



PREVALENCE OF DIABETES MELLITUS IN AN URBANIZED VILLAGE OF EAST DELHI

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ABSTRACT

Introduction: Diabetes mellitus has reached epidemic proportions globally. The World Health Organization estimated that there will be 300 million cases of diabetes in the world by year 2025 and maximum number of cases expected in India. As there is no efficient surveillance system in India for non communicable diseases, epidemiological studies are urgently needed in this region of the country.

Aims and objectives: To determine the prevalence of Diabetes mellitus in an urbanized village of East Delhi and factors associated with Diabetes mellitus.

Materials and methods: This is a community based cross sectional study, conducted in residents of Gazipur. Sample size came to be 451 considering prevalence of Diabetes as 12.0%. Capillary blood was used to find the blood sugar level. Fasting level and OGTT (Oral Glucose Tolerance Test) was done to find the prevalence of Diabetes.

Results: Prevalence of Diabetes was found to be 15.3%; Higher the body mass index (BMI) and longer duration of stay in urban area higher was the prevalence of diabetes.

Conclusions: Older age group, higher BMI and longer duration of stay in urban area have significant associations with the higher prevalence of diabetes.

Key words: Prevalence, Diabetes, Urbanization, Body Mass Index, Age

INTRODUCTION

The prevalence of type 2 diabetes rates continue to increase with increasing number of patients at risk of serious diabetes-related complications. Having diabetes increases the risk of a myocardial infarction two times and the risk of suffering a stroke two to four times and it is also a leading cause of blindness, limb amputation and kidney failure.^{1,2,3} Population based studies of CVD risk factor trends among subjects with and without diabetes show differing trend in disfavor of those with diabetes.⁴

WHO has projected that maximum number could occur in India by 2025.¹ Considering large popula-

tion and prevalence of around 33 million diabetic subjects, the burden of diabetes in India could be enormous.^{1,2} As there is no efficient surveillance system in our country for non communicable diseases, epidemiological studies are urgently needed in the country.

Previous studies have also found appropriate lifestyle intervention and drug treatment is effective in delaying or preventing both diabetes and its complications.⁴⁻⁸ Urbanization is found to be associated with a sedentary lifestyle, higher calorie food intake and stressful condition, which might contribute to the increasing prevalence of diabetes.^{9,10} It has been observed in Indian studies also that

prevalence of diabetes is higher in urban areas.¹¹ Hence this study was carried out in urbanized village of East Delhi to find the prevalence and its risk factors of diabetes.

METHODOLOGY

This is community based cross sectional study, was conducted in Gazipur which is an urbanized village and also a field practice area of University College Medical Sciences Delhi (UCMS). Ethical clearance was obtained from ethical committee of UCMS Delhi. Persons residing in Gazipur for more than 6 months and aged more than 20 years of age were included in the study. All pregnant and lactating women up to six months of lactation were excluded from the study.

According to National Urban Diabetic Survey the prevalence of Diabetes was estimated as 12.1%,¹² considering the prevalence as 12.0%, a sample size of 451 was calculated using the Epi info 2000 software, with absolute error of 3.0% and Confidence Interval of 95%.

WHO steps instrument was used to collect the information regarding study subjects. Purpose of the study was explained to the person selected in their own language and they were also assured of confidentiality of the results. Written and informed consent was taken before including a person in the study.

Physical measurements like weight, height and blood pressure were taken using standard apparatus and methods described below.

Weight - was recorded by weighing machine (Krupps weighing scale, New Delhi, India). The Machine was kept on firm horizontal surface and participants were asked to stand on the machine with minimum clothing (they were asked to remove sweaters, etc). They were also asked to remove shoes and sandals before standing on the weighing machine. Weight was recorded to the nearest 500 grams.

Height - was recorded by using a standard non stretchable tape, subjects were asked to stand upright against a wall on bare foot and heels touching the wall and participants looking straight. Height was measured in Centimeters nearest to the 0.1 cm.

Body Mass Index (BMI) - was calculated by using the formula $\text{Weight (kg)} / [\text{Height (meters)}]^2$. WHO cut off values for South Asian Countries were used to define participants as overweight and obese. Participants with BMI less than 23 were grouped under normal BMI, more than 25 were considered

as pre obese and who were in between 23 to 25 were grouped as overweight. BMI of more than 30 were considered as obese.

Study participant's natives of Gazipur (Delhi) were considered as permanent residents. Participants belonging to other states, not native of Delhi were considered as migrant population. Those who were residing in Gazipur for more than six months were included in the study as tenants.

Capillary blood glucose level was measured using Johnson & Johnson gluco-meter. All aseptic precautions were taken before carrying out the procedure. The questionnaire was filled on the previous day and subjects involved in study were asked to stay empty stomach for eight hours and not consume anything till the capillary glucose is measured. Fasting capillary blood glucose was measured before eight in the morning. WHO guideline (2006) was used for diagnosis of diabetes and impaired glucose tolerance¹³. After fasting capillary blood glucose was measured subjects were given 75g of anhydrous glucose orally and capillary blood glucose was measured after two hours. People showing fasting plasma glucose >126 mg/dl or 2 hour plasma glucose >200 mg/dl were diagnosed as diabetics. Study subjects who were diagnosed as diabetics, having impaired glucose tolerance and whose fasting blood glucose was impaired were referred to UCMS and GTBH Delhi for further management

Analysis: The data collected using questionnaire was entered in a Windows Excel spread sheet. Statistical analysis was done using SPSS software version 16. Prevalence of diabetes for different groups was calculated. Chi-square test was used to compare the prevalence of diabetes among different groups. To study the association of various factors with the prevalence of diabetes multiple logistic regression analysis was done and adjusted odds ratios were calculated. Prevalence of diabetes was taken as dependent variables for multiple logistic regressions.

RESULTS

The socio-demographic characteristics of the study subjects are shown in Table 1. The included 451 subjects of which 247 (54.8%) were males and 204 (45.2%) were females. Of the total study subjects, 63.2% were literate and 10.0% were graduates and above. Monthly family income, 76.0% study subjects belonged to the family whose monthly income was less than Rs10000.

Table 1: Socio-demographic features of study participants

Socio-demographic variables	Total (%)	Male (%)	Female (%)
Age in years			
20-30 years	186(41.2)	100(40.4)	86(42.2)
31-40 years	168(37.3)	81(32.8)	87(42.6)
41-50 years	53(11.8)	36(14.7)	17(8.3)
>50 years	44(9.8)	30(12.1)	14(6.9)
Type of family			
Joint	126(27.9)	63(25.5)	63(30.9)
Nuclear	281(62.3)	143(57.9)	138(67.6)
Others	44(9.8)	41(16.6)	3(1.5)
Education			
No schooling	166(36.8)	64(25.9)	102(50)
1 st -7 th	191(42.4)	121(49)	70(34.3)
8 th -12 th	46(10.2)	29(11.7)	17(8.3)
Graduation and above	48(10.6)	33(13.4)	15(7.4)
Monthly income			
< Rs 10,000	347(76.9)	175(70.9)	172(84.3)
Rs 10,000 -Rs 20,000	76(16.9)	53(21.5)	23(11.3)
>Rs 20,000	28(6.2)	19(7.6)	9(4.4)

Table 2: Relation between Diabetes and other variables

Variable	Prevalence of Diabetes	Crude OR (95%CI)	Adjusted OR (95% CI)	Significance
Age in group years				
20-30	12 (6.5)	1		
31-40	16 (9.5)	1.53 (0.7-3.3)	1.509 (0.68-3.3)	0.309
41-50	15 (28.3)	5.72 (2.5-13.2)	5.635 (2.3-13.6)	0
>50	26 (59.1)	20.94 (9.1-48.4)	19.207 (7.4-49.9)	0.001
Education				
Illiterate	32 (19.3)	1	1	
Primary, middle school	13 (11.4)	0.54 (0.27-1.8)	1.121 (0.5-2.5)	0.784
Secondary, higher secondary	19 (15.4)	0.77 (0.41-1.4)	1.325 (0.6-2.9)	0.472
Graduation, post graduation	5 (10.4)	0.47 (0.18-1.3)	0.872 (0.2-3.1)	0.834
Occupation				
Unemployed	27 (13)	1	1	
Unskilled, Semi and Skilled	30 (15.7)	1.25 (0.71-2.1)	0.89 (0.5-1.8)	0.75
Clerks, Semi and Professional	12 (15.3)	2.01 (0.94-4.3)	1.32 (0.5-3.7)	0.602
Habits				
Use of tobacco				
Yes	25 (19.5)	0.65 (0.37-1.1)	0.75 (0.3-1.59)	0.454
No	44 (13.6)	1	1	
Use of alcohol				
Yes	17 (20.0)	0.66 (0.36-1.2)	1.24 (0.5-2.84)	0.604
No	52 (14.2)	1	1	
Family history of diabetes				
Yes	7 (26.9)	2.16 (0.79-5.7)	0.35 (0.1-1.19)	0.094
No	62(14.6)	1	1	
BMI				
<22.9	13 (6.3)	1	1	
23-24.9	5 (5.4)	0.96 (0.33-2.7)	0.998 (0.33-2.9)	0.864
>25	51 (41.8)	11.66 (6-22.64)	12.704 (6.1-26.1)	0
Duration of Stay In Gazipur				
Less than 10 years	9 (4.3)	1	1	
More than 10 years	26 (20)	3.3 (1.2-9)	3.376 (1.48-7.6)	0.004

Logistic regression was applied to calculate the adjusted odds ratio

The overall prevalence of diabetes was found to be 15.3%. Among males the prevalence of diabetes was 16.6% and in females it was 13.7%. Chi-square test showed the significance association between

Age, BMI, and duration of stay in Gazipur. Prevalence of diabetes was higher among the residents (30.9%) compared to tenants (10.3%) and was statistically significant. In multivariate logistic regres-

sion model it was observed that age, BMI and duration of stay in Gazipur showed statistically significant association with prevalence of diabetes. Participants residing in Gazipur (urbanized village and among tenants) for 10 years or more had 3.37 times higher risk of suffering from diabetes as compared to those who stayed for less than 10 years, this was statistically significant with p value <0.004 (Table 2).

DISCUSSION

Many cross sectional studies conducted in India and other countries have shown that there is rise in prevalence of diabetes globally. There is rapid increase in prevalence of diabetes in India and other Asian countries. It has been predicted that India will be having maximum number of diabetes cases in year 2025¹⁴. This present study was conducted to estimate the prevalence of Diabetes in an urbanized village of East Delhi.

In this study the prevalence of Diabetes was found to be 15.3%, Impaired Glucose Tolerance (IGT) to be 8% and Impaired Fasting (IFG) was 16.4%. Prevalence in our study was higher as compared to the NUDS conducted earlier by Ramachandra et al where in 2001 it was 11.6% and prevalence of IGT was 8.6%¹³. There was no gender predilection for diabetes in the present study, which is consistent with the findings of previous studies^{12,15,16}. Many other Indian studies on diabetes like Rao et al¹⁶ and Mohan et al¹⁷ have seen that prevalence did not differ with respect to gender, however few studies have shown higher prevalence among the females.^{18,19}

It was observed that mean BMI of the participants was $23.28 \pm 3.9 \text{ kg/m}^2$. Prevalence of diabetes was higher in participants whose BMI was more than 25. Many other studies have shown significant association between BMI and prevalence of diabetes.^{20,21,22}

Migration from rural to urban is considered as a risk factor for diabetes and other non-communicable disease. Studies conducted by MDRF (Madras Diabetic Research Foundation) in Southern India and many others parts of India have shown that migration is one of the important risk factor.^{19,23} The present study observed that participants who stayed for more than 10 years in Gazipur had higher risk of developing diabetes as compared to participants who stayed for less than 10 years, this difference in prevalence was statistically significant with p value <0.001 . When adjusted for other variables in logistic regression it remained significant with p value 0.026 and adjusted odds ratio to be 0.366 (0.151-0.886, 95% CI). Similar finding was observed in Mohan et al²⁴,

carried out in Chennai in 2003, had shown higher prevalence of diabetes due to change in life style factors due to urbanization. Phase I results of Indian Council of Medical Research popularly known as ICMR-INDIAB study has shown that, prevalence of diabetes was higher in urban areas as compared to rural areas, this has been observed in all the four states where study was carried out.¹¹

CONCLUSION

High prevalence of diabetes indicates the environmental factors may encompass a strong role for the rising prevalence of diabetes in urbanizing population. Study found that longer the duration of stay in urban area higher the risk of suffering from diabetes. Hence urgent intervention is needed to carry out in urban area irrespective of the economic status of the residents since diabetes is no more rich man's disease.

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