

Original Article

Evaluation of risk factors associated with diabetes mellitus among rural population

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ABSTRACT:

Background: Today, diabetes no longer remains a disease of the high socioeconomic status or confined to urban area. However, not enough prevalence studies have been conducted in India for rural population. **Aim of the study:** To evaluate risk factors associated with diabetes mellitus among rural population. **Materials and methods:** The present study was conducted in the Department of community medicine of the medical institution. For the study, a total of 6500 subjects from rural population were included in the study population. An informed written consent was obtained from the participants after explaining them the protocol of the study in detail. **Results:** In the present study, a total of 6500 patients were included in the study. The number of male subjects was 3400 and number of female subjects was 3100. The diabetes was prevalent in 10.79 % patients. It is evident from the results that diabetes is more prevalent in obese patients. Furthermore, vegetarian diet, smoking and alcohol consumption contribute in the risk of diabetes mellitus. The p-value for risk factors was less than 0.05 and was statistically significant. **Conclusion:** Within the limitations of the present study, it can be concluded that diabetes mellitus is highly prevalent in rural population. It can be prevented by regular exercise, reduction in smoking and alcohol consumption and consumption of protein rich diet.

Keywords: Diabetes mellitus, rural population, diabetes

Received: 22-03-2013

Accepted: 28-03-2013

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This article may be cited as: Kumar A. Evaluation of risk factors associated with diabetes mellitus among rural population. J Adv Med Dent Scie Res 2013;1(1):138-141.

INTRODUCTION:

Prevalence of diabetes mellitus (DM) and impaired fasting glucose are reported to be highly variable among rural and urban population in India. A number of epidemiological studies with varying sample sizes have reported prevalence of diabetes at different geographical areas ranging from 1.6–12.4%,¹ type-2 diabetes is a global health problem.² The prevalence of diabetes in Indian adults was found to be 2.4% in rural and 4–11.6% in urban dwellers.³ Today, diabetes no longer remains a disease of the high socioeconomic status or confined to urban area. However, not enough prevalence studies have been conducted in India for rural population.

American Diabetes Association has proposed the screening of all patients aged over 45 years by measuring fasting blood glucose every three years, in addition to screening patients from high-risk groups and

younger patients with hypertension, obesity, a family history of diabetes in a first-degree relative, or a family history of gestational diabetes.⁴ It is estimated that 20% of global burden resides in South East Asia Region (SEAR) area, which will be tripled to 228 million by the year 2025 from the current 84 million.⁵ The major determinants for projected increase in the number of Diabetes in SEAR countries are population growth, age structure, and urbanization. Diabetes and its complications pose a major threat to public health resources and World Health Organization (WHO) has projected the maximum increase in Diabetes would occur in India.⁶ Prevalence of Diabetes is increasing day-by-day in our country. Hence, the present study was conducted to evaluate risk factors associated with diabetes mellitus among rural population.

MATERIALS AND METHODS:

The present study was conducted in the Department of community medicine of the medical institution. The ethical clearance for the study was approved from the ethical committee of the hospital. The present study was conducted in the Department of community medicine of the medical institution. The ethical clearance for the study was approved from the ethical committee of the hospital. For the study, a total of 6500 subjects from rural population were included in the study population. An informed written consent was obtained from the participants after explaining them the protocol of the study in detail. Subject information regarding name, age, sex, education, occupation, diet, smoking, alcoholism, and family history of the disease was taken. Subjects blood sample was taken for evaluation of both fasting and random blood sugar estimation.

The following factors were considered positive for diabetes.

1. Plasma glucose concentration >126/dl in case of fasting and >200mg/dl in case of random blood glucose level.
2. Polyuria, polydipsia and unexplained weight loss. Results were tabulated and subjected for

correct inferences. P value < 0.05 was considered significant.

The statistical analysis of the data was done using SPSS version 11.0 for windows. Chi-square and Student's t-test were used for checking the significance of the data. A p-value of 0.05 and lesser was defined to be statistically significant.

RESULTS:

In the present study, a total of 6500 patients were included in the study. The number of male subjects was 3400 and number of female subjects was 3100. The mean age of the participants was 39.29 years. (table 1). Table 2 shows the prevalence of diabetes in study population. The diabetes was prevalent in 10.79 % patients. Table 3 shows the risk factors in study population. It is evident from the results that diabetes is more prevalent in obese patients. Furthermore, vegetarian diet, smoking and alcohol consumption contribute in the risk of diabetes mellitus. The p-value for risk factors was less than 0.05 and was statistically significant.

Table 1: Demographics of patients

Variables	Number
Total no. of patients	6500
No. of male subjects	3400
No. of female subjects	3100
Mean age (years)	39.29

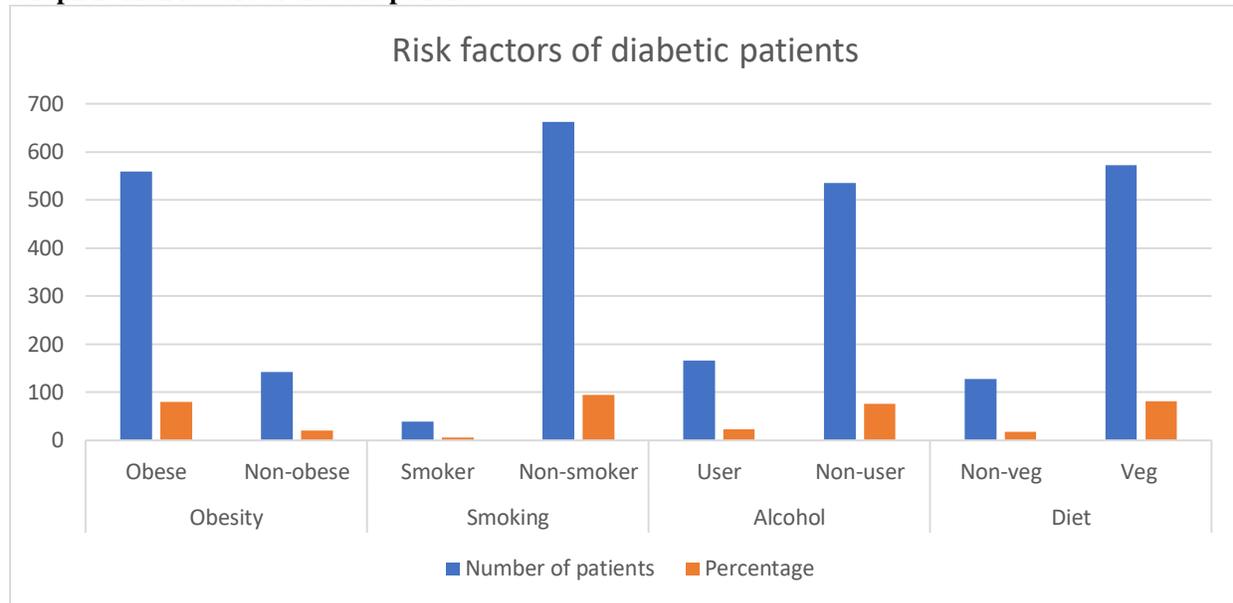
Table 2: Prevalence of diabetes in study population

Total no. of subjects	Patients with diabetes mellitus	Percentage
6500	701	10.79

Table 3: Risk factors in subjects

Risk factor	Category	Number of patients	Percentage	p-value
Obesity	Obese	559	79.8	0.001
	Non-obese	142	20.2	
Smoking	Smoker	39	5.6	0.004
	Non-smoker	662	94.4	
Alcohol	User	166	23.7	0.02
	Non-user	535	76.3	
Diet	Non-veg	128	18.2	0.001
	Veg	573	81.8	

Graph 1: Risk factors of diabetic patients



DISCUSSION:

In the present study, we observed that diabetes mellitus was prevalent in 10.79 % of rural population. The risk factors commonly associated with diabetes mellitus are obesity, smoking, alcohol consumption. A total of 6500 subjects from rural population were selected in the present study. The results were statistically significant. Khatib NM et al ⁷ studied the determinants of type-2 DM in people who are ≥45 years of age by selective screening methodology in rural area of Wardha district. A cross-sectional population-based study was conducted among those who are at risk of developing DM, as per the WHO guidelines on Laboratory Diagnosis and monitoring of Diabetes Mellitus 2002. Blood glucose estimation was done using a blood glucose meter. Eight point four nine percent of the 306 persons above the age of 45 years were diabetic. This study also revealed that the proportion of people diagnosed with DM increases with increasing age groups. Mean fasting and post meal blood glucose level (in mg%) among the study participants (nondiabetics) were 83.6 ± 1.6 and 129.9 ± 1.9 and mean fasting and post meal blood glucose level among diabetics were 138.8 ± 2.1 and 220.7 ± 1.9, respectively. The difference between the post meal blood glucose level among the diabetics and nondiabetics was statistically significant. The proportion of diabetics was more among those who had family history of diabetes (8.6%), BMI more than 25 (24.1%) and those with sedentary lifestyle (10.4%). They concluded that implementation of preventive measures to reduce the burden of diabetes is needed. Identification of the environmental factors adversely related to glucose intolerance helps evolve preventive strategies. Melidonis AM et al ⁸ investigated

the prevalence of DM in a representative rural area of Greece. In total, 880 subjects, aged 1-99 years (410 males [46.6%] mean age [+/- standard deviation, SD] 46.7 +/- 26 yrs, 470 females-mean age [+/- SD] 48.2 +/- 24.3 years) were screened for the presence of DM. Body mass index (BMI), waist to hip ratio (WHR), personal and family history were recorded at baseline. After an overnight fast, blood samples were drawn for the determination of plasma glucose (FPG) and serum lipid profile. In the case of FPG >126 mg/dL a second determination was performed one week later. Subjects with FPG <126 mg/dL on repeated test, and those with FPG between 110 and 126 mg/dL, were invited to undergo an oral glucose tolerance test. Diagnosis of DM was based on the 1999 WHO criteria. The prevalence of DM was 7.8 %, with known diabetics being 5.3% of the population and undiagnosed diabetes being 2.5%. No significant differences were detected between males and females. There was a significant increase in the prevalence of DM with increasing age. Impaired glucose tolerance was diagnosed in 3.9%, while impaired fasting glucose was diagnosed in 1.9%. They concluded that the prevalence of DM has significantly increased in the rural population of Greece. Age, hypertension, obesity, family history of diabetes and elevated triglyceride levels were significantly associated with prevalent diabetes. These subjects should be a primary target for preventive intervention strategies.

Malini DS et al ⁹ identified prevalence of Type-II Diabetes and assessed risk factors associated with development of diabetes in working women. A cross sectional study was carried out in six educational institutes. A total of 100 working women were selected

as study population. During the two-month study period, Fasting Blood Sugar (FBS) was estimated to identify the diabetics and the Impaired Glucose Tolerance (IGT). Information from the study population was collected through pre-tested questionnaire using several anthropometric measurements. Out of 100 women, 24 were having FBS compatible with IGT or diabetes. The incidence was highest in 46 to 55 yr age group. 75% of women with diabetes or IGT were in higher income group. Body Mass Index was more than 25 kg/m² in maximum (75%) women having diabetes or IGT. 92% women with diabetes or IGT had their Waist Hip Ratio ≥ 0.85 . They concluded that prevalence of diabetes and IGT was higher among urban working women and is increasing with increase in age. Obesity plays a major role in development of Type 2 diabetes. Gupta SK et al¹⁰ estimated the usefulness of the Indian diabetes risk score for detecting undiagnosed diabetes in the rural area of Tamil Nadu. The present study was conducted in the field practice area of rural health centers, covering a population of 35000 from February to March 2008 by using a predesigned and pretested protocol to find out the prevalence and the risk of diabetes mellitus in general population by using Indian diabetes risk score. 1936 respondents comprising 1167 (60.27%) females and 769 (39.73%) males were studied. Majority 1203 (62.50%) were Hindus. 1220 (63.%) had studied up to higher secondary. 1200 (62%) belonged to lower and lower-middle socio-economic class. A large number of the subjects 948 (50%) were below 35 years of age. Most of the respondents 1411 (73%) indulged in mild to moderate physical activity. 1715 (87.91%) had no family history of diabetes mellitus. 750 (39.64%) individuals were in the overweight category (>25 BMI). Out of these overweight persons, 64% had high diabetic risk score. It is observed that chances of high diabetic score increase with the increase in BMI. Prevalence of diabetes in studied population was 5.99%; out of these, 56% known cases of diabetes mellitus had high (>60) IDRS. Correlation between BMI and IDRS shows that, if BMI increases from less than 18.50 to more than 30, chances of high risk for developing diabetes mellitus also significantly increase. This study estimates the usefulness of simplified Indian diabetes risk score for identifying undiagnosed high risk diabetic subjects in India. This simplified diabetes risk score has categorized the risk factors based on their severity. Use

of the IDRS can make mass screening for undiagnosed diabetes in India more cost effective.

CONCLUSION:

Within the limitations of the present study, it can be concluded that diabetes mellitus is highly prevalent in rural population. It can be prevented by regular exercise, reduction in smoking and alcohol consumption and consumption of protein rich diet.

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