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A STUDY ON VALIDITY OF INDIAN DIABETES RISK SCORE (MDRF) FOR SCREENING OF DIABETES MELLITUS AMONG THE HIGH RISK GROUP (POLICEMEN) OF DIABETES MELLITUS OF BHAVNAGAR CITY.

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ABSTRACT

Objective: - To validate the Madras Diabetes Research Foundation (MDRF)-Indian Diabetes Risk Score (IDRS) as a screening test for diagnosis of Diabetes mellitus.

Method: - The present study was conducted among policemen of the Bhavnagar city, total 260 policemen of 30 or more years of age enrolled for the study (Response rate was 83 %).The fasting and 2 hour postprandial blood glucose test was done for diagnosis of the diabetes and According to American Diabetes Association (2004) criteria subjects was diagnosed as a diabetic, prediabetic (Impaired Fasting Glucose and Impaired Glucose Tolerance) and normoglycemic. Blood glucose test was taken as a "gold standard test" while MDRF- Indian diabetes risk score as a screening test and the sensitivity and specificity of IDRS calculated for various cut off point of an IRDS. To identify optimum cut off point of IDRS for diagnosis of diabetes, Receiver operator characteristic (ROC) curve was constructed.

Result: -We found that the MDRF-IDRS score of ≥ 60 had the best sensitivity (92.5%) and Specificity (62.27%) for detecting diabetes in the study population. Receiver operator characteristic curve shows that IDRS ≥ 60 is the best cut off point for diagnosis of diabetes, for IRDS ≥ 60, area under the ROC curve was 0.838.

Conclusion: - The MDRF-Indian diabetes risk score is the highly sensitive and specific, easy to perform and cost effective tool for diagnosis of diabetes.

INTRODUCTION

Socioeconomic development, technological advancements and changes in lifestyles, behavioural patterns, demographic profile transition (aging population) lead to major health transition, causes rapidly rising the burden of the non communicable diseases and its burden overweight the communicable diseases. India has also experienced this health transition cause increase the burden of diabetes and other Noncommunicable diseases.[1,2,3, 4]

According to 5th edition of IDF Diabetes Atlas, India is second to china in world for the number of people suffering from diabetes. Number of people with diabetes in India is estimated around 61.3 million in 2011 and this number is expected to rise to 101.2 million by 2030, unless urgent preventive steps are taken. [5]

The most disturbing trend is the shift in the age of onset of diabetes to a younger age in the recent years; Indians succumb to diabetes 5-10 years earlier than their western counterparts, during their most productive years. This leads to considerable loss of productive years; this could have long lasting adverse effects on the nation's health and economy. [6,7[

In India more than 50 % of people are unaware of their disease status are left untreated and thus more prone to microvascular as well as macrovascular complications.[7,8] Hence, it is necessary to detect the large pool of undiagnosed diabetic subjects in India and offer early therapy to these individuals. [7]

Early identification of at risk individuals using simple screening tools like the Indian Diabetes risk score (IRDS) 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. [7]

Diabetes Risk Score was developed by Madras Diabetes Research Foundation during Chennai urban rural epidemiological study (CURES) based on multiple logistic regression model using four simple parameters namely age, abdominal obesity, physical activity and family history.

It is the cost effective method for early diagnosis of Diabetes.[10]

Police work is widely considered to be among the most stressful occupations. There is increased prevalence of cardiovascular diseases risk factors and type 2 diabetes mellitus among policemen in many countries.[11] There is limited data on health status of policemen in India. Hence a cross-sectional study was conducted among the police personnel of Bhavnagar city.

MATERIAL AND METHODS: A Community based Cross sectional study conducted among police personnel working in Bhavnagar city during the year 2011 after obtaining the permission from the ethics committee of Govt. Medical College, Bhavnagar. All police personnel of Bhavnagar city of ≥ 30 yrs of age were enrolled for the study. Total 260 out of 314 study subjects were included in the study after applying inclusion and exclusion criteria.

Diagnosis of the diabetes was done by blood sugar examination by "Gluco Dr" portable glucometer with aseptic precaution. Waist circumference was measured (in centimetre) using a non stretchable tailor's tape at a point mid way between tip of iliac crest and last costal margin in the back and at umbilicus in the front, hip circumference was measured at the widest level over the greater trochanters.

On previous day study subjects (participants) were instructed for 8 hour fasting and on next day morning fasting blood sugar and 2 hour postprandial blood glucose test was done and according to ADA 2004 criteria subjects were classified as diabetics, pre diabetics (impaired fasting sugar or impaired glucose tolerance) and normoglycemics.

The information for these risk factors for IRDS can be obtained based on four simple questions and one anthropometric measurement namely waist circumference (in cm).

The four questions are:

1. What is your age?
2. Do you have a family history of diabetes? If yes, does your father or mother or both have diabetes?
3. Do you exercise regularly?
4. How physically demanding is your work [occupation]?

Indian Diabetes Risk Score (MDRF) [8]

Particulars	Score
Age [years]	
< 35 [reference]	0
35 – 49	20
≥ 50	30
Abdominal obesity	
Waist <80 cm [female], <90 [male] [reference]	0
Waist ≥ 80 – 89 cm [female], ≥ 90 – 99 cm [male]	10
Waist ≥90 cm [female], ≥ 100 cm [male]	20
Physical activity	
Exercise [regular] + 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
Minimum score	0
Maximum score	100

≥ 60: Very high risk of having diabetes, 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: Moderate risk of having diabetes. OGTT is recommended to rule out diabetes.

< 30: Low risk of having diabetes.

Statistical analysis:- Data entry was done in Excel 2007 sheet and Statistical analysis was done by MedCalc version 11.6.1.0 (trial version) statistical software. For Every cutoff point of IRDS validity (sensitivity and specificity) calculated, Receiver operator characteristic curve was developed to estimate best diagnostic cut off point of IRDS using the optimal criteria method Of ROC curve in MedCalc software.

RESULT

Out of 260 study subjects, 40 (15.4%) had diabetes mellitus type II. An additional 39 subjects (15 %) had impaired fasting glucose or impaired glucose tolerance. Out of 40 diabetic subjects 25 (62.5%) were newly diagnosed during the study and 15 (37.5%) subjects are known diabetics. To validate the Indian Diabetes Risk Score, IDRS used as a 'Screening Test' and Blood Glucose Test as a 'Gold Standard test' for diagnosis of diabetes Mellitus.

Table 1 shows sensitivity, specificity, positive predictive value and negative predictive value of Indian Diabetes Risk Scores in predicting Diabetes Mellitus in the study population.

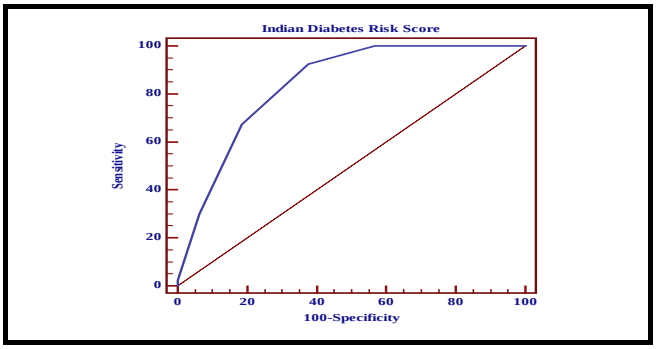
Table1: Sensitivity, specificity, Positive predictive Value and Negative predictive Value of Indian Diabetes Risk Score at various cut off score:-

IRDS	Sensitivity	Specificity	Positive Predictive Value	Negative Predictive Value
≥ 10	100	2.72	15.75	100
≥ 20	100	6.36	16.26	100
≥ 30	100	21.36	18.78	100
≥ 40	100	28.18	20.20	100
≥ 50	100	43.18	24.24	100
≥ 60	**92.5**	**62.27**	30.83	97.86
≥ 70	67.5	81.36	39.70	93.23
≥ 80	30	93.64	46.15	88.03
≥ 90	2.5	100	100	84.94
≥ 100	0	100	0	84.61

We found that an IDRS ≥ 60 has the best sensitivity of (92.5%) and specificity of (62.27%) for detecting Diabetes mellitus in the community. Higher IDRS scores increased the specificity but the sensitivity dramatically decreased. Conversely, lower IDRS values increased the sensitivity but the specificity drastically decreased. Our study thus confirms and validated the CURES[7] data and confirms the same IDRS Score of ≥ 60 as being the best cut point for identifying diabetes mellitus.

Receiver operator characteristic curve shows that IDRS ≥ 60 is the best cut off point for diagnosis of diabetes, In our study IDRS ≥ 60 recognized Diabetes subjects with Area Under the curve (AUC) from Receiver Operator Characteristic (ROC) curve of 0.838.(Figure 1)

Figure 1: Receiver Operator Characteristic (ROC) curve of Indian Diabetes Risk score



Area Under the curve = 0.838

DISCUSSION

In our study the Indian diabetes risk score diagnosed diabetes subjects with sensitivity and specificity of 92.5% and 62.27% respectively when the score is 60 and above. Similar result also found in the study of S Nandeshwar et al[9], IDRS ≥ 60 was detected Undiagnosed Diabetes subjects from a population with Sensitivity of 94.68% and Specificity of 44.87%. And in the study of P Adhikari et al [8] IDRS > 60 was detected Undiagnosed Diabetes subjects from a population with Sensitivity of 62.2% and Specificity of 73.7%.

This Indian diabetes risk score consists of four variable namely age, family history, physical activity and waist circumference, information regarding this variable are easily collected by oral question and measurement of waist circumference by measuring tape, the Indian diabetes risk score easily calculate by field level health workers and those who are a high risk group (≥ 60) are further screened by Blood sugar examination. This two stage screening could help reduce the costs of screening for diabetes by nearly 50%, makes screening cost effective.[7]

In the study of P Adhikari et al [8] and V. Mohan et al [10] IDRS ≥ 60 recognized Diabetes subjects with Area Under the curve (AUC) 0.668 and 0.698 of ROC curves respectively.

There are many other diabetes risk score for predicting diabetes like Finnish diabetes risk score, German Diabetes Risk score, Dutch diabetes risk score using variable like but in our knowledge Indian diabetes risk score is the simple score to perform which is suitable for rural areas of India where scare laboratory support for diagnosis of diabetes.[12]

Thus IDRS is a useful tool for mass screening of the high risk individual of Diabetes. IDRS is easy to administer and its accuracy helps us to screen the diabetes in a larger population. Use of this Indian Diabetic Risk score can make mass screening for diabetes at grass root level more valid and cost effective where laboratory resources are limited.

CONCLUSION

This study validates that Indian diabetes risk score is the accurate, simple, noninvasive and cost effective tool for identifying diabetic subjects in the community.

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