

# Assessment of quality of care of diabetic patients by health-care professionals in a city – A community-based cross-sectional study



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## ABSTRACT

**Background:** Diabetes is undoubtedly one of the most challenging health problems of the 21<sup>st</sup> century. Patients from poor parts of the Indian urban population do not frequently have access to these health benefits despite having access to reliable screening methods and antidiabetic drugs. Hence, this study was designed to assess the quality of care of diabetic patients by health-care professionals in a city. **Aims and Objectives:** This study aims to assess the quality of care of diabetic patients by health-care professionals in a city. **Materials and Methods:** A community-based cross-sectional study was conducted in the city of Aurangabad, Maharashtra. The sample size calculated was 145 and we used the probability proportionate to size sampling technique to identify the number of participants. **Results:** Overall 9% of patients had good quality of care. Almost 61.4% were dissatisfied with their treating physician. Almost all patients going to public health centers complained of the unavailability of medications whereas three-fourth (73.5%) of patients complained of unavailability of investigations. Only 23.4% of diabetic patients were referred to a specialist for screening or management of complications. **Conclusion:** Quality of care assessed through patient's opinion showed that most diabetic patients were not well informed about comprehensive diabetic management by the health-care providers. Glycemic controls in diabetic patients were far below recommended standards.

**Key words:** Diabetes; Quality of care; Public health, Non-communicable disease

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## INTRODUCTION

Diabetes is the most common metabolic syndrome and one of the most common non-communicable diseases in the world. It is the fifth leading cause of death in the world. Diabetes is undoubtedly one of the most challenging health problems of the 21<sup>st</sup> century.<sup>1,2</sup> One out of five of the people who are above 65 years old have diabetes and one in two (232 million) people with diabetes were undiagnosed. As per the 2019 update of the International Diabetes Federation's (IDF's), most recent estimates indicate that 9.3% of adults (463 million people) have diabetes, and the number of people with diabetes is set to rise beyond 578 million by 2030. India ranked 2<sup>nd</sup> in the world in terms of the private valence of diabetes after China. Current

estimates indicate that 9.6% of the adult population, 74.2 million people, have diabetes in India.

Diabetes and its complications are major causes of early death in most countries. According to IDF an update in 2019, diabetes and its related complications caused approximately 4.2 million deaths. This estimated number of deaths is similar in magnitude to the combined deaths from several infectious diseases.

To assist change when facing health concerns, it is important to identify the factors that determine the prevalence of disease throughout a nation.<sup>1-3</sup> Hence, we need to find out what are those variables that are currently affecting diabetes in India and contributing to this severe problem.

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The disadvantaged patients do not frequently have access to reliable screening techniques and antidiabetic medications, despite the fact that the urban Indian population does.<sup>4</sup> Insufficiencies contribute to an infrastructure that may lead to poor diabetes screening and preventive services, non-compliance with diabetic care recommendations, a lack of counseling resources, and commute to medical facilities. These populations were more likely to suffer from diabetic complications.<sup>5</sup> Only a few studies on diabetes care in India have given an understanding of the existing patient profile and their management.<sup>6</sup> Hence, in the above scenario, it is important to assess the quality of care provided to diabetic patients by health-care professionals and so this study was designed to assess the quality of care provided to diabetic patients in the selected city.

### Aims and objectives

This study aims to assess the quality of care of diabetic patients by health-care professionals in a city.

## MATERIALS AND METHODS

### Study design and setting

The study was a community-based cross-sectional study conducted in a city of field practice area of tertiary care Institute in Aurangabad, Maharashtra. The field practice area is located 60 km from the associated medical college and the training hospital cadres; the total population of the city was 38,376.

### Sample size (n)

According to Indian Diabetes Federation, the prevalence of diabetes in rural India is about 9.1%.<sup>2</sup> We used the software OpenEpi, Version 3, for the calculation of sample size. At 95% confidence level, we got a sample size of 127. Assuming the non-response rate of 10%, we got the sample size of 140 which is rounded up to 145.

### Study population

Previously diagnosed diabetic patients with an age of  $\geq 20$  years were regarded as the study subjects. The population  $\geq 20$  years in that area is around 23,025.<sup>7</sup>

### Inclusion criteria

All previously diagnosed diabetic patients aged  $\geq 20$  years and who were permanent residents ( $>6$  months) of the study area.

### Exclusion criteria

Pregnant and lactating mothers and those who did not consent to participate in the study were excluded from the study.

### Sampling technique

Consecutive sampling was done. From each ward, central lane (road) was identified. Then, at the entry point of

that lane right-hand house was identified, and from that house; by keeping right-hand direction; we continued door-to-door survey, till, we got proportionate patients from each ward.

### Study tool and procedure

We used a predesigned, pretested questionnaire to check the quality of care provided by health care workers among diabetic patients. The tool consisted of three sections. Section A included sociodemographic details of the patients such as age, gender, education, occupation, duration of diabetes, place of care, and any complications related to diabetes. Section B contained questions pertaining to the quality of care as assessed by glycemic control, the standard investigation battery practiced by health-care providers (HCPs), and frequency of follow-up. Section C contains HCPs awareness regarding managing diabetes. The study tool was administered to the included patients through face-to-face interview and cross verified their medical documents and compared it with Public Health Foundation of India and Indian Diabetes Association's ideal guidelines for the management of diabetes. After completing the preformed questionnaire, the patients were asked to come to the health center after an overnight fasting for blood investigations such as blood sugar (fasting and postprandial), renal function tests, and lipid profile. The quality of care by HCPs was scored based on patients' opinion regarding the care they received and clinical parameters at follow-up. An overall quality of care scores of 11 was given. Based on the quartiles, the quality of care score were classified as poor (5 or less), moderate (6–7), and good (8 or more).

### Statistical analysis

The collected data were entered into MS Excel and cleaned for any inconsistency and irrelevancy and were stored by maintaining confidentiality, and finally, data were processed for quality control. The data were statistically analyzed using IBM SPSS ver. 22.0 (IBM Corp., Armonk, NY, USA). Descriptive analyses were conducted to describe the demographic characteristics, laboratory findings, diabetes-related complication, and ideal management. Categorical variables such as gender, education status, occupation, and place of diabetes care were expressed as proportions and percentages. Chi-square test of association was used to see association between complications and duration of diabetes. One-way ANOVA was conducted to see the association of clinical parameters across overall quality of care provided to the patients. Statistical significance was attributed to  $P < 0.05$ .

### Ethical approval

This study was approved by the Institute Ethics Committee, Government Medical College, Aurangabad (Pharma/IEC-

GMCA/424/2014). We adhered to the principles of ethics throughout the study and thereafter.

## RESULTS

### General characteristics of study participants

The mean age of study participants was  $58.2 \pm 11.1$  years and mean duration of diabetes was  $7.2 \pm 5.5$  years. Among the 145 participants, 77 (53.1%) were male, 83 (57.2%) were illiterate, almost more than half, 82 (56.6%) were employed and around two-thirds, 96 (66.2%) take diabetes care at private centers. Nearly, half of the total, 81 (55.9%) participants had complication related to diabetes, 78 (53.8%) had duration of diabetes since <5 years and 28 (19.5%) had >10 years (Table 1).

### Complication versus duration since diagnosis

The most common complication was found to be hypertension (31.7%, followed by cataracts (18.6%) and diminution of vision (13.8%). Almost more than half (56.56%) of patients had one or more different types of complications (Table 2).

Here, we also found that the prevalence (%) of some complications such as hypertension, cataract, and cerebrovascular accidents increases with an increase in the duration of disease (diabetes mellitus [DM]) (Figure 1).

### Laboratory finding of study participants

Nearly more than half, 82 (56.5%) patients had abnormally high fasting blood sugar (FBS) ( $\geq 126$  mg %) and 92 (63.4%) patients had abnormally high postprandial

blood sugar (PPBS) ( $\geq 200$  mg %), that is, uncontrolled DM. Mean value of FBS was  $140.0 \pm 53.4$  mg/dl whereas mean value of PPBS was  $230.9 \pm 82.9$  mg/dl. Almost 26 (17.9%) diabetic patients had abnormal ( $\geq 1.2$  mg/dl) creatinine level whereas 24 (16.5%) diabetic patients had abnormal ( $\geq 200$  mg/dl) cholesterol level.

### Ideal management of DM

Table 3 shows the poor quality of management of diabetic patients. Physicians are not following ideal guidelines. Only 6.8% of diabetic patients were classified by physicians as type 1 DM, type 2 DM, or others. At index visit, all (100%) patients underwent FBS and PPBS testing, only 0.7% underwent HbA1c, 2.6% underwent (LFT), 3% underwent kidney function test (KFT), lipid profile by 2.6%, dilated retinal examination by 2.6%, and electrocardiogram (ECG) by 6.8% diabetic patients only. For every 3 months; about 77% of patients were checked for their FBS and PPBS and only 0.7% of patients were getting their HbA1c checked. None of the diabetic patient were going for recommended annual check-up. Only 6.8% of diabetic patients were having their treatment plan and only 12% of diabetic patients received graded diabetic education.

### Quality of care provided to diabetic patients

Quality of care assessed through patient's opinion shows that only 43.4% of diabetic patients were well informed about comprehensive diabetic management by the HCP. About 61.4% were not satisfied with the treating physician. Almost all (100%) patients going to public health center complaints of unavailability of medication while three-fourth, 73.5% of the patient complaint of unavailability of investigation regarding diabetes management. Less than one-fourth, 23.4% of diabetic patients were referred to specialists for screening or management of complications. Not even a single patient carries a diabetic identification card (Table 4).

### Association of clinical parameters across overall quality of care provided to the patients

We found that among total participants, 87 (60%) had poor, 45 (31%) moderate, and only 13 (9%) had good quality of care. FBS, PPBS, cholesterol, and blood pressure of diabetics were found to be statistically significant ( $P < 0.05$ ) across three categories of quality of care. Creatinine level and body mass index were not found to be statistically significant (Table 5).

### Awareness about diabetes management among public HCPs

A total of five HCPs were asked about the management of DM. None of the HCPs were trained in diabetic management during their service period. Only 20% of HCP updated their knowledge regarding diabetes

**Table 1: Sociodemographic profile of diabetic patients (n=145)**

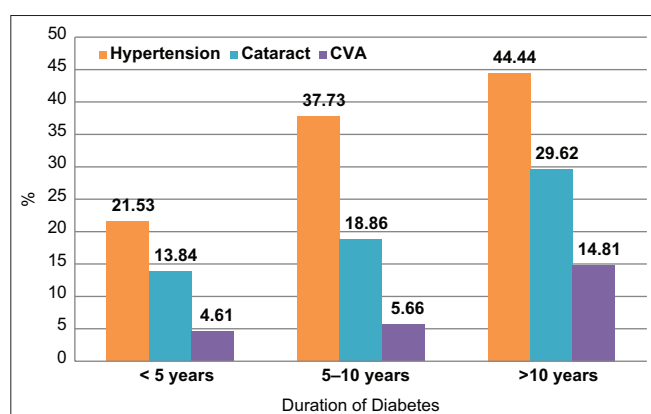
Variable	n	%
Age (year). ([mean (SD)])	58.2±11.1	-
Gender		
Male	68	46.9
Female	77	53.1
Education status		
Illiterate	62	42.8
Literate	83	57.2
Occupation		
Unemployed	63	43.4
Employed	82	56.6
Duration of diabetes (Year) (mean [SD])	7.2±5.5	
<5 years	78	53.8
5–10 years	39	26.7
>10 years	28	19.5
Place of diabetes care		
Government	49	33.8
Private	96	66.2
Complication related to diabetes		
Absent	64	44.1
Present	81	55.9

SD: Standard deviation

**Table 2: Distribution of diabetic patients according to duration since diagnosis and development of complication (n=145)**

Complication	Duration of diagnosis of diabetes			Total* (%)
	<5 years	5–10 years	>10 years	
Hypertension	14 (21.53)	20 (37.73)	12 (44.44)	46 (31.72)
Cataract	9 (13.84)	10 (18.86)	8 (29.62)	27 (18.62)
Diminution of vision	10	9	1	20 (13.79)
CVA	3 (4.61)	3 (5.66)	4 (14.81)	10 (6.89)
IHD	3	0	4	07 (4.82)
Peripheral neuropathy	5	1	1	07 (4.82)
Diabetic foot	1	0	3	04 (2.75)
Blindness	2	0	1	03 (2.06)
No complication	31	20	12	63 (43.44)
Total patients**	65 (44.82)	53 (36.55)	27 (18.62)	145 (100)

Figures in parenthesis indicate percentages, \*total number of complications is more than actual numbers of patients having complication as some patients have more than 1 complication, \*\*total patients diagnosed in the past 5 years were 44.8%; between 5 and 10 years were 36.5%, and patients diagnosed since more than 10 years were 18.6%. Mean treatment duration was  $7.2 \pm 5.5$  years



**Figure 1:** Distribution of diabetic patients according to duration since diagnosis and development of complication

management. Almost 40% of HCP knew about newer drugs in diabetes. About 80% of HCPs knew about the complication of diabetes but only 20% were able to manage diabetic complications. Only 20% of HCPs knew about the National Programme for Prevention and Control of Cardiovascular Disease, Diabetes, Cancer, and Stroke.

## DISCUSSION

By 2035, up to 109.0 million people in India could have DM, which would rank second only to China (142.7 million). Although reliable screening techniques and antidiabetic drugs are accessible to the urban Indian population, patients from poor backgrounds do not frequently have access to these health benefits.<sup>4</sup> Inadequacies may lead to poor diabetes screening and preventative services, non-compliance with diabetic treatment recommendations, a lack of counseling services, and excessive travel times to medical facilities. Diabetes problems were more prevalent in these populations.<sup>5</sup> Only a few research on diabetes care in India have offered information on the patient profile at the moment and how they are managed.<sup>6</sup>

## Quality of care

In this study, the quality of care assessed through patient's opinion showed that more than 50% of patients were not well informed about comprehensive diabetic management, by the HCP. Almost 61% were not satisfied with treating physician. Only 23% of patients were referred to specialist such as ophthalmologist or cardiologist or nephrologist. No single patients carried medical identification card about diabetes. All 49 patients taking treatment at public hospital had complaint of frequent unavailability of drugs and sometime blood investigations too. In the present study, we found that chances of some complications such as hypertension, cataract, and CVA increased with increase in duration of disease (DM). The most common complications were hypertension (31.7%) followed by cataract (18.6%) and diminution of vision (13.8%). Nearly half, 56.56% of patients had one or more different type of complications. The mean duration of diabetes in our study was  $7.19 \pm 5.5$  years.

This study showed poor quality of management of diabetic patient. Physicians were not following ideal guidelines. Almost more than 90% of patients were not managed properly. We found that only 7% of patients were classified under different types of diabetes. At index visit, 100% of patients got FBS and PPBS done; but rest of routine investigation were almost neglected. Observation of our study about investigation at index visit was FBS and PPBS (100%), HbA1c (0.7%), LFT (2.6%), KFT (3%), lipid profile (2.6%), and ECG (6.8%). Only 7% of patients knew about their treatment plan and 12% of patients received graded diabetic education from health-care providers.

Similar to our findings, Venkataraman et al., also reported that it is challenging to monitor and guarantee high-quality services everywhere due to the diversity of health-care providers and the absence of national standards and procedures for health-care services, including requirements

**Table 3: Distribution of diabetic patients according to ideal management of diabetes mellitus as per Indian Diabetes Federation (n=145)**

S.no.	Ideal management of DM	Observation recorded through patients interview and medical record (in %)
1.	Classification of DM	6.8
2.	Identifying associated complications	56.4
3.	Investigations planned and carried out	
Index visit	FBS and PP	100.0
	HbA1C	0.7
	LFT	2.6
	KFT	3.0
	Lipid profile	2.6
	Dilated retinal examination	0.7
	Detailed feet examination	2.6
	ECG	6.8
	CXR (if clinically indicated)	0.0
	Once in 3 months	FBS and PP
	HbA1C	0.7
Once in 6 months	Lipid profile	2.0
Annual check-up	All test of index visit	0.0
4.	Treatment plan	6.8
5.	Graded diabetic education	12.0

LFT: Liver function test, KFT: Kidney function test, CXR: Chest X-ray, ECG: Electrocardiogram, DM: Diabetes mellitus, FBS: Fasting blood sugar, PP: Postprandial

**Table 4: Assessment of quality of care provided to diabetic patients (n=145)**

Questions regarding quality of care	Yes (%)
Information given about your diabetes management plan	63 (43.4)
Natures of complaints	
Any complaints about health-care provider	89 (61.4)
Doctors did not examine properly	78 (53.8)
Unavailability of medication in pH facility (n=49)	49 (100.0)
Unavailability of investigation in pH facility (n=49)	36 (73.5)
Were you referred to any specialist?	34 (23.4)
Do you carry medical identification card about DM?	00 (00.0)

for employees, facilities, and treatment protocols. George et al., reported that the blood pressure is the only parameter which is regularly monitored in majority (93%) of the diabetics. Hb1AC, low-density lipoprotein cholesterol, and eye check-up were less common and done only in 40%, 52.6%, and 56.8% of diabetics, respectively. Only 33 (17.37%) had at least five of the seven essential parameters monitored at least once in the last year. The improved investigation facility reported by George et al., may be due to fact that their study was conducted at tertiary care hospital.

We found that about 56% of patients had uncontrolled FBS while 63% of patients had uncontrolled PP blood sugar. Abnormally high cholesterol and creatinine level were found in 16.5% and 18% of patients, respectively. This highlights the failure of health-care providers to manage diabetic patients appropriately. If not taken care immediately, many patients will have permanent organ damage and risk of premature death.

**Table 5: Association of clinical parameters across overall quality of care provided to the patients (n=145)**

Variables	Quality care (Mean±SD)		
	Poor (87)	Moderate (45)	Good (13)
FBS (mg%)*	155±59	120±33	110±34
PPBS (mg%)*	255±84	198±66	187±73
Creatinine (mg%)	0.8±0.3	0.9±0.3	0.7±0.2
Cholesterol (mg%)*	188±36	173±19	175±17
Blood pressure (mmHg)*	152±24	134±24	134±23
BMI (kg/m <sup>2</sup> )	21.7±3.5	21.6±3.7	21.7±3.7

\*-Statistically significant for overall quality of care across FBS, PPBS cholesterol levels, and blood pressure by ANOVA. FBS: Fasting blood sugar, PPBS: Postprandial blood sugar, BMI: Body mass index, SD: Standard deviation

Similar to our study; Venkataraman et al.,<sup>6</sup> Raheja et al.,<sup>8</sup> Nagpal and Bhartia,<sup>9</sup> Joshi et al.,<sup>10</sup> and George et al.,<sup>11</sup> described the poor quality of care against standard care expected. A wide gap exists between practice recommendations and delivery of diabetes care. There is a need to create the local standards of care and clinical practice guidelines for the management of diabetes that are easily accessible and available to the health-care professionals and applicable to our country at the national level.

#### Limitations of the study

The study was conducted in a city that is a field practice area of our medical college. This area may not be representative of the other urban area of India.

## CONCLUSION

Quality of care assessed through patient's opinion showed that most diabetic patients were not well-informed about comprehensive diabetic management by the HCPs. Glycemic controls in diabetic patients were far below recommended standards and attempts to prevent, detect early, and manage chronic complications of diabetes were very poor. The HCPs were not trained in ideal management of diabetes management.

Doctors working at the secondary level of health care should give adequate and repeated counseling regarding comprehensive diabetic care. Effective referral systems for diabetic patients to tertiary care for complicated diabetic patients should be made available and functional. IEC activities for the diabetic patient should be arranged at the taluka level so that diabetic patients will be updated and will take adequate self-care.

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### Authors' Contributions:

**RTA**- Concept and design of the study, prepared the first draft of the manuscript; **MKD**- Concept, coordination, and revision of the manuscript; and **PK**- Interpreted the results, reviewed the literature and statistical analysis and interpretation, and preparation of the manuscript.

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