



## Risk Assessment Of Type 2 Diabetes Mellitus Using Indian Diabetes Risk Score (Idrs) – A Community Based Cross Sectional Study

<sup>1</sup>Sheril Raju, <sup>2</sup>Aiswarya Madhu, <sup>3</sup>Shani S, <sup>4</sup>Noel Saji, <sup>5</sup>Dr. Jiji Alfred, <sup>6</sup>Mrs. Nisha Pothen

<sup>5,6</sup>Assistant Professor,

<sup>1,2,3,4</sup> Sixth year Pharm D, <sup>5</sup>Department of Pharmacy Practice, <sup>6</sup>Department of Pharmacology  
Nazareth College of Pharmacy, Othara P.O, Thiruvalla, Kerala, India

**\*Corresponding Author:**

**Sheril Raju**

Sixth year Pharm D, Department Of Pharmacy Practice, Nazareth College Of Pharmacy, Othara P.O Thiruvalla, Kerala, India

Type of Publication: Original Research Paper

Conflicts of Interest: Nil

### Abstract

The prevalence of type 2 diabetes mellitus (T2DM) has expanded above the proposed value in India because the Indian population is particularly susceptible to the disease because of its genotype and changing lifestyle. The primary objective of the study was to assess the risk of type 2 diabetes mellitus in study subjects using the Indian Diabetes Risk Score (IDRS). Our study was a cross sectional study done on 329 individuals aged above 18 years and the study was carried out in Eraviperoor Gramapanchayath and Thiruvalla Municipality from Pathanamthitta district. Age, waist circumference, details of physical activities and family history of diabetes were recorded by providing a semi-structured questionnaire to each subject. Based on this, the risk was classified as high ( $\geq 60$ ), medium (30-50) and low ( $< 30$ ). Out of 329 subjects, 155 had a high risk of developing type 2 diabetes mellitus which is clearly a dangerous sign for the community, needing lifestyle changes to be initiated as soon as possible to delay the onset of type 2 diabetes mellitus. Counseling was given to the subjects to increase the knowledge of type 2 diabetes mellitus and the subjects who were at high risk are referred to check their blood sugar level. Our study concludes that age, central obesity and physical activity were found to be significantly related to the risk of diabetes.

**Keywords:** Indian Diabetes Risk Score, waist circumference, physical activity, family history

### Introduction

Diabetes mellitus (DM) is a group of metabolic disorders characterized by chronic hyperglycemia with disturbances of carbohydrate, protein and lipid metabolism due to impaired insulin secretion, insulin action or both. Awareness of the risk of developing diabetes is a primary preventive measure among the high-risk population. A study by the American Diabetes Association reports that India will see the greatest increase in people diagnosed with diabetes by 2030 <sup>(1)</sup>. The high incidence is attributed to a combination of genetic susceptibility plus adoption of a high calorie, sedentary lifestyle. A majority of our population is at high risk of developing Diabetes

Mellitus and is not aware of it until complications arise. Early Identification of Type 2 Diabetes Risk through Periodic Screening and adequate behavior change communication would be effective in controlling the diabetes crisis. IDRS is an effective tool to screen high risk individual in order to design strategies for future prevention and delay type 2 diabetes mellitus onset.<sup>(2,3)</sup>

### Indian Diabetes Risk Score

As the prevalence of type 2 diabetes mellitus increases the burden on individuals and the health care system also increases. The use of diabetes risk assessment tools could identify those at high risk,

leading to the early detection and prevention of diabetes <sup>(3)</sup>. The Indian Diabetes Risk Score is a simple scoring system for the quantification the risk of diabetes in the Indian population developed by Mohan et al’s group at the Madras Diabetes Research Foundation (MDRF) from their large population based study on diabetes ‘Chennai Urban Rural

Epidemiology Study(CURES).This risk score is based on four parameters using known risk factors for diabetes, two of which are modifiable and two non-modifiable risk factors. Waist circumference and physical inactivity are the modifiable risk factors, and age and family history of diabetes mellitus are the non modifiable risk factors.<sup>(4)</sup>

**Table 1: Indian Diabetes Risk Score (Idrs)**

PARAMETERS	CRITERIA	SCORE
AGE	Less than 35 years	0
	35-49 years	20
	Greater than or equal to 50 years	30
WAIST CIRCUMFERENCE	<80 cm(female), <90 cm(male)	0
	≥80-89cm(female),≥90-99cm (female)	10
	≥90cm(female),≥100cm (males)	20
PHYSICAL ACTIVITY	Regular vigorous exercise or strenuous activities at home/work	0
	Regular moderate exercise or moderate physical activity at home /work	10
	Regular mild exercise or mild physical activity at home/work	20
	No exercise and /or sedentary activities at home/work	30
FAMILY HISTORY	One parent is diabetic	10
	Both parents are diabetic	20

Subjects with an IDRS of less than 30 was categorized as low risk, 30-50 as medium risk and those with score greater than or equal to 60 as high risk for diabetes.

**Table 2 - Risk Category Based On Idrs**

IDRS SCORE	RISK CATEGORY
Less than 30	Low risk
30-50	Medium risk
Greater than or equal to 60	High risk

The IDRS considers waist circumference measurement an indicator of abdominal obesity. Waist circumference provides a unique indicator of body fat distribution and exhibits more ability in predicting abnormal fasting blood glucose as compared with BMI. Diabetes is linked to obesity in particular abdominal obesity. So instead of BMI, the use of waist circumference in the screening makes IDRS a better tool for assessing type 2 diabetes mellitus.<sup>(5)</sup>

Advantages of IDRS include non-invasive, cost effective, simple and easy applicability by the target population. IDRS can be considered as a strong and appropriate tool to screen and confirm the hidden cases of undiagnosed diabetes and for increasing awareness of the modifiable risk factors and healthy lifestyle.<sup>(6)</sup> Filling in the IDRS may encourage a person who gets a high value to have blood glucose measured and helps in early implementation of preventive measures, reducing economic costs and morbidity associated with diabetic complications. It is user friendly, simple, fast, economical, accurate and effective tool. It is easy to administer. It can be used by community health workers after a short training. When compared with other tools IDRS consist of simple parameters, only single waist circumference and three simple questions. So we can consider it as one of the best diabetic score with high specificity and sensitivity.<sup>(7,8)</sup>

## Materials And Methods

**Aim:** The aim of the study is to assess the risk of undiagnosed diabetes mellitus in study subjects using IDRS

### Objectives

- To assess the risk of undiagnosed cases of type 2 diabetes mellitus using IDRS.
- To categorize the study subjects into low risk, medium risk and high risk.

**Design of the study:** A community based cross-sectional study.

**Duration of the study:** Six months after approval of Institutional Review Board.

**Location of the study:** The study was carried out in Eraviperoor Gramapanchayath and Thiruvalla Municipality from Pathanamthitta District.

**Sample size:** The sample size was calculated and was found to be 329 non diabetic subjects.

### Criteria for eligibility

#### Inclusion criteria

1. Age above 18 who are willing to participate in the study.
2. Those who are not diagnosed with diabetes.

#### Exclusion criteria

1. Those who are unwilling to participate in the study.
2. Pregnant women and lactating mothers.
3. Age below 18 years.

### Brief procedure of the study

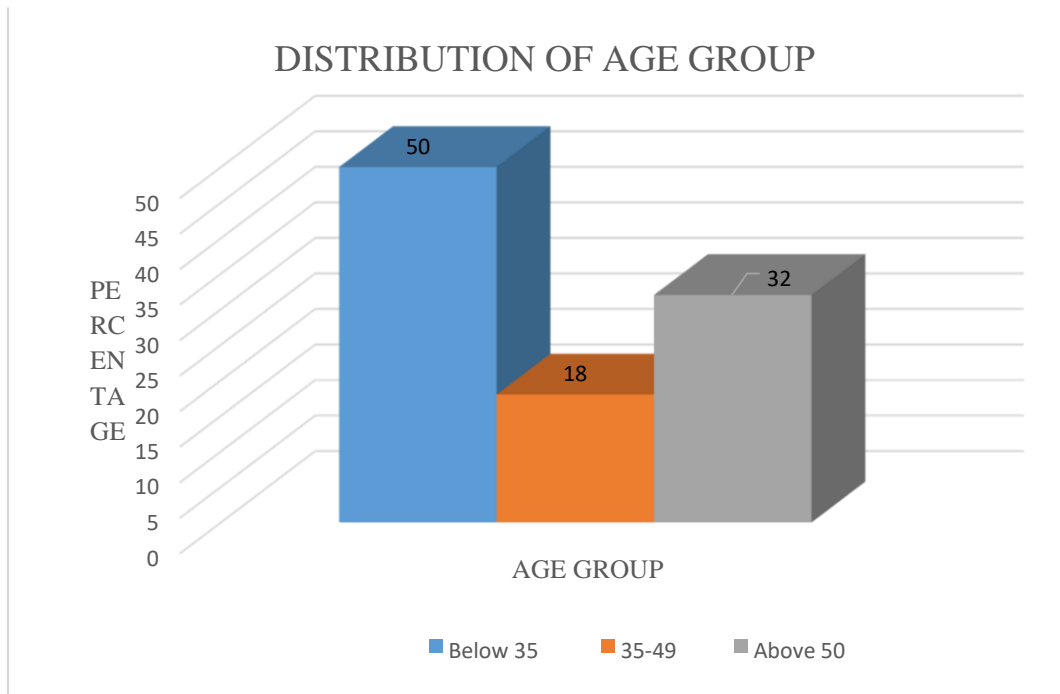
Participants who are willing to participate and who have given informed consent were taken into study and were asked to fill a semi structured questionnaire to determine their risk of developing type 2 diabetes mellitus and their awareness regarding diabetes mellitus was also assessed. Questionnaires were filled and data were collected. Two modifiable (waist circumference & physical activity) and two non modifiable risk factors (age, family and history) were used to obtain the score. IDRS of the study subjects was calculated and data was analyzed. Subjects with IDRS <30 were graded as low risk, 30-50 as moderate risk and  $\geq 60$  as high risk. Later counseling was given and leaflet was also provided to the subjects to raise awareness about diabetes.

**Results And Discussions:**

**Table 3: Distribution of age group**

SL.NO:	AGE GROUP	NO.OF SUBJECTS	PERCENTAGE
1	Below35	163	50
2	35-49	60	18
3	50 and above	106	32
	Total	329	100

**Figure 1: Distribution of age group**



The above graph illustrates the total population of 329 people was divided into three categories based on their age, the age group below 35 having the most respondents.

**Table 4: Distribution of waist circumference in male and female**

SL.NO:	CATEGORY	WAIST CIRCUMFERENCE	NO.OF SUBJECTS	PERCENTAGE
1	Male	Less than90cm	17	11
		90-99cm	74	47
		More than 100cm	65	42

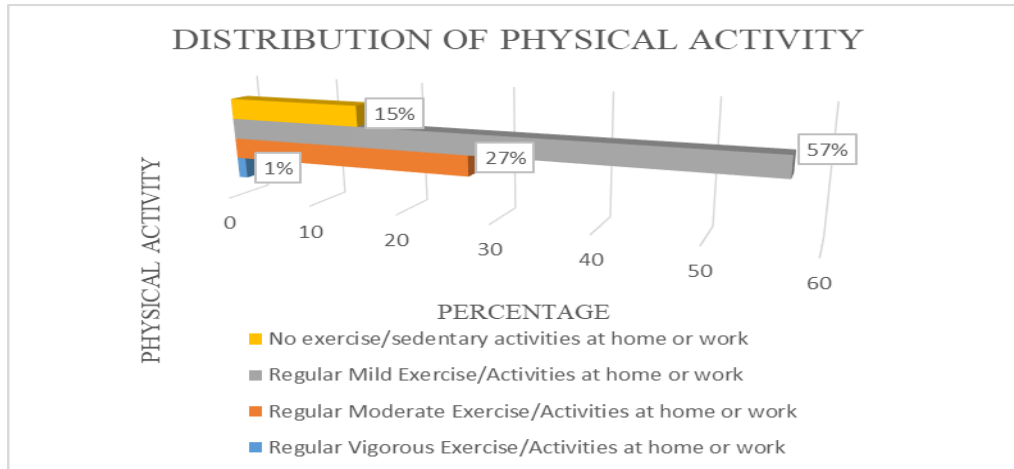
2	Female	Less than 80cm	50	29
		80-89cm	86	50
		More than 90cm	37	21

The above table shows the distribution of waist circumference in males and females. In males, the waist circumference is divided into 3 groups: less than 90 cm, 90-99 cm and more than 100cm. In females, it is divided into 3 groups: less than 80 cm, 80-89 cm and more than 90 cm. In this study, 11% of males had waist circumference less than 90 cm, 47% of males had waist circumference between 90-99cm and 42% of males had waist circumference of more than 90cm. In females, 29% of subjects had waist circumference less than 80cm, 50% of subjects had waist circumference between 80-89cm and 21% of subjects had waist circumference more than 90cm.

**Table 5: Distribution of physical activity**

SL.NO:	PHYSICAL ACTIVITY	NO.OF SUBJECTS	PERCENTAGE
1	Regular Vigorous Exercise/Activities at home or work	4	1
2	Regular Moderate Exercise/Activities at home or work	88	27
3	Regular Mild Exercise/Activities at home or work	188	57
4	No exercise/sedentary activities at home or work	49	15
	Total	329	100

**Figure 2: Distribution of physical activity**

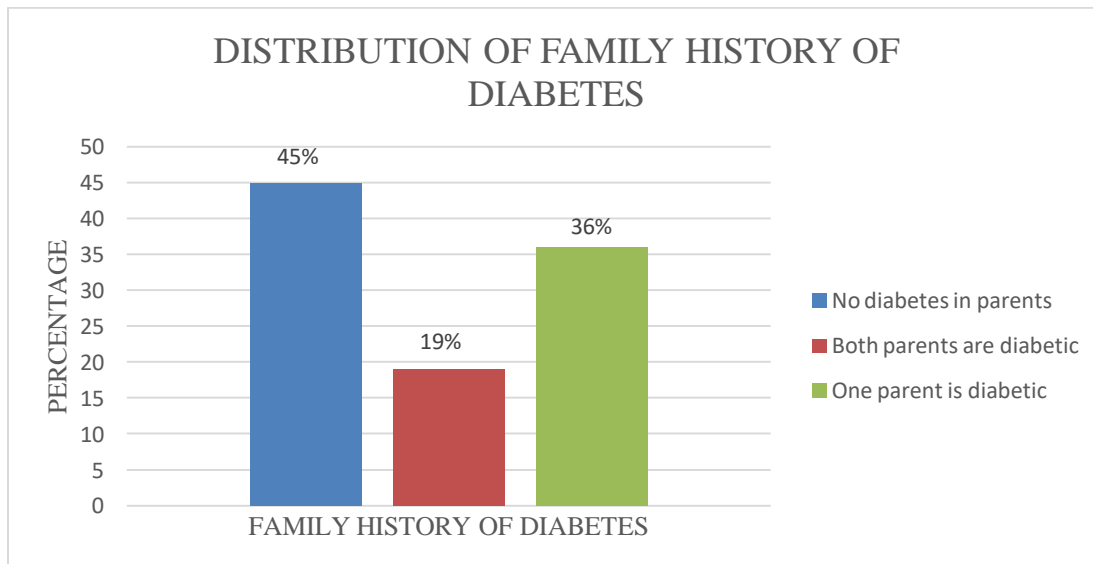


This graph illustrates that out of total study population of 329, 1% of them had regular vigorous exercise/ activities at home or work, 27% of them had moderate regular exercise/activities at home or work, 57% of them had regular mild exercise / activities at home or work and 15% of them had no exercise/ sedentary activities at home or work

**Table 6: Distribution of family history of diabetes**

SL.NO:	FAMILY HISTORY	NO.OF SUBJECTS	PERCENTAGE
1	No diabetes in parents	149	45
2	Both parents are diabetic	63	19
3	One parent is diabetic	117	36
	Total	329	100

**Figure 3: Distribution of family history of diabetes**



The above graph illustrates the distribution of family history of type 2 diabetes. Out of 329 total population, the parents of 45% of subjects had no diabetes, both the parents of 19% of subjects had diabetes and 36% of them had one diabetic parent.

**Table 7: Distribution of IDRS score in total study population**

SL.NO:	RISK	SCORE	NO.OF SUBJECTS	PERCENTAGE
1.	Low Risk	Less than 30	59	18
2.	Medium Risk	30-50	115	35
3.	High Risk	Greater than or equal to 60	155	47
	Total		329	100

The Indian Diabetes Risk Score (IDRS) classifies the population into 3 groups: low risk, medium risk and high risk. According to IDRS, persons with a score of less than 30 are considered low risk, those with a score of 30-50 are considered medium risk, and those with a score of greater than or equal to 60 are considered high risk. In the entire population, 18% of participants had a low risk of acquiring type 2 diabetes, 35% had a medium risk, and 47% (155) had a high risk of developing type 2 diabetes.

**Conclusion**

This study was mainly focused on the effectiveness of the IDRS to identify individuals with high risk for developing type 2 diabetes mellitus. The main strategies adopted were assessing the subject’s awareness about type 2 diabetes mellitus with the help of a questionnaire, followed by patient counseling. It includes basic information about diabetes, it’s symptoms, complications and prevention measures. By using IDRS, the subjects are classified into 3 categories which include low risk(<30), moderate risk(30-50) and high risk(≥60) for developing type 2 diabetes. Out of 329 subjects, 155 had high risk for developing Type 2 Diabetes Mellitus which indicates the need for initiating life style changes as soon as possible to delay the occurrence of type 2 diabetes mellitus. Exercise and lifestyle modifications should be instituted at the earliest to prevent or delay the onset of diabetes mellitus and its complications in later. IDRS is also prognostic for metabolic syndrome and cardiovascular disease as 3 of the factors (age, physical activity and waist circumference) are risk

factors for both metabolic syndrome and cardiovascular disease.

**References**

1. American Diabetes Association. Screening for diabetes. Diabetes care. 2002 Jan 1;25(suppl 1):s21-4
2. Nagalingam S, Sundaramoorthy K, Arumugam B. Screening for diabetes using Indian diabetes risk score. International Journal of Advances in Medicine.2016;3:415-8.
3. Sowmiya KR, Balaji SM, Arumugam B, Mohanan S. Indian Diabetic Risk Score-a screening tool for detecting type 2 diabetes mellitus at the primary health care level .Natl J Res Community Med.2017;6(01):69-72.
4. Bala S, Pandve H, Kamala K, Dhanalakshmi A, Sarikonda H. Performance of Indian diabetic risk score as a screening tool of diabetes among women of industrial urban area. Journal of family medicineandprimarycare.2019Nov;8(11):356 9.
5. Ahmed A. Indian Diabetic Risk Score(IDRS), a screening tool for detecting undiagnosed diabetes. BMR Medicine.2015;2.
6. Saleem SM, Raina AF, Khan SM, Jan SS. Indian Diabetic Risk Score-A Tool For Predicting Risk Of Undiagnosed Type 2 Diabetes Mellitus. International Journal of Current Research and Review Vol. 2017Feb 10;9(3):39.

6. Gopalakrishnan S Rama R, Muthulakshmi M. Assessing the risk of developing Type 2 diabetes mellitus among medical students in Chennai using Indian diabetes risk score. *Int J community Med Public Health*. 2017;4:2366-72.
7. Dharmakari V, Jha PK, Manisha D. Screening for Undiagnosed Diabetic Subjects Using a Simplified Indian Diabetic Risk Score in Warangal District of Telangana State. *Annals of Community Health*. 2021 Jul 1;9(2):302-6.