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Assessment of Risk of Type 2 Diabetes using Indian Diabetes Risk Score: A Community Based Cross-Sectional Study in Urban Field Practice Area of a Medical College, Chitradurga

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Abstract

India leads the world with the most 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. A cross-sectional study was done in urban field practice area of Basaveshwar Medical College among adults >20 years of age with sample size of 20. Systematic random sampling was used to select the subjects. Data was collected using standardised questionnaire which included socio-demographic profile, standard glucometer was used to measure random blood glucose for all participants. IDRS was used to ascertain the risk of developing diabetes. Data was analysed using Pearson’s Chi square test and Fischer exact. The overall prevalence of diabetes was 11%. Among 191 subjects, 4.2% were in low risk category. 42.9% and 52.8% were in moderate and high risk category respectively. Total of 8 subjects were newly diagnosed in our study. Among them 7 subjects were in the high risk category and 1 was in the low risk category. 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.

Keywords: IDRS; Risk for diabetes; Sociodemographic factors

Introduction

Diabetes is a significant clinical and public-health issue. In a developing country like India, diabetes mellitus is one of the primary causes of long-term morbidity and a serious health threat.⁽¹⁾ India has the highest number of diabetic subjects in the world, gaining the dubious title of "Diabetes Capital of the World."⁽²⁾ In India, an estimated 67 million individuals have diabetes in 2014, with that number expected to rise to 109 million by 2035.⁽³⁾ According to the World Health Organization, India now has over 19 percent of the world's diabetic population.⁽⁴⁾ In urban India, its prevalence has risen from 2.4 percent in 1970 to 8.7 percent in 2015. However, because there is no obvious etiological agent in noncommunicable illnesses, the control mechanism is mainly reliant on identifying and addressing risk factors. Unfortunately, more than half of all diabetes people in India are ignorant of their condition, adding to the disease burden.⁽⁴⁾ Because of the disease's growing burden, its iceberg nature, its consequences, and the ability to prevent these complications through better identification and treatment, strong efforts for early diabetes diagnosis are essential. Age, gender, and family history are non-modifiable risk factors, but smoking, diet, physical activity, hypertension, diabetes, and other risk factors are modifiable. As a result, a standard screening or prevention plan for non-communicable illnesses may not be effective, and basic preventative principles must be applied properly. Diabetes mellitus can be prevented or delayed if at-risk persons are identified early and proper lifestyle interventions are implemented. This emphasises the importance of simple, low-cost techniques for diabetes early detection.⁽⁵⁾ A innovative method based on basic non-invasive ratings has the potential to be used in mass screening programmes. V Mohan and his colleagues at the Madras Diabetes Research Foundation (MDRF) in Chennai established the Indian Diabetes Risk Score (IDRS), which is regarded as one of the most accurate predictors of inci-

dent diabetes in India.⁽⁶⁾ It uses four simple characteristics such as age, waist circumference, family history of diabetes, and physical activity to detect undiagnosed diabetics. It is a useful technique for categorising diabetes mellitus risk in the community. It also aids in the detection of type 2 diabetes that has gone undiagnosed. The present study aims at assessing the risk for type 2 diabetes mellitus among adults in central Karnataka.

Methodology

A community-based cross-sectional study was conducted in urban field practice area of department of Community Medicine, Basaveshwara Medical College, Chitradurga. Study was approved by the Institutional Ethics Committee. Age group of >20 years were included in the study area. According to a cross sectional study by Patil SR et al the prevalence of at risk subjects for diabetes was 36.6% in urban area of Pune, Maharashtra.⁽⁷⁾ Sample size was calculated as: Equation: Sample size, $n = \frac{4pq}{l^2 \cdot \delta}$ Prevalence $p = 36.6\%$ $Q = 1 - P = 63.4\%$ $\delta = 53.4 =$ allowable error, 20% of P with 10% data loss. So the sample is 191. Exclusion criteria were pregnant and lactating women and study subjects who did not give consent for the study. Systematic random sampling is used to select subjects.

A individual was interviewed using a pre-designed semi-structured questionnaire. Name, age, religion, caste, occupation, and education are all included in the questionnaire, as well as anthropometric measurements such as height, weight, waist, and hip measurements. For all subjects, a standard Glucometer was used to measure random blood glucose. The IDRS was used to determine the risk of diabetes.

Diagnostic criteria: Random blood glucose of > 200mg/dl was considered as diabetic.⁽⁸⁾

IDRS has 4 parameters like waist circumference and physical activity which are modifiable risk factors and age and family history which are non-modifiable.⁽⁶⁾

Particulars	Score
Age in years	
<35	0
35-49	20
>50	30
Abdominal obesity	
Waist <80cm (F); <90cm (M).	0
Waist 80-89cm (F); 90-99cm (M)	10
Waist >90cm (F); >100cm (M).	20
Physical activity	
Exercise regular + strenuous work	0
Exercise regular or strenuous work	20
No exercise and sedentary work	30
Family history	
No family history	0
Either parents	10
Both parents	20
SCORING	
High risk	>60
Moderate risk	30-50
Low risk	<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

Our study revealed that 21 subjects out of 191 were diabetics and 170 (89%) were non-diabetics. So, the prevalence of diabetes in our study was 11%. (Table 1)

Table 1. Prevalence of Diabetes

	N (%)
Non- Diabetes	170(89)
Diabetics	21(11)
Total	191(100)

Our study showed that 4.2% subjects belonged to low risk IDRS category and 42.9% and 52.8% belonged to moderate and high risk category respectively. (Table 2)

Table 2. Distribution according to IDRS SCORE

IDRS score category	N (%)
Low risk	8(4.2)
Moderate risk	82(42.9)
High risk	101(52.8)
Total	191(100)

It was observed that the prevalence of diabetes was more in high risk category (80.9%) followed by moderate risk (14.3%) and low risk category (4.8%). The association was highly significant (p=0.01). (Table 3)

Table 3. Association of IDRS risk score and diabetes

IDRS risk	Diabetes classification		χ^2 (p value)
	Non diabetics N=170	Diabetics N=21	
Low risk	7(4.11%)	1(4.8%)	8.04 (0.01)
Moderate risk	79(46.5%)	3(14.3%)	
High risk	84(49.4%)	17(80.9%)	

In underweight category 11.9% had high risk IDRS. Out of preobese people 42.5% had high risk and among Obese class 1 category 13.9% were under high risk. Even with normal BMI 42.5% of the subjects had high risk IDRS score. (Table 4)

Table 4. Distribution of study population according to BMI and Diabetes risk

BMI	IDRS risk			χ^2 (p value)
	Low risk N=8	Moderate risk N=82	High risk N=101	
Under weight	0	7(8.5%)	12(11.9%)	7.02 (0.31)
Normal	6 (75%)	47(57.3%)	43(42.5%)	
Pre-obese	2 (25%)	21(25.6%)	32(31.7%)	
Obese class 1	0	7(8.5%)	14(13.9%)	

Total of 8 subjects were newly diagnosed in our study. Among them 7 subjects were in the high risk category and 1 was in the low risk category. The mean and standard deviation for the newly diagnosed was more (50+ 14.4) compared to non-diabetics (40.9+ 15.35). (Table 5)

Table 5. Distribution of Newly diagnosed diabetic subjects according to IDRS risk score category

IDRS SCORE	Newly diagnosed	Non Diabetics
Mean+ SD	50+ 14.4	40.9+ 15.35
Low risk	1	7
Moderate risk	0	82
High risk	7	94
Total	8	183

Discussion

In the present study, the prevalence of Diabetes in persons aged 20 years and above was 11%. A similar finding was noted in the study done by Arun A et al in urban and rural areas of Lucknow with a prevalence of 13.8% in urban area.⁽⁹⁾ As per WHO, the prevalence of Diabetes in India in 2015 was 8.7% which was less compared to our study. The high prevalence found in this study could be attributed to a sedentary lifestyle and a lack of knowledge about the disease.

In this study, Indian diabetes risk score was used for identifying high risk subjects in urban area. 52.8 % of the population had high risk score(>60), 42.9% were under moderate risk(30-50) and 4.2% were in low risk(<30). In the study done by Arun A et al. in urban area of Lucknow reported that 14.9% of the subjects were under high risk category which is much lower than the present study.⁽⁹⁾ In a similar study conducted by Brahmabhatt RK et al in urban area of south India reported 34% of the population were found in high risk category which is also lower than this study.⁽¹⁰⁾ This risk difference could be related to differences in population lifestyles, as well as an indicator that if risk factors are not altered, one is more likely to get diabetes. As a result, lifestyle and dietary changes must be implemented to counteract the risk factors in these groups.

In underweight category 11.9% had high risk IDRS. Out of preobese people 42.5% had high risk and among Obese class 1 category 13.9% were under high risk. Even with normal BMI 42.5% of the subjects had high risk IDRS score. In the study done by Gupta et al. in rural areas of Tamilnadu reported 14.6% high IDRS score in underweight category (BMI<18.50) whereas in obese category (BMI >30) 40% had high IDRS score which is less compared to the present study.⁽¹¹⁾ The IDRS high risk score among the underweight category and obese group in the Gupta et al. study is less when compared to the present study. This difference may be due to different socio-demographic profile of the subjects.

In the present study, 8 were newly diagnosed study subjects with mean and SD of 50+14.4. In contrast to the present study, the study done by Adhikari P et al in south Indian population found 45 newly diagnosed diabetes subjects.⁽¹²⁾ Hence IDRS can be useful screening tool to diagnose Diabetes early and it

could motivate people to undergo blood sugar testing.

Conclusion

The IDRS was a simple test that was used in a community-based study to identify people who were at high risk of diabetes. For identifying participants at high risk of developing diabetes, it is recommended that they use a cost-effective tool like the IDRS for routine screening. It is a useful and cost-effective method in identifying at-risk subjects and motivating people to have their blood sugar levels examined in poor nations like India, where half of diabetics are ignorant of their diabetes condition.

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