Original Article

Assessment of risk of developing diabetes mellitus using Indian diabetes risk score (IDRS) among adult population living in an urban field practice area

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Abstract

Background: The Indian Diabetes Risk Score (IDRS) is a simple and cost-effective tool for the early detection of undiagnosed cases in the community and is most suited for the Indian population to assess the risk of developing diabetes. **Aim and Objectives:** To assess the risk of Type 2 Diabetes Mellitus among the adult population living in an urban area by using the Indian Diabetes Risk Score (IDRS). To determine associated risk factors among the study population. **Materials and Methods:** A community-based cross-sectional study was done among 145 adults in an Urban field practice area under the Department of Community Medicine, Andhra, Medical College, Visakhapatnam. All males and females aged between 20 and 60 years living in the urban field practice area for the past year or more. The known diabetics and severely ill patients were excluded. Ethical permission was obtained and informed consent was taken from all the study participants. **Results:** Out of 145 study population, 66 people (45.5%) were found to be at the low-risk category, 41 people (28.3%) were in the medium-risk category and 38 people (26.2%) were at high risk based on their IDRS scores. **Conclusion:** The study showed a statistically significant relationship between factors such as gender, age, increased waist circumference, family history of diabetes mellitus, physical activity, and increased risk score.

Keywords: Adults, IDRS, urban area

Introduction

Type 2 diabetes mellitus (T2DM) is a non-communicable metabolic disorder occurring in adults due to progressive β-cell malfunction and insulin resistance.[1] The number of individuals with diabetes mellitus in India was 40.9 million by the end of 2010, and it is predicted to increase to 69.9 million individuals by 2025 and 79.4 million individuals by 2030.[2] Unfortunately, more than half of the diabetics in India remain unaware of their diabetic status, which adds to the disease burden.[3]

Indian Diabetes Risk Score (IDRS) was proposed by the Madras diabetic research foundation.[4] It is a simple and cost-effective tool for the early detection of undiagnosed cases in the community and is most suited for the Indian population. This study will help us classify the people into their respective risk groups and simplify the delivery of appropriate healthcare services at the primary healthcare level in a cost-effective manner.

The current study aims to provide a locally relevant, validated, and tailored profile of the sample community based on the unique genetic, lifestyle, and environmental factors prevalent

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in the sample population taken for healthcare professionals to efficiently assess the situation and suggest intervening strategies to the government and non-government organizations.

Aims and Objectives of the Study

- To assess the risk of Type 2 Diabetes Mellitus among the adult population living in an urban area by using the Indian Diabetes Risk Score (IDRS).
- To determine associated risk factors among the study population.

Methodology

Study type and study design

Community-based cross-sectional study

Study setting

Urban field practice area under the Department of Community Medicine

Study population

All males and females aged between 20 and 60 years living in the urban field practice area for the past one year or more.

Inclusion criteria

- All males and females of the age group 20 to 60 years.
- No known history of diabetes mellitus.
- Who gave their informed consent.

Exclusion criteria

- Known diabetics.
- Severely ill patients.
- Pregnant women.
- Unwilling participants.

Sample size

A study done by Sreeja Nittoori *et al.*,[5] found that 74.3% of the study population were at high risk by IDRS. According to this percentage, considering the allowable error of 10% at a 95% confidence interval thus the sample size is calculated by using the formula:

$N = Z^2PQ/L^2$

Where, Z = Standard normal table value, $P = 74.3\%$, Q = 100-P, and L = allowable error (10% of prevalence).

Sample size (N) = $Z\ Q/L^2$

$= [(1.96)^2 \times 74.3 \times 25.7)/(7.4 \times 7.4)] = 138$

Adding a non-response rate of 5%, N = 145 people.
Study period: 2 months.

Ethical considerations

The Ethical clearance for the study was taken from the institutional ethics committee (with IEC number: 238/IEC AMC/OCT 2023). The study was initiated only after getting permission from them, and after taking informed consent from every participant.

Method of data collection

The study has been conducted in an urban field practice area under the Department of Community Medicine. House-to-house data collection was done by using the IDRS study tool. The participants were explained about the study and informed consent was taken before administering the questionnaire. The questionnaire included the 4 parameters of IDRS score, age, waist circumference, family history of diabetes, physical activities, height and weight etc.

Study tools

The main study tool used was the Indian Diabetes Risk Score (IDRS) put forward by Mohan Deepa *et al.*,[6] from the Madras Diabetic Research Foundation. It has four study variables- two of them being modifiable factors- waist circumference and physical activity, and two of them being non-modifiable factors- age and family history of diabetes mellitus. A score is given for each of these factors and the individual's risk of developing diabetes mellitus is calculated based on the total score out of 100. If the total score is less than 30, it is classified as low risk. If the total score is between 30 and 50, it is classified as moderate risk, and if it is 60 or more, it is classified as high risk.

Statistical analysis

The data was collected and entered into a Microsoft Excel sheet and analysis was done by using Statistical Package for Social Sciences (SPSS) software, IBM Corp., Armonk, Newyork. Qualitative data was represented as percentages and quantitative data was represented as means and standard deviation. To find out the significance of the association, a Chi-square square test was done. *P* value of less than 0.05 was considered as statistically significant at a 95% confidence interval.

Observations and Results

A total of 145 study participants were included and the analysis was done. The mean age of the study population was 35.8 ± 10.75 years. Out of 145 study participants, 77 (53.1%) were males and 68 (46.9%) were females.

From Figure 1, of the total 145 study participants, 70 people (48.2%) were < 35 of years age, 54 people (37.2%) were between 35 and 49 years of age and 21 people (14.4%) were above 50 years of age.

From Figure 2, based on Indian Diabetes Risk Score (IDRS), out of 145 study population, 66 people (45.5%) were found to

be at low risk category, 41 people (28.3%) were at medium risk category and 38 people (26.2%) were at high risk based on their IDRS scores.

From Figure 3, Based on IDRS scores, out of 145 sample population, 70 people were below 35 years of age (score 0), 54 were aged from 35 to 49 years (score 20), and 21 were above 50 years of age (score 30). 50 people were with low waist circumference (score 0), 50 people were with moderate waist circumference (score 10) and 45 people were with high waist circumference (score 20). 50 people did regular vigorous exercise or strenuous manual activities (score 0), 37 people did mild exercise or physical activity regularly (score 20), and 58 people did not do any exercise (score 30). 107 people had no history of diabetes in their parents (score 0), 34 people had one diabetic parent (score 10), and in 4 people, both parents were diabetic (score 20).

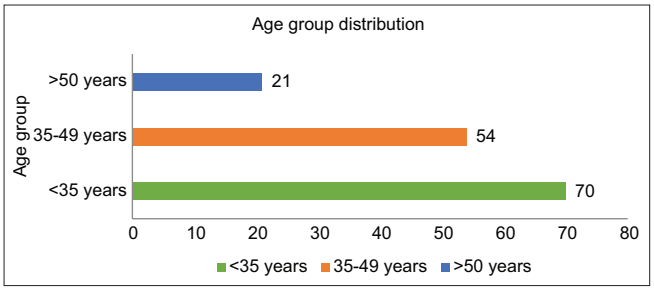

Figure 1: Distribution of study participants based on age group

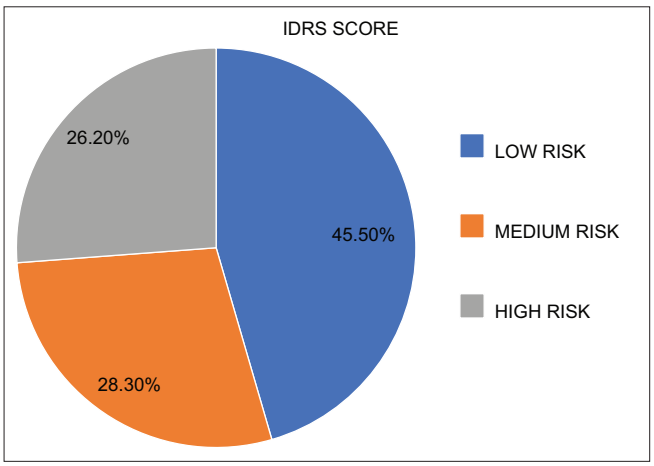

Figure 2: Distribution of study population based on their risk category

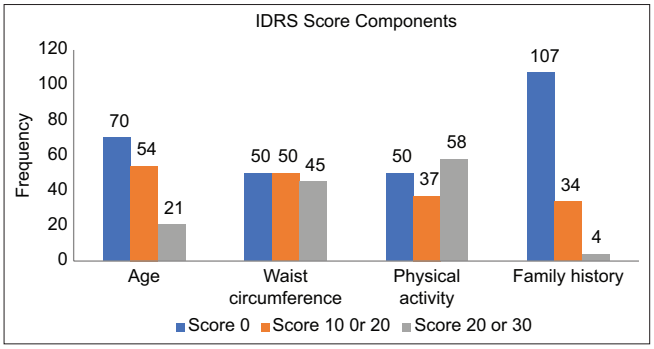

Figure 3: Distribution of the subjects according their total IDRS Scores

From Table 1, After assessing their total IDRS scores and classifying them into their respective risk categories, it was observed that out of the 70 people who were given a score of 0 (i.e. <35 years of age), 42 (60%) were the low-risk category and 28 (40%) people were in the medium risk category. It was also observed that out of the 21 people who were found to have a score of 30 (i.e ≥ 50 years age group), 13 (61.9%) were under the high-risk category and 5 (23.8%) were in medium risk, and only 3 (14.3%) were in the low-risk category. The difference observed between groups was found to be statistically significant.

From Table 2, it was found that out of 50 people who were given a score of zero (i.e. with normal waist circumference), 46 people (92%) were in the low-risk category, and 2 people (4%) were in the moderate and high-risk category each. Out of the 45 people who were given a score of 20 for their waist circumference, 28 people (62.2%) were categorized into the high-risk category 15 people (33.3%) for categorized into the medium-risk category and only 2 people (4.4%) were under the low-risk category. The difference observed between groups was found to be statistically significant.

From Table 3, out of the 50 people who were given a score of 0 (i.e, with regular strenuous work or exercise), 42 people (84%) were in the low-risk category, 8 people (16%) were in the medium-risk category, and 0 people were in the high-risk category, and out of the 58 people who were given a score of 30 (i.e, physically inactive), 27 people (46.6%) were in the high-risk category, 18 people (31%) were in the medium risk

Table 1: IDRS score vs Age

Age	Low Risk	Medium Risk	High Risk	Total
Score 0 (<35 years)	42 (60%)	28 (40%)	0 (0%)	70 (100%)
Score 20 (35-49 years)	21 (38.9%)	8 (14.8%)	25 (46.3%)	54 (100%)
Score 30 (≥ 50 years)	3 (14.3%)	5 (23.8%)	13 (61.9%)	21 (100%)
Total	66 (45.5%)	41 (28.3%)	38 (26.2%)	145 (100%)
P value		0.05		

Table 2: IDRS Score vs risk factor-waist circumference

Abdominal Obesity	Low Risk	Medium Risk	High Risk	Total
Score 0 (M: <90 F: <80)	46 (92.0%)	2 (4.0%)	2 (4.0%)	50 (100%)
Score 10 (M: 90-99 F: 80-89)	18 (36%)	24 (48%)	8 (16%)	50 (100%)
Score 20 (M: >100 F: >90)	2 (4.4%)	15 (33.3%)	28 (62.2%)	45 (100%)
Total	66 (45.5%)	41 (28.3%)	38 (26.2%)	145 (100%)
P value		0.05		

category and 13 people (22.4%) were in the low-risk category. The difference observed between groups was found to be statistically significant.

From Table 4, out of the 107 people who are given a score 0 (i.e, no family history of diabetes), a majority of the people-(54 people, 50.5%) were classified into the low risk category, and for the 4 people who were given a score of 20 (i.e., both of whose parents were diabetic), all 4 of them were found to be under the high-risk category. The difference observed between groups was found to be statistically significant.

Discussion

Out of 145 cases, the majority of them were males (53.1%). Similar study findings were found in a study done by Angeline Jeyaseeli V *et al.*,[7] in which males were 54%. The present study findings were discordant to a study done by Sarit Sharma *et al.*,[8] and Aditya Oruganti *et al.*,[9] in which the majority of the participants were female. In a study done by Sudha Bala *et al.*,[10] include only females as study participants.

In the current study, among the total of 145 study participants, the majority of them were found to be under the low-risk category 66 people (45.5%), followed by 41 people (28.3%) in the medium-risk category and 38 people (26.2%) in the high-risk category. Similar findings were seen in a study done by M Meghachandra Singh *et al.*,[11] whose study showed that 77% of study population was in the lowest category and 23% were in the moderate and high-risk categories. The present study findings were inconsistent with study done by Angeline Jeyaseeli V *et al.*,[7] who observed that 12.6% of the study population were in low risk, 73.7% were in medium risk, 13.7% were in high risk. In a study done by Sreeja Nittoori *et al.*,[5] who reported that 2.2% of study participants had low risk score, 23.5% had medium risk and 74.3% had high risk IDRS score. In a study done by Aditya Oruganti *et al.*,[9] 7% of study participants had low risk score, 63% had medium risk and 30% had high risk IDRS score. In a study done by Sudha Bala *et al.*,[12] 22% of study participants had low risk score, 40% had medium risk and 38% had high risk IDRS score and in a study done by Mohammed Mustufa Khan *et al.*,[13] 3.2% of study participants had low risk score, 29.6% had medium risk and 67.2% had high risk IDRS score. The difference observed might be because of difference in sample size of the study population, region, difference in lifestyles.

It was also observed that out of the 21 people who found to have a score of 30 (i.e ≥ 50 years age group), 13 people (61.9%) were under the high risk category and 5 (23.8%) were in medium risk and only 3 people (14.3%) were in the low risk category. The difference observed between groups was found to be statistically significant. This shows that higher age groups have high risk scores. Similar findings were observed in following studies. In a study done by Sreeja Nittoori *et al.*,[5] it was reported that 92.5% of the individuals in the age group 50 years or more were in the high risk category. In a study done by Aditya Oruganti *et al.*,[9] It was reported that 71.7% of the people in age group 51 to 60 years were found to be in high risk.

Out of the 45 people who were given a score of 20 for their waist circumference, 28 people (62.2%) categorised into the high risk category and 15 people (33.3%) for categorised into the medium risk category and only 2 people (4.4%) were under the low risk category. The current study findings were consistent with studies done by Angeline Jeyaseeli V *et al.*,[7] Sarit Sharma *et al.*,[8] Puja Dudeja *et al.*,[12] Aditya Oruganti *et al.*,[9] Mongjam Meghachandra Singh *et al.*,[11] and Sreeja Nittoori *et al.*[5]

Out of the 58 people who were given a score of 30 (i.e, physically inactive), 27 people (46.6%) were in the high risk category, 18 people (31%) were in the medium risk category and 13 people (22.4%) were in the low risk category. The current study findings were consistent with studies Aditya Oruganti *et al.*,[9] Who reported that 76.9% of the people with sedentary lifestyle were in the high risk category. Angeline Jeyaseeli V *et al.*,[7] Sarit Sharma *et al.*,[8] Puja Dudeja, *et al.*,[12] Mongjam Meghachandra Singh *et al.*,[11] and Sreeja Nittoori *et al.*[5] reported similar findings in their results.

Table 3: IDRS score vs. risk factor-Physical Activity

Physical Activity	Low Risk	Medium Risk	High Risk	Total
Score 0 (regular vigorous exercise or strenuous activities)	42 (84.0%)	8 (16%)	0 (0%)	50 (100%)
Score 20 (regular mild exercise or activities)	11 (29.7%)	15 (40.5%)	11 (29.7%)	37 (100%)
Score 30 (no exercise or sedentary activities)	13 (22.4%)	18 (31.0%)	27 (46.6%)	58 (100%)
Total	66 (45.5%)	41 (28.3%)	38 (26.2%)	145 (100%)
P value		0.05		

Table 4: IDRS score vs. risk factor-Family History of Diabetes

Family History	Low Risk	Medium Risk	High Risk	Total
Score 0 (no diabetes in parents)	54 (50.5%)	26 (24.3%)	27 (25.2%)	107 (100%)
Score 10 (one parent diabetic)	12 (35.3%)	15 (44.1%)	7 (20.6%)	34 (100%)
Score 20 (both parents diabetic)	0 (0%)	0 (0%)	4 (100%)	4 (100%)
Total	66 (45.5%)	41 (28.3%)	38 (26.2%)	145 (100%)
P value		0.05		

Conclusion

In the current study, it has been found that about 45.5% were under low risk category, followed by 28.3% of the people in medium risk category and 26.2% in a high risk category. It has been found that 61.9% of people above 50 years of age, 62.2% of people with high waist circumference, 46.6% of people with sedentary lifestyles, and 100% of people with diabetes in both their parents were in the high-risk category according to IDRS classification. The study showed a statistically significant relationship between factors such as gender, age, increased waist circumference, family history of diabetes mellitus, physical activity, and increased risk score.

Limitations

- Since this is a cross-sectional study, The study didn't allow to establish a temporal relationship between the variables, and the risk of developing diabetes.

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Conflicts of interest

There are no conflicts of interest.

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