Assessment of Risk of Type 2 Diabetes using Indian Diabetes Risk Score – Community-Based Cross-Sectional Study in Urban Mysuru

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ABSTRACT

Background: India leads the world with largest number of diabetic subjects earning the dubious distinction of being termed the "Diabetes capital of the world". Approximately half of all subjects with diabetes in the developing world remain undiagnosed and untreated leading to serious long term consequences.

Methodology: A community-based cross sectional study was conducted in the urban areas of Mysore from March and July 2015. Using the estimation set up technique for proportion, the sample size was calculated to be 872 rounded off to 900, with level of significance of 5% and precision of 10%. Direct interview method was used for the data collection. Risk level for diabetes was assessed using Indian Diabetic Risk Score (IDRS) and socio-demographic and anthropometric factors were assessed through a semi structured pretested questionnaire.

Results: Total of 900 individuals participated, majority of subjects had moderate to low IDRS risk. On the whole, around 22% of adults had a high risk score (score >60) for diabetes, 42.6% had moderate scores and 35.6% had low scores on IDRS.

Conclusion: This study estimates the usefulness of simplified Indian Diabetes Risk Score for identifying high risk for diabetes in the community. It should be used routinely in community-based screening to find out high risk category of population for diabetes.

Key Words: IDRS; Risk for diabetes; Socio-demographic factors

INTRODUCTION

Diabetes mellitus is a major clinical and public health problem. Diabetes mellitus is one of the leading cause of long term morbidity and a major health hazard in a developing country like India.[1] India leads the world with largest number of diabetic subjects earning the dubious distinction of being termed the **"Diabetes capital of the world"**.[2] In 2014, there were an estimated 67 million people with diabetes in India and this is projected to increase to 109 million by 2035.[3] Recently WHO commented that over 19% of the world's diabetic population currently resides in India.[1] Its prevalence in urban India has increased from 2.4% in 1970 to 8.7% in 2015. However in non-communicable diseases due to lack of a clear etiological agent the control mechanism is heavily dependent on identifying and tackling risk factors. Unfortu-nately more than 50% of the diabetic subjects in India remain unaware of their diabetic status, which adds to the disease burden.[4] Because of this increasing burden of the disease, its iceberg nature, its complications and the potential to prevent these complications with effective diagnosis and treatment, active efforts are required for the early diagnosis of diabetes. The risk factors like age, gender, family history are non-modifiable while others like smoking, diet, physical activity, hypertension, diabetes etc. are modifiable. Thus for non-communicable diseases a typical screening or preventive strategy may not work and principles of primordial prevention have to be applied effectively. Early identification of at-risk individuals and appropriate lifestyle intervention would help in preventing or postponing the onset of diabetes mellitus. This highlights the need for simple, low-

cost tools to aid early screening of diabetes.[5] A novel approach utilising simple non-invasive scores can offer a potential for mass screening programmes. The Indian Diabetes Risk Score (IDRS) was developed by V Mohan and his colleagues in Madras Diabetes Research Foundation (MDRF), Chennai and is considered to be one of the strongest predictor of incident diabetes in India.[6] It is for identifying undiagnosed diabetic subjects using four simple parameters like age, waist circumference, family history of diabetes and physical activity. It is an efficient tool to categorize the risk of diabetes mellitus in community. It also helps in detecting undiagnosed type 2diabetes. The present study aims at assessing the risk for type 2 diabetes mellitus among adults in urban area of Mysore.

METHODOLOGY

A community-based cross-sectional study was conducted in urban field practice area of department of Community Medicine, Mysore Medical College and Research Institute, Mysore. Study was approved by the Institutional Ethics Committee. The maximum inflated sample size was 872 rounded off to 900, which was calculated using estimation technique with prevalence of high risk for diabetes using IDRS as 31.5 %[2] with 5% level of significance and precision 10%. The sample

size was allocated to each ward using "Proportionate allocation technique". The voter's lists were obtained from Chief Electoral Office, Karnataka which contains demographic details of voters in different wards of urban field practice area. This list was compiled to form the required sampling frame for the selection of individuals. To achieve randomization in the selection of subjects at each ward, SRSWOR (simple random sampling without replacement) was used. To achieve random sampling RAND Corporation released random number table was used. Selected participants aged 18 years and above, not diagnosed cases of diabetes were included in the study.

Study was conducted from March to July 2015. Information was collected by visiting the houses of the selected participants. To collect the required information from the study subjects the "Direct interview method" of Primary source of information technique was used. The individuals were interviewed for collection of necessary information using the pre-tested, semi structured and structured questionnaire method. The questionnaire was prepared by a thorough review of literature.

The four components of IDRS are Age, Family history of diabetes, Physical activity and Waist circumference. The study subjects were scored according to the following score. [6]

Indian Diabetes Risk Score [IDRS] [6]

Particulars	Score
Age:	
<35 years	0
35 – 49 years	20
≥ 50 years	30
Waist circumference:	
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 [regular] or strenuous [manual] work at home / work (Combine PAC ≥ 3)	0
Moderate exercise [regular] or moderate physical activity at home / work (Combine PAC 2)	10
Mild exercise [regular] or mild physical activity at home / work (Combine PAC 1)	20
No exercise and sedentary activities at home / work (Combine PAC 0)	30
Family history of diabetes:	
No diabetes in parents	0
One parent is diabetic	10
Both parents are diabetic	20

*The physical activity component (PAC) of IDRS was scored the following way:

Physical activity component of IDRS	0 Score	1 Score	2 Score	3 Score
a) How physically demanding is your work (occupation)?	Sedentary	Mild	Moderate	Heavy
b) Do you exercise regularly in your leisure time?	Not at all	<3 times a week	≥ 3 times a week	almost daily
c) How would you grade your physical activity at home?	Sedentary	Mild	Moderate	Strenuous

The final IDRS score was calculated and were subdivided into	
High risk	combined score is ≥60
Moderate risk	combined score is between 30-50
Low risk	combined score is <30

Statistical Analysis: Data were entered into Microsoft excel sheet and analysed using SPSS Inc. 17.0 software. Frequency and percentages (descriptive statistics) were calculated. Pearson's Chi-square was used as a test of significance. P-value < 0.05 was considered statistically significant.

RESULTS

In total, 900 persons participated in the study. Socio-demographic profile of participants is described in Table 1. Assessment results for all the parameters of "Simplified Indian Diabetes Risk Score" are mentioned in Table 2.

Table 1: Socio-demographic profile of subjects

Socio-demographic Variable	Subjects (n=900)(%)
Gender	
Male	311 (34.6)
Female	589 (65.4)
Religion	
Hindu	840 (93.3)
Christian	21 (2.3)
Muslim	39 (4.3)
Type of family	
Nuclear	445 (49.4)
Joint	455 (50.6)
Socio-Economic Status (SES)	
Class II	504 (56)
Class III	361 (40.1)
Class IV	35 (3.9)
Marital Status	
Married	745 (82.8)
Unmarried	65 (7.2)
Separated/ Widowed	90 (10)
BMI	
Underweight	150 (16.7)
Normal	353 (39.2)
Overweight	252 (28)
Obese	145 (16.1)

Table 2: Assessment results for IDRS parameters

Parameter	Subjects (%)
Age Category	
18-35 years	336 (37.3)
36-49 years	258 (28.7)
>50 years	306 (34)
Waist Circumference	
< 80 cm (female)/<90 cm (male)	350 (38.9)
80 - 89 cm (female)/ 90 - 99 cm (male)	191 (21.2)
>90 cm (female)/>100 cm (male)	359 (39.9)
Physical Activity	
Strenuous	575 (63.9)
Moderate	211 (23.4)
Mild	69 (7.7)
Sedentary	45 (5)
Family History	
No family history	166 (18.4)
Either Parent	39 (4.3)
Both parents	695 (77.2)
IDRS Score	
High Risk (≥60)	197 (21.9)
Moderate Risk (30-50)	383 (42.5)
Low Risk (<30)	320 (35.6)

DISCUSSION

In the present study, the prevalence of people at high risk of diabetes was 22%. S Nandeshwar et al.[7] reported that the prevalence of high IDRS in their study was 68.8%. This high proportion can be attributed to the small sample size. 43% of the population were found in high risk category in a study conducted at Chennai by Mohan et al.[6] Another study done by Sanjay Kumar Gupta et al.[8] in urban area of Pondicherry had reported 31.2% high risk subjects. The prevalence of high risk individuals in a study by Prabha Adhikari et al.[9] was found to be 29.7%, which is similar to the present study.

Table 3: Comparison of IDRS scores between males and females

Variables	High Risk (IDRS ≥60)	Moderate Risk (IDRS 30-60)	Low Risk (IDRS <30)	Chi square value	p value
Age Category					
18-35 years	75 (38.1)	139 (36.3)	122 (38.1)	0.766	0.943
36-49 years	56 (28.4)	108 (28.2)	94 (29.4)		
>50 years	66 (33.5)	136 (35.5)	104 (32.5)		
Waist Circumference					
< 80 cm (female)/<90 cm (male)	15 (7.6)	98 (25.6)	237 (74.1)	389.13	**0.000**
80-89 cm (female)/ 90-99 cm (male)	15 (7.6)	135 (35.2)	41 (12.8)		
>90 cm (female)/ >100 cm (male)	167 (84.8)	150 (39.2)	42 (13.1)		
Physical Activity					
Strenuous	18 (9.1)	269 (70.2)	288 (90)	426.541	**0.000**
Moderate	89 (45.2)	93 (24.3)	29 (9.1)		
Mild	48 (24.4)	18 (4.7)	3 (0.9)		
Sedentary	42 (21.3)	3 (0.8)	0 (0)		
Family History					
No family history	39 (19.8)	80 (20.9)	47 (14.7)	4.827	0.305
Either Parent	9 (4.6)	16 (4.2)	14 (4.4)		
Both parents	149 (75.6)	287 (74.9)	259 (80.9)		

A study conducted by Reshma S Patil et al.[10] in 2011–12 in an urban slum of Pune, Maharashtra reported the prevalence of high risk to be 37%, while a study conducted in an urban area of Jamnagar, Gujarat by Suraj A Khandhedia et al.[11] reported the prevalence of high risk of diabetes up to 29%. Another study conducted by Hemlata Chaurasia et al.[12] among people attending the different medical OPDs of a medical college hospital, showed that the prevalence of high risk was 25%.

Physical activity is one of the important modifiable risk factors for diabetes. Globally, physical inactivity accounts for 14% of diabetes, [13] and it also acts as a major risk factor for obesity, which again has a significant relationship with diabetes. Gupta et al. reported similar findings to those of the present study, that individuals with a sedentary lifestyle or who undertook only mild physical activity, had a higher risk for diabetes;[14] also, the Chennai Urban Population Study (CUPS-14) conducted by Mohan et al. found a significant association between light physical activity and undiagnosed diabetes.[15]

Waist circumference is a more powerful determinant of a subsequent risk of diabetes mellitus. (2)Several other studies have noted a significant association between waist circumference and undiagnosed diabetes, which is similar to the findings of the present study.[16-20]

CONCLUSION

This study estimates the usefulness of simplified Indian Diabetes Risk Score for identifying the risk pattern for diabetes in the community. This simplified diabetes risk score has categorised the risk factors based on their severity.

Non-modifiable risk factors like increasing age and family history of diabetes, and modifiable risk factors like lack of physical activity and central obesity were the most common factors found in participants who were at high risk for diabetes.

Use of IDRS can make mass screening for diabetes in India more cost effective and feasible. IDRS can be used for routine screening of people aged over 35 years for identification of subjects at high risk for development of diabetes.

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