

ORIGINAL ARTICLE

Assessment of Risk of Type 2 Diabetes using Indian Diabetes Risk Score: A Community-Based Cross-Sectional Study in Marathwada region of Maharashtra

Purushottam A Giri, Hina M Kausar

Department of Community Medicine, Indian Institute of Medical Science & Research (IIMSR) Medical College, Badnapur, Dist. Jalna, Maharashtra, India

CORRESPONDING AUTHOR

Dr. Purushottam A. Giri, Professor & Head, Dept. of Community Medicine, Indian Institute of Medical Science & Research (IIMSR) Medical College, Badnapur, Dist. Jalna, Maharashtra, India 431202
Email: drpgiri14@gmail.com

CITATION

Giri PA, Kausar HM. Assessment of Risk of Type 2 Diabetes using Indian Diabetes Risk Score: A Community-Based Cross-Sectional Study in Marathwada region of Maharashtra. Indian J Comm Health. 2024;36(3):329-334. <https://doi.org/10.47203/IJCH.2024.v36i03.002>

ARTICLE CYCLE

Received: 23/04/2024; Accepted: 20/05/2024; Published: 30/06/2024

This work is licensed under a Creative Commons Attribution 4.0 International License.

©The Author(s). 2024 Open Access

ABSTRACT

Background: Diabetes mellitus is one of the non-communicable diseases which have become a major global health problem whose prevalence is increasing worldwide and will reach to 12.2% (783 million) by 2045. The risk of diabetes escalates with increase in the number of risk factors and their duration as well. The Indian Diabetic Risk Score (IDRS) is a simple, low cost, feasible tool for mass screening programme for diabetes at the community level. The present study was carried out to assess the level of risk of developing type 2 diabetes using IDRS. **Methods:** A cross-sectional study was carried out amongst 380 participants aged 20 years and above during the period of July 2018 to June 2019 in the field practice area of Rural Health Training Centre of IIMSR Medical College in Jalna, Maharashtra. A semi-structured interview schedule consisting of socio-demographic characteristics, risk factor profile and Indian Diabetes Risk Score was used. Data was analysed by using appropriate statistical test. **Results:** In our study, 52% are moderately at risk and 2% are at high risk for developing diabetes mellitus. About 62.1% participants belonged to nuclear family, 42.6% had family history of diabetes mellitus, 76.3% carried out moderate physical activity and 50.3% were overweight / obese. Family history of diabetes, lack of physical activity and overweight / obesity were found to be potential risk factors for developing diabetes mellitus. **Conclusion:** More than half i.e. 52% of the study subjects were at risk of having diabetes, hence screening is of utmost importance so that interventions can be initiated at an early stage.

KEYWORDS

Type 2 Diabetes, Indian Diabetes Risk Score, Physical Activity, Family history

INTRODUCTION

Epidemiological transitions in India in the 21st century have led to non-communicable diseases becoming a major public health problem of growing magnitude. One of the

important diseases in this respect is diabetes mellitus, which is a major public health problem, which affects all age groups and has now been identified in youth. The Indian Diabetes Risk Score (IDRS) devised and

developed by the Madras Diabetes Research Foundation (MDRF), is a cost-effective, validated tool for the detection of undiagnosed diabetes with high risk of developing type 2 diabetes mellitus (T2DM) in future. It considers four risk factors namely age, family history, abdominal obesity and physical activity.(1)

Hence individual with high risk of developing diabetes mellitus in near future can be identified and systematic counselling and further interventions can be applied in order to reduce diabetes related complications. Numerous studies have been conducted to estimate the prevalence of diabetes mellitus among the urban population of India.(2-3) Very few data are available on the prevalence of diabetes mellitus among the rural population of India and so in Maharashtra state. Data suggest that approximately 742 million people in India (70% of Indian population) live in rural area. It certainly becomes very important to estimate the prevalence of diabetes in rural Indian population to design various strategies to tackle the battle against diabetes mellitus.(4)

Several prospective studies have shown that measures of lifestyle modification help in preventing the onset of diabetes. Early identification of the high risk individuals would help in taking appropriate intervention in the form of dietary changes and increasing physical activity, thus helping to prevent or at least delay the onset of diabetes.(5) This means that identification of at risk individuals is extremely important if we are to prevent diabetes mellitus. Hence, keeping this in mind, the present study was carried out to assess the level of risk of developing type 2 diabetes using Indian Diabetes Risk Score (IDRS) amongst adult population of Marathwada region of Maharashtra, India.

MATERIAL & METHODS

A community based cross-sectional study was carried out amongst 380 participants aged 20 years and above during the period of one year i.e. from July 2018 to June 2019 in the field practice area of Rural Health Training Centre (RHTC), Kasturwadi of IIMSR Medical College, Badnapur Dist. Jalna, Maharashtra, India.

Inclusion criteria: All adult population aged 20 years and above who apparently healthy during study period were included in the study.

Exclusion criteria: Those people who are critically, not willing to participate in the study, known case of any type of diabetes mellitus were excluded from the study.

Data collection: In the study area, individuals were interviewed using a structured questionnaire based on IDRS scoring system. Questionnaire captured data regarding socio-demographic details of the study population, family history of diabetes mellitus, Indian diabetes risk score. IDRS includes four parameters: age, waist circumference, physical activity and family history. Each parameter has assigned score ranging from 0 to 60 and accordingly the subject was graded as having, no risk, moderate risk or high risk. Waist circumference was measured. Interviewer was trained in collecting the details present in IDRS questionnaire before the data collection. Data was collected after getting written informed consent.

Sample Size: Sample size was calculated based on the previous study conducted by Gupta SK et al(4) in Pondicherry found that the prevalence of risk of diabetes mellitus using IDRS Score among adult population was 51%, with 95% confidence interval and 11% of relative precision. Calculated sample size was 379.6.

Sampling methods: Participants were recruited using Systematic random sampling. Total no. of houses in the study area- 6080
Sample size=380; Sampling Interval= Total no. of Houses/Sample size = 6080/380 =16
Every 16th house was selected for the study and from each selected house one adult was included in the study, by simple random sampling (Lottery method).

Indian diabetes risk score (IDRS) developed by Mohan et al.(1) and parameters comprising two modifiable (waist circumference & physical activity) and two non-modifiable risk factors (age & family history) for diabetes. Indian diabetes risk score (IDRS) analysis was done with the help of all these four parameters.

Age -
<35 years score = 0

35-49 years score = 20

>50 years score = 30

Waist circumference -

<80 cm for female and <90 cm for male score = 0

>80-89 cm for female and >90-99 cm male score = 10

>90 cm for female and >100 cm for male score = 20

Physical activities -

Vigorous exercise or strenuous work score = 0

Moderate exercise work/home = 10

Mild exercise work/home = 20

No exercise and sedentary work/home = 30

Family history of diabetes -

No family history = 0

Family history present either parent = 10

Family history present both parents = 20

After adding all above four parameters, if risk score is (>60 they are at high risk, in between 30 to 50 they are at moderate risk, and those <30 they are at low risk). It is helpful to identify subjects at high risk for diabetes and also raised awareness about diabetes and its risk factors.

Waist circumference(4) was measured to the nearest 0.1 cm at the midpoint between the tip of the iliac crest and the last costal margin in the back and at the umbilicus in the front, using a non-stretchable tape, at the end of normal expiration, with the subject standing erect in a relaxed position. Abdominal central obesity was considered to be present when the waist circumference was >80 cm in women and >90 cm in men.

Physical activity levels were graded based on WHO STEPS(5) definitions of sedentary, mildly, moderately or vigorously physically active.

Family history of diabetes(6) if either or both of a subject's parents had diabetes, they were considered to have a positive family history.

Weight was measured in minimal clothing with bathroom weighing scale. Height was measured with a stadiometer with person standing erect, feet parallel and bare-feet. BMI grading was done using WHO international standards.(7)

Data analysis: Data was entered and analysed in SPSS software version 17.0. Continuous data was expressed as mean, median, standard

deviation, and 95% CI was used. The categorical data was expressed as percentage and proportions whenever necessary. Chi-square test was also used and P-value <0.05 was considered to be statistically significant.

RESULTS

Table 1 shows that the socio-demographic characteristics of study population, where more than half (52.7%) of study population was having age between 35 to 50 years followed by <35 years (29.1%). Male participants were more (67.3%) as compare to females (32.7%). Maximum number of study population (65.5%) belongs to Hindu community followed by Muslim (32.9%) and only (1.6%) was Christian. With related to socio-economic status (42.7%) belongs to lower middle class followed by upper lower (29.2%). About (62.1%) study population belongs to nuclear family and (31.5%) in joint family.

Table 1: Demographic characteristics of the study population

Demographic characteristics	Number (n=380)	Percent age
Age (in years)		
<35 yrs	92	29.1
35– 50 yrs	198	52.7
>50 yrs	90	18.2
Gender		
Male	256	67.3
Female	124	32.7
Religion		
Hindu	249	65.5
Muslim	125	32.9
Christian	06	1.6
Socio-economic Status		
Upper middle	107	28.1
Lower middle	163	42.7
Upper lower	110	29.2
Type of Family		
Nuclear family	236	62.1
Joint family	120	31.5
Three generation family	24	6.4

Table 2: Distribution of study subjects according to different risk factor for diabetes

Risk factors for diabetes	Number (n=380)	Percent age
Age (in years)		
<35 yrs	92	24.2
35 – 50 yrs	198	52.1
>50 yrs	90	23.7

Risk factors for diabetes	Number (n=380)	Percentage
Family history of Diabetes		
No family history	218	57.4
Present in either parent	131	34.4
Both parents	31	8.2
Physical activity		
Vigorous exercise or strenuous work	46	12.1
Moderate exercise work/home	290	76.3
Mild exercise work/home	36	9.5
No exercise and sedentary work/home	8	2.1
Body Mass Index (BMI)		
<18.5	20	5.3
to 22.9	169	44.4
23 to 24.9	160	42.1
>25	31	8.2

As Table 2 shows that the maximum number of study population (75.8%) in the age group of >35 years, showing increasing age as a risk factor for diabetes. Regarding family history,

Table 4: Association between socio-demographic characteristics of study subjects and Indian diabetes risk score

Variables	No risk	Moderate risk	High risk	Total	Chi-square value P-value
Age (in years)					
<35 yrs	89	02	01	92	$\chi^2 = 119.1934$ d.f. = 4 P=0.00001
35-50 yrs	188	08	02	198	
>50 yrs	43	42	05	90	
Gender					
Male	79	170	07	256	$\chi^2 = 70.4589$ d.f. = 2 P=0.00001
Female	95	28	01	124	
Socio-economic status					
Upper middle	05	60	05	90	$\chi^2 = 109.7638$ d.f. = 4 P=0.00001
Lower middle	80	120	02	192	
Upper lower	89	18	01	98	
Body Mass Index (BMI)					
<18.5	20	00	00	20	$\chi^2 = 132.4705$ d.f. = 6 P=0.00001
- 22.9	116	52	01	169	
23.0 - 24.9	33	125	02	160	
>25	05	21	05	31	

It was seen from Table 4 that the association between socio-demographic characteristics of study subjects and diabetes risk score. Risk score is higher in the study population aged 50 years and above, so as age advances risk of diabetes increases and it is statistically significant as $p < 0.00001$. Males had higher risk score for diabetes than females, and it is also statistically significant as $p < 0.00001$. With relation to socio-economic status, upper

42.6% had family history of diabetes mellitus as either or both of a study subject's parents had diabetes. Related with physical activity, (76.3%) study subjects carried out moderate physical activity followed by (12.1%) does vigorous exercise or strenuous work. According to BMI, 42.1% were overweight and 8.2% were obese.

Table 3: Distribution of study subjects according to Indian diabetes risk score

Indian Diabetes Risk Score (IDRS)	No. of Subjects (n=380)	Percentage
High Risk (score is ≥ 60)	08	2.0
Moderate Risk (score between 30–50)	197	52.0
Low Risk (score is < 30)	175	46.0

As shown in Table 3 that the 52% study subjects had moderate risk as they had IDRS score in between 30-50 and 2% had IDRS score equal or more than 60, so they are at high risk for developing diabetes and 46% of study population is at low risk for diabetes.

middle class had high IDSR score, so at more risk of developing diabetes followed by lower ones, It is also statistically significant as $p < 0.00001$. As body mass index increases, risk of diabetes also increases and it is also statistically significant as $p < 0.0001$.

DISCUSSION

The IDRS is a practical tool for screening individuals for type 2 diabetes risk, especially

in resource-constrained settings. By focusing on easily obtainable information, it allows for early identification and prompt management to prevent the onset of diabetes and its complications. The study uses a simplified, validated IDRS tool to assess the risk of type 2 diabetes in a rural community of Marathwada region of Maharashtra, which helps to identify the hidden pool of diabetics and pre-diabetics. In the present study, different risk factors for diabetes was measured and assessed by IDRS score and found 2% study population were at high risk, 52% were at moderate risk and 46% were at low risk for diabetes mellitus. Similarly, a study done by Poornima MP et al (6) found that 12.2%, 51.6% and 36.3% had low, moderate and high risk for diabetes mellitus respectively.

Another study conducted by Gupta SK et al,(4) in rural Tamil Nadu showed that 18.6% had high risk, 50% had moderate risk and 31.3% had low risk for diabetes mellitus. One more study conducted by Mohan V et al.(2) at Chennai found that 43% of the population were in high risk category. Another community based cross-sectional study was conducted by Chowdhury R et al (7), among 250 undiagnosed diabetic people aged ≥ 20 years in rural area of Kolkata. The socio-demographic factors and various anthropometric measurements were considered and found that 49.2% had moderate risk; 31.5% had high risk and 22.6% had low risk. Another similar study done by Jayakiruthiga S et al (8) in urban area, found that 30(8.5%) were in low risk category, 119(33.9%) were in moderate risk, 202(57.6%) were at high risk group as per IDRS. Similar study conducted by Patil RS et al (9), the proportion of individuals at high risk for diabetes was 36.5%, 54.6% of participants with moderate risk and 8.9% of participants with low risk. A study done by Jeyaseeli VA et al (10) in rural area of south found that of the total of 12.6% were in the low-risk group, 73.7% were in the moderate-risk group and 13.7% were in the high-risk group according to the IDRS. In another study conducted by Subramani R et al(11) among a rural Tamil Nadu community, 12% of subjects were found to be at high risk of diabetes. The difference might be due to

different lifestyles prevalent in the concerned areas.

The present study found statistically significant results that risk score is higher in the study population aged 50 years and above, so as age advances risk of diabetes increases, study also found males had higher risk score than females that was also statically significant. Similarly a study done by Jayakiruthiga S et al (8) found that there was a statistically significant association of diabetes risk with age. Another study conducted by Sharma S et al (12) in a rural area of northern of India showed a significantly increasing trend with increasing age, but they found that the risk for developing diabetes was higher among females.

In our study, with related to socio-economic status, 42.8% belongs to lower middle followed by 29.2% upper lower and 28.1% in upper middle class. Similarly a study done by Jayakiruthiga S et al(8) found that the participants were belong to the socio-economic groups (upper middle 96(27.4%), lower middle 158 (45.0%), and upper lower 97(24.6%).

In the present study, obese were found at significantly higher risk of diabetes as compared to those with normal BMI. Similarly, a study done by Gupta SK et al (4) and Sharma S et al (12) observed that the risk for diabetes increased significantly with increase in BMI.

It is alarming that most of the rural population screened in our study was at moderate and high risk of developing diabetes, and this risk had significant relationship with lack of physical activity, increasing age, higher BMI, and waist circumference. These findings highlight the importance and urgent need to focus on and strengthen health promotion even in rural population along with the urban population. Due to modernization, in recent times, rural communities are also adopting more and more sedentary lifestyle, leading to increased risk of development of non-communicable diseases.

CONCLUSION

The IDRS is a valuable tool for assessing the risk of T2DM, particularly in the Indian context. Its ease of use, cost-effectiveness, and high sensitivity make it an excellent choice for large-

scale screening and early intervention. This study concluded that even in rural area, more than half of population is at moderate risk of developing diabetes mellitus. Further investigation should be done for diabetes among them and counselling of the subjects regarding diet and physical activity. As early identification of risk factors will help in prevention and control of the disease. IDRS is a simple and useful method for identifying high risk diabetic subjects in the community. In India, the use of IDRS can make mass screening for diabetes in easy and cost effective manner.

LIMITATION OF THE STUDY

Limitations of the study include that the study was conducted in a small rural community i.e. residing at rural field practice area of a single rural medical college, so the findings may not be generalizable, and being a cross-sectional study design may not provide information about the trends of the risk factors in the community.

AUTHORS CONTRIBUTION

Both authors have contributed equally.

FINANCIAL SUPPORT AND SPONSORSHIP

Nil

CONFLICT OF INTEREST

There are no conflicts of interest.

ACKNOWLEDGEMENT

We express our deep sense of gratitude to the Management, JIU Trust and Dr. Azhar A. Siddiqui, Dean, IIMSR Medical College, Badnapur, Dist. Jalna, Maharashtra for granting permission for this study. We also deeply acknowledge the help and support of all teaching faculty of Department of Community Medicine of IIMSR Medical College, Badnapur Dist. Jalna, Maharashtra during this study. Last but not the least, the authors express their sincere gratitude to all participants for sparing their valuable time to participate in this study.

DECLARATION OF GENERATIVE AI AND AI ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

The authors haven't used any generative AI/AI assisted technologies in the writing process.

REFERENCES

1. Mohan V, Deepa R, Deepa M, Somannavar S, Datta M. A simplified Indian Diabetes Score for screening for undiagnosed diabetic subjects. (CURES-24) J Assoc Physicians India 2005; 53:759-63
2. Mohan V, Mathur P, Deepa R, Deepa M, Shukla DK, Menon GR et al. Urban rural differences in prevalence of self-reported diabetes in India-The WHO-ICMR Indian NCD risk factor surveillance. Diabetes Res Clinical Practice 2008;80:159-68
3. Sadikot SM, Nigam A, Das S, Bajaj S, Zargar AH, Prasannakumar KM et al. The burden of diabetes and impaired glucose tolerance in India using the WHO 1999 criteria: Prevalence of diabetes in India study (PODIS). Diabetes Res Clin Pract.2004;66:301-07
4. Gupta SK, Singh Z, Purty AJ, Kar M, Vedapriya DR, Mahajan P, Cherian J. Diabetes Prevalence and its Risk Factors in Rural Area of Tamil Nadu. Indian J Community Med 2010;3(35):396-99
5. Vardhan A, Prabha A, Shashidhar MK, Saxena N, Gupta S, Tripa A. The Value of the Indian Diabetes Risk Score as a Tool for Reducing the Risk of Diabetes among Indian Medical Students. Journal of Clinical and Diagnostic Research 2011;5(4):718-20
6. Poornima MP, Walvekar PR, Mallapur MD et al. Assessment of susceptibility to diabetes mellitus among rural population using Indian diabetic risk score - a cross sectional study. Int J Health Sci Res. 2016; 6(2):54-58.
7. Chowdhury R, Mukherjee A, Saibendu LK. A Study on Distribution and Determinants of Indian Diabetic Risk Score (IDRS) among Rural Population of West Bengal. National Journal of Medical Research. 2012;2(3):203-08.
8. Jayakiruthiga S, Rajkamal R, Gopalakrishnan S, Umadevi R. Assessment of diabetes risk in an adult population using indian diabetic risk score in urban area of Tamil Nadu. Int J Community Med Public Health 2018;5:1587-90.
9. Patil RS, Gothankar JS. Assessment of risk of type 2 diabetes using the Indian Diabetes Risk Score in an urban slum of Pune, Maharashtra, India: a cross-sectional study. WHO South-East Asia J Public Health 2016; 5(1): 53-61.
10. Jeyaseeli VA, RG, Mathivanan D, Prabakaran P A. Assessment of the Risk of Type 2 Diabetes Mellitus among a Rural Population in South India Using the Indian Diabetic Risk Score. Cureus. 2023;15(7):e41880.
11. Subramani R, Devi U, Shankar U, Stephen, Karthik, Seshadhri, et al. Assessment of Risk of type 2 diabetes mellitus among rural population in Tamilnadu by using Indian diabetic risk score. Middle-East J Sci Res 2014;21:223-5
12. Sharma S, Bansal A, Singh SP, Chaudhary A, Satija M, Singla A, et al. Assessment of diabetes risk profile in a rural population of northern India using the Indian Diabetes Risk Score – A community based study. J Family Med Prim Care 2022;11:7077-84.