

**Screening for Prediabetes among patients by using Indian Diabetes Risk Score (IDRS)**Lakshmi Deepika P.<sup>1</sup>, Sankar K.<sup>2</sup>, Sikindar Mohan T.<sup>3</sup><sup>1</sup>Assistant Professor, Department of Pharmacology, DY Patil Medical College, Kolhapur, Maharashtra, India<sup>2</sup>Professor & Director of PG, Nimra Medical College, Ibrahimpatnam, A.P., India<sup>3</sup>Associate Professor, Department of General Medicine, Government Medical College & Hospital, Eluru, A.P., India

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**Abstract:****Background:** Prediabetes is one the leading cause as it leads of diabetes within few months to years. For developing countries like India diabetes is a major health hazard. To identify and control the diseases we can use Indian Diabetes Risk Factor (IDRS) as an important scale to screen the population for prediabetes and diabetes.**Methods:** The study was conducted in a Government Medical college and Hospital in Krishna district, Vijayawada. A total of 585 patients were screened. To estimate the risk of prediabetes & diabetes, an IDRS tool was employed, which included two modifiable (waist circumference, physical activity) and two non-modifiable risk factors (age, family history). Diabetes was confirmed using blood sugar levels from a fasting blood sample.**Results:** The data was analysed for 585 non-diabetic adults aged 25years and above. The average age was around 40.8years, with females accounting for 54.1% of the study sample and males accounting for 45.9%. According to IDRS score, the study population were classified to be low, medium and high risk for prediabetes & developing type-2 diabetes were 13%, 47% and 39% respectively.**Conclusion:** This study has described that the majority of the adult population were at medium and high risk of developing type 2 diabetes which is actually a dangerous sign for the community, needing lifestyle changes to be initiated as soon as possible to delay the occurrence of type 2 diabetes. However, as this study was conducted after the first COVID, COVID may be a contributing factor to the population's increased risk.**Keywords:** Prediabetes, undiagnosed diabetes screening tool, Risk score, IDRS.**DOI:** 10.25258/ijcpr.18.5.164This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.**Introduction**

India is a diabetic capital of world with maximum number of diabetic patients. In developed countries T2D is mainly effecting the older population while in developing countries like India young people are being affected by diabetes in the prime of their life and career posing more threat. Unfortunately, this diabetes epidemic has coincided with an increase in the prevalence of associated complications, both micro and macro vascular, which account for a significant portion of diabetes-related premature morbidity and death in India. [1]

According to estimations given in the WHO there were 171 million people in the world with diabetes in the year 2000 and this is projected to increase to 366 million by 2030. According to International Diabetes Federation (IDF), 88 million people in the Southeast Asia region have diabetes. [2] Of this 88 million, 77 million belong to India. The prevalence of diabetes in the population is 8.9%. There is a large

burden of undetected diabetic cases in India. [2] There is an increasing risk in community and slum because of illiteracy, lack of awareness, low socioeconomic status and unhealthy life style.

With rapid escalation of the diabetes epidemic, all levels of prevention (i.e., primary, secondary & tertiary diabetes prevention) need to be put into action simultaneously. So, the priority is to screen, diagnose and treat as many people with T2DM as possible. [1]

IDRS is a simple screening tool for the prediction of undiagnosed diabetes, which was developed by Dr. Mohan and colleagues at Madras Diabetes Research Foundation (MDRF), Chennai. [1] IDRS screening technique is a non-invasive approach for screening T2D risk. It assesses an individual's chance of acquiring type 2 diabetes using a thorough scoring system that includes four primary risk factors: (1) age, (2) family history, (3) waist circumference, &

(4) physical activity. Given its simplicity, IDRS is thought to be a cost-effective way to screen for prospective diabetes risk at the population level. [1,3,4,5] Subjects with an IDRS value of <30 were categorized as low risk, those between 30 and 50 as medium risk and those with ≥60 as high risk for diabetes.

Due to the well-established risk factors for type 2 diabetes, including aging, obesity, a family history of the disease, inactivity, stressful surroundings, and dietary habits, numerous associations and federations worldwide have created risk scores for the disease's development. [5]

The American Diabetes Association (ADA) Risk Tools, the Finnish Diabetes Risk Score (FINDRISC), the National Health and Nutrition Examination Survey (NHANES) risk score, the study to prevent non-insulin dependent diabetes mellitus (STOP NIDDM) Risk Score in developed countries, and the Indian Diabetes Risk Score, which was created by the Madras Diabetes Research Foundation and Ramachandran A et al. [4,5,6]

**Aim:** The aim of the study is to screen the patients for prediabetes and undiagnosed diabetes using Indian Diabetes Risk Score (IDRS).

**Methodology**

This study was carried out at a government medical college and Hospital, Vijayawada, Krishna district, Andhra Pradesh from December 2020 to August 2021 as a part of Ph.D. work on prediabetes. The screening study was conducted before starting the patient procurement for the study. All known cases of diabetes are excluded.

At total of 585 subjects were participated in the study. To screen the subjects for prediabetes or undiagnosed diabetes, an IDRS tool was employed, which included two modifiable (waist circumference, physical activity) and two non-modifiable risk factors (age, family history). Pre diabetes and type-2 diabetes was confirmed using blood sugar levels from a fasting blood sample and HbA1c. Along with the IDRS factors some basic demographical variable information was also taken from the participants like family status, education, body mass index, habits etc.,

The findings have been presented as percentages according to the IDRS risk score indicating low, medium, and high risk of acquiring diabetes. The maximum possible score is 100, while the minimal possible score is 0.

Categorized risk factors	Score
<b>Age</b>	
<35 years	0
35-49 years	20
≥50 years	30
<b>Abdominal obesity - Waist circumference</b>	
Female <80cm, Male <90cm	0
Female 80-89cm, Male 90-99cm	10
Female >90cm, Male >100cm	20
<b>Physical activity</b>	
Vigorous exercise / strenuous at work	0
Moderate exercise at work / home	10
Mild exercise at work / home	20
No exercise and sedentary at work/home	30
<b>Family history</b>	
Non-diabetic parents	0
Any one parents diabetic	10
Both parents diabetic	20
<b>Maximum score</b>	100

**Score > 60, High-risk; 30-50, Moderate risk; < 30, Low -risk**

**Result**

We analysed the data of 585 non-diabetic adults aged 25years and above. The average age was around 40.8years, with females accounting for 54.1% of the study sample and males accounting for

45.9%. An outline of the study variables is provided in Table 1.

Table-2 shows that, out of 585 subjects 35.6% have vegetarians' dietary habits and 64.4 are non-veg with 30.7 & 29.7 % of smoking and alcohol habits respectively. By observing the data we can say more

than 70% of the subjects in the study are overweight and obese by the BMI calculation.

**Table 1: Demographic variables of the study population**

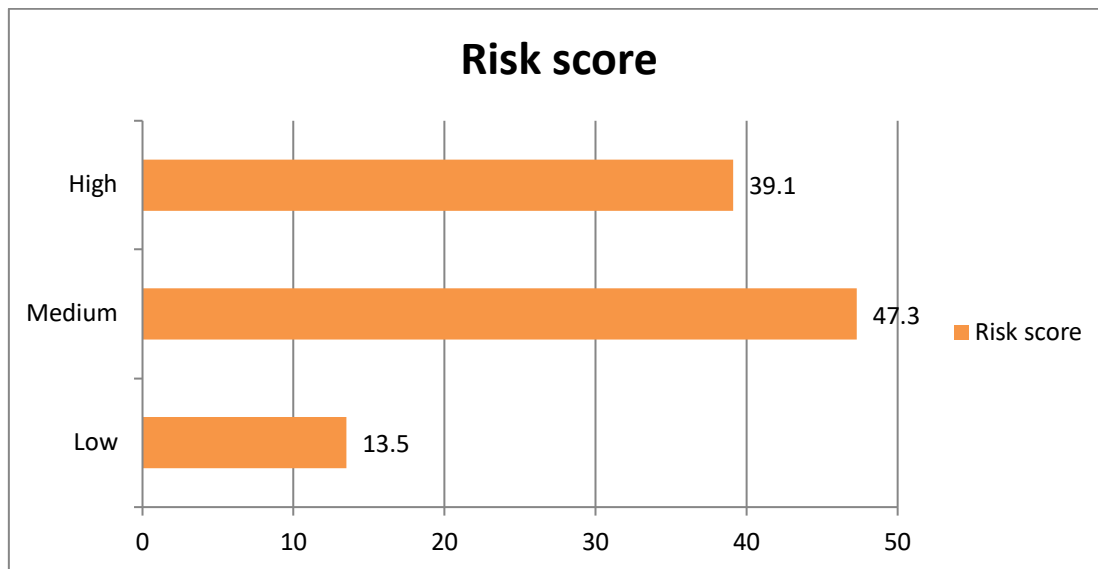
S. No.	Variables	Frequency (n=)	Percentage (%)
1.	<b>Age :</b>		
	25-35	162	27.6
	36-45	292	49.9
	46-55	103	17.6
	>55	28	0.04
2.	<b>Sex :</b>		
	Females	316	54.01
	Males	269	45.9
3.	<b>Education:</b>		
	Never attended school	46	7.86
	Up to primary school	88	15.04
	Secondary schooling	135	23.07
	Higher education	316	54.01
4.	<b>Family wealth status:</b>		
	Poor	115	19.6
	Middle class	260	44.4
	Higher middle class	185	31.6
	Above	25	4.27

**Table 2: Distribution of other variables like diet, habits, body mass index**

S. No.	Variables	Frequency (n=)	Percentage (%)
	<b>Diet:</b>		
	Veg	208	35.6
	Non-veg	377	64.4
	<b>Habits:</b>		
	Smoking	180	30.7
	Alcohol	174	29.7
	<b>Body mass index (BMI):</b>		
	Under weight	15	2.56
	Normal	96	16.4
	Over weight	286	48.9
	Obese	188	32.1

According to IDRS score, the study population were classified to be low, medium and high risk for

prediabetes & developing type-2 diabetes were 13%, 47% and 39% respectively. (Table-3 & Figure 1)



**Graph 1: diagram showing Risk of development of diabetes**

**Table 3: Risk of development of diabetes based on IDRS**

	Risk	
High	229	39.1
Medium	277	47.3
Low	79	13.5

Table-4 Shows different variables used in IDRS screening questionnaire and their scoring system. Among the study population, more than 50% were more than 36 years of age, almost >30% had high abdominal obesity by waist circumference, 35% were having sedentary habits and 33% had family

history of diabetes in both parents. According to Body Mass Index measure, the mean BMI was 25.6 among the total study population of which 286 (49%) had BMI between 25 to 29.99 and 188 (32%) had BMI above 30.

**Table 4: Scoring system of IDRS among study population**

Variable	Frequency	Percentage
<b>Age</b>		
0	162	27.6
20	344	58.8
30	79	13.5
<b>Waist</b>		
0	186	31.7
10	220	37.6
20	179	30.5
<b>Physical activity</b>		
10	92	15.7
20	284	48.5
30	209	35.7
<b>Family history</b>		
0	73	12.5
10	314	53.6
20	198	33.8

A total of 212 cases of prediabetes & previously undiagnosed diabetes were confirmed out of which 166 (28.3) had IDRS of more than 60 and <2% scored low (less than 30). There was a significant association between occurrence of high score (>60) and presence of diabetes. Significant association between risk factors for diabetes like age, family history, waist circumference, waist hip ratio and occurrence of diabetes was found by the data.

### Discussion

IDRS is simple to perform, and its precision allows us to screen for diabetes in a larger population. It does not require any medical or paramedical personnel to collect the data. It is simple to perform because it only requires the collection of data such as age, family history, physical activity, and waist circumference measurement. Screening and early identification of high-risk individuals would aid in the implementation of relevant interventions, such as lifestyle modification. It could help prevent or delay the onset of diabetes mellitus.

Diabetes screening questionnaires vary by ethnicity, despite being created by numerous societies worldwide. Almost every screening questionnaire includes risk factors such as age and weight. This IDRS is unique in that it considers family history,

physical activity, and waist circumference as indicators of abdominal obesity. This is critical in identifying the role of acquiring diabetes because the Indian population is prone to type-2 diabetes. So, using waist circumference in the screening makes it a better tool for assessing prediabetes and type 2 diabetes, whereas the Finnish group diabetes risk score includes both BMI and waist circumference.

Compared to other risk factor scoring systems or prediction tools Ramchandran [4], Finnish questionnaire [8], American Diabetes Association (ADA) Risk Tools, National Health and Nutrition Examination Survey (NHANES) Risk Score, and Study to Prevent Non-Insulin Dependents Diabetes Mellitus (STOP-NIDDM) [9] Mohan et al.'s IDRS, requires only a single waist measurement and three easy questions, has good sensitivity and specificity for assessing diabetic risk in Indian population. It is the most effective method for predicting and screening undiagnosed diabetes in a particular group. Our study found that IDRS scores of 60 or higher have the highest sensitivity and specificity.

### Conclusion

IDRS is a useful technique for identifying undiagnosed diabetes and prediabetes in the general population. The majority of adults were found to be

at medium to high risk of acquiring prediabetes and diabetes, which is concerning for the community. However, as this study was conducted after the first COVID, COVID may be a contributing factor to the population's increased risk. Indicating the lifestyle changes should be implemented as soon as feasible to delay the onset of diabetes.

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**Conflict of interest:** None declared.

**Ethical approval:** The study was approved by the IECs.

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