

Original Research Article

Prevalence of diabetes mellitus in a rural population of north India

Ashok Kumar, Tanveer Bano*, Sunil Kumar Garg, Ganesh Singh, Sanjeev Kumar

Department of Community Medicine, LLRM, Meerut, Uttar Pradesh, India

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***Correspondence:**

Dr. Tanveer Bano,

E-mail: tanveerbano@hotmail.com

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ABSTRACT

Background: Diabetes is the serious public health problem in all the countries but majorly in developing countries. The prevalence of diabetes is showing an upward trend in most countries. The prevalence of diabetes is rapidly rising in rural population. Also, there is paucity of data regarding diabetes mellitus in rural Meerut. The aim of the study was to study the prevalence of diabetes mellitus and Associated factors with diabetes mellitus. A cross-sectional study.

Methods: By taking the prevalence of diabetes mellitus 13% in persons age 30 years and above by various studies and relative precision 20% the sample size come out to be 642, total subjects studied were 700 for uniform coverage in villages selected by systematic random sampling, fasting blood sugar was done to estimate the prevalence of diabetes. Rest of the information was collected on predesigned and pretested questionnaire.

Results: The prevalence of diabetes were found to be 11.7% in persons aged 30 years and above in rural population of Meerut. The prevalence of diabetes was found to be significantly associated with increasing age, family history, social status and body mass index.

Conclusions: The diabetes mellitus is a significant health problem after 40 years of age in rural population.

Keywords: Diabetes mellitus, Rural population, Fasting blood sugar

INTRODUCTION

Diabetes mellitus is a chronic non communicable disease and characterised by chronic hyperglycaemia with disturbances of carbohydrate, fat, proteins metabolism due to defect in insulin secretion, insulin action or both.¹

Non communicable diseases are increasing among the adult population in both developed and developing countries. Diabetes is the serious public health problem in all the countries but majorly in developing countries.² This is an important cause of disability and death not only in our country but also throughout the world.¹

The prevalence of diabetes is showing an upward trend in most countries. According to the 6th edition of International Diabetes Federation Diabetes Atlas, it is estimated that there are currently 387 million people with

diabetes worldwide and this number is set to increase to 592 million by the year 2035. China has the largest number of people with diabetes in the world (98 million) followed by India with (65 million). These figures of India are predicted to increase to 109 million by 2035.³

The prevalence of diabetes is rapidly rising in rural population the prevalence of diabetes in rural Andhra Pradesh is 13.2%. The diabetes mellitus has a multifaceted nature of causation. Diabetes associated with various socioeconomic factors like age, Sex. Family history of diabetes, education etc. but their role in causation of diabetes mellitus has not been proved conclusively.⁴

The objective of the study was to study the prevalence of diabetes mellitus. To study the factors associated with diabetes mellitus.

METHODS

This was a cross-sectional study. The present study was conducted in the rural population Machhara block of district Meerut There are 47 villages covering the 158188 population in Machhara block. The population wise list of all villages was obtained from Community Health Centre, Machhara.

Sampling size

Prevalence of diabetes mellitus in various studies in rural population was found to be 13% among persons aged 30 years and above. Therefore, by taking the prevalence of diabetes 13% with 95% confidence level and relative precision of 20%, the sample size calculated was 642. A sample of 700 individuals above 30 years of age was taken for uniform coverage from 10 villages selected by systematic random sampling technique. The study was carried out from June 2014 to 31 may 2015. The present study was conducted in a Rural Population of 30 years and above who belongs to Machhara block, Meerut.

Methods

This study was conducted by house to house visit in the selected villages. A population wise list of all the villages covered under Community Health Centre, Machhara was obtained and divided by number of villages to be studied for obtaining the sample interval. Then random number was drawn from random number table and the village corresponding to that number was selected as first village and then subsequent villages were identified by adding the sample interval. Thus 10 villages were selected by cluster sampling. For selection of houses in the villages investigator went to the centre of the village along with ASHA and village Pradhan and the pencil was dropped and the direction of pencil pointing towards the house was chosen as first house and the next nearest houses were visited continuously without leaving a single house until sample size of 70 persons aged 30 and above was completed in each selected village. Two house visits were done in each family. First to collect the information pertaining to socio-demographic characteristics and other factors associated with diabetes on pre-designed and pretested proforma. And then second visit was done on next day early morning for doing fasting blood sugar of study subject by glucometer. In case any study subject unavailable on first visit, his/her information was collected on second visit along with fasting blood sugar test. However, if any person found unavailable on both the visits or showed non co-operative attitude was excluded from the study and another subject was included in the study from next house in continuation

Statistical analysis

The data was checked thoroughly for its consistency and analysed using Epi-info. Chi-square test was used to

determine the statistical significance of association between diabetes mellitus and associated factors.

RESULTS

In the present study 700 study subjects of aged 30 years & above were studied to know the prevalence of diabetes mellitus, and a total 82 cases of diabetes mellitus were found among the study population accounting for the diabetes prevalence rate of 11.7% in study population.

Table 1, depicts the association of socio-demographic factors with diabetes mellitus. Age an increasing trend in the prevalence of diabetes mellitus was seen with the advancement of age as the prevalence was minimum in the age group for 30-39 years (3.3%), than sharply rising to 12.4% in 40-49 years and gradually increased to maximum (28.6%) in the persons aged 70 years and above (28.6%).

The prevalence of diabetes mellitus was 12.6% among males and 10.4% among female however this difference in prevalence of diabetes mellitus in relation to sex was not found to be statistically significant ($p>0.05$).

The prevalence of diabetes mellitus was maximum in upper class (18.1%) followed by 14.2% in upper middle class and minimum (7.6%) in upper lower socio-economic class with 9.4% and 9.7%, lower middle class and lower class respectively. Prevalence of diabetes mellitus was not found to be directly associated with the socio-economic status of the population (Table 1).

Prevalence of diabetes mellitus was significantly higher among the individuals (39.0%) having positive family history of diabetes mellitus as compared to 4.9% among individuals having no family history of diabetes mellitus. ($p<0.001$)

Table 2, shows that a majority of study population was having Body Mass Index more than normal being pre obese (30.8%) and Obese (27.2%) and only 4.8% population was under weight. Prevalence of diabetes mellitus was higher in obese person (20.5%) followed by pre-obese, under-weight and normal weight persons (10.6%, 8.8% and 6.5% respectively). Further it may be noted that the prevalence of diabetes mellitus in relation to body mass index was found to be statistically significantly.

Prevalence

700 study subjects were studied to know the prevalence of diabetes mellitus. During the study total 82 cases of diabetes mellitus were found among the study population. Prevalence of diabetes mellitus was found to be 11.7% in study population as shown in table.

Table 1: Socio-demographic characteristics and diabetes mellitus.

		Total population		Diabetes mellitus		
		N0	Percentage (%)	N0	Percentage (%)	
Age group (in years)	30-39	330		11	3.3	X ² =49.90 Df=4 P<0.01
	40-49	119		16	13.4	
	50-59	108		21	19.4	
	60-69	115		26	22.6	
	70 and above	28		08	28.6	
	Total	700		82	11.7	
Gender	Male	406		51	12.6	X ² =0.67 Df=1 P=0.41
	Female	294		31	10.6	
	Total	700		82	11.7	
Socio-economic status	Upper	94		17	18.1	X ² =5.45 Df=1 P=0.02
	Upper middle	204		29	14.2	
	Lower middle	266		25	9.4	
	Upper lower	105		8	7.6	
	Lower	31		3	9.7	
	Total	700		82	11.7	
Family history	Present	141		55	39.0	X ² =13.8 Df=1 P<0.01
	absent	559		27	4.9	
	total	700		82	11.7	

X² =49.90, df=4, (p<0.01).

Table 2: Prevalence of diabetes mellitus among study population in relation to body mass index.

Body mass index (kg/m ²)	Total population		Diabetes mellitus	
	N0	Percentage (%)	N0	Percentage (%)
< 18.50 (under-weight)	34	4.8	03	8.8
18.50-24.99 (normal weight)	260	37.2	17	6.5
25.0-29.99 (pre obese)	216	30.8	23	10.6
30.0- & above (obese)	190	27.2	39	20.5
Total	700	100	82	11.7

X²= 21.52, df=3, (P<0.01).

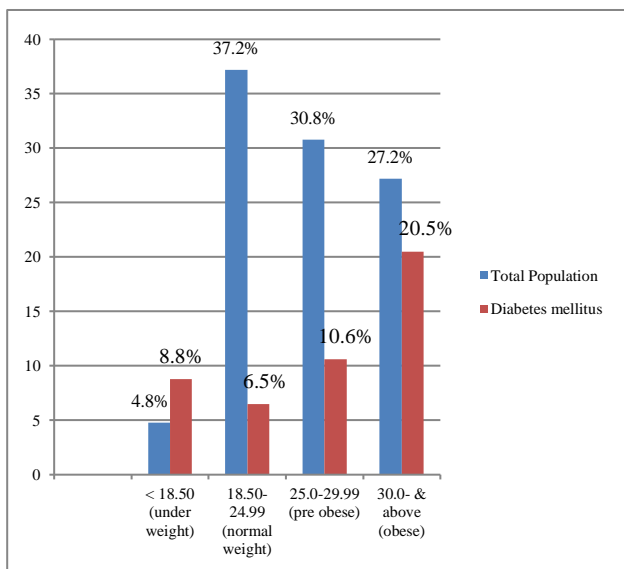


Figure 1: Prevalence of diabetes mellitus among study population in relation to body mass index.

Table 3: Prevalence of diabetes mellitus among study population.

Diabetes mellitus	Numbers	Percentage (%)
Present	82	11.7
Absent	618	88.3
Total	700	100

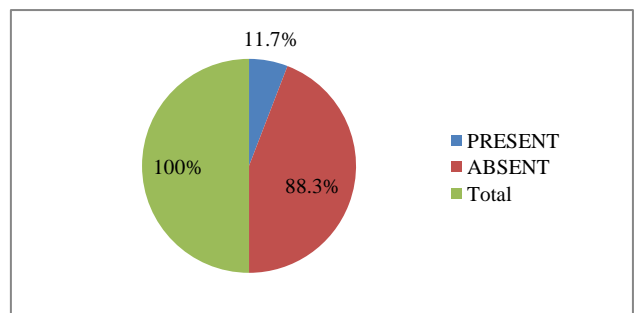


Figure 2: Prevalence of diabetes mellitus among study population in relation to body mass index.

DISCUSSION

In the present study 82 out of 700 individuals were found to be suffering from diabetes mellitus accounting for a prevalence rate of 11.7% in population aged 30 years and above. This prevalence of diabetes mellitus was higher than 9.3% and 8.2% as reported by Mohan et al in rural population of Maharashtra and Anjana et al rural population of Chandigarh respectively and 13.2% reported by Chow et al in the rural population of east and west Godavari districts of Andhra Pradesh.^{5,6,4}

The prevalence rate of diabetes mellitus in the present study was found to be increasing significantly with increasing age in both the sexes after the age of 30 years as has been reported by Madan et al.⁷ The prevalence of diabetes mellitus was found to be maximum among persons aged 70 years and above (28.6%) in the present study population. Madaan et al reported that maximum prevalence of diabetes (41.96%) was found in the age group of 46-60 years.⁷ Nafisa et al in a rural population of Goa, also reported that prevalence of diabetes mellitus increases with increasing age.⁸

In the present study no, significant difference was found in the prevalence of diabetes mellitus in relation to sex. The prevalence of diabetes mellitus in males and female was 12.6% and 10.4% respectively. Nafisa et al reported 12% in female and 8.4% in male in rural population of Goa.⁸ Madan et al reported that the prevalence of diabetes mellitus was 19.36% in males and 16.98% in females in rural population of Sonipat India respectively.⁷

In the present study the prevalence of diabetes mellitus was not found to be significantly associated with the socio-economic status of individuals. Gupta et al reported that similar finding no significant statistical difference in the prevalence of diabetes mellitus with higher income groups in rural population. Whereas Mehta et al reported that the risk of IDDM may be higher in higher socio-economic group.⁹⁻¹¹ Illangasekera et al in their study in rural Srilankan that low prevalence of diabetes mellitus was found in low socio-economic status community.

In the present study, the prevalence of diabetes mellitus was found to be significantly higher in individuals with positive family history of diabetes mellitus (39.0%) than in individuals with negative family history of diabetes mellitus (4.9%). Gupta et al and Motala et al also observed similar finding in different communities of India.^{9,12}

In the present study the prevalence of diabetes mellitus was found to be significantly high in obese (20.5%) and overweight persons (10.6%) in comparison to underweight persons (8.8%) and average weight persons (6.5%). WHO (1980) also concluded that the most powerful risk factor for type-2 diabetes was obesity. Rathod et al overweight status was associated with diabetes as 38.5% of diabetics were overweight compared

to 18.6% of non-diabetics.^{13,15} Valliyot et al Reported that there was no statistically significant association between BMI and diabetic status.¹⁵

CONCLUSION

Study shows that diabetes is a problem not only of urban India but is also rising in rural India. A comprehensive approach will be required active participation of all section of community, including health services, Mass health education programme, encouragement of people for regular physical activity, people should be aware about diabetes. For prevention of diabetes mellitus IEC activity should be organised in rural as well as urban areas on regular interval.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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