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Risk of type 2 diabetes mellitus among urban slum population using Indian Diabetes Risk Score

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Background and objectives: Diabetes has emerged as a major health challenge in India due to a rapid rise in the number of diabetes cases. Early identification of high risk individuals through screening and early interventions in the form of lifestyle modifications and treatment would help in the prevention of diabetes and its complications. This study was done to assess the risk of type 2 diabetes mellitus (T2DM) in an urban slum population using the Indian Diabetes Risk Score (IDRS) and to determine the factors associated with high risk score.

Methods: A community-based cross-sectional study was conducted among the urban slum population in North Telangana, India. A total of 136 study participants were selected randomly from the records. A pre-designed and pre-tested structured questionnaire was used for data collection. Assessment of risk of T2DM was done using the IDRS.

Results: Of the 136 study participants, 101 (74.3%) were at high risk (IDRS ≥60) followed by 32 (23.5%) at moderate risk (IDRS 30-50) and three (2.2%) at low risk (IDRS <30). Sixty two (92.5%) individuals in the age group ≥50 yr were at high risk compared to 34 (63%) in 35-49 yr age group. Most (n=35, 87.5%) of sedentary workers were at high risk compared to those employed in moderate (n=52, 75.4%) and strenuous work (n=14, 51.9%).

Interpretation & conclusions: Nearly three-fourth (74.3%) of the study participants were at a high risk of developing T2DM. Age, type of occupation, abdominal obesity, general obesity and high blood pressure were the factors significantly associated with high risk IDRS score.

Globally about 9.3 per cent of adults (*i.e.* about 463 million people) are living with diabetes[1]. India ranks second to China for the highest number of diabetes cases in the world. More than half of individuals with diabetes remain unaware of their diabetic status[2], thus untreated leading to complications. Low awareness regarding diabetes[3] and poor compliance to the management[4] are among the major challenges. Genetic susceptibility coupled with fast food culture and sedentary lifestyle[5] are the major factors for the rise in diabetes cases in India. Identification of high risk individuals by screening and early interventions would

help in the prevention of diabetes and its complications[6]. The Indian Diabetes Risk Score (IDRS)[7] is simple and cost-effective tool for early detection of undiagnosed cases in the community. Hence, the present study was done to assess the risk of type 2 diabetes mellitus (T2DM) in an urban slum population in southern India using IDRS and to determine the factors associated with high risk score.

Material & Methods

A community-based cross-sectional study was conducted among urban slum population from June 1 to July 31, 2017 at Sahethnagar, which is an urban field practice area of Prathima Institute of Medical Sciences, Karimnagar, in North Telangana, India. Of the total 824 households in the area, 136 were selected randomly. One individual from each of these selected households was selected randomly. Individuals aged 30 yr and above with no history of diabetes and willing to participate in the study were included. Informed written consent was obtained from the participants, and approval from the Institutional Ethics Committee was obtained before the commencement of the study.

A pre-designed and pre-tested structured questionnaire was used for data collection. The data comprised socio-demographic variables, variables related to IDRS and measurement of blood pressure (BP) and body mass index (BMI). The IDRS components were scored as follows: age: <35 yr (0 score), 35-49 yr (20 score), and ≥50 yr (30 score); abdominal obesity (waist circumference): <80 cm in females and <90 cm in males (0 score), 80-89 cm in females and 90-99 cm in males (10 score), and ≥90 cm in females and ≥100 cm in males (20 score); physical activity: exercise (regular) plus strenuous work (0 score), exercise (regular) or strenuous work (20 score), and no exercise and sedentary work (30 score); family history of diabetes: no family history (0 score), either parent with diabetes (10 score), and both parents with a history of diabetes (20 score); and individuals with total IDRS of ≥60, 30-50 and <30 were categorized as high, moderate and low risk, respectively[8].

The sample size was calculated using OPENEPI software. For a prevalence of 8.7 per cent for diabetes as per the International Diabetes Federation Report[9] and 95 per cent confidence level and five per cent absolute precision, the sample size calculated was 127. A total of 136 individuals were included in the study.

Statistical analysis: Statistical analysis was done using SPSS software version 22 (IBM Corp., Armonk, NY, USA). Data were analyzed by calculating frequency, percentages, mean, and standard deviation. Pearson's Chi-square test and ANOVA test were used as test of significance.

Results & Discussion

A total of 136 individuals were assessed for the risk of T2DM using IDRS. The socio-demographic characteristics of the participants are as shown in Table I. The mean age of the individuals was 51.20±15.11 yr [median=60, range=30-90 yr] and the male/female ratio was 72:100.

Majority (n=101, 74.3%) were at a high risk of developing T2DM followed by 23.5 per cent (n=32) at moderate risk. Only three (2.2%) were at low risk. The observations were similar to a study conducted in Bangalore[10]. Majority of individuals (n=62, 92.5%) of age group ≥50 yr were at high risk compared to 35-49 yr (n=34, 63%; *P*<0.001). These observations were comparable to a study conducted in Pune[11]. More females (79.7%) as compared to males (66.7%) were at high risk of diabetes (*P*<0.08). A study conducted in north India also showed no significant association between gender and risk score[12]. No significant association was noted between education and risk of diabetes. However, Patil *et al*[11] observed a significant association between low education and high risk status. In the present study, 87.5 per cent individuals with sedentary work were at high risk compared to those in moderate (75.4%) and strenuous work (51.9%) (*P*<0.01) (Table I). Individuals belonging to socio-economic class I and V (83.3% each) were at high risk of developing T2DM. A higher risk in the lower-middle class was observed in a study[13]. In the present study, 79.4 per cent of the individuals with a family history of diabetes and 72.5 per cent with no family history were at high risk similar to an earlier study[11].

The mean age of the individuals in the high risk category was higher than in moderate and low risk category (*P*<0.001). Similarly, significantly higher mean systolic (*P*<0.05) and diastolic BP (*P*<0.05) was noted among the individuals in high risk category (Table II). Hypertension was a comorbidity in 44.9 per cent diabetics in a study[14]. The mean waist circumference was significantly more in the high risk group among both men (*P*<0.001) and women (*P*<0.001), indicating a greater risk of diabetes in those with abdominal obesity as reported earlier[15]. The small sample size due to limited time was a major limitation of the study.

Table I. Socio-demographic factors and the risk of type 2 diabetes mellitus by Indian Diabetes Risk Score (IDRS)

Socio-demographic factors	IDRS		Total (n=136)	P
	≥60 (n=101), n (%)	30-50 and <30 (n=35), n (%)		
Age group (yr)				
<35	5 (33.3)	10 (66.7)	15	<0.001
35-49	34 (63)	20 (37)	54	
≥50	62 (92.5)	5 (7.5)	67	
Gender				
Male	38 (66.7)	19 (33.3)	57	0.08
Female	63 (79.7)	16 (20.3)	79	
Education				
Illiterate	29 (80.5)	7 (19.4)	36	0.50
Primary	5 (100)	0 (0)	5	
Middle school	17 (68)	8 (32)	25	
High school	11 (73.3)	4 (26.7)	15	
Intermediate/graduate	39 (70.9)	16 (29.1)	55	
Occupation				
Sedentary	35 (87.5)	5 (12.5)	40	<0.01
Moderate	52 (75.4)	17 (24.6)	69	
Strenuous	14 (51.9)	13 (48.1)	27	
Socio-economic status[16]				
Class I	15 (83.3)	3 (16.7)	18	0.52
Class II	27 (79.4)	7 (20.6)	34	
Class III	25 (67.6)	12 (32.4)	37	
Class IV	24 (68.6)	11 (31.4)	35	
Class V	10 (83.3)	2 (16.7)	12	
Family history of diabetes mellitus				
Yes	27 (79.4)	7 (20.6)	34	0.42
No	74 (72.5)	28 (27.5)	102	

Table II. Comparison of mean age, blood pressure and waist circumference in various Indian Diabetes Risk Score (IDRS) categories

Variables	IDRS, mean±SD			P
	High score (n=101)	Medium score (n=32)	Low score (n=3)	
Age (yr)	54.85±14.49	41.06±12.12	36.00±7.93	<0.001
Systolic BP (mm Hg)	131.46±18.59	123.75±15.04	108.66±12.05	<0.05
Diastolic BP (mm Hg)	83.57±11.79	78.43±10.29	72.00±3.46	<0.05
Waist circumference male (cm)	95.21±10.49	81.82±10.42	78.50±10.60	<0.001
Waist circumference female (cm)	91.07±12.10	78.66±8.88	69.00±0.00	<0.001
SD, standard deviation; BP, blood pressure				

In conclusion, nearly three-fourth (74.3%) of the study participants had a risk score of >60 by IDRS. Age, type of occupation, abdominal obesity, general obesity and high BP were the risk factors significantly associated with high risk score. Intensive information, education and communication efforts would be required at the community level for the prevention of diabetes.

Conflicts of Interest: None.

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