ORIGINAL ARTICLE

Prevalence of obesity and need for screening using tools like Indian Diabetes Risk Scale in Diabetes prevention among medical students

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Abstract

Introduction: The prevalence of lifestyle diseases in increasing throughout the world. They are increasingly taking over communicable diseases as the major cause of morbidity and mortality. Medical students usually have sedentary lifestyle coupled with high level of stress, owing to academic requirements. Hence, they are at a much higher risk of developing lifestyle diseases. **Materials and Methods:** Study subjects were administered a validated questionnaire to collect information related with the components of IDRS. Based on the score, they were divided into high risk, moderate risk and low risk. Data was analysed using the SPSS version 21. **Result:** Half of all the students were in the moderate risk group. The rest was distributed among low risk (17.33 %) and high risk (27.33%). Among those with low risk of developing T2DM, 73% were males, whereas females constituted 70.7% of those with high risk of developing T2DM. The association of developing T2DM was also highly significant with obesity. Statistically significant association of high T2DM risk were found with gender being female, family history of T2DM and BMI≥23 Kg/m2 **Conclusion:** IDRS has been shown to be an effective tool for screening populations. Hence, regular programs with IDRS along with blood sugar and lipid profile of moderate and high risk group along with stress management can be effective in supporting medical students to cope with demanding study and work conditions among medical students and doctors.

Keywords

Diabetes Mellitus Type II; Risk Factors; Medical Students; IDRS

Introduction

The prevalence of lifestyle diseases in increasing throughout the world. They are increasingly taking over communicable diseases as the major cause of morbidity and mortality. These diseases have multifactorial aetiology. Obesity, stress, sedentary life style, eating habits and family history are considered to be an important risk factor in the development of lifestyle diseases.

Diabetes Mellitus Type 2 (T2DM) is one of the major lifestyle diseases and a major cause of fatal and non-fatal complications. As per the latest reports, over 19% of the world's diabetic population lives in India, which translates to over 35 million diabetic patients, and is projected to increase to 80 million by the year 2030 (1).

Medical students usually have sedentary lifestyle coupled with high level of stress, owing to academic requirements. Medical Colleges are known to be stressful environment for students (2), because of long working hours, lack of sleep, fear of failure, lack of peer support and exposure to practical education sessions very different from those experienced in the school classrooms. Hence, they are at a much higher risk of developing lifestyle diseases.

Obesity has been consistently associated with high prevalence and incidence of lifestyle diseases (3). Measuring a person's waist circumference (WC) is the simplest way to assess central obesity. WC has been shown to be one of the most accurate anthropometrical

indicators of abdominal fat and predictor of risk of developing T2DM (4), better than BMI (5). It is closely correlated to the waist to hip ratio (WHR), but is thought to be a more reliable measure of abdominal fat; the WHR can mask the status of abdominal obesity with a disproportionately large hip circumference (6). People with higher BMI tend to develop T2DM at a younger age (7).

Numerous studies have shown that lifestyle interventions has impact on preventing and modifying the course of the disease. In a multicentre clinical research study, The Diabetes Prevention Program, Lifestyle interventions showed a reduction of 58% in the risk of diabetes as compared to a 31% reduction in the group administered Metformin (8). A recent multicentre randomized control trial found that intensive lifestyle interventions (ILI) led to significant weight loss and improvement in fitness in individuals with T2DM as compared to the control group with diabetes support and education (DSE). Over the four years of study, ILI subjects had better level of glycaemic control, blood pressure, HDL-C and triglycerides (9). The Indian Diabetes Prevention Program has also shown similar results (10). Yu et al found that the total healthcare cost declined by $213 per person per year for a weight loss of 1% in T2DM (11).

Indian Diabetes Risk Score (IDRS), devised and developed by Mohan et al. at the Madras Diabetes Research Foundation (MDRF), is a validated tool to identify individuals with high risk of developing T2DM in future. It takes into consideration family history, waist circumference, age and physical activity to identify individuals at high risk of developing diabetes (12) and can be an efficient tool to reduce the risk of diabetes (13). High risk individuals identified using IDRS can be counselled to reduce the risk of diabetes. (Table 1)

Using IDRS as screening tool among medical students has shown reduction in mean abdominal circumference by 1.47 ± 1.14 cm and decrease in mean calorie consumption 176 ± 87 kcal along with increase in physical activities. All these contributing to reduction of mean risk score from 36 to 31 (14).

Aims & Objectives

1. To assess risk of type 2 diabetes mellitus (T2DM) using the IDRS among Medical Students
2. To study association of other risk factors based on IDRS results.

Material & Methods

The current study was done in a medical college in north India. Convenient sampling method was used to identify the study population. All the students coming to the department of Community Medicine in their clinical postings and gave informed consent were included and administered a validated questionnaire to collect information related with the components of IDRS. Their waist circumference was measured and IDRS calculated. Grades of BMI (modified for Asians) were used (15). Based on the score, they were divided into high risk (score >60), moderate risk (score between 30-50) and low risk (score <30). Anthropometric measurements (height, weight, waist circumference, hip circumference and blood pressure) were measured using standard methods and noted. Data were entered and analysed using the SPSS version 21. Quantitative data were expressed as mean and standard deviation and 95% confidence interval (CI) was calculated. Qualitative data were expressed as percentage/proportion and the Chi-square test ($\chi 2$) was used to assess statistical significance of results. 'P' < 0.05 (0.01) was considered statistically significant (highly significant).

Results

150 medical students (68 male (45.3%) and 82 females (54.7%)) gave informed consent and were included. The results have been tabulated below

(Table 2) shows that of all the male study subjects, 73.5% had waist line less than 90 cm and 14.7% had it above 100 cms. Of the females, 23.2% had it less than 80 cms whereas 37.8% measured above 90 cms.

(Table 3) shows the distribution of risk of T2DM among study subjects. Half of all the students were in the moderate risk group. The rest was distributed among low risk (17.33 %) and high risk (27.33%).

(Table 4) shows the distribution of characteristics among study subjects. Among those with low risk of developing T2DM, 73% were males, whereas females constituted 70.7% of those with high risk of developing T2DM. The association of developing T2DM was also highly significant with obesity, with more than half of obese students had high risk of developing T2DM.

(Table 5) shows statistically significant association of high T2DM risk with the gender being female (P=0.015), family history of T2DM (P≤0.001) and BMI≥23 Kg/m2 (P≤0.001)

Discussion

Present study shows that 26 (17.33%), 83 (55.33%) and 41 (27.33%) subjects were in low, moderate and high-risk category to develop T2DM as per the IDRS. Findings for high-risk category in our study were much higher than from the study conducted by Singh et al. (1%) (16), Gopalakrishnan et al. (1.9%) (17) and Bhatia et al. (1%) (18).Studies by Subramani et al., Kumar et al., Mohan et al. and Chowdhury et al., showed 12.1% (19), 18.6% (20), 31.2% (21) and 31.5% (22) in high-risk category, respectively. Dissimilar observation for moderate-risk category were found in the study conducted by Vardhan et al. at (28%) (14). However, similar figures for moderate-risk category were found in studies conducted by Chowdhury et al. (46%), Mohan et al. (50.3%) (21), Bhatia et al. (68%) (18) and Subramani et al. (74.7%) (19) (22).

There is a statistically significant association of moderate to high risk of developing T2DM with being female (P = 0.011) and with higher BMI (P=0.009). This is very

different from other studies. Singh et al found statistically significant association of moderate-high diabetes risk with male gender and with higher BMI (16). Similar statistically significant association between male gender and higher BMI with increased diabetes risk was present in a study conducted by Gopalakrishnan et al. (17) and Chowdhury et al(22). This dissimilar finding in the present study may be due to the fact that almost three-fourth of the female subjects had waist measurement above 80 cms.

The risk of developing T2DM with positive family history of diabetes in our study was found to be highly significant (20/33 (60.6%), P< 0.001). Studies have also shown family history as an independent risk factor for T2DM (23), which is being corroborated in our study also. Though other studies conducted by Subramani et al. (16.6%) (19), Bhatia et al. (32%) (18), Gopalakrishnan et al. (46.6%) (17)& Singh et al (41.5%) (16) have found positive family history of diabetes in subjects with high risk of developing T2DM, the proportion was much higher in our study and is similar to study by Adhikari et al. which showed that 45–80% children who develop T2DM had a parent with the disease (24).

In our study, vigorous, moderate, mild and no physical activity was carried out by 4 (2.67%), 53 (35.33%), 66 (44%) and 27 (18%) subjects, respectively. Association between no/mild physical activity and moderate-high diabetes risk was statistically significant (P< 0.0001). Our study corroborates with the findings from several studies which have shown that physical activity less than the recommended values for moderate exercise (<150 min per week) does increase the risk of T2DM. Findings for moderate physical activity are similar to results of study conducted by Singh et al (31%) (16) and Bhatia et al. (49%) (18).Higher figure for moderate physical activity was seen in a study conducted by Gopalakrishnan et al. (76.5%) (17) and Subramani et al. (74.7%) (19).

Conclusion

IDRS has been shown to be an effective tool for screening populations. Hence, regular programs with IDRS along with blood sugar and lipid profile of moderate and high risk group along with stress management can be effective in supporting medical students to cope with demanding study and work conditions among medical students and doctors. In recent years, Medical Council of India (MCI) has shown greater concerns for well-being of medical students. Various programs have been introduced in medical colleges to support students. Supplementing them with such lifestyle intervention programs will further augment MCI's effort in ensuring students well-being.

Recommendation

There has been increasing awareness about lifestyle diseases. Early adoption of healthy lifestyle, especially among those who are at a higher risk of developing such diseases has been found to be preventive. Not only does it delays the onset of disease, but also decelerates the progress and long term consequences. Conducting such assessments in medical students can go a long way in increasing awareness among students and motivating them in adopting preventive measures. It can also help in early identification and treatment of disease.

Limitation of the study

The study was conducted among medical students who have good knowledge about diseases and its prevention and are likely to understand and adopt lifestyle interventions. Such targeted group interventions will be cost effective and have significant impact. However, it will not be easy to convince general population without putting efforts. Cost of lifestyle interventions, as calculated by Wolf et al, was $328 per person per year (25). Though this cost will be negated by lower healthcare use and lesser hospital admissions, it needs to be seen how an efficient and effective behaviour change program can be designed to induce healthy lifestyle practices. Cross-sectional analysis does not permit observation of trend of diabetes risk among the subjects over time. Also, as the study was conducted in the younger age group, so the effect of age on diabetes risk could not be considered.

Relevance of the study

With evolution of better living conditions and availability of health care services, lifestyle diseases are increasingly becoming more important public health concern, as compared to infectious diseases. Tools like IDRS have the potential to identify the risk of developing T2DM and other lifestyle diseases, so that steps can be taken to promote primordial preventative measures and prevent or delay the onset of disease and its consequences. The current study is an attempt to find the strength of association of known risk factors of T2DM with IDRS in a select group. This, and other such studies will help in identifying wider applicability of IDRS and its use for preventing T2DM and its long term health effects.

Authors Contribution

All the authors have contributed significantly for the designing the study, implementing it, collecting data and analyzing data as well as repairing the final document.

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Tables

TABLE 1 MDRF-IDRS (12)

Particulars	Score
Age	
<35	0
35-49	20
>=50	30
Abdominal Obesity	
Waist <80 cm (females), <90 cm (males)	0
Waist >80-89 cm (females), >90-99 cm (males)	20
Waist >=90 cm (females), >=100 cm (males)	30
Physical Activity	
Exercise + Strenuous work	0
Exercise or Strenuous work	20

No Exercise or Strenuous work	30
Family History	
No family history	0
Either parent	10
Both parents	20

TABLE 2 RISK SCORE COMPONENT OF STUDY SUBJECTS (N=150)

IDRS component	No of Students (n)	Percentage (%)
Waist Circumference (cm) of Males		
≤90	50	73.5
91-99	8	11.8
≥100	10	14.7
Total	68	100
Waist Circumference (cm) of Females		
≤80	19	23.2
81-89	32	39
≥90	31	37.8
Total	82	100
Physical Activities of the Study Participants		
Vigorous	4	2.67
Moderate	53	35.33
Mild	66	44
No	27	18
Total	150	100
Family History of Diabetes Mellitus		
No Family History	117	78
Either parents	31	20.67
Both Parents	2	1.33
Total	150	100

TABLE 3 DISTRIBUTION OF STUDY SUBJECTS ACCORDING TO RISK GROUPS (N=150)

Group (Risk Score)	No of Students (n)	Percentage (%)	Mean Risk Score
Group-I (<30, Low Risk)	26	17.33	18.46
Group-II (30-50, Moderate Risk)	83	55.33	37.71
Group-III (≥60, High Risk)	41	27.33	64.39

TABLE 4 DISTRIBUTION OF CHARACTERISTICS AMONG STUDY SUBJECTS WITH IDRS (N=150)

Parameters	Low Risk		Moderate Risk		High Risk		Total		P Value
	Number	%	Number	%	Number	%	Number	%	
Gender									
Females	7	26.90%	46	55.40%	29	70.70%	82	54.70%	0.002 *
Males	19	73.10%	37	44.60%	12	29.30%	68	45.30%	
Total	26	100.00%	83	100.00%	41	100.00%	150	100.00%	
Body Mass Index (BMI) as per modified Asian criteria									
Underweight (<18.5)	2	7.70%	1	1.20%	0	0.00%	3	2.00%	<0.001*
Normal Weight (18.5-22.9)	11	42.30%	25	30.10%	4	9.80%	40	26.70%	
Over Weight (22.9-27.5)	8	30.80%	42	50.60%	15	36.60%	65	43.30%	
Obese (>27.5)	5	19.20%	15	18.10%	22	53.70%	42	28.00%	
Total	26	100.00%	83	100.00%	41	100.00%	150	100.00%	
* P Value is highly significant at 0.01 level of significance									

TABLE 5 ASSOCIATION OF CHARACTERISTICS AMONG STUDY SUBJECTS WITH IDRS (N=150)

Characteristic	High Risk (%)	Moderate to Low Risk (%)	Total (%)	Odds Ratio (Unadjusted)	95% CI	Chi Square	df.	P Value
Gender								
Males	12(17.6)	56(82.35)	68 (100)	0.392	0.181-0.846	5.876	1	0.015*
Females	29 (35.4)	53 (77.9)	82 (100)					
Dietary Habits								
Vegetarian	29 (32.2)	61 (67.7)	90 (100)	1.902	0.879-4.114	2.708	1	0.1
Non-Vegetarian	12 (20)	48(80)	60 (100)					
Family History of Diabetic Mellitus								
Present	20 (60.6)	13 (39.4)	33 (100)	7.033	3.027-16.339	23.581	1	0.000*
Absent	21 (17.9)	96 (82.1)	117 (100)					
BMI (kg/m^2)								
BMI ≥23	37 (90.2)	4 (9.8)	41 (100)	5.384	1.784 – 16.249	10.442	1	0.001*
BMI<23	67 (71.7)	39 (28.3)	106 (100)					
Hypertension								
No Family History	26 (23.4)	85 (76.6)	111 (100)	0.489	0.224-1.068	3.286	1	0.07
Either Parents	15 (38.5)	24 (61.5)	39 (100)					
Physical Activity								
Moderate/Vigorous	5 (8.8)	52 (91.2)	57 (100)	0.112	0.108-0.136	20.73	1	<0.0001*
No/Mild	41 (44.1)	52 (55.9)	93 (100)					
* P Value is highly significant at 0.01 level of significance								