B12	447 (14.5)	
	Serum vit D	415 (13.5)	
	Antidiabetic medication started after diagnosis	On the same day of diagnosis	1693 (54.9)
		Up to 1 month	454 (14.7)
1-3 months		195 (6.3)	
3 months-1 year		98 (3.2)	
After 1 year		138 (4.5)	
Not started yet		504 (16.4)	
Frequency of visits per year	Every month	275 (8.9)	
	Every 3 months	1238 (40.2)	
	Once in 6 months	819 (26.6)	
	Once in a year	750 (24.3)	
Briefed by doctor about diabetes reversal by life style modification		781 (25.3)	
Having glucometer at home		1829 (59.3)	
Briefed by doctor about hypoglycemia		1547 (50.2)	

(**Figures in parenthesis are percentage). (*Multiple responses are considered)

Table 3: Factors associated with qualification of the treating doctor

Category	Qualified doctors (n=1879)	Nonqualified doctors (n=947)
Medication started within 3 months of diagnosis	1631 (86.8)	711 (75.1)
HbA1c test done at diagnosis	949 (50.5)	389 (41.1)
Investigations for complications not done	722 (34.4)	500 (52.8)
Briefed about hypoglycemia	1019 (54.2)	454 (47.9)
Patients advised to have glucometer	1186 (63.11)	548 (56.9)

(Figures in parenthesis are percentages)

Also, only 40.2% of the population visited their doctors every 3 months after diagnosis. In a study on self-monitoring blood glucometer, only 10.7% of the respondents said they purchased a glucometer on their own, whereas others found it either too expensive or too tedious to self-monitor the blood glucose levels.^[21] In the present study, a statistically significant association ($P < 0.0001$) was found among the patients using a glucometer, awareness about the hypoglycemic episodes, and

the qualification of the prescribing doctor. It is also alarming to see that nearly half of the doctors had not informed the patients about hypoglycemia.

There are an estimated 72.96 million cases of diabetes in the adult population of India and only 3.71 lakh specialists of various faculties.^[1,14] Assuming 10% of them are qualified diabetologists, even then the doctor-patient ratio is not adequate

to handle the current epidemic of T2DM. In such a scenario, it is necessary to train the doctors belonging to various medical fraternities regarding management and standard guidelines of T2DM, so as to reduce the resulting morbidity and mortality rates.

Diabetes care is complex and requires many issues beyond glycemic control. The standard guidelines are intended to provide clinicians, patients, and researchers with the components of diabetes care, treatment goals, and tools to evaluate the quality of care.^[22] These recommendations favorably affect the health outcomes and quality of life of the patients diagnosed with T2DM and, therefore, must be followed meticulously by all the medical practitioners irrespective of their qualification and specialization. One of the important aspects our article infers is that there are parts of India where doctors with specialization are not available, which does not mean that the doctors available in that area should not be allowed to treat the patients with T2DM; however, these doctors must follow the guidelines proposed by various bodies nationally and internationally, instead of following the local trends of management of T2DM.

Lastly, it is not enough to emphasize that cost-effective management by lifestyle modification for T2DM must be promoted for diabetes reversal by all cadres of medical practitioners as suggested in the standard treatment guidelines. However, the availability of numerous lifestyle modifications around the globe, makes it difficult for the patients as well as practitioners to follow “one regime for all.” The main issue in many lifestyle modifications proposed is the dietary restrictions, which make it difficult for the patient to sustain it. Therefore, “World free of obesity and diabetes” campaign proposes a sustainable dietary regimen with negligible restrictions of “two only meals a day” [*the patient has to have a fixed time for meals; with each meal in the order of 6–8 dry fruits (no raisins, dates, apricot), then 1 bowl salad (excluding beetroot, carrots), followed by 1 bowl of sprouted beans/pulses or 2 boiled eggs, and then all food items cooked at home the individual is used to consume (excluding foodstuff containing sugar/sugar substitutes, jaggery or honey, and any sweet fruits). He can only have fluids like water, tea, or coffee without any added flavor (no sugar, jaggery, honey, sugar substitute), or diluted homemade buttermilk in between these two meals* and exercise in the form of walking at least 4.5 km within 45 min daily. The regimen proposed in the campaign is based on the concept that, by reducing the frequency of food consumption, the insulin secretion and consequently the insulin level is reduced thereby reversing the effects of hyperinsulinemia. The reduction of fasting insulin levels can be considered as a proxy indicator of reduction in insulin resistance and remission of T2DM from earlier studies.^[8–10] However, the effect of this lifestyle modification on hepatic insulin resistance has not been studied yet. This regimen can be followed by anyone and anywhere in the world, with a scope of customizing their meal choices in the part where “they can eat all food items cooked at home” and easily doable exercise regimen. In order to propose this

guideline in forthcoming studies by the campaign, it was necessary to study the current diabetes care given by various professionals in India.

CONCLUSIONS

This study has aided in adding to the pre-existing data on diabetes care given in India. The results of this study are found to be barely satisfying the global standards of diabetes care proposed by various bodies, and this is the condition in metro cities of India, which questions the care given in rural areas, where there is a scarcity of health professionals and services. Therefore, it implies the need for training and continued medical education of all the doctors belonging to different fraternities, who practice management of T2DM patients on a regular basis.

T2DM has reached epidemic proportions and is one of the leading causes of premature morbidity and mortality worldwide. Frequent eating, overeating, junk food, and low levels of physical activity are commonplace and are major factors for the global epidemic of obesity. Given that lifestyle modification is safe and cost-effective, its importance should be stressed not only upon the diagnosis of diabetes but throughout the course of the disease. Once type 2 diabetes is diagnosed, it is of utmost importance that patients receive optimum standard of care to avoid complications. Considering the high cost incurred at various steps of screening, diagnosis, monitoring, and management, it is important to realize that cost-effective measures of lifestyle modification should gain importance among all medical practitioners and should be practiced routinely.

Result-oriented, innovative programs like “World free of obesity and diabetes campaign,” are required to combat the current diabetes epidemic in India. A balanced approach to improve awareness about diabetes care and its control among the patients and medical fraternity is need of the hour.

Limitations

The results of this study are based on self-reporting by the patients. We did not verify the facts with the treating doctor. However, it can be presumed that there might not be any vested interest of any patient in providing wrong information as it was a completely voluntary activity. As the survey was conducted using google forms, only patients with the availability of smartphones/laptops/tablets would have been able to answer. This might have led to selection bias.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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