

# An epidemiological study to assess the risk factors and complications among patients with diabetes: A community-based study in Ahmedabad

Arjunkumar H Jakasania, Grishma T Dixit, Farzana Mansuri, Parimal Patel

Department of Community Medicine, B.J. Medical College, Ahmedabad, Gujarat, India

Correspondence to: Arjunkumar H Jakasania, E-mail: aarrjuunn999@gmail.com

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## ABSTRACT

**Background:** Diabetes mellitus (DM) is a chronic metabolic disease. The prevalence of diabetes is reaching epidemic levels worldwide, more so in developing countries like India due to rapid urbanization. Type 2 DM is a progressive disease and hampers the quality of life of the patients due to micro- and macro-vascular complications. **Objective:** The aim of this study is to know the prevalence of risk factors and complication of diabetes in the slums of Ahmedabad. **Materials and Methods:** A community-based cross-sectional study was carried out by randomly selected 70 patients with diabetes in the slum areas of Ahmedabad Municipal Corporation. Predesigned and pre-tested semi-structured questionnaire was used to collect the data regarding sociodemographic profile, risk factors, and complications of diabetes. **Results:** Among the 70 study participants, 40 (57%) were males and 30 (43%) were females. Diabetes was more common among that above age of 50 years followed by 41-49 years. Prevalence of modifiable risk factors is high such as obesity is 57%, physical inactivity is 57%, tobacco addiction is 26%, and alcohol addiction is 17% in diabetes patients. Prevalence of hypertension is 67% in all patients with diabetes. Diabetic complications are found such as neuropathy in 54%, retinopathy is in 30%, coronary artery disease is in 13%, and nephropathy in 8.5%. **Conclusion:** Obesity, physical inactivity, and hypertension are the more prevailing risk factors in the study group. Neuropathy and retinopathy are a more prevailing complication in the study group. Lifestyle modification, regular monitoring of emerging complication, and treatment of complication will definitely reduce the burden of DM.


**KEY WORDS:** Prevalence; Diabetes; Risk Factors; Complications; Anthropometry

## INTRODUCTION

Diabetes mellitus (DM) is a chronic metabolic disease.<sup>[1]</sup> Diabetes has led to increased morbidity and mortality.<sup>[2]</sup> The prevalence of diabetes is reaching epidemic levels worldwide,<sup>[3,4]</sup> more so in developing countries like India due to rapid urbanization.<sup>[5,6]</sup> The World Health Organization (WHO) has estimated that the number of

people with DM is expected to rise from 171 million in 2000 to 366 million in 2030, as a result of population aging and urbanization.<sup>[7]</sup> Urbanization through faulty dietary habits, sedentary lifestyle, and stress has contributed to a rise in levels of overweight and obesity increasing the risk of diabetes. Individuals with a family history of diabetes are at higher risk of developing the condition.<sup>[8,9]</sup> Besides their reduced productivity, diabetes further imposes a high economic burden in terms of health-care expenditure, lost productivity, and foregone economic growth.<sup>[10]</sup> The total direct cost of the management of diabetes has doubled in 2005 compared to 1998 levels.<sup>[6]</sup>

Gujarat is also affected by the epidemic of DM. Many studies on diabetes prevalence have been conducted in India, but few data have been available about the diabetic patients of

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Gujarat. Gujarat is one of the economically prosperous states with which comes a modern lifestyle placing the population at increased risk of many non-communicable diseases including DM.<sup>[11]</sup> Based on few prevalence studies, nearly 6-10% of the total population of Gujarat is diabetic.<sup>[12,13]</sup>

Type 2 DM (T2DM) is a progressive disease and hampers the quality of life of the patients due to micro- and macro-vascular complications. The complications related to diabetes pose a significant health-care burden and a deterrent to the overall quality of life. The Chennai urban population study and Chennai urban rural epidemiology study are one of the few population-based studies on complications of diabetes in India and show that there is a huge burden due to diabetes-related complications in India. The prevalence of diabetic retinopathy (DR) was 17.6%, microalbuminuria in 26.9%, neuropathy was 26.1%, coronary artery disease (CAD) was 21.4%, and peripheral vascular disease was 6.3%.<sup>[13-7]</sup> This translates to millions of people in India with each of the complications of diabetes and many with multiple complications. The cost of treatment for diabetic complications adds to the health-care costs.

Multiple studies have shown that lifestyle behaviors such as regular physical activities and healthy dietary choices are associated with lower risk of developing diabetes.<sup>[14]</sup> Considering diabetes being a chronic disease that lasts for a lifetime it has important financial implications for individual patients as well as a burden for the country.<sup>[15]</sup> Therefore, prevention is important from financial viewpoint also. There is a need to increase awareness of risk factors and how to prevent them in the population.<sup>[16]</sup> The study of the risk factors profile and early assessment of sign and symptoms of complications in patients with diabetes is important for their better management and including the provision of preventive services. Hence, the current study was carried out with an objective to study the risk factors and complications of diabetes among the diabetic patients.

## MATERIALS AND METHODS

The current cross-sectional study was carried among the known case of diabetes residing in the slum area of Ahmedabad Municipal Corporation (AMC). Random sampling was carried out to recruit the study participants. House-to-house survey was carried out to know the diabetic patients in the conveniently selected slum areas of AMC. All the participants ( $n = 70$ ) present at the time of my visit to slum area was interviewed after taking their verbal consent. Pre-tested and pre-designed semi-structured questionnaire was used to collect the data. Blood pressure was measured by standard technique using mercury sphygmomanometer. Recording of blood pressure was done after the participants had rested for at least 5 min and two readings for blood pressure were measured 5 min apart, and mean of the two

records was considered the actual blood pressure to be recorded. Weight and height were measured by standard techniques using calibrated an adult weighing scale and stadiometer, respectively. The WHO standard definitions were used to categorize physical activity, body mass index (BMI), hypertension, and diabetic complications. The collected data were entered, compiled, and analyzed using Microsoft Office Excel-07.

## RESULTS

### Sociodemographic Characteristic

Out of total 70 patients interviewed, 57% were male and 43% were female. About 40% of the cases were observed in the age group of 50-59 years (18 male and 10 female), followed by 25.5% in the age group of 60-69 years and 24.5% in the age group of 40-49 years. Most of them (80%) were following Hindu religion. Almost half of the patients (60%) were from OBC caste followed by unreserved category (32.5%). Out of total 70 patients interviewed, almost half of the participants (51%) were having education till secondary, and 23% were illiterate. Almost one-third of them, 23 (33%) are retired or unemployed at present, and the majority of them are married and living with a partner (Table 1).

### Risk Factors

After assessing the anthropometric parameters, by doing height and weight measurement, we have calculated BMI ( $\text{kg}/\text{m}^2$ ) and waist-to-hip ratio (WHR). We have considered the person as obese as per abovementioned criteria in methodology. Out of total 70 participants, 12 (17%) were obese as per BMI ( $\text{kg}/\text{m}^2$ ) out of them 6 were male and 6 were female, and as per WHR, 40 are obese including 15 male and 25 female (Table 2).

After assessing the prevalence of the modifiable lifestyle-related risk factors, out of total 70 patients, 40 (57%) are found to be physically inactive, and out of them, 22 were male and 18 were female. Out of total 70 patients, 18 (25.5%) and 12 (17%) are addicted to tobacco alcohol, respectively. After assessing past and family history of diabetic patients, data show that out of 70 patients, 32 (45.5%) were having positive family history of diabetes, and out of them, 20 were male and 12 were female. Almost two-third of the patients (64%) were found to be hypertensive, and out of them, 23 were male and 24 were female (Table 2).

### Prevailing Complications in the Patients with Diabetes

After assessing the history of a complication of diabetes, we have found that out of total patients, almost half of the participants (54%) were having diabetic neuropathy among them 18 were male and 20 were female. Almost one-third (30%) of the subjects were found to have DR, 13% were found

**Table 1:** Sociodemographic profile of diabetic patients

Parameters	Male	Female	Total (%)
Age (years)			
20-29	2	1	3 (4.0)
30-39	3	1	4 (5.5)
40-49	11	6	17 (24.5)
50-59	18	10	28 (40)
60-69	6	12	18 (25.5)
Religion			
Hindu	35	21	56 (80.0)
Muslim	5	9	14 (20.0)
Caste			
UR	18	5	23 (32.5)
OBC	19	23	42 (60.0)
SC	1	1	2 (3.0)
ST	2	1	3 (4.0)
Education			
Illiterate	4	12	16 (23.0)
Primary	12	14	26 (37.0)
Secondary	14	3	17 (24.0)
Graduate	7	0	7 (10.0)
Postgraduate	3	1	4 (5.5)
Occupation			
Unemployed/retired	4	19	23 (33.0)
Employed	36	11	47 (67.0)
Marital status			
Married	39	30	69 (98.5)
Unmarried	1	0 (0)	1 (1.5)
Total	40 (57.0)	30 (43.0)	70 (100)

**Table 2:** Distribution of lifestyle-related risk factors among diabetic patients

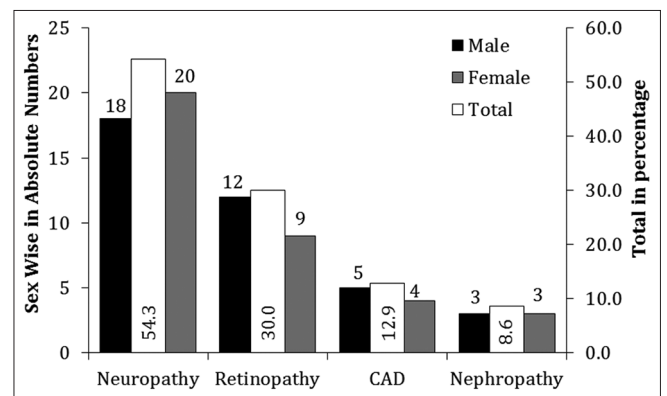
Risk factors	Male	Female	Total (%)
Hypertension	23	24	47 (64.0)
Physical inactivity	22	18	40 (57.0)
Obesity/WHR	15	25	40 (57.0)
Family history	20	12	32 (45.5)
Tobacco	16	2	18 (25.5)
Obesity/BMI	6	6	12 (17.0)
Alcohol	10	2	12 (17.0)

WHR: Waist-to-hip ratio, BMI: Body mass index

to have CAD, and 8% were having diabetic nephropathy (Figure 1).

**DISCUSSION**

DM is a major public-health problem nowadays among the non-communicable diseases. Its prevalence is rising in developing countries. India is considered the diabetes capital of the world. Individuals with T2DM are on high



**Figure 1:** Prevaling diabetic complication among the study group (n = 70)

priority for rapid evaluation and halt the progress of the pathophysiology of diabetes so that it's complications can be prevented.

This study presented data from the diabetes patients in the community. Our main motivation for this study is to identify the existing risk factors and the complication. Our study has shown that majority of the patients were in the geriatric age group. A study by Patel et al., in a private hospital from the city of Ahmedabad in Gujarat, has shown the proportion of geriatric patients (defined as >55 years in their study) to be only one-fourth.<sup>[17]</sup> The difference may be because a large number of younger patients with diabetes coming from lower socioeconomic class catered by our hospital may not be detected early for the reasons of non-awareness about the disease. The awareness among the population served by the hospital in the study by Patel et al. may be high so that patients are detected at an early age.

With regard to our findings related to nutritional status, more than 15% of our patients were in the obese category as per their BMI, whereas in the study by Patel et al., almost 70% of their patients were in the obese category. A study by Shrivastava et al. from Rewa city in Madhya Pradesh showed that 55% of their patients were obese and another 22% were overweight.<sup>[18]</sup> More than 50% of patients are found to be obese as per WHR.

Our study showed almost half of the diabetic patients to be hypertensive. Similar findings were observed in the study by Patel et al.<sup>[17]</sup> A study by Venugopal et al., from Christian Medical College, Ludhiana, showed a quarter of the patients to be hypertensive and as high as 50% being pre-hypertensive.<sup>[19]</sup> Even a community-based study by Basavegowda et al. from the urban slums of the city of Mysore showed the prevalence of hypertension among patients with diabetes to be around 65%.<sup>[20]</sup>

Our study shows the prevalence of diabetic complication such as neuropathy, retinopathy, cardiovascular disease, and

nephropathy to be 54%, 30%, 13%, and 8.5%, respectively. The another study by Mohan *et al.* from all over India has shown the prevalence of neuropathy (24.6%) was the most common followed by cardiovascular (23.6%), renal (21.1%) and eye (16.6%) complications.<sup>[21]</sup> The difference between the prevalence of two study might be due to two different study population and their different sociodemographic variables.

The present study was conducted in the slums of Ahmedabad by the house-to-house survey. The anthropometric measurement was done by only one investigator with a periodically calibrated instrument to eliminate bias in the study. A detailed history was assessed to rule out complications, and medical case sheets were also checked for the reference. In the current study, only selected variables of interest are included in this study with small sample size which is the limitations of the study.

The present study critically evaluated the prevalence of major risk factors and complications of diabetes, in the patients with diabetes. The current study shows that risk factors for diabetes such as obesity, physical inactivity, and hypertension are more prevailing. Neuropathy and retinopathy are a more prevailing complication in the study group. Patients can live healthier and delay the progression of the complication by reducing associated modifiable risk factor. Lifestyle modification, regular monitoring of emerging complication, and treatment of complication will definitely reduce the burden of DM.

## CONCLUSION

Obesity, physical inactivity, and hypertension are the more prevailing risk factors in the study group. Neuropathy and retinopathy are a more prevailing complication in the study group. Lifestyle modification, regular monitoring of emerging complication, and treatment of complication will definitely reduce the burden of DM.

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