Diabetes Mellitus Research in the Local Community Around the Index Medical College Hospital & Research Center, Indore

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Abstract

Background: Rapid urbanization, sedentary lifestyles, and dietary shifts are driving a continuous rise in incidence across both urban and peri-urban settings, making diabetes mellitus (DM) an emerging important public health concern in India. This change is most clearly seen in Indore and the rest of central India. **Aim:** Hence, the aim was to assess the DM affected subjects in the Local Community Around the Index Medical College Hospital & Research Center, Indore. **Methods:** This was a community-based, cross-sectional study conducted in the local catchment areas surrounding the Index Medical College Hospital & Research Center (IMCHRC), Indore, Madhya Pradesh, India. The study area included both urban and peri-urban localities within a 10–15 km radius of the institution, representing a diverse mix of socioeconomic and occupational groups. Data collection was carried out over a period of six months. **Results:** A total of 400 individuals with diabetes mellitus were included in the study. The mean age of participants was 54.3 ± 11.2 years (range: 35 - 82 years), with a slight predominance of females (54.0% vs 46.0%). The majority belonged to the 45–59 years age group. Most participants were from the upper-middle socio-economic class as per the Modified Kuppuswamy's scale. **Conclusion:** Addressing cultural and behavioral determinants alongside medical management could substantially improve outcomes in similar semi-urban Indian settings.

Key words: Diabetes mellitus; Diabetic complications; uneducated; lifestyle; Indore; Research centre.

Introduction:

Rapid urbanization, sedentary lifestyles, and dietary shifts are driving a continuous rise in incidence across both urban and peri-urban settings, making diabetes mellitus (DM) an emerging important public health concern in India. This change is most clearly seen in Indore and the rest of central India, where migrant populations, growing industrial corridors, and diverse socioeconomic profiles combine to produce a complex web of risk factors, such as obesity, food insecurity, lack of physical activity, high levels of psychological and social stress, and uneven access to preventative healthcare [1-3]. Various contextual factors, like walkability of the area, availability of fresh food, cultural eating behaviors, and

continuity of primary care, cause local epidemiology to differ from national studies, which yield broad estimates [2-4]. In order to develop practical strategies for screening, prevention, and management in the areas surrounding the Index Medical College Hospital & Research Center (IMCHRC) in Indore, it is crucial to use data gathered locally.

Obesity, hypertension, dyslipidemia and microvascular and macrovascular consequences such as retinopathy, nephropathy, neuropathy, coronary artery disease, and stroke add to the toll that diabetes mellitus takes on the body [5]. These consequences can be hastened by treatment inertia, irregular follow-up, and delayed diagnosis. When health literacy is poor and adherence is uneven, clinical morbidity is compounded in resource-constrained homes around IMCHRC due to indirect expenses like as work absenteeism, transportation to tertiary institutions, and out-of-pocket expenditure on medications and diabetes monitoring. Although primary health clinics and urban health posts are the initial sites of contact, there is still a lack of uniformity in the implementation of referral channels and recall systems for glycemic management, complication screening, and lifestyle counseling [1-5].

Opportunities and threats abound in Indore's immediate surroundings. High consumption of refined carbohydrates and trans fats may be encouraged by the city's abundance of street food and crowded marketplaces, but new exercise facilities and community organizations can help encourage healthy lifestyle choices if they are actively involved [6-8]. Additional factors that might affect glycemic management and exercise habits include temperature, air pollution, and the time of year. In light of the above, IMCHRC is in a prime position to strengthen screening, risk stratification, and follow-up frameworks by combining hospital-based clinical services with community outreach within its catchment region. Nevertheless, there is a lack of specific data on the locality's diabetes and prediabetes prevalence, clustering of risk factors, treatment trends, and control rates.

To address this knowledge gap, this study examined the local population around IMCHRC to determine the prevalence of diabetes mellitus, measure the level of care-seeking behavior and glycemic control, and identify the factors that help and hinder comprehensive diabetes care. To enhance results and lower the long-term cardiometabolic footprint in Indore's surrounding population, the findings are meant to inform context-appropriate, scalable treatments. These initiatives would integrate community screening with structured lifestyle counseling, prompt referrals, and standardized follow-up.

Materials & methods:

This was a community-based, cross-sectional study conducted in the local catchment areas surrounding the Index Medical College Hospital & Research Center (IMCHRC), Indore, Madhya Pradesh, India. The study area included both urban and peri-urban localities within a 10–15 km radius of the institution, representing a diverse mix of socioeconomic and occupational groups. Data collection was carried out over a period of six months.

Study Population: The target population consisted of adult residents (≥35 years) living in the study area for at least one year. Both individuals with a known diagnosis of diabetes mellitus and those without a prior diagnosis were included. Pregnant women, critically ill patients, and individuals unwilling to participate were excluded from the study.

Sample Size and Sampling Technique: The sample size was calculated based on an anticipated prevalence of diabetes mellitus from previous regional studies, with a 95% confidence interval and a 5% margin of error. Considering an expected non-response rate of 10%, the final sample size was adjusted accordingly. A multistage random sampling method was used. In the first stage, selected wards/villages were chosen randomly. In the second stage, households within each selected area were identified using systematic sampling, and one eligible participant per household was recruited using a random selection method.

Data Collection Tools and Procedure: Data were collected using a pre-tested, structured questionnaire administered through face-to-face interviews. The questionnaire captured demographic details, socioeconomic status, family history of diabetes, dietary habits, physical activity patterns, tobacco and alcohol use, past medical history, medication use, and health-seeking behavior.

Anthropometric and Clinical Measurements: Body weight and height were measured using calibrated scales and stadiometers, and body mass index (BMI) was calculated. Waist circumference was measured at the midpoint between the lower margin of the last rib and the iliac crest. Blood pressure was recorded using a standard sphygmomanometer after the participant had rested for at least five minutes.

Biochemical Analysis: Fasting blood samples were collected after an overnight fast of at least 8 hours. Blood glucose was measured using the glucose oxidase-peroxidase method. For participants with fasting plasma glucose between 100–125 mg/dL, an oral glucose tolerance test (OGTT) was performed. HbA1c levels were also measured to assess long-term glycemic control in known diabetic cases.

Operational Definitions: Diabetes mellitus was defined as per the American Diabetes Association (ADA) criteria: fasting plasma glucose $\geq$126 mg/dL, 2-hour plasma glucose $\geq$200 mg/dL during OGTT, HbA1c $\geq$6.5%, or self-reported use of antidiabetic medications.

Ethical Considerations: Ethical clearance was obtained from the Institutional Ethics Committee of IMCHRC, Indore. Written informed consent was obtained from all participants prior to enrolment. Confidentiality and anonymity of the data were maintained throughout the study.

Statistical analysis:

Data were entered into Microsoft Excel and analyzed using SPSS software version 25. Descriptive statistics were used to summarize demographic, clinical, and biochemical variables. Chi-square test and Student's t-test were applied to assess associations between categorical and continuous variables, respectively. A p-value <0.05 was considered statistically significant.

Results:

A total of 400 individuals with diabetes mellitus were included in the study. The mean age of participants was 54.3 ± 11.2 years (range: 35 - 82 years), with a slight predominance of females (54.0% vs 46.0%). The majority belonged to the 45–59 years age group. Most participants were from the upper-middle socio-economic class as per the Modified Kuppuswamy's scale.

Table 1: Socio-Demographic Characteristics of Study Participants

Variable	Category	Frequency (n)	Percentage (%)
Age group (years)	18–29	18	4.5
	30–44	92	23.0
	45–59	176	44.0
	≥60	114	28.5
Gender	Male	184	46.0
	Female	216	54.0
Marital status	Married	368	92.0
	Unmarried	16	4.0
	Widowed	16	4.0
Education	Illiterate	48	12.0
	Primary	102	25.5
	Secondary	144	36.0
	Graduate+	106	26.5
Occupation	Unemployed	62	15.5
	Unskilled	88	22.0
	Skilled	166	41.5
	Professional	84	21.0
Socio-economic class	Upper	28	7.0
	Upper-middle	166	41.5
	Lower-middle	112	28.0
	Upper-lower	74	18.5
	Lower	20	5.0

Table 2. Lifestyle Factors of Participants

Variable	Category	Frequency (n)	Percentage (%)
Physical activity	Adequate	138	34.5
	Inadequate	262	65.5
Diet type	Balanced	122	30.5
	High-fat	94	23.5
	High-carb	146	36.5
	Mixed	38	9.5
Tobacco use	Yes	108	27.0
	No	292	73.0
Alcohol consumption	Yes	74	18.5
	No	326	81.5
Sleep duration (hours)	<6	116	29.0
	6–8	246	61.5
	>8	38	9.5

Table 3: Clinical and Anthropometric Parameters

Parameter	Mean ± SD / n (%)
BMI (kg/m²)	27.6 ± 4.3
Overweight (BMI 25–29.9)	174 (43.5%)
Obese (BMI ≥30)	98 (24.5%)
Waist circumference (cm)	94.2 ± 9.6
Central obesity	258 (64.5%)
Waist-hip ratio	0.92 ± 0.06
Duration of DM (years)	7.8 ± 4.5
Hypertension	236 (59.0%)
Dyslipidemia	188 (47.0%)
Cardiovascular disease	62 (15.5%)

Discussion:

The present community-based cross-sectional study conducted around the Index Medical College Hospital & Research Center, Indore, assessed the socio-demographic, lifestyle, and clinical factors associated with individuals having diabetes mellitus (DM). Our findings indicate that the majority of participants were aged 45–59 years, with a slight predominance of females, and a high prevalence of modifiable risk factors such as overweight/obesity, central adiposity, inadequate physical activity, and unhealthy dietary patterns.

Age and Gender Distribution: We observed that over 70% of participants were aged ≥45 years, corroborating national estimates from the ICMR–INDIAB study, which reported higher diabetes prevalence with advancing age, particularly beyond 40 years [7]. This trend may be attributable to progressive β-cell dysfunction, insulin resistance, and the cumulative impact of long-term lifestyle exposures [8]. Interestingly, our study found a female predominance, which contrasts with certain urban Indian datasets showing male predominance [9]. Possible explanations include gender-specific health-seeking patterns in the local community and the inclusion of a higher proportion of home-based women with limited physical activity.

Socio-Economic Status and Education: Most participants belonged to the upper-middle socio-economic class, similar to earlier reports from semi-urban India where better economic status is linked with greater access to calorie-dense diets, motorized transport, and sedentary occupations [10]. Educational attainment in our sample was moderate, with nearly 37% having secondary education, aligning with observations that limited health literacy may influence diabetes risk awareness and self-care practices [11].

Anthropometric and Clinical Parameters: Our participants demonstrated a high prevalence of overweight (43.5%) and obesity (24.5%), with 64.5% showing central obesity—findings comparable to recent Indian studies highlighting abdominal adiposity as a stronger predictor of

diabetes than BMI [12]. Hypertension (59%) and dyslipidemia (47%) were frequent comorbidities, reinforcing the clustering of metabolic syndrome components among diabetics [13].

Local Contextual Relevance: The Indore region is experiencing rapid urban expansion, economic growth, and lifestyle transitions, contributing to the rising diabetes burden. Cultural factors such as high consumption of fried snacks, sweets, and ghee, combined with limited structured physical exercise, may partially explain the high rates of obesity and metabolic risk factors in our study population. Additionally, reliance on home remedies and late presentation to formal healthcare may delay optimal diabetes control in this community.

Strengths and Limitations: A key strength of our study is its community-based design covering diverse socio-economic strata within the hospital's catchment area, thereby improving external validity. The use of standardized tools for anthropometric measurements and validated questionnaires for physical activity assessment adds methodological rigor. However, limitations include the cross-sectional nature precluding causal inference, reliance on self-reported lifestyle data subject to recall bias, and the absence of laboratory testing for all participants, which limited uniform biochemical assessment.

Conclusion:

This community-based study highlights a substantial burden of modifiable risk factors for diabetes mellitus in the population surrounding Index Medical College Hospital & Research Center, Indore. The predominance of middle-aged adults, central obesity, physical inactivity, and unhealthy dietary patterns underscores the urgent need for targeted lifestyle interventions. The coexistence of hypertension and dyslipidemia further emphasizes the clustering of metabolic risks in this community. Region-specific prevention strategies, enhanced health literacy, and accessible screening programs are essential to curb the growing diabetes burden. Addressing cultural and behavioral determinants alongside medical management could substantially improve outcomes in similar semi-urban Indian settings.

Conflict of interest:

None.

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