Validity Assessment of IDRS for Diabetes Mellitus

Singhal Raghav, Kapoor Anil
Department of Medicine, People's College of Medical Sciences and Research Centre, Bhopal

ABSTRACT

A cross sectional study was conducted in a tertiary health care centre of Central India to determine correlation between IDRS and fasting blood sugar to assess the validity of IDRS in diagnosing DM. In the diabetic group, high risk, medium risk and low risk were found to be 85(42.5%), 105(52.5%) and 10 (5%) respectively as per IDRS criteria, whereas 54(13.5%), 187(46.8%) and 159(39.8%) cases for the same categories were apparently healthy subjects. IDRS was correlated with FBS ; FBS level above 126 mg% (undiagnosed or hidden diabetics) was found among 12(3%) in high risk to medium risk individuals. FBS level between 100-126mg% (undiagnosed or hidden pre-diabetics) was 94(23.5%) in cumalative exposed apparently healthy subjects. Hence, undetected diabetics can be picked up by IDRS score as all twelve cases had high to medium scores. The study concludes that IDRS as developed by V Mohan et al, a simplified screening tool without involving any invasive procedure is valid tool. The IDRS is able to identify high risk apparently healthy subjects having hidden diabetes or pre-diabetes and are at risk of progression to diabetes.

INTRODUCTION:

Diabetes Mellitus (DM), with an increasing incidence worldwide, has become one of the leading cause of morbidity and mortality[1]. With an increase in life expectancy in India, the prevalence of non-communicable diseases including Diabetes Mellitus are on the rise too. Unfortunately, more than 50% of the diabetic patients in India remain unaware of their diabetic status, which increases the risk of development of diabetic complications in them. This has lead to the need of mass awareness and screening programmes to detect diabetes at an early stage so that general public can be made aware of the disease and its further complications.

Currently, oral glucose tolerance test (GTT) is the gold standard method to diagnose Diabetes Mellitus as per the criteria given by American Diabetes Association (ADA) and World Health Organization (WHO) and also to estimate the incidence and prevalence of DM. Several diabetes risk scores have been devised for screening and prevention programmes which include Finnish Diabetes Risk Score, ADA risk test, Danish Diabetes Risk Score etc[2,3].

In India, V Mohan et al from their Chennai Rural Epidemiology Study (CURES) cohort, have developed a single user friendly Indian Diabetic Risk Score (MDRF-IDRS), which takes into consideration the age, abdominal obesity, physical activity and the family history of the patients[4].

IDRS has been shown to be a cost-effective method of screening for undiagnosed diabetes in the community, to predict incident diabetes, to identify cardiometabolic risk in normoglycemic subjects, to discriminate primary and secondary causes of diabetes, as well as to be associated with complications of diabetes[5].

The present study was conducted to assess the validity of IDRS in identifying undiagnosed diabetics and pre-diabetics in apparently healthy study population.

MATERIALS AND METHODS:

This observational study was conducted in the Department of Medicine of People's College of Medical Sciences & Research Centre, Bhopal. Indian Diabetes Risk Score (IDRS) was calculated for all the participants (200 diabetic patients and 400 apparently healthy subjects.)

Corresponding Author:
Dr Singhal Raghav
Department of Medicine,
People's College Medical Sciences and
Research Centre, Bhopal
Phone No.: +91 9424603153
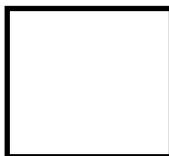**E-mail**: raghavsag08@gmail.com

Table 1: MDRF-Indian diabetes risk score[4].

Particular	Score
Age (years)	
<35 (Reference)	0
35-49	20
>50 years	30
Abdominal obesity	
Waist <80 cm (female). <90 cm (male)	0
Waist ≥80-89 cm (female). ≥90-99 cm (male)	10
Waist ≥90 cm (female). ≥100 cm (male)	20
Physical activity	
Vigorous exercise or strenuous (manual) labor at home/ work	0
Mild to moderate exercise at home/ work	20
No exercise or sedentary activities at work/ home	30
Family history	
No family history	0
Either parent	10
Both parents	20
Minimum score	0
Maximum score	100

Permission from Research Advisory Committee and Institutional Ethics Committee (IEC) was taken before conducting the study. Informed consent was taken from all participants of the study. Age was recorded in completed years nearest to previous or coming birthday. Family history of DM in parents was recorded (single or both). The waist circumference taken at the midpoint between the iliac crest and the lower border of the ribs after a normal expiration in standing position was measured by using a non stretchable fibre tape. Measurement of the waist was taken directly on the body with light clothing with an accuracy of +/- 0.5 cm. Height was measured by asking subjects to stand upright without shoes with their back against stadiometer, heels together and eyes directed forward. Weight was measured by weighing machine. Subjects were asked to wear light clothing and weight was recorded to nearest 0.5 kg. BMI was calculated using weight (in kg)/height (in meter^2). Blood pressure was recorded in sitting position in right arm using sphygmomanometer. Two readings were taken 5 minutes apart and higher reading was taken for the study purpose. Routine physical activity (sedentary, mild, moderate, vigorous exercise or strenuous work) of participants was assessed by general physical activity questionnaire developed by the London School of Hygiene and Tropical Medicine as a validated short measure of physical activity. The general practice physical activity questionnaire (GPPAQ) is a validated screening tool, used in primary care to assess the physical activity levels of 16 to 74 years[6].

IDRS was calculated for all participants as per the categorized risk factors given by V. Mohan et al. Participants who had IDRS > 60 were labelled as high risk, those who had IDRS between 30 -50 as medium risk and those who had IDRS below 30 as low risk as according to MDRF-IDRS.

After assessing the IDRS score, all subjects were asked to give their blood sample for fasting blood sugar next day. Those whose fasting blood sugar came to be ≥126mg/dl, they were asked to get their postprandial blood sugar. Blood glucose measurement was done by using peroxidase method by Biosystem A25 auto analyser machine.

Inclusion criteria were age above 16 years to 65 years, those who gave the consent to participate, apparently healthy patient's relatives, doctors and medical students, patients with recently detected type 2 diabetes within 3 months of diagnosis. Exclusion criteria were known cases of type 2 DM for more than 3 months, those who were unwilling to participate in

Table 1: Distribution of the diabetics and apparently healthy subjects according to IDRS (n= 600).

Serial no.	Risk assessment by IDRS	Participants	
		Diabetics n (%)	Apparently Healthy subjects n (%)
1	High risk	85 (42.5)	54 (13.5)
2	Medium risk	105 (52.5)	187 (46.8)
3	Low risk	10 (5)	159 (39.8)
	Total	200 (100)	400 (100)

Table 2: Distribution of healthy subjects according to IDRS and fasting blood glucose levels (ADA criteria).

Serial no.	Risk assessment by IDRS in healthy subjects	FBS level (mg%)			Total n (%)
		<100 n (%)	100 - <126 n (%)	≥126 n (%)	
1	High risk	27 (6.75)	20(5)	7(1.75)	54(13.5)
2	Medium risk	127(31.75)	55(13.75)	5(1.25)	187(46.75)
3	Low risk	140 (35)	19 (4.75)	0 (0)	159 (39.75)
	Total	294 (73.5)	94(23.5)	12(3)	400(100)

the study, those whose age was less than 16 years, chronically ill patients, patients who were having malignancy or infectious disease (eg :T.B.) or drugs leading to increased blood sugar (eg : steroids) and patients with type 1 diabetes.

RESULTS:

High risk, medium risk and low risk were found to be 85(42.5%), 105(52.5%) and 10 (5%) respectively as per IDRS criteria in the diabetic group whereas apparently healthy subjects were found in 54(13.5%), 187(46.8%) and 159(39.8%) cases for the same categories, The difference is found to be statistically significant (p<0.001).

IDRS was correlated with FBS. FBS level above 126 mg% (undiagnosed or hidden diabetics) was found among 12(3%) in high risk to medium risk, whereas FBS level between 100-126 mg% (undiagnosed or hidden pre-diabetics) was 94(23.5%) in all risk tested among apparently healthy subjects. Hence, undetected diabetics can be picked up by IDRS score as all twelve cases had high to medium scores. The difference is found to be statistically significant (p<0.001). Majority of undiagnosed hidden diabetics and undiagnosed pre-diabetics were having high to medium risk as per IDRS.

DISCUSSION:

The study was conducted in the Department of Medicine at People's College of Medical Sciences & Research Centre, Bhopal. In this study, validation for simplified Indian Diabetes Risk Score (IDRS) was done among. 200 recently diagnosed diabetic patients and 400 apparently healthy subjects were included. The study showed that IDRS is a useful tool to identify hidden diabetics and also at risk subjects (pre-diabetics among the apparently healthy population). IDRS calculated for all the diabetic subjects showed that most of the diabetics were having high and medium risk score 190(95%), while in healthy subjects most were having medium risk and low risk score 346 (87%). Newly detected diabetics had more chances of high and medium risk scores as compared to apparently healthy subjects.

Among 400 apparently healthy subjects, fasting blood sugar level ≥126 mg/dL (diabetic) was detected in 12 (3%) and 94 (23.5%) were diagnosed as pre-diabetics (FBS level- 100 to <126 mg%) as per ADA criteria. All 12 hidden diabetics had high to medium risk in IDRS. When compared with other published data, V Mohan et al in their study detected 365 diabetics (15.5%) out of the 2350 individuals screened, S Nandeshwar et al detected 94 (37.6%) diabetics out of 250 individuals and Hemlata et al detected 60 pre-diabetic individuals [7,8,9]. These observation shows that IDRS attempts to identify individuals at risk so unnecessary investigations for identification of type-2 DM among apparently healthy population can be avoided.

CONCLUSION:

The present study concluded that IDRS as

developed by V Mohan et al, a simplified screening tool without involving any invasive procedure, is able to identify high risk (apparently healthy) subjects with hidden diabetes or pre-diabetes and at risk of progression to Diabetes. Even apparently healthy subjects should be screened for the risk of developing T2DM by calculating the IDRS. Subjects who are in the high risk IDRS should undergo yearly follow up in order to demonstrate whether the score has increased or not and tested for FBS.

REFERENCES:

1. American Diabetes Association. Diagnosis and classification of diabetes mellitus. Diabetes Care. 2014;37(1):S81–S90.
2. Saaristo T, Peltonen M, Lindstrom J, Saarikoski L, Sundvall J, et al. Cross-sectional evaluation of the Finnish Diabetes Risk Score: a tool to identify undetected type 2 diabetes, abnormal glucose tolerance and metabolic syndrome. Diab Vasc Dis Res 2005;2: 67–72.
3. Glumer C, Carstensen B, Sandbaek A, Lauritzen T, Jorgensen T, Borch-Johnsen K. Danish diabetes risk score for targeted screening: the Inter 99 study. Diabetes Care 2004;27:727–33.
4. Mohan V, Deepa R, Deepa M, Somannavar S, Datta M. A simplified Indian Diabetes Score for screening for undiagnosed diabetic subjects. J Assoc Physicians India 2005;53:759-63.
5. Mohan V, Vassy JL, Pradeepa R, Deepa M, Subashini S. The Indian Type 2 Diabetes Risk Score also helps identify those at risk of macrovascular disease and neuropathy (CURES-77) J Assoc Physicians India.2010;58:430–433
6. The General Practice Physical Activity Questionnaire (GPPAQ), Dept of Health, 23 April 2013, England.https://www.gov.uk/government/publications/general-practice-physical-activity-questionnaire-gppaq.
7. Mohan V, Sandeep S, Deepa M, Gokulakrishnan K, Datta M, Deepa R. A diabetes risk score helps identify metabolic syndrome and cardiovascular risk in Indians-the Chennai Urban Rural Epidemiology Study (CURES-38). Diabetes Obes Metab 2007;9:337-43
8. Chaurasia H, Chaurasia RS. To find out the diabetic risk in study population by subjecting them to Indian diabetic risk scale. Int J Med Sci Res Pract 2015;2(1):37–40.
9. Nandeshwar S, Jamra V, Pal DK. Indian diabetes risk score for screening of undiagnosed diabetic subjects of Bhopal city. National J Community Med 2010;1(2),176-177.