

A cross sectional study to assess sensitivity of Indian diabetes risk score as a screening test tool of diabetes mellitus among adult population in Jodhpur, Rajasthan

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Abstract

Objective: To find out the sensitivity of Indian diabetes risk score as a screening test tool of diabetes mellitus among adult population by comparing the result of IDRS with ADA diabetes diagnostic criteria (fasting blood glucose/postprandial blood glucose). As adult population is at risk for developing diabetes mellitus. Early diagnosis and treatment may reduce the morbidity and mortality.

Methodology: The study was conducted on 600 patients of Dr. Sampurnanand Medical College and Associated Hospital, Jodhpur included all individuals > 20 years of age, a verbal consent taken from all individuals entering in to the study. IDRS will be applied to all individuals, then all subjects will tested for fasting (8 hours fasting) blood glucose level and, or 2 hours postprandial blood glucose level population attending the outdoor clinics, indoor wards and general population (attendants, accompanying peoples) using venous blood sample in fluoride vial.

Conclusion: In our study it can be concluded that IDRS can be applied as a screening test in our country regardless of the demographic variation in the prevalence of diabetes. Thus IDRS is a simple, reliable and easy to use tool for mass screening of the high risk individual of Diabetes mellitus.

Keywords: Diabetes, risk factor, IDRS

Introduction

Diabetes mellitus is one of the main threats to human health in the 21st century. In the past two decades, an explosive increase in the number of people diagnosed with diabetes is seen worldwide ^[1]. Diabetes mellitus referred to a group of metabolic disorder characterized by high blood glucose level, have an increased risk of generalized microvascular and macrovascular damage affecting the heart, eye, kidney and nerves leads to serious life threatening health complication, resulting in reduced quality of life and increased mortality ^[2, 3, 4].

Criteria for the diagnosis of diabetes mellitus

Table 1: From Harrison's principles of internal medicine 20th edition

Type of Diabetes	Normal glucose tolerance	Hyperglycemia		
		Pre-diabetes*	Diabetes Mellitus	
		Impaired fasting glucose or impaired glucose tolerance	Not insulin requiring	Insulin required for control
Type 1			→	
Type 2		←	→	
Other specific types		←	→	
Gestational Diabetes		←	→	
Time (years)			→	
FPG	<5.6 mmol/L (100 mg/dL)	5.6-6.9 mmol/L (100-125 mg/dL)	≥ 7.0 mmol/L (126 mg/dL)	
2-h PG	<7.8 mmol/L (140 mg/dL)	7.8-11.0 mmol/L (140-199 mg/dL)	≥ 11.1 mmol/L (200 mg/dL)	
HbA1C	<5.6%	5.7-6.4%	≥ 6.5%	

India, experiencing rapid socioeconomic progress and urbanization but carries a considerable share of the global diabetes burden. Lower age at onset and a lack of good glycemic control are likely to increase the occurrence of vascular complications. The economic burden of treating diabetes and its complications is considerable. The primary prevention of diabetes is urgently needed in India to curb the rising burden of diabetes^[5]. 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^[6]. Hence the present study has been undertaken to evaluate IDRS (Indian Diabetes Risk Score) as a screening tool to detect DM.

Materials and Methods

Site of study: Dr. Sampurnanand Medical College and Associated Hospital.

Study period: Six month after getting approval of dissertation or till the desired sample size is achieved.

Sample size: Sample size is calculated at 95% confidential interval and 20% relative allowable error using formula below.

$$N = \frac{Z^2_{1-\alpha} / 2P(1-P)}{E^2} \times 1/p$$

Where

N = Sample size number of individuals to be included in study.

P = Prevalence of undiagnosed diabetes taken as 10%.

E = Relative allowable error taken as 20%.

P = Sensitivity of IDRS taken as 65% as per reference articles.

Z = Standard normal deviation for 95% confidence level, taken as 1.96.

Sample size is calculated to be 580 subjects which is round of 600 Minimum sample size will be 600 subjects from all individual's > 20 years of age willing to participate in study are included. The data for this study will be collected from individuals attending the outdoor clinics, indoor wards and general population (attendants, accompanying peoples).

Sampling criteria

Inclusion criteria: Adults in the age group of ≥ 20 years of both gender, who are willing to participate in the study.

Exclusion criteria

1. Known cases of diabetes mellitus.
2. A person with severe co-morbid illness, steroid intake.
3. Pregnant and lactating female.

Methodology

The study will include all individuals > 20 years of age, a verbal consent taken from all individuals entering in to the study. A written consent will be taken from all the individuals who undergo fasting blood glucose level testing. IDRS will be applied to all individuals, then all subjects will tested for fasting (8 hours fasting) blood glucose level and, or 2 hours postprandial blood glucose level population attending the outdoor clinics, indoor wards and general population (attendants, accompanying peoples) in Dr S.N.M. College, jodhpur using venous blood sample in fluoride vial. Sample will send to lab and processed.

Indian Diabetes Risk Score (IDRS)

Table 2

Particulars	Score
Age in years	
<35	0
35-49	20
>50	30
Abdominal obesity	
Waist<80 cm (F); <90cm (M).	0
Waist 80-89cm (F); 90-99cm (M).	10
Waist >90cm (F); >00cm (M).	20
Physical activity	
Exercise regular + strenuous work	0
Exercise regular or strenuous work	20
No exercise and sedentary work	30
Family history	
No family history	0
Either parents	10
Both parents	20
Minimum score	0
Maximum score	100

Table 3

Age (yrs.)	No. of subjects	Percentage
<35	251	41.83
≥35	349	58.17
Gender	No. of subjects	Percentage
Male	394	65.67
Female	206	34.33
BMI (kg/m ²)	No. of subjects	Percentage
<18.5	96	16.00
18.5-24.9	353	58.83
25-29.9	95	15.83
≥30	56	9.33
Total	600	100.00

Total 600 participants are involved in study in which 251(41.83) subjects are <35 years and 349(58.17) are ≥35 years, 394(65.67%) and 206(34%) respectively male and female. 96 (16%), 353(58.83%), 95(15.83%), and 56(9.33%) are included in obese range respectively underweight range (BMI <18.5), normal range (BMI 18.5-24.9), overweight (BMI 25-29.9) and obese (BMI ≥30).

Table 4: Diagnosed type 2 diabetes mellitus cases

Diabetes	No. of subjects	Percentage
Yes	56	9.33
No	544	90.67
Total	600	100.00

A total 600 subject's ≥20 year's age are screened for undiagnosed diabetes mellitus to assess the performance of IDRS as screening tool. 56 subjects have fasting blood glucose ≥126 mg/dl i.e. 9.33% (prevalence of undiagnosed diabetes in our study) have diabetes.

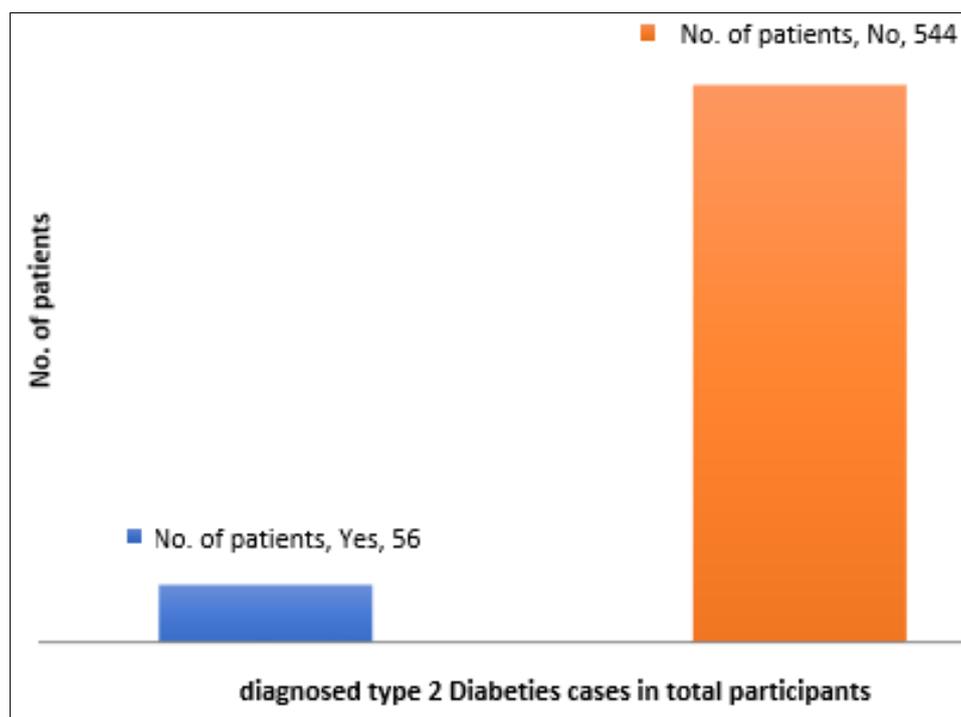
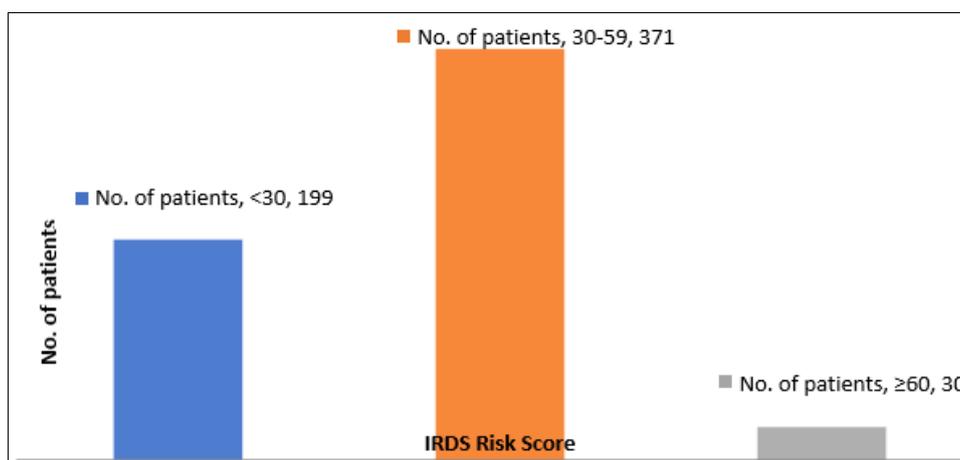


Fig 1: No. of Diabetes Mellitus patients

Table 5: IDRS score distribution in total participants

IRDS score	No. of subjects	Percentage
<30 (low risk)	199	33.17
30-59 (mod. risk)	371	61.83
≥60 (high risk)	30	5.00
Total	600	100.00

Among total study subjects 199 (33.17%), 371 (61.83%), and 30 (5%) have respectively low, moderate and high risk of diabetes that indicate 2/3 of subject are under moderate to high risk group.

**Fig 2:** IDRS score distribution in total participants**Table 6:** IDRS score in undiagnosed diabetic and non-diabetic subjects

IRDS	Yes (diabetic)		No (non-diabetic)		Total	
	N	%	N	%	N	%
<30 low risk	1	0.72	137	99.28	138	23.00
30-59 moderate risk	6	2.44	240	97.56	246	41.00
≥60 high risk	49	22.69	167	77.31	216	36.00
Total	56	9.33	544	90.67	600	100.00

* P value <0.0001.

The IDRS score <30 (low risk) is found in this study, 1 (0.72%) and 137 (99.28%) subjects respectively in undiagnosed diabetic and non-diabetic subjects. Moderate risk (30-59) score is found in 6 (2.44%) and 240 (97.56%) subjects respectively in undiagnosed diabetic and non-diabetic, and high risk (≥60) score have in 49 (22.69%) undiagnosed diabetic subjects and in 167 (77.31%) non diabetic subjects with significant p value <0.0001. Table 9. Out of 56 undiagnosed diabetes subjects 1 (1.78%), 6 (10.7%) and 49 (87.5%) subjects have respectively in mild, moderate and high risk group.

Discussion

In our current study the prevalence of undiagnosed type diabetes is 9.33% (56 subjects have fasting blood glucose ≥126 mg/dl, have diabetes). In total male 394 (65.67%) subjects, 34 (8.63%) are diabetic and 360 (91.37%) are non-diabetic, and in total female 206 (34.33%) subjects, 22(10.68%) are diabetic and 184 (89.32%) are non-diabetic (Table 8). This study shows females have slight higher prevalence of undiagnosed type 2 diabetes. As compared to other study, The Indian Council of Medical Research-India DIABetes (ICMR-INDIAB)

study, an ongoing national study is being conducted in all the states of the country. It is one of the largest epidemiological studies ever conducted on diabetes. As per ICMR- INDIAB, the estimated prevalence of diabetes in India is 7.3%. The prevalence was significantly higher in mainland (8.3) compared to the northeast (5.9). Also, overall, urban prevalence was double that in rural area (urban 11.2% vs. rural 5.2%). In our study prevalence (9.33) is about similar to other study. In South East Asia total number adult population with undiagnosed diabetes were 47 million and percentage of undiagnosed adult population were 57%, “One in Two adult with diabetes are undiagnosed”. Two – third of people with diabetes live in urban area and number will increase to three fourth by 2045. The undiagnosed diabetes cases are serious thing because unaware cases of their disease status are left untreated and end up with unpleasant complications in future. In our study among total study subjects 199 (33.17%), 371 (61.83%), and 30 (5%) have respectively low, moderate and high risk of diabetes with significant p value <0.001. that indicate 2/3 of subjects are under moderate to high risk group and out of 56 undiagnosed diabetes subjects 1 (1.78%), 6 (10.7%) and 49 (87.5%) subjects have respectively in mild, moderate and high risk group. The similar finding was found in other studies as, Sheikh Mohd. Saleem ^[7], Adman Firdous Raina ^[8], *et al.*, 2017, A cross sectional study comprising 1530 adult participants, age (>20yrs) attending out patients department of a primary health centre located at Harwar, district Srinagar without a diagnosis of type 2 diabetes mellitus. According to IDRS, 70.4%, 19.5%, and 10.1% study population were classified to be low, medium and high risk for developing type 2 diabetes. A cross section observational study, Nirmal Bhusal, Gopesh Mangal ^[9, 10], *et al.*, (2017), was conducted on to evaluate the risk of diabetes in community using IDRS, Out of 190 subjects 38.5% had high risk of developing diabetes and 45.2% had moderate risk and 16.3% low risk for developing diabetes mellitus. A cross sectional, study Aditya Oruganti, Aninash Kari *et al.*, (2019) ^[11, 12], on “Risk of developing diabetes mellitus among urban poor South Indian population using Indian Diabetes Risk Score.” In this the proportion of low, moderate and high risk of developing diabetes mellitus as IDRS was 7%, 63% and 30% respectively. The prevalence of newly diagnosed diabetes participants was 10.25% more over 57% of them with positive family History were in the High risk.

Conclusion

In the study of V Mohan *et al.*, IDRS uses well to the south Indian population with significant outcome. In our study we applied the Indian diabetes risk score for the population in a tertiary center in Jodhpur (western Rajasthan) and found out the similar results. The study used simplified Indian Diabetes Risk Score for assessing diabetic risk in an adult population. In our study it can be concluded that IDRS can be applied as a screening test in our country regardless of the demographic variation in the prevalence of diabetes. Thus IDRS is a simple, reliable and easy to use tool for mass screening of the high risk individual of Diabetes mellitus. Indian diabetes risk score (IDRS) is simple to apply and accuracy helps us to screen the diabetes in a large population. This IDRS can use as mass screening for diabetes at grass root level more convincing and cost effective where laboratory resources are inadequate more likely in rural areas in developing countries. IDRS score involves collection of data for two non-modifiable risk factors such as age and family history of diabetes and two modifiable risk factors such as physical activity and waist circumference. Screening and early identification of high risk individuals would help to take appropriate intervention like lifestyle modification. It would also help in early diagnosis and treatment to prevent or to delay the onset of diabetes mellitus and its complication.

Conflict of interest: No.

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