

## Original Research Article

# Association of risk factors with diabetes mellitus in rural population RHTC Peeplikhera, Meerut, Uttar Pradesh, North India

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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. Aim and objective was to study the associated factors with diabetic population.

**Methods:** A cross-sectional study was conducted in diabetic population of 20 years and above who visited the OPD of RHTC Peeplikhera, Mulayam Singh Yadav Medical College, Meerut, fasting blood sugar was done to estimate the diabetes.

**Results:** The prevalence of diabetes was found to be significantly associated with increasing age, family history 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

### 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. 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. This is an important cause of disability and death not only in our country but also throughout the world.<sup>1</sup>

The latest data published in the IDF Diabetes Atlas 9th edition shows that 463 million adults are currently living with diabetes. Without sufficient action to address the pandemic, 578 million people will have diabetes by 2030. That number will jump to a staggering 700 million by 2045.<sup>2</sup> Type 2 diabetes is a common lifestyle disorder caused by insulin resistance with relative or absolute

insulin deficiency, resulting in chronic hyperglycaemia and various cardiovascular complications. Globally, according to the International Diabetes Federation diabetes atlas (eighth edition, 2017), in 2017 there were roughly 425 million people with diabetes, a figure that is projected to increase to 629 million by 2045.<sup>3</sup> Sedentary habits and unhealthy dietary patterns are the major risk factors for the development of various lifestyle disorders, including diabetes. Psychological stress also increases the risk and severity of diabetes. Lack of physical activity was found to increase the risk of diabetes by 3 times and the risk of coronary artery disease by 2.4 times.<sup>4</sup>

Dietary control and exercise are established treatment modalities in patients with type 2 diabetes and other lifestyle disorders, including obesity, hypertension, and dyslipidaemia. Urbanisation, the intake of calorie-rich food, use of various machines, less open space for exercise, a busy modern lifestyle, and lack of motivation reduce the likelihood of adherence to dietary control and

exercise as a management option in people with diabetes. Moreover, individuals with diabetes have a reduced capacity to engage in exercise because of overweight, physical unfitness, sedentary lifestyle, limited joint mobility, and other diabetes-related complications, including cardiovascular disease, peripheral neuropathy, and diabetic foot problems. Several studies have shown that poor adherence to diet and exercise programs were major limitations in the implementation of non-pharmacological treatments of diabetes.<sup>5</sup> 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.<sup>6</sup> Aim and objective was to study the risk factors of diabetic population.

**METHODS**

This was a cross-sectional study, conducted in the rural population in RHTC, Peeplikhera, Meerut. The patients more than 20 years who visited in the OPD of RHTC, Peeplikhera were taken in the study. The study was carried out from September 2019 to December 2019.

This study was conducted at RHTC Peeplikhera, Meerut which is a field practice area and training health centre of MSY Medical College, Meerut. First to collect the information pertaining to socio-demographic characteristics and other factors associated with diabetes. On the second visit, next day early morning for doing fasting blood sugar of the patient by glucometer. Only those populations were taken who have local permanent address in Peeplikhera. However, if any patient unavailable on the second visit or showed non co-operative attitude and pregnant women were excluded from the study.

**Statistical analysis**

The data was checked thoroughly for its consistency and analyzed using Epi -info. Chi-square test was used to determine the statistical significance of association between diabetes mellitus and associated factorsts.

**RESULTS**

Total OPD in the RHTC during the study period was 575, out of which diabetics were 32.

Table 1 showed the socio-demographic characteristics, males were 50.8% and females were 49.2%. Age group in years was highest in the age group 31-40 years which was 32.0%. Family history of diabetes mellitus was found to be 4.2%.

Table 2 showed that the non-drinking population was found maximum that is 66.6%. The non-smoker population was found maximum that is 68.3%. The non-drinking population was found maximum that is 66.6%. In the population, heavy workers were found maximum that is 54.8%.

Table 3 The table shows that majority of population who had diabetes mellitus were found in age group from 41-50 years (12.1%), had family history of diabetes mellitus (52.5%), with BMI >30 in 14.5%, 11.6% in regular drinkers and 9.7% in regular smokers.

**Table 1: Socio-demographic factors.**

Demographic factors	Variable	Freq	%
Age (in years)	21-30	167	29.0
	31-40	184	32.0
	41-50	107	18.6
	51-60	79	13.8
	>60	38	6.6
Sex	Male	292	50.8
	Female	283	49.2
Family history of diabetes	Yes	24	4.2
	No	551	95.8

**Table 2: Behavioural factors.**

Behavioural factors	Variable	Freq	%
Alcohol	Regular-drinker	137	23.8
	Non-drinker	383	66.6
	Ex-drinker	55	9.6
Smoking	Regular-smoker	113	19.7
	Non-smoker	393	68.3
	Ex-smoker	69	12.0
Physical activity	Sedentary	93	16.2
	Moderate	167	29.0
	Heavy	315	54.8

**Table 3: Factors associated with diabetes mellitus.**

Variable	Diabetes mellitus		Total	P value	χ <sup>2</sup>
	Yes (%)	No (%)			
<b>Age (in years)</b>					
21-30	2 (1.2)	165 (98.8)	167	0.0004, df=4	15.71
31-40	4 (2.2)	180 (97.8)	184		
41-50	13 (12.1)	94 (87.9)	107		
51-60	9 (11.4)	70 (88.6)	79		
>60	4 (10.5)	34 (89.5)	38		
Total	32	543	575		

Continued.

Variable	Diabetes mellitus		Total	P value	$\chi^2$
	Yes (%)	No (%)			
<b>Sex</b>					
Male	18 (6.1)	284 (93.9)	292	4.33, df=1	512.8
Female	14 (4.9)	269 (95.1)	283		
Total	32	543	575		
<b>Family history of diabetes mellitus</b>					
Yes	21 (52.5)	19 (47.5)	40	0.0001, df=1	14.7
No	11 (2.0)	524 (98.0)	535		
Total	32	543	575		
<b>Bmi</b>					
<18.5	3 (3.0)	94 (97.0)	97	0.0006, df=3	17.2
18.5-24.9	7 (2.6)	259 (97.4)	266		
25-29.9	14 (8.9)	143 (91.1)	157		
>30	8 (14.5)	47 (85.5)	55		
Total	32	543	575		
<b>Alcohol</b>					
Regular-drinker	16 (11.6)	121 (88.4)	137	0.008, df=2	9.4
Non-drinker	11 (2.9)	272 (97.1)	383		
Ex-drinker	5 (9.0)	50 (91.0)	55		
Total	32	543	575		
<b>Smoking</b>					
Regular-smoker	11 (9.7)	102 (91.3)	113	0.15, df=2	3.6
Non-smoker	17 (4.3)	376 (95.7)	393		
Ex-smoker	4 (5.7)	65 (94.3)	69		
Total	32	543	575		
<b>Physical activity</b>					
Sedentary	13 (7.5)	84 (92.5)	93	0.002, df=2	12.9
Moderate	8 (6.0)	157 (94.0)	167		
Heavy	11 (4.7)	300 (95.3)	315		
Total	32	543	575		

## DISCUSSION

In the present study we found that there is increasing significance with increasing age in both the sexes after the age of 40 years as has been reported by Madan et al.<sup>7</sup> The prevalence of diabetes mellitus was found to be maximum among persons aged 70 years and above (28.6%) in the present study population. Madan et al reported that maximum prevalence of diabetes (41.96%) was found in the age group of 46-60 years.<sup>7</sup> Nafisa et al in a rural population of Goa, also reported that prevalence of diabetes mellitus increases with increasing age.<sup>8</sup>

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 6.1% and 4.9% respectively. Nafisa et al reported 12% in female and 8.4% in male in rural population of Goa.<sup>8</sup> 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.<sup>7</sup> In the present study, the prevalence of diabetes mellitus was found to be significantly higher in individuals with positive family history of diabetes mellitus (52.5%) than in individuals with negative family history of diabetes

mellitus (2.0%). Gupta et al and Motala et al also observed similar finding in different communities of India.<sup>9,10</sup>

In the present study the prevalence of diabetes mellitus was found to be significantly high in obese (14.5%) and overweight persons (8.9%) in comparison to underweight persons (3.0%) and average weight persons (2.6%). WHO also concluded that the most powerful risk factor for type-2 diabetes was obesity.<sup>11</sup> Rathod et al overweight status was associated with diabetes as 38.5% of diabetics were overweight compared to 18.6% of non-diabetics.<sup>12</sup> Gray et al reported that there was no statistically significant association between BMI and diabetic status.<sup>13</sup>

In the current study individuals were grouped in sedentary, moderate and heavy workers according to their working status, being 7.5%, 6.0% and 4.7% respectively. The working status of the present study can be compared to 27.49%, 29.99% and 39.99% respectively.

In present study 11.6% individuals were found to be alcoholics which is higher than 10.1% as reported by Gray et al in rural population of Meerut.<sup>13</sup>

In the present study 9.7% individual were found to be smoker which is less than 35.0% as reported by Gray et al in rural population of Meerut.<sup>13</sup>

## CONCLUSION

Study showed 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.

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## REFERENCES

1. Walker BR, Colledge NR, Ralston SH, Penman ID. Davidson's principal and practice of medicine. Endocrine and metabolic disease. Elsevier Health. 2014: 658.
2. IDF diabetes atlas. Available at [https:// www. diabetesatlas.org/en/introduction/](https://www.diabetesatlas.org/en/introduction/). Accessed on 12 March 2020.
3. International Diabetes Federation. IDF Diabetes Atlas. 8th edition. Brussels: International Diabetes Federation; 2017: 40-59.
4. Thangasami SR, Chandani AL, Thangasami S. Emphasis of yoga in the management of diabetes. J Diabetes Metab. 2015;6:613.
5. Liu XC, Pan L, Hu Q, Dong WP, Yan JH, Dong L. Effects of yoga training in patients with chronic obstructive pulmonary disease: a systematic review and meta-analysis. J Thorac Dis. 2014;6:795-802.
6. Park K. Textbook of preventive and social medicine. 23rd edition. Banarasidas Bhanot Publisher; 2017: 362.
7. Madaan H, Agrawal P, Garg R, Sachdeva A, Surajeet Kumar Partra, Rajesh Nair. Prevalence of diabetes mellitus in rural population of district Sonapat, India. Int J Med Sci Public Health. 2014;3(3):261-4.
8. Vaz NC, Ferreira AM, Kulkarni MS, Vaz FS, Pinto NR. Prevalence of diabetic complications in rural Goa, India. IJCM. 2011;36(4):283-6.
9. Gupta OP, Dave SK, Baba S, Goto Y, Fuki I. Aetiological factors in the prevalence of diabetes in urban and rural populations in India. Diab Mellitus Asia. 1976;3:23-44.
10. Omar MA, Motala AA, Seedat A, Pirie F. The significance of a positive family history in South African Indians with NIDDM diabetes res. Clin Pract. 1996;34:13-6.
11. International Diabetes Federation. Diabetes Atlas, (6th edition.),2013. Available at [www.idf.org](http://www.idf.org). Accessed on 19 February 2020.
12. Rathod HK, Darade SS, Chitnis UB, Bhawalkar JS, Jadhav SL, Banerjee A. Rural prevalence of type 2 diabetes mellitus: a cross sectional study. J Social Health Diab. 2014;2(2):34-8.
13. Gray N, Picone G, Sloan F, Yashkin A. The relationship between BMI and onset of diabetes mellitus and its complication. Southern Med J. 2015;108(1):29-36.

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