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Original Research Article

Prevalence and risk factors of diabetes among young students of a Medical College in Central India

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Abstract

Background: India is home to 69.2 million diabetics and is second only to China in these numbers. There has been a rapid increase in the prevalence of diabetes worldwide, developing countries being the worst hit. Recent studies have revealed a trend of occurrence of diabetes mellitus at a younger age. This implies morbidity and mortality due to diabetes will occur at an early age among large proportion of individuals. We aimed to determine the prevalence of diabetes mellitus among young medical students of MGIMS Sevagram and risk factors associated with diabetes.

Methods: This cross-sectional study was conducted between August 2010 and December 2012 in MGIMS Sevagram, a medical college located in central India. Total of 700 students, aged 17-35 years, were studied using a modified STEPs questionnaire. After an overnight fast, blood samples for fasting blood glucose and lipid profile were collected. Statistical analysis was done using STATA 13 software.

Results: The prevalence of diabetes mellitus was found to be 2.36%. Impaired fasting glucose or prediabetes was present in 17.57%. Control of diabetes was very poor among study subjects as only 33.3% of diabetics had their fasting blood sugar under control. .After multivariate logistic regression analysis diabetes risk was significantly higher among those aged >30 years {OR-11.32 (95% CI 3.43-37.32)}, those with low physical activity level {6.99 (95% CI 1.52-32.08))}, those with abnormal waist circumference {OR-3.70 (95% CI 1.07-12.81)} and those who had hypertriglyceridemia {OR-3.12 (95% CI 1.02-9.51)}.

Conclusion: A significant proportion of young medical student's have diabetes and prediabetes. This study is an eye-opener, as a large proportion of young medical students having diabetes are not able to control their diabetes, despite adequate knowledge and treatment opportunity. One factor which can be responsible for this problem is stressful routine through which a medical student has to go through during the training, especially during residency.

Keywords: Diabetes mellitus, nephropathy, retinopathy, myocardial infarction, stroke.

1. Introduction

Diabetes mellitus is one of the major non communicable diseases and also a major cause of mortality and morbidity worldwide.[1] International diabetes federation estimated that worldwide 415 million people, aged 20-79 years had diabetes in 2015. 5.0 million deaths occurred which were attributable to diabetes mellitus (DM), and the total global health expenditure of 673 billion US dollars was estimated due to diabetes. What is more alarming for India is that 75% of those with diabetes live in low- and middle-income countries. The story doesn't end here; in fact is likely to become worse as, by 2040, the number of people with diabetes aged 20-79 years was predicted to rise to 642 million.[2] In terms of the maximum number of cases of DM, India is ranked second, just below China, the home to the maximum cases of DM in the world.[3]

WHO has reported a prevalence of 8.5% worldwide among individuals older than 18 years of age. There are geographic variations in the prevalence of diabetes with highest prevalence reported in the eastern Mediterranean region (i.e. 13.7%) and lowest in African region (i.e. 7.1%). The prevalence reported in south east Asia is 8.7%. India is home to 69.2 million diabetics with a prevalence of 8.7%.[4]

The natural history of DM is such that apart from acute complications it causes dreaded chronic complications like nephropathy, retinopathy, myocardial infarction, stroke etc. Being chronic these complications occur after several years of disease occurrence. Hence, anyone who has diabetes for a longer duration is more likely to have these complications, compared with somebody with a shorter duration of DM, provided diabetes control is similar.[5, 6] Not only this, there has been a rapid increase in occurrence of DM at an early age.[7-9] This implies that it is better to detect and control DM at an early stage of life.

Only a few studies have reported prevalence of DM among young adult and they have also suggested that the prevalence of DM in young individuals in increasing[10, 11] ICMR-INDIAB study has reported that more and more cases of DM occur at younger age and 25-34years of age can be considered a takeoff point of prevalence of DM.[12] But still, the data in India regarding the prevalence of DM in young are scarce. Hence, this study was conducted with an aim of determining the prevalence of DM and its associated risk factors in young medical students.

2. Materials and Methods

2.1 Study design and setting

This was a cross sectional study, conducted in Mahatma Gandhi Institute of Medical Sciences, Sevagram, a medical college located in Wardha district of Maharashtra, India. The study was done from August 1, 2010 to December 31, 2012.

2.2 Study subjects

All medical students i.e. undergraduates, interns and postgraduates, who were enrolled in the college during the study period were considered for the study. Those who did not give consent to participate in the study were excluded. During the study period, a total of 720 students were enrolled in the institute. We aimed to study>95% of students enrolled during the study period.

2.3 Study procedure

The WHO STEPS approach was used to assess the prevalence of diabetes and it's associates.[11]

All the subjects were asked to fill in a pre-validated self answered questionnaire which was designed to evaluate the various risk factors of diabetes. This included details related to age, gender, physical activity, history of smoking or alcohol, past history of DM and the family history of DM. Then physical examination was done to measure blood pressure and anthropometric measurements like height, weight, waist circumference, hip circumference, waist/hip ratio were taken. After an overnight fast of minimum 8 hours, blood samples were analyzed for fasting blood glucose and lipid profile including serum total cholesterol, LDL-C, HDL-C and triglycerides.

Those with fasting blood glucose $\geq$ 126 mg/dl were diagnosed to have diabetes along with those who were already taking medicines for diabetes. Prediabetes was defined as fasting blood glucose of 100-125mg/dl.[5] Waist circumference(WC) cut off for defining obesity for Asians was used, hence WC of ≥90 cm for males and ≥80 cm for females were considered cut off points for defining an abdominal obesity.[13, 14]

2.4 Statistical analysis

We used statistical software STATA version 13 for statistical analysis. Prevalence of diabetes was expressed in percentage. Chi-square test was used to calculate the unadjusted odds ratio (ORs) along with 95% CIs to assess the strength of association between independent variables (age, sex, and family history of DM etc. and dependent variables (diabetes). After univariate analysis, multivariate logistic regression analysis was performed to derive the final model. P <0.05 was considered as significant.

2.5 Ethical Issues

Clearance from the institutional ethics committee was taken before commencing the study. All the students were explained the study procedures and objectives, before enrolling. Only those who gave written consent were included in the study.

3. Results

720 students were enrolled in the medical college during study duration and 20students who did not give consent were excluded from the study. Age of the study subjects was between 17 and 35 years with a mean of 24.9 years (SD=3.8).

Table 1 describes the baseline characteristics of the study subjects with respect to their clinical and biochemical parameters.

Table 1: Baseline characteristics of the study subjects

Age (completed years)	Number	Percentage
≥30	77	11.00
<30	623	89.00
Sex		
Males	293	41.86
Females	407	58.14
Family history of diabetes		
Present	106	15.14
Absent	594	84.86
Physical activity		
Non Vigorous	60	8.57
Vigorous	640	91.43
Waist circumference		
Abnormal	145	20.71
Normal	555	79.29
Triglycerides (mg/dl)		
>150mg/dl	121	17.29
<150mg/dl	579	82.71
HDL cholesterol (mg/dl)		
Abnormal	312	43.57
Normal	388	55.43
LDL cholesterol (mg/dl)		
>130mg/dl	40	5.71
<130mg/dl	660	94.29
Total cholesterol (mg/dl)		
>200mg/dl	31	4.43
<200mg/dl	669	95.57

3.1 Burden of diabetes mellitus

The prevalence of diabetes mellitus was found to be 2.36%. Impaired fasting glucose or prediabetes was present in 17.57%. Control of diabetes was very poor among study subjects as only 33.3% of diabetics had their fasting blood sugar under control.

3.2 Associations with diabetes mellitus

On univariate analysis, Odds of DM were significantly higher in students aged ≥ 30years {OR-7.90(95% CI, 2.96-21.17)}, those with abnormal waist circumference {OR-3.54(95% CI 1.34-9.35)}, abnormal total cholesterol {OR- 5.01 (95% CI 1.36-18.45)}, those with abnormal LDL cholesterol {OR-3.74 (95% CI 1.03-13.59)}, those with hypertriglyceridemia {OR-4.48(95% CI 1.69-11.87)}. (Table-2)

Multivariate logistic regression analysis revealed that DM was significantly higher among those aged ≥30 years {OR-11.32 (95% CI 3.43-37.32)}, those with vigorous physical activity {6.99 (95% CI 1.52-32.08))} those with abnormal waist circumference {OR-3.70 (95% CI 1.07-12.81)} and those who had hypertriglyceridemia {OR-3.12 (95% CI 1.02-9.51)}. (Table-2)

Table 2: Correlates of diabetes

Correlates of Hypertension	Univariate analysis		Multivariate analysis	
	OR (95% CI)	P value	OR (95% CI)	P value
Age				
≥ 30 years	7.90 (2.96-21.17)	<0.001	11.32 (3.43-37.32)	<0.001
< 30 years	1		1	
Gender				
Male	1.74 (0.61-5.02)	0.29	1.09 (0.30-3.88)	0.81
Female	1		1	
Family h/o diabetes				
Present	1.75 (0.56-5.48)	0.31	1.17 (0.33-4.11)	0.32
Absent	1		1	
Physical activity				
Non vigorous	2.35 (0.66-8.43)	0.2	6.99 (1.52-32.08)	0.01
Vigorous	1		1	
Waist circumference				
Abnormal	3.54 (1.34-9.35)	0.001	3.70 (1.07-12.81)	0.03
Normal	1		1	
Serum triglyceride				
≥ 150mg/dl	4.48 (1.69-11.87)	0.001	3.12 (1.02-9.51)	0.03
< 150mg/dl	1		1	
Serum total cholesterol				
≥ 200mg/dl	5.01 (1.36-18.45)	0.03	1.12 (0.22-5.71)	0.82
< 200mg/dl	1		1	
Serum LDL cholesterol				
≥ 130mg/dl	3.74 (1.03-13.59)	0.03	4.79 (0.93-24.69)	0.45
< 130mg/dl	1		1	
Serum HDL cholesterol				
Abnormal	0.51 (0.18 1.46)	0.25	1.14 (0.61-2.18)	0.41
Normal	1		1	

4. Discussion

We found that the prevalence of diabetes mellitus was found to be 2.36% in the study population. Impaired fasting glucose or prediabetes was present in 17.57%. Control of diabetes was very poor among study subjects as only 33.3% of diabetics had their fasting blood sugar under control. After multivariate analysis, we found statistically significant increased risk of DM with older age group, non active or sedentary life style, obesity as defined by abnormal waist circumference and hypertriglyceridemia. No significant association was found between DM and gender, family history of DM, hypercholesterolemia, high LDL-C and abnormal HDL-C.

In our study, we found that the prevalence of DM was 2.36% among the young medical students. Prevalence of DM in our study was similar to a study done in south India by Raghupathy *et al*, who reported the prevalence of DM among young adults aged 26-32 years, to be 2.8%.[15] Similarly, 2.8% prevalence of DM has been reported in a population aged 20 to less than 30 years of age in Jeddah, Saudi Arabia.[16] Bhargava *et al* have reported that 4.4% of young individuals aged 26-32 years, had DM.[17] Hence, a significant proportion of young individuals have DM.

In our study, we found that 17.57% of young students had impaired fasting glucose or prediabetes. A study done in medical students in Andhra Pradesh found that 8.9% had prediabetes.[18] Another study done in Delhi among young individuals has reported that 10.8% had prediabetes.[17] Ramachandra *et al* have reported a prevalence of 12.1% in individuals <40years of age.[19] Hence, apart from a significant proportion individuals having DM, a larger proportion of young adults like medical students have prediabetes and are at significant risk of developing frank DM. What is more alarming is that our study has found that almost two third of diabetic medical students did not have their blood sugar levels under control. All such individuals were doing residency during the study period. This is a very serious situation as doctors despite having adequate knowledge and treatment accessibility are not able to control their diabetes.

We found that older students i.e.≥ 30years of age(OR-11.32 (95% CI,3.43-37.32), with sedentary life style (OR-6.99 (95% CI,1.52-32.08), obesity (OR-3.70 (95% CI,1.07-12.81) and hypertriglyceridemia (OR-3.12 (95% CI,1.02-9.51) were significantly at higher risk of developing DM. Amarnath *et al*[18] have also reported a similar increased risk of diabetes with abnormal waist circumference but they also found a positive association with family history of DM which was not found in our study. McClain *et al* found that prevalence of diabetes in young adults was significantly higher among those who had obesity and raised serum total cholesterol, triglycerides, VLDL cholesterol, and HDL cholesterol.[20] Similar to the study reported by Anderson *et al*, our study also found sedentary life style as a risk factor for the development of DM.[21] In our study positive family history of DM was not found to be associated with higher risk of DM but other studies have reported this association.[22] These differences between our study and others are probably because of the differences in the population studied.

5. Conclusion and recommendation

This study has found a significant burden of diabetes among young medical students. Diabetes mellitus has become an endemic problem for countries like India and is rapidly involving more and more young adults. Thereby, imposing huge economical and psychosocial burden. It is really an eye-opener, as a large proportion of young medical students having diabetes are not able to control their diabetes, despite adequate knowledge and treatment opportunity. One factor which can be responsible for this problem is probably the stressful routine through which a medical student has to go through during the training, especially during residency. Further studies are required to determine the likely reasons and planning of appropriate strategies so as to prevent the occurrence improve control and prevent dangerous non reversible consequences of diabetes.

Competing interest

The authors declare that they have no competing interest.

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