Research Article

Assessment of risk of type 2 diabetes using simplified Indian Diabetes Risk Score – Community-based cross-sectional study

Krutarth R Brahmbhatt[1], Tamal Chakraborty[2], Chandana Gopal[2], Shwethashree M[2], Sajjan Madappady[2], Sowndarya TA[2], Bharani Kumar Anbalagan[2]

[1]Department of Community Medicine, GMERS Medical College, Junagadh, Gujarat, India.
[2]Department of Community Medicine, A.J. Institute of Medical Sciences & Research Center, Mangalore, Karnataka, India.
Correspondence to: Krutarth R Brahmbhatt, E-mail: krutarth_brahmbhatt@rediffmail.com

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Abstract

Background: Prevalence of diabetes mellitus in India is 8.7%. Around 52% of the cases of diabetes among adults in India are undiagnosed. A simplified Indian Diabetes Risk Score (IDRS) for screening of undiagnosed diabetic subjects was developed by Mohan Diabetes Foundation, Chennai. IDRS can be reliably used as an effective tool for the mass screening of diabetes in the community.

Objectives: To assess the risk for type 2 diabetes among study participants using simplified version of IDRS and to estimate prevalence of abdominal obesity and physical activity among males and females.

Materials and Methods: A community-based cross-sectional study was conducted in the field practice area of Urban Health Center of a medical college hospital in South India. Simple random sampling was performed to select the participants. Data collection tool had two parts. First part was about socio-demographic information and second part was "Simplified Indian Diabetes Risk Score". Pearson's Chi-square was used as a test of significance. *P*-value < 0.05 was considered statistically significant.

Results: Total 145 persons participated in the study. The prevalence of people at high risk of diabetes was 34% in the present study. The prevalence of abdominal obesity was 44% and 84% among males and females, respectively.

Conclusion: One-third of the participants were at high risk for diabetes. IDRS is a simple and easy to use tool to assess the risk of diabetes in the community.

KEY WORDS: Simplified Indian Diabetes Risk Score, abdominal obesity, physical activity, family history of diabetes

Introduction

The prevalence of diabetes mellitus in India is 8.7%. Around 52% of the cases of diabetes among adults in India are undiagnosed.[1]

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A simplified Indian Diabetes Risk Score (IDRS) for screening of undiagnosed diabetic subjects was developed by Mohan Diabetes Foundation, Chennai. IDRS consisting of variables such as age, abdominal obesity, physical activity, and family history predicted diabetes mellitus with optimum sensitivity, specificity, and has high positive and negative predictive value.[2] IDRS has been validated by various studies conducted in different parts of India. These studies have found IDRS as useful for identifying undiagnosed diabetic subjects, can make screening programmes more cost effective, can be reliably applied as effective tool for the mass screening of diabetes in the community.[3–6]

The National Urban Diabetes Survey (NUDS), a population-based study was conducted in six metropolitan cities across India and recruited participant representatives of all socio-economic strata. This study also revealed that the

prevalence in the southern part of India to be higher-13.5% in Chennai, 12.4%, in Bangalore, and 16.6% in Hyderabad; compared to eastern India (Kolkatta), 11.7%; northern India (New Delhi), 11.6%; and western India (Mumbai), 9.3%.[7]

As the prevalence of diabetes mellitus is higher in South India and majority of the subjects remain undiagnosed for diabetes; this study was conducted to find out the high-risk people for diabetes. This study was conducted to assess risk for type 2 diabetes amongst study participants using simplified version of Indian diabetes risk score, to estimate the prevalence of abdominal obesity and physical activity among males and females, to find out proportion of positive family history for diabetes in study participants and to study association of certain socio-demographic variables with diabetes.

Material and Methods

A community-based cross-sectional study was conducted in the field practice area of Urban Health Center – Shaktinagar which belongs to A.J. Institute of Medical Sciences and Research Center, Mangalore. The complete socio-demographic information of the people living in the catchment area of the urban health center was maintained. Study was approved by the Institutional Ethics Committee. Simple random sampling method was used to select the participants from the registers available at UHC. Selected participants aged 20 years and above, not diagnosed cases of diabetes were included in the study. Information was collected by visiting the houses of the selected participants. Participants were briefed regarding the objectives of the study. Participant information sheets which contained information about the objectives, procedures and implications of the study were distributed and explained to all the participants. Written informed consent was obtained from all the participants before enrolment. If the particular participant was not available at the time of visit, second visit was done the very next day. If the person was not available after two visits one more participant was selected randomly from the list. Data collection tool had two parts. First part was about socio-demographic information and second part was "Simplified Indian Diabetes Risk Score".[2] Data was collected by post-graduate students by interview method in local language. Questionnaire was validated for use in local language by translation from English to Kannada and back translation from Kannada to English. Study was conducted from January to April 2015. Sample size was derived by formula: 4 pq/L^2, where p = 10%,[7] q = 90%, absolute precision: 5%, = 144.

Operational definitions used in the study are mentioned below.

Participants with IDRS "≥60", "30 to <60" and "<60" were considered as "High risk", "Intermediate risk", and "Low risk" for diabetes mellitus.[2]

Family history of diabetes: If either or both of a participant's parents had diabetes, they were considered to have a positive family history.[2]

Physical activity: Grading was done as per WHO STEPS definitions of sedentary, mildly, moderately, or vigorously physically active.[8]

Abdominal obesity: Waist circumference (cm) was measured using a non-stretchable measuring tape. Waist circumference was measured at the smallest horizontal girth between the costal margins and the iliac crest at the end of expiration. Abdominal obesity (AO) was defined as a waist circumference (WC) ≥ 90 cm for men and ≥ 80 cm for women.[9]

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, 145 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. Association of gender with IDRS parameters is described in Table 3.

Discussion

The prevalence of people at high risk of diabetes was 34% in the present study. The prevalence of abdominal obesity was 44% and 84% among males and females, respectively.

Table 1: Socio-demographic profile of study participants (n = 145)

Variable	*N*	%
Gender		
Male	50	34.5
Female	95	65.5
Marital status		
Married	109	75.2
Unmarried	36	24.8
Education		
Illiterate	39	26.9
Primary	34	23.4
Secondary	23	15.9
Higher secondary	18	12.4
Graduate and above	31	21.4
Occupation		
Unemployed	1	0.7
Unskilled	32	22.1
Semiskilled	31	21.4
Skilled	21	14.4
Professional	22	15.2
Student	38	26.2

*Age is mentioned with IDRS parameters.

Table 2: Assessment results for IDRS parameters (*n* = 145)

Parameter	*N*	%
Age (years)		
< 35	43	29.7
35–49	47	32.4
≥ 50	55	37.9
Abdominal obesity (females)		
Waist < 80 cm	15	15.8
Waist ≥ 80–89cm	31	32.6
Waist ≥ 90 cm	49	51.6
Total	95	100
Abdominal obesity (males)		
Waist < 90 cm	28	56
Waist ≥ 90–99cm	12	24
Waist ≥100 cm	10	20
Total	50	100
Physical activity		
Exercise (regular) + strenuous work	12	8.3
Exercise (regular) or strenuous work	77	53.1
No exercise and sedentary work	56	38.6
Family history		
No family history	113	77.9
Either parent	30	20.7
Both parents	2	1.4
IDRS score		
High risk of diabetes (score ≥ 60)	49	33.8
Low risk of diabetes (score < 60)	13	9.0
Intermediate risk of (score 30 to < 60)	83	57.2

The prevalence of physical activity among males and females was 64% and 49%, respectively. Prevalence of positive family history (in either parent or both parents) was 22%.

In the present study, the prevalence of people at high risk of diabetes was 34%. Similar level of prevalence (31%) was reported by a study conducted in an urban area of Puducherry.[10] A study conducted by Patil in 2011–12 in an urban slum of Pune, Maharashtra reported it as 37%.[11] While a study conducted in urban area of Jamnagar, Gujarat reported the prevalence of high risk of diabetes up to 29%.[12] Another study conducted among people attending the different medical OPDs of a medical college hospital the prevalence found was 25%.[3] As the prevalence of diabetes is higher in South India than other parts of the country.[7] The prevalence of high risk people for diabetes is also higher in the present study compared to studies conducted in Gujarat and Central India. In the present study, the prevalence of abdominal obesity was 44% and 84% among males and females, respectively. While a study conducted in North India using the same cut-off values for waist circumference reported prevalence of abdominal obesity up to 62% and 75% among males and females, respectively.[13] Another study conducted in South India reported it up to 31% and 66% among males and females, respectively.[14] Prevalence of physical activity among males and females was 64% and 49%, respectively, in the present study. A study conducted by ICMR reported prevalence of physical activity among males and females as 60% and 40%, respectively.[15] While a study conducted in Ahmedabad, Gujarat reported prevalence of physical activity among males and females up to 68% and 32%, respectively.[16] In the present study prevalence of positive family history (in either parent or both parents) was 22%. A study conducted in Pune, Maharashtra reported it as 23%.[11] While a study conducted in urban area

Table 3: Association of gender with certain IDRS parameters (*n* = 145)

		Variable		Chi-square (df)	*P*-value
		Physical activity			
Gender	Exercise (regular) + strenuous work	Exercise (regular) or strenuous work	No exercise and sedentary work		
Female	9 (9.5)	38 (40)	48 (50.5)		
Male	3 (6.0)	29 (58.0)	18 (36.0)	0.871 (2)	0.669
Gender		*Abdominal obesity*			
	1*	2#	3$		
Female	15 (15.8)	31 (32.6)	49 (51.6)		
Male	28 (56.0)	12 (24.0)	10 (20.0)	26.7 (2)	0.0001
Gender		*Risk of diabetes*			
	High risk	Moderate risk	Low risk		
Female	38 (40.0)	53 (55.8)	04 (4.2)		
Male	11 (22.0)	30 (60.0)	09 (18.0)	9.68 (2)	0.008

*Waist < 80 cm: female, < 90: male [reference]
#Waist ≥ 80–89 cm: female, ≥ 90–99 cm: male
$Waist ≥ 90 cm: female, ≥ 100 cm: male

of Jamnagar, Gujarat reported the prevalence of positive family history of diabetes up to 18%.[12]

Strength: This was a community-based study and a validated questionnaire (IDRS) was used.

Limitation: Recall bias might have played role in reporting of family history by participants.

Conclusion

One-third of the participants were at high risk for diabetes. IDRS is a simple and easy to use tool to assess the risk of diabetes in the community. It should be used routinely in community-based screening to find out high risk people for diabetes.

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