



ORIGINAL RESEARCH PAPER

Medicine

EFFECTIVENESS AND VALIDATION OF MODIFIED INDIAN DIABETIC RISK SCORE TOOL. : A CROSS SECTIONAL STUDY

KEY WORDS: Indian diabetes risk score, Screening, Diabetes, Sensitivity, Specificity, ROC curve

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ABSTRACT

Introduction: India is diabetic capital of world, with maximum number of diabetic patients. There is large burden of undetected diabetic cases in community. There is increasing risk of diabetes in urban as well as rural areas, because of illiteracy, lack of awareness, low socioeconomic status and unhealthy life style. We have developed Modified Indian Diabetes Risk Score (MIDRS) to detect high risk individuals likely to be benefited by lifestyle interventions in preventing or delaying Type 2 diabetes. **Methods:** Screening for diabetes was carried out from urban and rural community of Unjha Taluka district Mehsana Gujarat state. The sample size was 989. MIDRS (Modified Indian Diabetes Risk Score) tool comprising of five modifiable (BMI, waist circumference, physical activity, calorie intake and personal habits) and three non-modifiable risk factors (age, family history and h/o hypertension) for diabetes was used to assess the risk of diabetes. Anthropometry data was obtained. Conformation of diabetes was done using blood sugar levels on fasting and post prandial 2 hours venous sample. **Results:** Mean and SD for age of study subjects were 42.6 + 15.4 years, BMI 25.9 + 3.9 kg/m², waist hip ratio (females) 0.87 + 0.07 cm, waist hip ratio (males) 0.87 + 0.07 cm, waist circumference (females) 87.6 + 9.8 cm, waist circumference (males) 88.9 + 10.1 cm, SBP 134.6 + 20.5 mm Hg and DBP 83.6 + 12.1 mm Hg. MIDRS predicted the risk of diabetes mellitus with sensitivity of 90% and specificity of 71.6% in individuals with score >60. Mean MIDRS score is 52.9. **Conclusion:** MIDRS can be used as an effective tool for detect high risk individuals likely to be benefited by lifestyle interventions in preventing or delaying Type 2 diabetes.

INTRODUCTION

India has earned the reputation as a diabetic capital of world. Recent WHO report suggests that over 20 % of the world's diabetic population resides in India. As per International diabetic federation there are approximately 72 million diabetics in India (2017) expected to double to 134 million by 2045, out of which prevalence among adults is 8.8% (2017) which is proposed to increase to 11.4% (2045).

The factors responsible for existence of this epidemic are due epidemiological transition associated with changes in dietary patterns and decreased physical activity.

Diabetes is no longer to be considered as disease of rich. The prevalence of the diabetes is now rapidly increasing in the urban slums, in the middle class and even also in the rural areas.

Unfortunately the poor diabetic subjects delay taking treatment leading to increased risk of complications.

Several studies have proven that Diabetes is a major risk factor for many fatal and non fatal complications. And also that type 2 diabetes can be prevented or atleast delayed by modification of lifestyle and diet in high risk individuals.

So it is of utmost importance to find such high risk individuals, who will be benefited by extensive lifestyle counselling; and prevention of their transition from normo-glycemia to impaired blood sugar to diabetes.

Screening of Blood Sugar level will only identify people with impaired blood sugar or asymptomatic diabetes. But to identify individuals with normal sugar level but at increased risk of developing future Diabetes is need of the hour.

Diabetes also exhibits the best example of Iceberg phenomenon with the majority being hidden as undiagnosed cases. Evidences suggest that early detection of diabetes by suitable screening methods, especially in subjects with

elevated risk for diabetes will help to delay the micro and macro vascular complications, thereby reducing the clinical, social and economic burden of the disease.

AIMS AND OBJECTIVES

This study was conducted to measure the effectiveness and validation of the modified Indian diabetic risk score for detecting undiagnosed diabetes and to identify high risk individuals for developing future diabetes or other lifestyle diseases in the people of Unjha taluka of the Gujarat state.

MATERIALS AND METHODS

This study was a cross sectional analytical study. This study was conducted in rural and urban community from Unjha Taluka Dist. Mehsana between January 2022 to April 2022.

Total 989 subjects who gave written informed consent age more than 18 were screened for random Blood Sugar irrespective of their symptoms or their previous known diabetic status. Out of them 262 found to be hyperglycemic. Rest adult subjects found to have their sugar value within normal limits.

All subjects were asked to answer a predesigned, pretested and pre-coded questionnaire regarding their lifestyles and family history. Questionnaire was prepared by modification of Indian diabetic Risk Score.

Data collected consisted of socio demographic variables and Indian Diabetic Risk Score where 8 parameters were included which comprises of five modifiable (BMI, waist circumference, physical activity, calorie intake and personal habits) and three non-modifiable risk factors (age, family history and h/o hypertension) for diabetes.

Because the aim was to produce a simple risk calculator that could be conveniently used in primary care and also by individuals themselves, only parameters that are easy to assess without any laboratory tests or other clinical measurements requiring special skills were entered into the model.

Interaction terms between the independent variables were not considered, because we wanted to keep the Diabetes Risk Score simple and easy to use

Sr No	Characteristics	Values	Score
1	Age	< 35	0
		35-50	10
		>50	20
2	BMI	< 25	0
		25-30	5
		>30	10
3	Waist Circumference	< 90(M) < 80 (F)	0
		90-100 (M)80-90(F)	5
		>100 (M) > 90 (F)	10
4	Physical Activity	Moderate exercise	0
		Mild exercise	5
		sedentary	10
5	Calorie Intake	< 2000	0
		2000-2500	5
		>2500	10
6	Family History	none	0
		1 person	10
		>1 person	20
7	H/O hypertension	No	0
		yes	10
8	Habits	None	0
		Either king/alcohol	5
		both	10

Minimum score 0
Maximum Score 100

- **≥ 60: Very HIGH RISK of having diabetes:** Oral Glucose Tolerance Test (OGTT) is recommended to rule out diabetes. If this is not possible, at least a random blood sugar or a fasting blood sugar should be done
- **30 – 50: The risk of having diabetes is MODERATE:** It is still recommended to have the above check up.
- **< 30: Risk of having diabetes is probably LOW**

Newly detected or previously known diabetic subjects were started on anti hyperglycaemic drugs under physician guidance according to their sugar level.

All subjects were divided in different categories by age, sex, SE status.

Sensitivity, Specificity, Positive Predictive value, negative predictive value, likelihood ratio for positive test, likelihood ratio for negative test and Accuracy were calculated for Modified Indian Diabetic Risk Score cut offs > 20, >40, >60 and > 80.

Statistical analysis

Descriptive statistics such proportions, percentage, Mean and Standard deviation was used. Sensitivity and Specificity, positive and negative predictive values and accuracy for predicting undiagnosed diabetes were calculated for cut off scores of less than 60 and greater than 60 of MIDRS score.

Ethical considerations

The study was conducted according to the protocol which was reviewed and approved by the institutional ethics committee of the institute. A written informed consent was taken from all patients after explaining the procedure.

RESULTS

Score	No diabetic	diabetic	Total
0-20	51(98.1%)	1(1.9%)	52(5.3%)
20-40	159(97%)	5(3%)	164(16.6%)
40-60	312(94.5%)	18(5.5%)	330(33.4%)
60-80	175(56.3%)	136(43.7%)	311(31.4%)
80-100	30(22.7%)	102(77.3%)	132(13.3%)
Total	727 (73.5%)	262 (26.5%)	989

Table-1 Association between MIDRS score and occurrence of diabetes

chi square for linear trend= 292.39
p-value(1 degree of freedom)= <0.0000001

Mean MIDRS in this study is 52.9

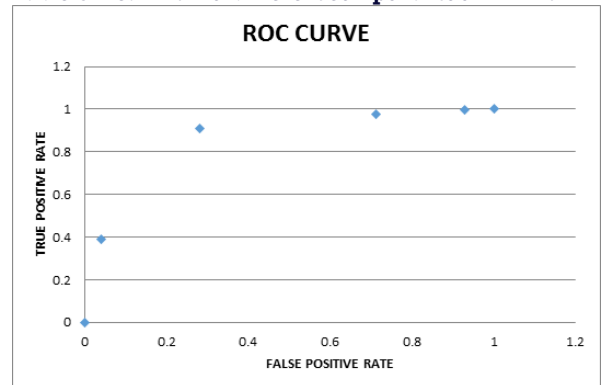
Prevalance of Diabetes (undiagnosed +previously diagnosed) in our study is 26.5%

Variables	Hyperglycemic	Normo glycemic	Total
Male	130	403	533
Female	132	324	456
Total	262	727	989
Lower income group	66	307	373
Middle income group	86	238	324
Upper income group	110	192	302
Total	262	727	989
Illiterate	56	204	260
Literate	206	523	729
Total	262	727	989

Table- 2 Demographic variables

Variables	Mean + SD
Age	42.6 + 15.4
BMI	25.9 + 3.9
Waist circumference male	88.9 + 10.1
Waist circumference female	87.6 + 9.8
Systolic blood pressure	134.6 + 20.5
Diastolic blood pressure	83.6 + 12.1
Waist hip ratio male	0.89 + 0.08
Waist hip ratio female	0.87 + 0.07

Table-3 Mean + SD of different componants of MIDRS



Parameters	≥20	≥40	≥60	≥80
	%	%	%	%
Sensitivity	99.61	97.7	90.8	38.9
Specificity	7	28.8	71.8	95.8
PPV	27.85	33	54	77
NPV	98.07	96.9	94.5	56.2
LR for Positive test	1.067	1.37	3.16	7.8
LR for negative Test	0.06	0.079	0.128	0.637
Accuracy	31.54	47.11	76.84	80.78

Table -4 Effectiveness and Validation parameters For MIDRS score >60, we can get 90 % sensitivity with 72% specificity and 77% accuracy. So we would like to recommend the FBS/PP2BS screening and lifestyle modification for all individuals with score above 60.

CONCLUSION

So the modified Indian diabetic risk score would be the virtually no cost screening tool for screening the iceberg situation of the undiagnosed diabetes in the population of the Unjha Taluka of Mehsana district.

Also it can identify high risk individuals who are prone to developing diabetes in future. These people, if counselled for extensive lifestyle modification, can prevent/ delay the onset of diabetes, which is true meaning of primary prevention.

Modified Indian diabetic risk score would be the cost effective screening tool as it uses simple, safe and inexpensive measures. It would help for selective screening instead universal screening.

For example, if we want to screen 1,00,000 adult population of any area, it would cost rupee 30 for FBS and PPBS. i.e 30,00,000/-. If we screen all adults with Modified IDRS and go for RBS for selected cohort of those who have score more than 60 than cost could be decreased by at least 55 %.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient (s) has/have given his/her/their consent for testing and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Nil.

Conflicts of interest

There are no conflicts of interest between the authors.

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