

## A community-based study: Prevalence of diabetes mellitus and its complications in rural population of Moradabad district, Uttar Pradesh, India

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**Background:** In last two-decade prevalence of Diabetes Mellitus in India is increasing at higher rate and currently India is the Diabetic Capital of the World. Reliable and informative epidemiological evidence is vital to quantify impacts and predictors of disease and to facilitate formulation of prevention and control strategies. In North India particularly Uttar Pradesh the area specific data regarding diabetes mellitus is scarce. **Objectives:** Prevalence of Type-II Diabetes Mellitus and its associated risk factors in rural population of the Moradabad district. **Materials and Methods:** ;A Cross-sectional, community-based study was conducted from October 2016 to October 2017 among adults in the age group of 30 year and above residing in Moradabad rural area. A two-stage stratified random sampling technique was adopted to achieve the desired sample size. **Result:** The prevalence of Diabetes Mellitus was found to be 10.7%, it was 17.8% among males and 14.8% among females. 4.6% were newly diagnosed while the remaining 6.1% were known diabetics. In the present study statistically, significant association is observed between prevalence of diabetes mellitus with age, socioeconomic class, BMI. **Conclusion:** There is a need for continuous screening program and lifestyle modifications to timely detect and intervene in the pathogenesis of diabetes mellitus. Behaviour change communication strategy should take a vital role in improving lifestyle of the community as most of these risk factors are modifiable.

**Keywords:** Diabetes Mellitus, Impaired Fasting Glucose, Body Mass Index

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## Introduction

India leads the world with largest number of diabetic subjects coming with the dubious distinction of being termed the "Diabetic capital of the world". The prevalence of Diabetes is rapidly rising all over the globe at an alarming rate [1] over the past 30 years the status of diabetics mellitus has changed from being considered as a mild disorder of the elderly to one of the major cause of mortality and morbidity affecting the youth and middle age people.

Nowhere is diabetic epidemic more pronounced than in India as WHO report shows that 32 million people had diabetics mellitus in 2000 [2] had diabetes mellitus and the estimate for year 2025 is 69 million [3].

## Aims and Objectives

To study the prevalence of diabetes Mellitus in Rural population of Moradabad and to study the prevalence of complications of diabetes, retinopathy and nephropathy.

## Material and Method

**Duration:** The study was done from October 2016 to October 2017.

**Setting:** The present study selected few villages of a selected rural block of Moradabad District and all individual more than 30 years of age willing to participate in the study were included in the study. It was a cross-sectional observational study.

**Sample size:** Sample size was calculated using the formula

- $N = (1.96)^2 \frac{PQ}{D^2}$
- P= Prevalence
- $Q = 1 - P$
- D= error- 15%
- 95% Confidence level
- 10% Non-response error,

Using the above formula and the demographic profile of the area a total of 800 cases were included.

**Inclusion criteria:** All individual more than 30 years of age willing to participate in the study and individuals with Type II Diabetes where included in the study.

**Exclusion criteria:** Individual who were excluded from the study where individuals less than 30 years of age, individuals with type I diabetes, individuals with gestational Diabetes.

**Data collection technique and tool:** The study was divided into 2 phases. Phase-I: All individuals in study underwent FBS (fasting blood sugar test). Those having fasting blood sugar > 126 mg/dl were eligible to participate in Phase-II of the study.

Capillary blood was taken, and glucometer was used for measuring fasting blood sugar. Phase-II: Those individual test positive in phase-I were screened for evidence of retinopathy and nephropathy by basic screening test.

Screening test used was for retinopathy by fundus examination using a fundoscope, for nephropathy by presence of albumin in 24-hour urine albumin test.

Data collected was evaluated using SPSS software (version 6). Chi Square test was used to study the correlation between various variables.

## Results

**Table-1: Distribution of cases according to fasting blood sugar status of study subjects.**

Known Diabetics		Newly diagnosed		IFG		Normal	
No.	%	No.	%	No.	%	No.	%
49	6.1%	37	4.6%	45	5.6%	669	83.6%

**Table-2: Distribution of diabetics and IFG study subjects according to socioeconomic status.**

Class	Total no.	Diabetics		IFG		p value
I	96	16	16.6%	7	7.2%	0.01
II	192	30	15.6%	13	6.7%	
III	200	22	11%	11	5.5%	
IV	272	15	5.5%	12	4.4%	
V	40	3	7.5%	2	5%	

Table 2 demonstrated that the prevalence of Diabetes is 16.6% in Class I of BJ Prasad classification. The prevalence decreases to 15.6% in class II. There is further decline in prevalence to 11% in Class III and 5.5% in Class IV.

There is increase in the prevalence to 7.5% in Class V. On applying Chi square test the p value was 0.01 which shows that there is statistically significant correlation between socioeconomic status and Diabetes.

Similar trend is seen on correlating socioeconomic status and IFG [4].

**Table-3: Distribution of Diabetics according to BMI**

BMI	Total	Diabetes		IFG		p value
		No.	%	No.	%	
<18.5	110	6	5.4%	4	3.6%	0.001
18.5-24.9	486	36	7.4%	19	3.9%	
25-29.9	135	24	17.7%	13	9.6%	
30-34.9	44	12	27.2%	6	13.6%	
>=35	25	8	32%	3	12%	

On applying chi square test the p value comes out to be 0.001 which shows that there is statistically significant correlation between BMI and Diabetes in the study.

**Table-4: Prevalence of retinopathy in diabetics**

Total no. of diabetics	No. of diabetics having retinopathy	% of diabetics having retinopathy
86	13	15.1%

Table 4 demonstrated that among 86 diabetics 13 of them had retinopathy (15.1%).

**Table-5: Prevalence of nephropathy in diabetics.**

Total No. of diabetics	No. of diabetics having nephropathy	% of diabetics having nephropathy
86	19	22.1%

Table 5 showed that out of 86 diabetics 19 diabetics had evidence of nephropathy (22.1%).

**Table-6: Correlation between Diabetic Retinopathy and Nephropathy**

No. of individuals having Retinopathy alone	No. of individuals having Nephropathy alone	No. of individuals having both Nephropathy and Retinopathy	p value
6	12	7	0.001

Table 6 demonstrated correlation of nephropathy and retinopathy. The cases of diabetes in the study who had nephropathy alone were 12 and those with retinopathy alone were 6. The diabetics who had presence of both retinopathy and nephropathy were 7.

The p value on applying chi square test was 0.001 which shows that there is a statistically significant correlation between Nephropathy and retinopathy. This shows that patients who have diabetic nephropathy are more prone to develop retinopathy and vice versa [5].

## Discussion

Total 800 cases were included in the study and their fasting blood sugar was estimated. The cases who were diabetics were examined for presence of nephropathy and retinopathy. In the present study the overall prevalence of Diabetes was 10.7% amongst which newly diagnosed cases were 4.6% and known diabetics were 6.1%.

The prevalence of IFG in the present study was 5.6%. A study conducted by G Vijay Kumar et al (2008) among 1990 adults (women 1149, men 841) of two panchayat wards in Venmony Panchayat, Chengannur, Kerala, India.

Those who were on drugs for diabetes mellitus and or having fasting plasma glucose (FBS)  $\geq$  126 mg/dl were considered as diabetes mellitus, those with FBS 100-125mg/dl was considered impaired fasting glucose. The crude age adjusted prevalence of diabetes mellitus was 14.6% and 12.6% and that of IFG was 5.1% and 4.6 % [6].

In the present study there is increasing prevalence of diabetes with age 6.7% in 30-40 years, 10.3% in 40-50 years, 12.5% in 50-60 years with further increase to 16.9% in 60-70 years. There is a decline in the prevalence of diabetes to 9.3% in individuals of more than 70 years but this correlation of diabetes with age has no statistically significance.

Similar trend of increasing prevalence up to 70 years of age and decline thereafter was also observed by V Mohan et al. (CURES), Ramachandran A et al (NUDS) and R. M. Anjana et al. (2011) [7, 8, 9].

In the present study the prevalence of Diabetes is 16.6% in Class I of BJ Prasad classification. The prevalence decreases to 15.6% in class II. There is further decline in prevalence to 11% in Class III and 5.5% in Class IV, the prevalence is 7.5% in Class V.

The correlation of diabetes with socioeconomic status has statistically significant correlation in the present study. In the present study, that there was a statistically significant correlation between diabetes and BMI i.e. there is increasing trend of diabetes with increasing BMI.

Bhatti JS et al had also observed that the north Indian diabetic patients had a pronounced abdominal obesity as evidenced by their significant higher waist circumference and higher WHR [10]. Similarly, Ravikumar P et al. (2010) also reported

That the abdominal obesity was significantly and positively associated with diabetes mellitus [11].

In the present study 15.1% of the diabetics showed evidence of retinopathy. The CURES study conducted by Ramchandran et al in Chennai shows prevalence of retinopathy in diabetics to be 17.6% which is slightly higher than our present study [12]. Rema et al in their study mentioned a prevalence of 7.8% retinopathy in diabetic patients [13]. The present study shows that the prevalence of retinopathy among diabetics was slightly more among males (16.6%) as compared to females (13.1%).

In the present study the prevalence of nephropathy among diabetics was 22.1%. A study conducted by Vaibhav Shukla et al in Lucknow shows a lower prevalence (19%) of nephropathy compared to the present study [14]. Gupta et al reported a prevalence of 26.6% in 65 type 2 diabetics of North India.

In the present study 25% of the male diabetics had nephropathy while the prevalence of nephropathy among female diabetics was comparatively less i.e. 18.4%. In the present study it was observed that majority of the diabetics (77.9%) had no albuminuria, 13.9% had evidence of micro albuminuria while only 8.1% of the diabetics had macro proteinuria and this correlation is statistically significant.

There was significant correlation between diabetic retinopathy and nephropathy [15].

## Conclusion

Prevalence of Diabetes Mellitus among adult population of Moradabad rural area is as high as many urban cities of India and half of the diabetics are unaware of their diabetic status. Due to this wide diagnostic gap, preventable complications and avoidable morbidities related to diabetes mellitus are on a steep rise thus, further adding to the heavy disease burden.

There is a need of continuous screening program as a part of health care delivery system to timely detect and intervene in the pathogenesis of diabetes and related morbidities. Life style modifications from early age, with regard to physical activity, especially for individuals with family history of diabetes should be implemented, so that the occurrence of diabetes can be prevented or at least postponed [9].

## What the study adds to the existing knowledge

The present study generated an area specific data on diabetes mellitus in rural population of Moradabad. The present study shows as an overall prevalence of 10.7% amongst which newly diagnosed cases were 4.6% and known diabetics were 6.1%. A very few studies have been conducted in this region, this will further help us to understand the demography of Diabetes Mellitus in this region. The prevalence of impaired glucose tolerance is 5.6% in the rural community.

A proper awareness program is needed regarding Diabetes Mellitus so that these people may be prevented from overt DM. The present study showed a significant correlation between the complications of Diabetes Mellitus i.e. retinopathy with nephropathy. The prevalence of retinopathy (15.1%), nephropathy (22.1%) was quite high. So, the present study concluded that patient of Diabetes Mellitus should be screened for these complications regularly.

## Author's contribution

**Dr. Prashant Dubey:** Data collection tabulation & formulation of the paper.

**Dr. B. L. Bhantia:** Guidance.

**Dr. S. S. Yadav:** Application of statistic and formation of Tables.

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