Original Article

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Value of Indian Diabetes Risk Score among Medical Students and Its Correlation with Fasting Plasma Glucose, Blood Pressure and Lipid Profile

Internal Medicine Section

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ABSTRACT

Introduction: The Indian Diabetes Risk Score is a tool which was devised by the Madras Diabetes Research Foundation to screen people for the risk of developing Diabetes mellitus; it comprises of the family history, the abdominal circumference, age and the physical activity.

Aim of the Study: This study was aimed at finding out whether the Indian Diabetes Risk Score (MDRF) correlated with the blood sugar levels, the lipid profile and the blood pressure readings of medical students.

Methods: Seventy five female and 75 male students who signed the informed consent were selected for the study. Their IDRS was calculated by using a validated questionnaire which involved the family history, the abdominal circumference, age and the details of the physical activity. All of them had their blood pressure, fasting plasma glucose and lipid profiles measured.

Results: There were 101 students with an IDRS of <30, 42 students with a moderate IDRS (30-50) and 7 who had a high IDRS of ≥60. The fasting plasma glucose was significantly correlated with the IDRS (P=0.001, r = 0.472), with a mean FPG of 84 ± 3.63mg/dl in the low risk groups, of 88 ± 4.93mg/dl in the moderate risk groups and of 94 ± 6.50mg/dl in the high risk groups. The total cholesterol value was r = 0.420 (P= 0.001), the total triglycerides value was r = 0.373 (P=0.001), the LDL cholesterol value was r = 0.578 (P=0.001) and the VLDL value was r = 0.566 (P=0.001), which positively correlated with the risk score and the HDL value r = -0.480 (P=0.001) correlated negatively with the risk score. There was no correlation between the IDRS and the blood pressure.

Conclusion: Our study showed that nearly 40% of the medical students had a moderate to a high IDRS. The IDRS significantly correlated with the fasting plasma glucose and with all the components of the lipid profile. The IDRS did not correlate with the blood pressure readings.

Key Words: IDRS, Fasting plasma glucose, Lipid profile

INTRODUCTION

Diabetes is one of the major non-communicable diseases of the world and India has the dubious distinction of being the "diabetic capital" of the world. We have 40 million Indians with diabetes this forms the largest diabetic pool in the world [1]. The major threat is that 66% of the population of the Indian diabetic pool is undiagnosed. The rise in diabetes in India can be attributed to the genetic predisposition, the sedentary life-styles and the changing food habits.

It has been found that 66% of the Indian diabetes cases are not diagnosed, as compared to 50% in Europe and 33% in the USA. A diabetes risk score will help in devising effective screening strategies to unmask the hidden burden of the disease. The risk factor approach needs aggressive identification for planning prevention strategies and for an early diagnosis. Several diabetes risk scores or risk engines have been devised for prevention programmes in the USA, Scandinavia and in the UK. Mohan et al., from their Chennai Rural Epidemiology Study (CURES) cohort, have developed a single user friendly Indian diabetic risk score [2] (MDRF-IDRS), which takes into consideration the age, abdominal obesity, physical activity and the family history of the patients. The MDRF-IDRS has a sensitivity of 72.5% and a specificity of 60.1% and it was derived, based on the large population based studies which had been done on diabetes in India. Its advantages are its simplicity and low cost and it is easily applicable for mass screening programmes.

Medical students have a busy schedule and them generally they do not have much physical exercise. The effect of the physical inactivity on the prevalence of diabetes can be seen in CUPS [3,4].

This indicates that a small percentage of them could have high risk scores which could pre-dispose them for diabetes at a younger age. Hence, a study was planned to calculate the detailed risk score for the medical students by using the IDRS, by correlating it with the fasting blood sugar level, the blood pressure and the lipid profile and by educating the medical students about the risk reduction by bringing about a change in their life styles.

MATERIALS AND METHODS

After obtaining the ethics committee's approval and after getting their informed consents, 75 male medical students and 75 female medical students were included in the study. Their ages were noted, and the details on a family history of diabetes and physical exercise were collected. The abdominal obesity was measured by using a measuring tape at the mid-point below the lower rib cage and the highest point of the iliac crest. The measurements were

taken with the subjects in minimum clothes and when they were breathing quietly at the end of their expirations. The markers of insulin resistance such as acanthosis nigricans were noted, the risk score was calculated and the feedback was given to the medical students. The blood pressure was measured after allowing them 10 minutes of rest. An average of 2 readings was considered. The fasting plasma glucose and the lipid profile were measured for all the students. The MDRF-IDRS was calculated, based on the above collected data. The students are classified as high risk, moderate risk and low risk, based on the IDRS as follows – up to 30 score as low risk, 30-50 score as moderate risk and 60 and above as high risk.

Statistical Methods: The Fasting Plasma Glucose (FPG), the fasting lipid profile and the blood pressure were correlated with the risk score by using the Pearson's correlation coefficient (for the individual scores). The mean values of FPG, the lipid profile and the blood pressure were compared between the groups by using ANOVA.

RESULTS

We had a total of 150 medical students, out of which 75 were males and 75 were females. They were all of the age group of 20-25 years [Table/Fig-1].

Group (Risk Score)	No. of students (%)	Mean Risk Score
Group I (upto 30)	101 (67)	20
Group II (30-50)	42 (28)	34
Group III (≥60)	7 (5)	60

[Table/Fig-1]: shows number of students in each risk group

Sixty Seven % of them were in the low risk category, while 33% were in the moderate to the high risk categories [Table/Fig-2].

Physical activity	N	% Study
Minimal	33	22.0
Moderate	116	77.3
Strenuous	1	0.7
Waist circumference		
I (<80cm females & < 90cm males)	137	91.3
II (>80cm females & > 90 cm males)	11	7.3
III (> 90cm female & > 100 cm males)	2	1.3
	150	
Family history		
One parent	16	10.4
Both parent	3	2
None	131	87.6
Total		150

[Table/Fig-2]: Showing details of risk score component in 150 Medicals students

Eighteen of the 75 females had minimal physical activity, while 15 out of the 75 males had minimal physical activity. 5 females and 8 males had waist circumferences which exceeded 80cm and 90cm respectively. A total of 8.6% students had abnormal waist circumferences, while 12.4% had a family history of diabetes.

[Table/Fig-3] shows the mean fasting plasma glucose values (Group I – 84+3.63 mg/dl, Group II- 88+ 4.93mg/dl and Group III- 94+ 6.5mg/dl), the lipid parameters and the blood pressure in the different risk groups.There was a progressive increase in the mean values of the FPG and the lipid parameters viz. [total cholesterol (Group I -145± 12.19 mg/dl, Group II -149±16.8mg/dl, Group III- 183±26.5mg/dl), total triglycerides (Group I - 70 ± 15.6mg/dl, Group II- 78 ± 27.4mg/dl, Group III- 109 ± 26.2mg/dl) and LDLc (Group I - 80 ± 10.41mg/dl, Group II- 86 ± 10.22mg/dl, Group III- 117 ± 16.40mg/dl)] from the low to the high risk groups and a decrease in HDLc (Group I - 53 ± 7.8mg/dl, Group II- 47 ± 8.3mg/dl, Group III- 38 ± 2.8 mg/dl), as the risk increased. However, there was no difference in the mean systolic and the diastiolic blood pressure between the groups.

Cardiovascular risk factor	Group I (upto 30)	Group II (30-50)	Group III (60 and above)	P value by Anova
FPG mg/dl	84 ± 3.63	88 ± 4.93	94 ± 6.50	0.001
LDL mg/dl	80 ± 10.41	86 ± 10.22	117 ± 16.40	0.001
HDL mg/dl	53 ± 7.8	47 ± 8.3	38 ± 2.8	0.001
VLDL mg/dl	12 ± 3.23	15 ± 6.19	22.15 ± 3.18	0.001
TC mg/dl	145 ± 12.19	149 ± 16.8	183 ± 26.5	0.001
TG mg/dl	70 ± 15.6	78 ± 27.4	109 ± 26.2	0.001
Systolic BP mm Hg	119 ± 6	118 ± 5.8	120 ± 8	0.599
Diastolic BP mm Hg	77 ± 5.4	76 ± 5.2	78 ± 6.5	0.334

[Table/Fig-3]: Showing mean fasting plasma, glucose, lipid parameters and blood pressure in different risk groups.

Parameters	Pearson's correlation coefficient	Statistical significance (p)
FPG	0.472	0.001
LDL	0.578	0.001
VLDL	0.566	0.001
HDL	0.480	0.001
TC	0.420	0.001
Systolic B.P.	0.025	0.760
Diastolic B.P.	0.002	0.976

[Table/Fig-4]: Showing correlation between risk score and blood pressure FPG and lipid parameters.

[Table/Fig-4] shows the correlation between the risk score and the blood pressure, FPG and the lipid parameters (by using Pearson's correlation coefficient). It shows a significant correlation between the lipid profile and the risk score, as well as between FPG and the risk score. However, there was no correlation between the risk score and the blood pressure.

DISCUSSION

The results of our study showed that nearly 1/3rd of the young medical students had moderate to high risk diabetes scores. Although only 5% were in the high risk category, about 28% were in the moderate risk category and as the age advanced, these people were likely to progress to the high risk category. The increased risk scores were mainly due to a decreased physical activity (in 22% of the students), a family history of diabetes in about 13% students and an increased abdominal circumference in about 8% of the students. The study also showed that the fasting blood sugar value increased from a mean value of 84 mg/dl to 94 as the risk score progressed. There was a significant correlation between the IDRS and the lipid profile as well as the fasting plasma glucose value. A study which was done by V. Mohan et al. showed that an increase in the MDRF-IDRS was associated with a worsening of glucose tolerance. It also showed that the mean IDRS increase was associated with hypertriglyceridaemia, hypercholesteraemia and

the metabolic syndrome. The prevalence of all the cardiovascular risk factors which included the systolic blood pressure, increased with an increase in the risk score [5]. The Inter 99 study which was done by Glummer et al. showed a significant correlation between the Danish risk score and BMI, blood pressure, HDL cholesterol and HbA_1C [6]. In a follow up study, Stern et al. [7] developed two models to predict the type – II diabetes incidence, which included the age, sex, ethnicity, fasting glucose values, systolic Blood Pressure (BP), BMI and a family history of diabetes and a full model that also included 2-h glucose, diastolic B.P., total and LDL cholesterol and triglycerides. Therefore, they included most of the parameters of the metabolic syndrome, as was defined by the WHO consolation. Although the IDRS did not include all these parameters, our study confirmed that it could predict dyslipidaemia also. However, our study did not show any correlation between the B.P and the risk score, probably due to the younger age group which was included in this study.

In conclusion, it can be said that IDRS is a very useful tool which can be used for predicting the risk of developing diabetes. It is also a very useful tool which can be used for predicting dyslipidaemia. In resource limited settings, where a large population has to be screened for cardiovascular risk factors, calculating the IDRS and selecting high risk people for checking the lipid profile will save time and resources. It could also emerge as a good tool for health education and life style modifications, since the major cause of the high risk score among the young students was physical inactivity, which was easily modifiable.

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