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Assessment of the sensitivity and specificity of Indian Diabetes Risk Score

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ABSTRACT
Background: Many patients with diabetes can be cured at the primary care level by efficiently applying routine modifications after recognition of an under-risk population. The present study was conducted to assess the sensitivity and specificity of the Indian Diabetes Risk Score.
Materials and Methods: 230 subjects of both genders were studied. IDRS and its parameters are comprised of two modifiable (waist circumference, physical activity) and two non-modifiable risk factors (age, family history) for diabetes. The Indian diabetic risk score >60 was found to be highly sensitive and specific for predicting diabetes.
Results: Diabetes was present in 105 subjects and absent in 125 subjects. IDRS test positive score ≥ 60 was seen in 65 diabetics and IDRS test negative <60 in 40 diabetics. The sensitivity of the IDRS score was 90.3%, and the specificity was 43.2%. **Conclusion:** IDRS is incredibly helpful when it comes to identifying diabetes in undiagnosed subjects.
Key words: diabetes, IDRS, primary care

Introduction

Diabetes is a sneaky public health issue. According to the International Diabetes Federation (IDF), if immediate action is not taken, the number of people living with diabetes worldwide is predicted to increase from 366 million in 2011 to 552 million by 2030.[1] Since the 40–59 age group currently accounts for more than three-quarters of the estimated 179 million people with diabetes, it is critical to test patients at an early age to increase the quality of life and delay complications.[2] Many patients with diabetes can be cured at the primary care level by efficiently applying routine modifications after recognition of an under-risk population. Later, to mediate, one requires a cost-effective, rationally accessible tool to evaluate the risk of people pertaining to diabetes so that the health promotional procedures can be applied to high-risk individuals at the initial stage to lessen the burden.[3] Most individuals with diabetes live in low- and middle-income nations and will bear the greatest growth in cases of diabetes over the next 22 years.[4] According to the WHO, there is a seeming epidemic of diabetes, which is powerfully related to lifestyle and economic change. India has currently witnessed this demographic transition with a decrease in the crude birth rate and growth in life expectancy.[5]

Aims and objectives: The present study was conducted to assess the sensitivity and specificity of the Indian Diabetes Risk Score.

Materials & Methods

The present cross-sectional study included 230 subjects of both genders attending the General Medicine OPD at the Department of General Medicine in collaboration with the Department of preventive and social medicine (PSM) at Government Medical College, Bettiah, and Jan Nayak Karpuri Thakur Medical College & Hospital (JNKTMCH), Madhepura, Bihar, India. The study was approved by the institutional ethical and research committees. The study was conducted from September 2020 to August 2021. An informed and written consent was obtained from all the participants prior to the commencement of the study. The study was a community-based, cross-sectional questionnaire-based study. Keeping power (1-beta error) at 80% and confidence interval (1-alpha error) at 95%, the minimum sample size required was 60 patients; anticipating non-response and incomplete data collection, therefore, the sample size has been kept at 230 subjects (more than the minimum required number of cases) in the present study.

Inclusion criteria: Those who gave informed written consent
Exclusion criteria:

- Patients who refused to informed written consent

- Pregnant women
- Individual with any others systemic disease other than diabeties

Data such as name, age, gender, etc. was recorded. IDRS and its parameters are comprised of two modifiable (waist circumference, physical activity) and two non-modifiable risk factors (age, family history) for diabetes. The Indian diabetic risk score >60 was found to be highly sensitive and specific for predicting diabetes.The definitions of diabetes and prediabetes were based on World Health Organisation guidelines[6]. Individuals classified as diabetics had a fasting blood sugar (FBS) reading of 126 mg/dl or higher.An FBS readi ng of 110–125 mg/dl was regarded as prediabetic or impaired fasting glucose. Using SPSS version 22.0 (IBM Corp., 2016), statistical analysis was performed on the obtained data. Text, tables, charts, and other graphics were used to present the data. Continuous data were expressed as the mean and standard deviation, whereas qualitative data were expressed as percentages. Validity (specificity and sensitivity) was evaluated for different IDRS cut-off points. The significance of the difference between two or more proportions was tested using the chi-square test, and the difference between two means was tested using the Student's t-test. P values less than 0.05 were regarded as significant.

Results

Table I: Fasting blood sugar levels by anthropometric parameters of the study participants

Variables		FBS ≥110 mg % (n=105)	FBS <110 mg % (n=125)	P value
		Mean ± SD		
Weight (kg)		57.61 ±8.75	54.05 ±8.50	0.001
Height (meter)		1.50±0.09	1.52±0.06	0.64
Waist Circumference (cm)	Male	90.17± (6.59)	85.01 ±(7.25)	0.001
	Female	88.43 ±(8.01)	82.59 ±(9.26)	

SD: Standard deviation, FBS: Fasting blood sugar

Table: I shows that subjects with higher body weight and greater waist circumference had significantly higher FBS levels (≥110 mg/dl) than those with lower body weight and lesser waist circumference (P<0.05).

Table II: Fasting blood sugar level by age, physical activity, and family history of diabetes of the study Subjects

Variables	**Category**	**FBS ≥110 mg (n=105), %**	**FBS <110 mg % (n=125), %**	**P value**
Age (years)	≥40	98 (93.33%)	88 (70.4%)	0.002
	<40	07 (6.67%)	37 (29.6%)	
Family history of diabetes	yes	80 (76.19%)	99(79.2%)	0.001
	No	25 (23.81%)	26(20.8%)	
Physical activity	Sedentary	74(70.48%)	42(33.6%)	0.001
	Moderate	26(24.76%)	79(63.2%)	
	Heavy	05(4.76%)	4 (3.2%)	

Subjects aged 40 years or older-those with a family history of diabetes and less physical activity had significantly higher fasting blood sugar levels (P<0.05).

Table III: Distribution of patients according to the Indian Diabetes Risk Score

IDRS test	**Diabetes present**	**Diabetes absent**	**Total**
IDRS test positive score ≥ 60	65	45	110
IDRS test negative <60	40	80	120
Total	105	125	230

Table III and figure 1, show that diabetes was present in 105 subjects and absent in 125 subjects. An IDRS test positive score ≥ 60 was seen in 65 diabetics, and an IDRS test negative score <60 was seen in 40 diabetics.

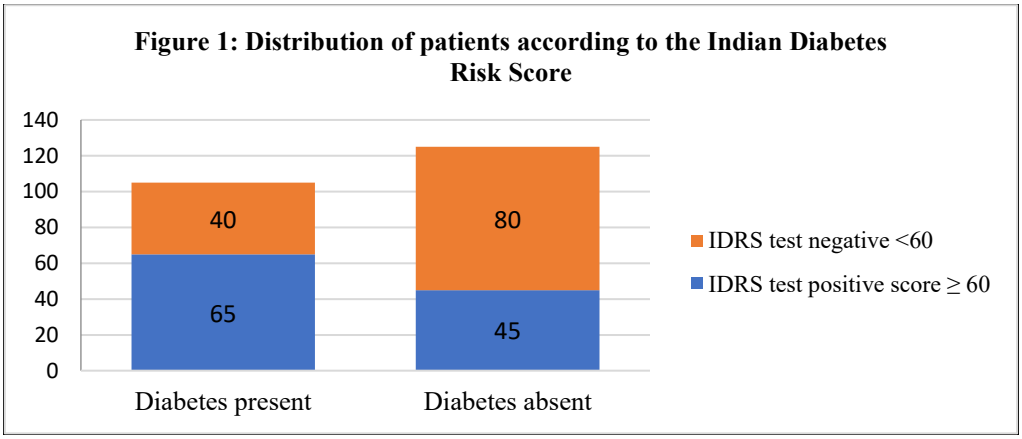


Table IV: Sensitivity and specificity of the IDRS (Indian Diabetes Risk Score) test

IDRS	Sensitivity	Specificity
>10	90.3	43.2
>20	84.2	55.7
>30	76.5	50.3
>40	53.1	74.2
>50	40.7	93.2
>60	29.5	95.4
>70	8.2	97.5
>80	0.4	100

Table: IV shows that the sensitivity of IDRS scores was 90.3% and the specificity was 43.2%. Higher IDRS showed higher specificity in predicting prediabetes, but with lowered sensitivity. Similarly, lower IDRS had a high sensitivity for predicting prediabetes but a lower specificity. 95% CI: confidence interval.

Discussion

India has the dubious distinction of being the diabetes capital, just next to China, with 62.4 million diabetics, which is expected to rise to 100 million by 2030.[7,8] Every fifth diabetic in the world is an Indian. The problem is further compounded by the fact that 66% of Indian diabetics are not diagnosed, compared to 50% in Europe and 33% in the USA. The WHO reports that diabetes appears to be on the rise and is strongly correlated with changes in lifestyle and economic conditions. With a decline in the crude birth rate and an increase in life expectancy, India is currently experiencing this demographic transition.[9] Since the majority of people with diabetes are between the ages of 40 and 60, this burden has a significant negative impact on a nation's social, economic, and human resources.[10] A major part of preventing diabetes and its complications would be the implementation of primary and secondary preventive measures, such as lifestyle change and screening for early detection.[11] The present study was conducted to assess the sensitivity and specificity of the Indian Diabetes Risk Score.We found that diabetes was present in 105 subjects and absent in 125 subjects. IDRS test positive score ≥ 60 was seen in 65 diabetics and IDRS test negative <60 in 40 diabetics. Khan et al.[12] assessed the sensitivity and specificity of the IDRS method as a screening tool in communities and determined the association of IDRS with socio-demographic factors. Out of 640 study subjects, the prevalence of diabetes mellitus was found to be 15.2%. Of these, almost half (7.1%) were newly diagnosed, and 22.7% were found to have a high IDRS score. By applying IDRS, at scores > 60, 30% sensitivity and 98% specificity were observed. Statistically significant associations between IDRS and age and gender were found. We found that the sensitivity of the IDRS score was 90.3% and the specificity was 43.2%. Acharyaet al.[13] assessed the risk score for diabetes among the study subjects using IDRS. Out of 580 subjects, 31 (5.3%) study subjects were not at risk of having diabetes, rest 94.5% were at moderate or high risk of diabetes. A statistically significant association of diabetes risk with marital status (p = 0.0001), education (0.005), body mass index (0.049), and systolic blood pressure (p = 0.006) was seen. Ashok Pet al.[14] identified first-year MBBS students at risk for developing type II DM using IDRS.The IDRS was used for screening 261 undergraduates (first-year MBBS students), taking into account factors like age, waist circumference, level of exercise, and family history of diabetes. It was observed that 5%, 55%, and 38% of students in high, moderate, and low-risk groups, respectively, developed type 2 D.M. The mean abdominal obesity in high-risk students was 101.95 ± 5.76 as compared to 79.17 ± 11.08 in moderate- and low-risk students. 63% of students had a sedentary lifestyle. A family history of diabetes in either or both

parents was present in 25% of students. The mean RCBG in students with a score greater than 50 was 97.33 ± 9.68 mg/dl. Also, two students had RCBG > 113 mg/dl, and one student was found to be prediabetic.
Study limitation: The small sample size and short duration were the study's limitation.

Conclusion
IDRS can be used as an efficient screening tool for the identification of people at risk for developing prediabetes or diabetes in the future to apply early preventive measures. The authors found that IDRS is incredibly helpful when it comes to identifying diabetes in undiagnosed subjects.

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