USE OF INDIAN DIABETIC RISK SCORE (IDRS) IN A STUDENT POPULATION OF A MEDICAL COLLEGE IN CENTRAL KERALA- A CROSS-SECTIONAL STUDY

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ABSTRACT

BACKGROUND
Type 2 diabetes mellitus threatens to cause increasing levels of morbidity and mortality in the near future as measures to control this global pandemic is currently not effective. The risk factor approach needs aggressive identification for planning prevention strategies and for early diagnosis as there is a disturbing trend in shift of diagnosis to a younger age. It is therefore mandatory to check for prevalence and assess the predisposing factors that lead to this disease in the young adults.

MATERIALS AND METHODS
A cross-sectional observational study was conducted among the medical students in central Kerala using the Indian diabetic risk score to identify naive diabetics and to aid in counselling those at risk. A total of 262 students were screened among which 81 were males.

RESULTS
The observational study identified 3 naive cases of type 2 DM and 10 students who were at high risk. The study also helped in understanding the characteristics of the students 36 of whom had a BMI >25. The PPBS obtained from the students also were positively correlated to the IDRS and BMI, however, were not significant.

CONCLUSION
The results show that the younger population in central Kerala face a crisis in maintaining a healthy lifestyle. The incidence of type 2 DM is rising and there is a strong need to create more awareness in the society in general to help reduce the incidence of new cases.

KEYWORDS
Diabetes, IDRS, Kerala.

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BACKGROUND

Type 2 diabetes mellitus threatens to cause increasing levels of morbidity and mortality in the near future as measures to control this global pandemic is currently not effective. The risk factor approach needs aggressive identification for planning prevention strategies and for early diagnosis as there is a disturbing trend in shift of diagnosis to a younger age. It is therefore mandatory to check for prevalence and assess the predisposing factors that lead to this disease in the young adults.

Current recommendations for diabetes screening suggests that screening decisions should be based on the risk of diabetes itself. People with diabetes detected by screening are at high risk of macrovascular disease and comparatively low risk of microvascular complications.[1] The risk factors like age, gender, family history are non-modifiable while others like smoking, diet, physical activity, hypertension, diabetes, etc. are modifiable. Thus for NCD, a classic screening or preventive strategy may not work and principles of primordial prevention have to be applied.[2] Early identification of at-risk individuals using simple screening tools like the Indian Diabetes Risk Score (IDRS) and appropriate lifestyle intervention would greatly help in preventing or postponing the onset of diabetes and thus reducing the burden on the community and the nation as a whole.[3]

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The IDRS developed by the Madras Diabetic Research Foundation was found to be efficient in assessing the prevalence of diabetics in the naive population as well as predict the prediabetic condition in the sample population. In this proposed research, we attempt to use the IDRS to effectively screen the medical student population to detect early, the development of type 2 diabetes mellitus. This is a part of our efforts to create awareness among the younger population of early diagnosis to prevent complications of diabetes mellitus.

IDRS was developed based on multiple logistic regression analysis using four simple parameters namely age, abdominal obesity, family history of type 2 diabetes and physical activity. In all subjects, family history of diabetes was obtained and details on physical activity were assessed using a validated questionnaire.

Subjects with an IDRS of <30 was categorised as low risk, 30-60 as medium risk and those with >60 as high risk of diabetes.[4] Biochemical and anthropometric measurements were done using standardised procedures. This easily applicable simple score could play an important role as the first step in the process of identifying individuals with an increased likelihood of having prevalent, but undiagnosed diabetes.[5]

An IDRS value > or = 60 had the optimum sensitivity (72.5%) and specificity (60.1%) for determining undiagnosed diabetes with a positive predictive value of 17.0%, negative predictive value of 95.1% and accuracy of 61.3%.[5]

The Indian Diabetic Risk Score is user friendly, simple, fast, economical and effective. It can be reliably applied as an effective screening tool for individuals with IDRS >60 for diabetes in the community. The score helps to identify the undiagnosed diabetes from the general population.[6]

AIMS AND OBJECTIVES

This cross-sectional observational survey aims to-

- Detect naive cases of type 2 diabetes mellitus among the study population by measuring the 2-hour postprandial blood glucose value.
- Using the IDRS, predict the probability of the study population in developing type 2 diabetes mellitus in the future.
- Determine if there exists a linear correlation between the values of IDRS and PPBS in the study population.

The objective of the study-

- Develop counselling strategies and early detection in order to check the rise of type 2 diabetes mellitus among the younger generation of Kerala.

MATERIALS AND METHODS

The objective of the study is to find out the undiagnosed diabetics by using IDRS and to show that the IDRS is a sensitive and specific screening tool to diagnose undiagnosed diabetes mellitus in student population of a medical college in central Kerala. This is a cross-sectional survey using a standardised questionnaire and a laboratory parameter to assess a correlation between the IDRS score and PPBS. A screening camp was conducted by the Department of Medicine in Sree Narayana Institute of Medical Sciences, Chalakka, Ernakulam.

Inclusion Criteria

- All students of the 1st, 2nd and 3rd batches of the medical students.

Exclusion Criteria

- Known diabetic patients.
- Students not giving consent to enrol in the study.

During the screening camp, data including age, gender, family history of diabetes are inquired and recorded (Appendix 1). Waist circumference of these subjects was measured at the maximum measurement at the belly measured in centimetres (cm) as per WHO criteria. Height in meters (m) and weight of the subject in kilograms (kg) was measured and BMI (kg/m^2) was calculated. Exercise status was categorised as physical activity (heavy exercise + strenuous work =0; mild exercise or light work = 20; no exercise and totally sedentary = 30) and family history of diabetes (no family history = 0; either parent diabetic = 10 and both parents diabetic = 20).

The blood sugar in the fasting subjects (at least 8 hours) is measured using a standardised glucometer two hours after consumption of 75 grams of anhydrous glucose mixed in 200 mL of water. Values more than 140 mg/dL are earmarked for further workup, which includes physician and dietitian counselling, further standardised laboratory investigation with HbA1c and C-peptide treatment if necessary, etc. Subjects with lower PPBS values and higher IDRS scores will also be included in the follow up surveillance.

The data collected from the above table will be analysed to understand whether there is a risk of developing diabetes in the future. This survey also takes into consideration the level of exercise and the abdominal obesity among the students. Institutional Ethics Committee approval was obtained prior to the screening. A pilot study was also done with 50 students to confirm the validity of the questionnaire.

Statistical Analysis

Pearson's correlation coefficient was sought between BMI and PPBS, BMI and IDRS, PPBS and IDRS. P-value was kept at the standard value of 0.01 for statistical importance. ROC curve analysis was done to estimate sensitivity and specificity along with the positive and negative predictive values with a disease prevalence of 10%.[3,7]

RESULTS

A total of 262 students with a mean age of 21.431 years were screened in this survey, including 181 females and 81 males. Only 23 students had an IDRS of 20, while majority (125) had 30 and 74 students scored 40. There were 27 students scoring 50, while 10 students had a score of 60 and 3 students had a high score of 70. It was noted that 14

students had both parents suffering from diabetes, while 86 had one diabetic parent. 91 students had a waist circumference above 80 cm of whom 74 were overweight (BMI >23). Most students (215) did not have a regular exercise schedule and those who exercised regularly had low scores as per IDRS. 5 students had a PPBS of >140 mg/dL. Further testing with HbA1c and C-peptide levels revealed 3 of them to have type 2 diabetes mellitus and 2 were having impaired glucose tolerance. The study revealed an IDRS value >/=60 had the optimum sensitivity (84.62%) and specificity (47.79%) for determining diabetes. The positive predictive value was 4.96% and negative predictive value was 95.04% for a disease prevalence of 10%.

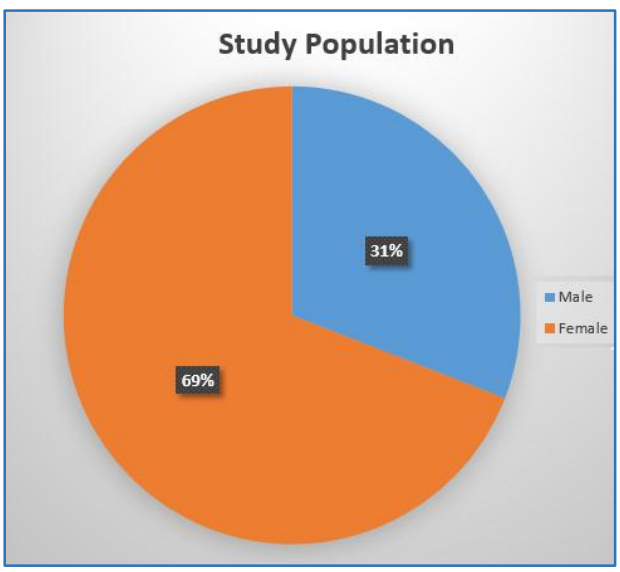

Figure 1. Gender Characteristics of the Study Population

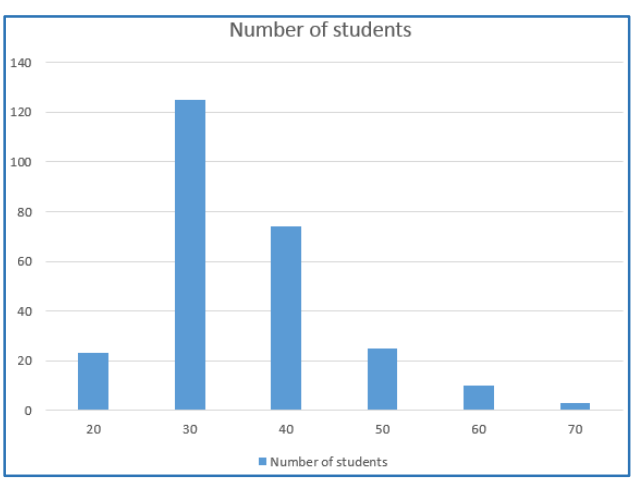

Figure 2. IDRS Distribution Among the Study Population

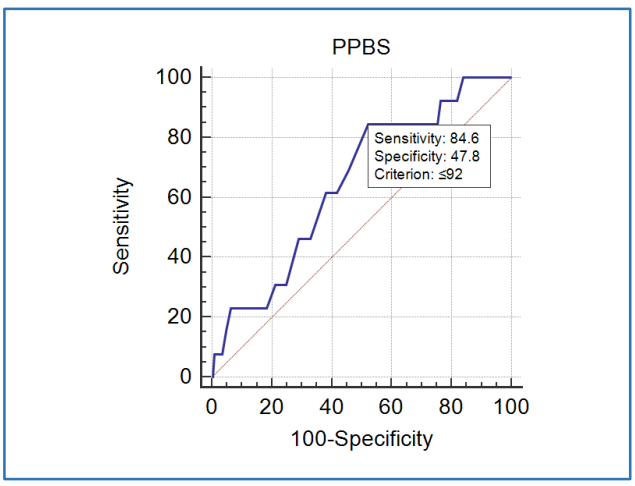

Figure 3. ROC Distribution Curve to Determine Correlation between IDRS and PPBS Values

DISCUSSION

Our study revealed that there is high prevalence of moderate to high IDRS in the student population of central Kerala. Since all the students were below the age group of 35, the IDRS score was mainly composed of the family history, waist circumference and the level of physical activity. Our study revealed that there is an increasing trend of sedentary lifestyle in the medical student community leading to overweight nature. A student with both parents with diabetes tend to have a greater IDRS. However, the study also notes that higher PPBS values corroborates with high BMI (p=0.01).

Similar studies like Vardhan et al and Ashok et al concluded with similar findings. In a similar study conducted on the effect of MDRF-Indian Diabetes Risk Score as a motivational tool for lifestyle change with special reference to physical activity and caloric intake, 150 medical students were assessed for IDRS scores and laboratory values of fasting plasma glucose and fasting lipid profile. IDRS and lab reports were reassessed after 6 months. Change in total caloric intake, duration of exercise, pedometer counts and waist circumference were recorded in 6 months' duration. They concluded that calculating diabetes risk by using MDRF-IDRS and informing the subjects improves physical activity, decreases caloric intake and waist circumference significantly among medical students and is a useful motivational tool for lifestyle change.[8]

Out of the 261 student-participants in another study, about 4% were in the high risk and 76% in moderate risk category. 22% had minimal physical activity and 10% had moderate physical activity, while no student had strenuous physical activity. About 38% of them had an increased waist circumference, thus indicating abdominal obesity. 23% had one diabetic parent and both the parents of 2% of the students were diabetics. Age had no role in the risk score of this group as all of them were well below 35 years, the mean age being 19±0.97 years.[9]

We had a significantly higher number of students participating in the study. There is also an increase in the glucose intolerance as the IDRS increased. 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.[3] The prevalence of glucose intolerance is high in this selected urban south Indian population. Lifestyle factors and family history have a synergistic effect on increasing the risk for diabetes in this population.[7] Worryingly, diabetes is now being shown to be associated with a spectrum of complications and to be occurring at a relatively younger age within the country.[10] Hence, the early identification of at risk individuals and appropriate intervention in the form of weight reduction, changes in dietary habits and increased physical activity could greatly help to prevent or at least delay the onset of diabetes and thus reduce the burden due to noncommunicable diseases in India.[2] Development of knowledge or awareness in turn evolves into improved self-care in diabetes.[11]

CONCLUSION

The analysis of the data in this study will reveal that there is an indication to improve the physical nature of the medical students. In order to prevent increasing morbidity and mortality due to obesity-related type 2 DM and cardiovascular disease in the college, there is an alarming need to initiate intervention programs focusing to increase physical activity.

APPENDIX 1 - PROFORMA

USE OF IDRS IN MEDICAL STUDENTS OF CENTRAL KERALA - A CROSS SECTIONAL STUDY

ID NO: _____ SEX : _____

1. **AGE :**
   - **</=35 (0)**
   - **35-49 (20)**
   - **>/=50 (30)**

2. **PHYSICAL ACTIVITY SCORE :**
   - **STRENUOS (0)**
   - **MODERATE (10)**
   - **MILD (20)**
   - **NONE (30)**

3. **FAMILY HISTORY OF DIABETES :**
   - **NONE (0)**
   - **ONE PARENT (10)**
   - **BOTH PARENTS (20)**

4. **WAIST CIRCUMFERENCE :**
   - **Waist <80 cm [female] , <90 [male] [reference] (0)**
   - **Waist ≥80 – 89 cm [female], ≥90 – 99 cm [male] (10)**
   - **Waist ≥90 cm [female], ≥100 cm [male] (20)**

IDRS 1+2+3+4 = _____

HEIGHT : _____ cm WEIGHT : _____ kg BMI : _____ | kg/m²
PPBS : _____ mg/dl

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