Type 2 Diabetes Mellitus: Risk Evaluation and Advice in undergraduate students in Mumbai

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ABSTRACT*: Background and aim: Type 2 Diabetes Mellitus (T2DM) is a disease that develops slowly and over time and only recently has it become evident that T2DM finds its presence even among the younger age groups. Therefore, a cross sectional study has been conducted to evaluate and assess the risk for developing T2DM among undergraduate students in Mumbai using a simple Indian Diabetes Risk Score (IDRS), a questionnaire that is simple, validated and has proven to be highly effective in previous studies. **Materials and methods:** A total of 108 female students and 114 male students were scored using IDRS that includes four parameters: Age, abdominal obesity, physical activity and family history of diabetes. **Results and conclusion:** A total of 222 students were assessed, out of which 1%, 68%, and 31% of the total were found to be in high, moderate and low risk groups respectively. Thus, it is essential to enhance awareness among the youth regarding obesity and physical activity as most were found to lead a sedentary lifestyle. Therefore, as per study plan at the end of the questionnaire, a booklet on 'Diabetes prevention advice' was provided to all the respondents.*

KEYWORDS *: T2DM, IDRS, obesity, physical activity, family history.*

I. INTRODUCTION

India leads the world with the highest number of diabetic patients earning the distinction of being termed the "diabetes capital of the world". [1] It is estimated that the number of diabetic subjects will rise to 69.9 million from 42 million by the year 2025. We can expect diabetes to have a serious damaging impact on the longevity as well as the quality of life in India. The increasing modernization, sedentary lifestyle and unhealthy dietary habits in rural and urban India has taken its toll on the health of the general public, especially the youth. [2]Diabetes mellitus (DM) can be split primarily into two types: Type 1 or Insulin dependent diabetes mellitus (IDDM) and Type 2 or Non-insulin dependent diabetes mellitus (NIDDM). Type 2 DM (T2DM) is a non – autoimmune, complicated, heterogeneous and polygenic metabolic disease condition in which the body is incapable of producing enough insulin, characterized by abnormal glucose homeostasis. Its pathogenesis appears to involve complex interactions between genetic predisposition and environmental factors. [3] T2DM occurs when impaired insulin resistance is accompanied by the failure to produce ample amount of β-cell insulin. [4] Diabetes once considered a disorder primarily affecting the "rich" and "elderly" has shifted status at an alarming rate to the younger and middle class people. This could have detrimental effects on the nation's economy .Thus, the early identification of at risk individuals and suitable intervention in the form of weight reduction, changes in dietary habits and increased physical exercise could greatly help to cease, or at least delay the onset of diabetes. [1]

Table 1: Top 5 South Asian countries for number of people with diabetes (20-79 years), 2013. [5]

Countries/Territories	Millions
India	65.1
Bangladesh	5.1
Sri Lanka	1.1
Nepal	0.7
Mauritius	0.1

Evidences suggest that premature detection of diabetes by suitable screening methods, especially in subjects with elevated risk for diabetes will help to intercept or delay the vascular complications and thus reduce the clinical, social and economic burden of the disease. There are also evidences to show that intervention at the pre diabetic stage is superior to diagnosis of diabetes. [6] We have used the 'Indian Diabetes Risk Score', (IDRS)[7] for this evaluation as the questionnaire is simple, inexpensive and easy to carry out. The IDRS incorporates four major parameters in its scoring: Age score, abdominal obesity score, physical activity score and family history of diabetes score. The score distribution according to the IDRS as a standard is mentioned in Table 2.

Table 2: Indian diabetic risk score. [7]

Parameters		Diabetes risk score
Age (years)	< 35	0
	35 – 49	20
	≥ 50	30
Abdominal Obesity	Waist < 80 cm [female], <90 [male]	0
	Waist ≥ 80–89 cm [female], 90–99 cm [male]	10
	Waist ≥ 90 cm [female], ≥100 cm [male]	20
Physical activity	Exercise [regular] and strenuous work [reference]	0
	Exercise [regular] or strenuous work	20
	No exercise and sedentary work	30
Family history	No family history [reference]	0
	Either parent	10
	Both parents	20
Maximum Score		100

The IDRS has proven to be a successful method of evaluating the risk of undetected and undiagnosed diabetes in the Indian population in studies conducted among medical students as well as south Indian population. [7,10]

II. MATERIALS AND METHODS

The study was a cross sectional study. It was conducted among under graduate students in Mumbai who were directly contacted by study team member randomly. The period of study was February to March 2014. All the eligible candidates from the age group 16 – 25 gave a written informed consent before inclusion in this study after its purpose was explained. Patients maintaining a diet, consuming oral hypoglycemics and insulin were excluded from the study. Patients suffering from Type 2 Diabetes mellitus were excluded from the study.All 222 subjects were assessed for IDRS by four parameters stated in Table 2. A previously structured questionnaire consisting of demographic details, family history of diabetes, and anthropometric measurement like waist circumference was used for data collection. Waist circumference is indicative of central as well as general obesity and was measured using a measuring tape with an accuracy of 0.5cm. The waist circumference was taken at the midpoint between the iliac crest and the lower border of the ribs after normal expiration. [8]
A score of zero was allotted to all candidates as all belonged to age group of 16 – 25 years. The score for family history was allotted as per Table 2. The score of each candidate was calculated and tabulated as mentioned in Table 3.

Table 3: Showing number of students in each risk group.

Group	Score	Male	Female	% Total
I	Low (<30)	47	21	31%
II	Medium (30 – 50)	65	87	68%
III	High (≥ 60)	2	0	1%
	Total	114	108	100%

III.   OBSERVATIONS AND RESULTS

Out of 222 students screened by the Indian Diabetes Risk Score, 114 (51%) were males and 108 (49%) were females. In the present study, according to IDRS, about 1% were in the high risk and 68% in the moderate risk category and about 31% were in the low risk category, as mentioned in Table 3. All the students were below 35 years of age (IRDS=0), thus age has no role in these risk groups. About 90 (41%) people had no exercise and sedentary work, 109 (49%) had regular exercise or sedentary work and 23 people (10%) had regular exercise and sedentary work, as mentioned in Table 4. There was a noteworthy association between the family history of T2DM and the IDRS score. 29% of the undergraduate students showed a family history of diabetes in any one patient and 3% of the students had both parents suffering from diabetes. About 7% of the females and 6% of the males under study had increased waist circumference which indicated abdominal obesity.

Table 4: Showing details of risk score component in 222 students.

Parameters	Number	Percentage
Physical Activity		
No exercise and sedentary work	90	41%
Exercise [regular] or strenuous work	109	49%
Exercise [regular] and strenuous work [reference]	23	10%
Waist Circumference		
1. <80 cm female	64	59%
2. <90 cm male	88	77%
3. ≥ 80 – 89 cm female	36	34%
4. ≥ 90 – 99 cm male	19	17%
5. ≥90 cm female	8	7%
6. ≥ 100 cm male	7	6%
Family History		
1. One parent	65	29%
2. Both parents	7	3%
3. None	150	68%

IV.   DISCUSSION

A simple and cost effective IDRS was used as it is able to predict diabetes risk as well as risk for cardiovascular diseases and thus serves as a tool for primary care physicians and/or health workers. This scoring also helps in setting a generalization and a standard through which cases involving risks associated with genetically transmitted diabetes can also be evaluated.A score ≥ 60 was found to have optimum sensitivity and

specificity for detecting undiagnosed diabetes. [9] Awareness among the Indian population regarding T2DM is still very low and a rising prevalence of the disease of this type occurs due to urbanization, adoption of an adverse lifestyle and possible genetic susceptibility. [10]In the present study, 108 female students and 114 male students participated and after assessing their case histories based on age, abdominal obesity, physical activity and family history of diabetes, 1%, 68%, and 31% of the total respondents were found to be in high, moderate and low risk group, respectively, for developing T2DM. As shown in the Table 4, with an increase in abdominal obesity, an increase in the risk score takes place. Therefore, the 32% of the students showing an increased waist circumference should be asked to keep a check on their obesity and the same must be evaluated in the next year to monitor further increase in obesity scores, if at all. For family history of diabetes mellitus it was found that type 2 DM has a strong genetic component. The individuals with a parent with type 2 DM have an increased risk of diabetes; if both parents have type 2 DM, the risk approaches 40%. So the students with family history of type 2 DM should be followed regularly every year for early diagnosis of prediabetes or T2DM. The available data as to the long-term complications of type 2 diabetes such as nephropathy microalbuminuria, hypertension, dyslipidemia, atherosclerosis, and polycystic ovarian syndrome, poor blood glucose control in young people underscores the severity of the disease. [11]

To prevent and control this disease from being passed on to the youth, it is important for the government to initiate programs for the awareness and knowledge of T2DM and its consequences – particularly among the youth. Anti-obesity programs need to begin for the betterment of the nation's young, particularly in terms of their physical health as well as mental health. Obesity in itself can be an economically dangerous condition, especially in a developing nation such as India, as our health spending is scarce. This is why all the respondents interviewed for this project were provided with a booklet on 'Diabetes prevention advice', which we hope will help enhance the understanding and comprehension of this disease.

V.   CONCLUSION

IDRS is a diagnostic test that is favorable compared to alternative, more labor intensive biochemical screening tests such as random capillary glucose, fructosamine, glycated haemoglobin and glycosuria testing. Earlier diagnosis of hyperglycaemia may lead to improved recording of cardiovascular risk factors, selection of appropriate antihypertensive medication, and more aggressive risk management. Earlier treatment may relieve previously unrecognized symptoms of hyperglycemia, reduce the risk of microvascular complications and even reverse the microangiopathic changes associated with diabetes. The risk score also identifies individuals with impaired glucose tolerance at risk of progression to diabetes. It may be possible to delay or prevent this progression through behavioral change programs or medication. [12]We recommend that all individuals around 18 years of age should be tested to determine the risk of developing T2DM by administering the IDRS and assessing the score thereafter. Those individuals who are at a higher risk should undergo follow up checks in order to demonstrate whether the score has increased or not. Thus, the IDRS, administered to undergraduate students in Mumbai helps in gauging a better idea regarding the health status of the young adults of Mumbai.

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