



## A Cross Sectional Study To Assess The Performance Of Idrs As A Screening Tool For Undiagnosed Cases Of Type 2 Diabetes Mellitus

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### Abstract

Diabetes mellitus is a chronic condition which is one of the most common of all endocrine disorders; characterized by hyperglycemia and impaired insulin secretion with or without insulin resistance. Prevalence of Type 2 Diabetes has escalated above the proposed value in India as Indian population is especially susceptible to the disease due to its genotype and uncertain lifestyle. In this study, we aim to assess the performance of IDRS (Indian Diabetic Risk Score) as a screening tool for undiagnosed cases of Type 2 Diabetes mellitus. A cross-sectional study was done on 329 participants aged above 18 years. Among the 329 subjects, 155 had high risk for developing Type 2 Diabetes Mellitus 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 mellitus. The study was carried out in southern part of Pathanamthitta district, Kerala. The study concludes that age, central obesity and physical activity were found to be significantly associated with risk of diabetes. Early detection of risk of Type 2 Diabetes mellitus by periodic screening and convenient behavioral changes, communication would be effective in controlling the diabetes crisis. IDRS is an effective tool to evaluate high risk in individuals in-order to design strategies for future prevention and delay of Type 2 Diabetes mellitus onset.

**Keywords:** Indian Diabetes Risk Score (IDRS), Type 2 diabetes mellitus, Prevalence, Age, Waist circumference, Physical activity, Family history

### Introduction

Diabetes is characterized by elevated levels of blood sugar (or glucose) is a chronic metabolic disease which can overtime leads to serious damage to the heart, eyes, blood vessels, nerves and kidneys. Diabetes is chiefly classified into three types: Type 1 Diabetes, Type 2 Diabetes and Gestational Diabetes. The most common symptoms of diabetes mellitus are increased thirst, frequent urination increased appetite etc. If left untreated, diabetes can lead to severe complications. Diabetes has been associated with an increase in complications such as heart disease and stroke. Acute complications include

hyper osmolar hyperglycemic state, diabetic ketoacidosis etc. Chronic complications include foot ulcers, diabetic neuropathy, diabetic nephropathy, cognitive impairment, cardio vascular disease, chronic kidney disease etc.<sup>(1,2)</sup>

Diabetes Mellitus occurs worldwide, but is commonly seen in more developed countries. Prevalence is more expeditious in depressed and middle income countries than in developed countries. The hike in incidence in developing countries is due to lifestyle adjustment and urbanization, including less palpably demanding functional condition, inactive lifestyle and urbanization, consumption of

foods that are high energy dense but deficient in nutrients (often high saturated fats and sugars, that can occasionally referred to as diet plans of Western pattern). Risk of developing Type 2 Diabetes has been widely found to be correlated with depressed socio-economic conditions. According to WHO 5.7 % is the prevalence of Diabetes Mellitus all over the globe, with a small difference in women (5.9%) and men (5.5%).<sup>(2,3)</sup>

Indian Diabetic Risk Score (IDRS) can be utilized as a sophisticated assessment tool which could analyze individuals at high risk edging to the initial detection and prevention of diabetes. IDRS is a transparent, economical and user-friendly scoring structure for the appraisal of diabetes risk in Indian population designed and developed by Mohan *et al.*'s group at the Madras Diabetes Research Foundation (MDRF). This risk analyzing score is based upon four simple parameters using known risk factors which are modifiable and two are non-modifiable which are waist circumference, physical activity and age and family history respectively. This study was conducted to assess the performance of IDRS as a screening tool

for undiagnosed cases of Type 2 Diabetes in rural area.<sup>(4,5)</sup>

**Methodology**

A community based cross-sectional study was carried out to assess the performance of IDRS as a screening tool for undiagnosed Type 2 Diabetes mellitus. The study was carried out in southern part of Pathanamthitta district, Kerala. This study was carried out for a duration of six months (January 2021- June 2021). The estimated sample size was 329 and it was calculated using the formula  $N = 4PQ / L^2$ . The study was on individuals aged above 18 years in Eraviperoor Grama-panchayat and Thiruvalla Municipality. Data from 329 were collected using a structured predesigned questionnaire. The participants who are willing to participate were asked to fill a prepared questionnaire to determine the performance of IDRS as a screening tool for undiagnosed cases of Type 2 Diabetes mellitus. The data were entered in MS- EXCEL 2013 version statistical analysis was done, and the results were obtained.

**Results:**

**Table 1: distribution of age group**

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

The above table reveals that the total population of 329 was divided into 3 groups based on their age, out of which the maximum respondents were from the age group below 35.

**Table 2: distribution of gender**

SL.NO:	GENDER	NO. OF SUBJECTS	PERCENTAGE
1	Male	156	47
2	Female	173	53
	Total	329	100

The above table illustrates that the total population of 329 was divided into 2 groups based on their gender. Out of this, 47% were males and 53% were females.

**Table 3: distribution of waist circumference in male and female**

SL.NO:	CATEGORY	WAIST CIRCUMFERENCE	NO.OF SUBJECTS	PERCENTAGE
1	Male	Less than 90 cm	17	11
		90-99 cm	74	47
		More than 100 cm	65	42
2	Female	Less than 80 cm	50	29
		80-89 cm	86	50
		More than 90 cm	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 100 cm. 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 90 cm. In females, 29% of subjects had waist circumference less than 80 cm, 50% of subjects had waist circumference between 80-89 cm and 21% of subjects had waist circumference more than 90 cm.

**Table 4: 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

This table 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 5: 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

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 6: distribution of idrs score**

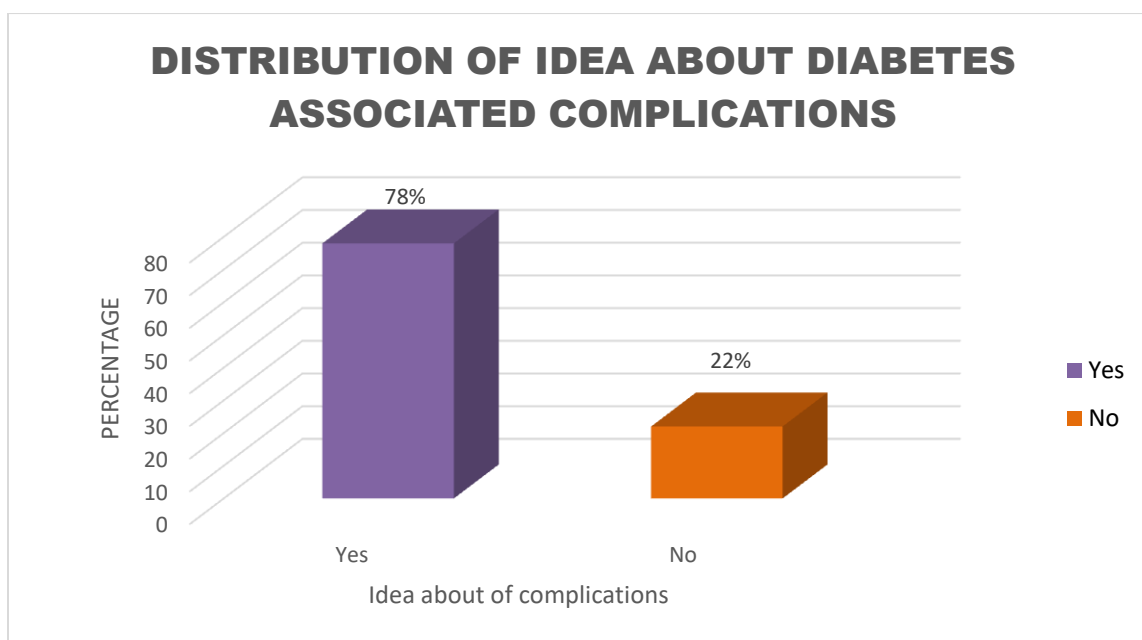
SL.NO:	RISK	SCORE	NO. OF SUBJECTS	PERCENTAGE
1	Low Risk	Less than 30	59	18
2	Medium Risk	30-50	115	35
3	High Risk	Greater than or equal to 60	155	47
	Total		329	100

The total population is divided into 3 groups based on the Indian Diabetes Risk Score (IDRS) as low risk, medium risk and high risk. According to IDRS, subjects with score less than 30 falls under the low risk category, subjects with score between 30-50 falls under the medium risk and subjects with score greater than or equal to 60 falls under the high risk category. Out of the total population, 18% of subjects had low risk for developing type 2 diabetes, 35% of subjects had medium risk and 47% had high risk for developing type 2 DM.

**Table 7: distribution of idea about diabetes associated complications**

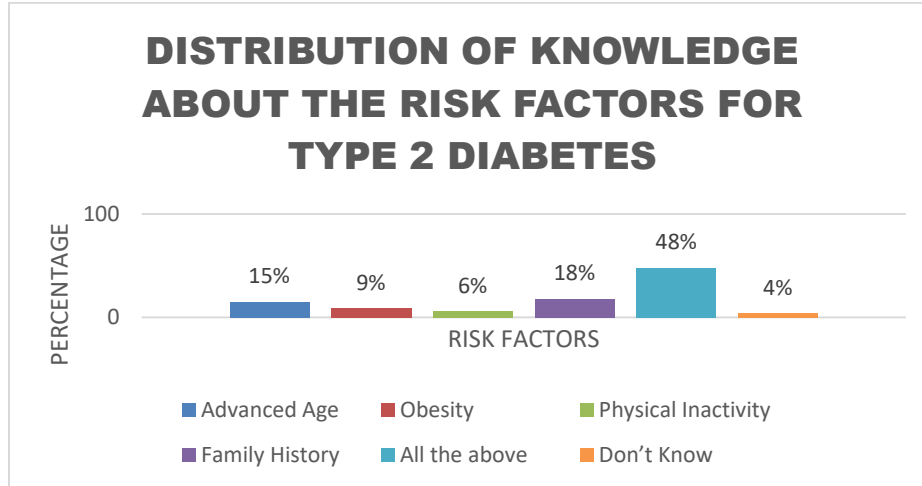
SL.NO:	RESPONSE	FREQUENCY	PERCENTAGE
1	Yes	256	78
2	No	73	22
	Total	329	100

**Figure 1: distribution of idea about diabetes associated complications**



The above graph illustrates that among 329 subjects, about 78% had positive response regarding the diabetes associated complications and 22% of subjects had negative response regarding the same.

**Figure 2: distribution of knowledge about the risk factors for type 2 diabetes**

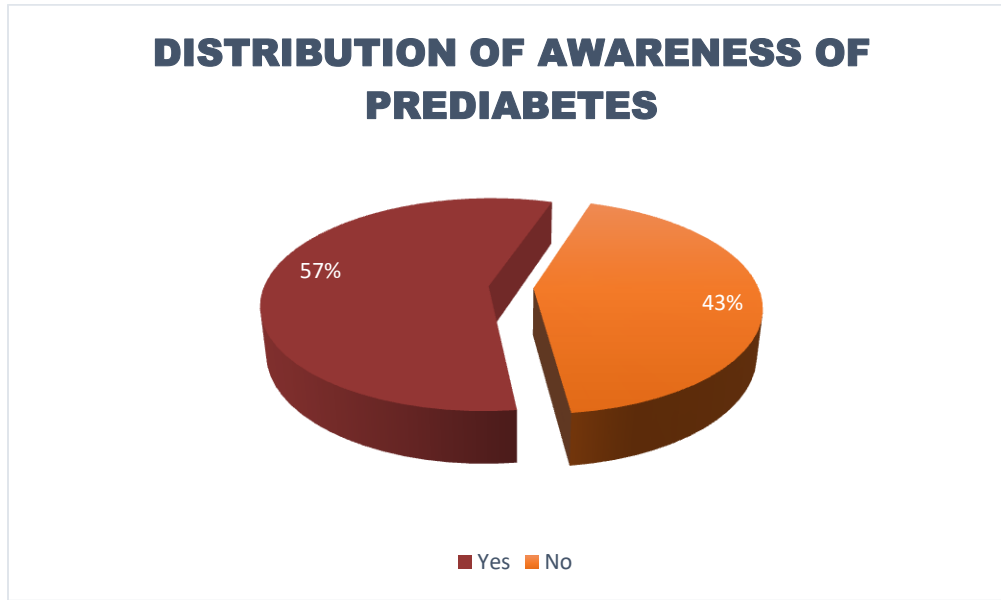


The above graph illustrates the distribution of knowledge about the risk factors of type 2 diabetes mellitus. Out of the total population, 15% of subjects chose advanced age as the risk factor, 9% chose obesity, 6% chose physical inactivity, 18% chose family history, 48% of subjects chose all the above mentioned risk factors and 4% of them were unaware about the any risk factors

**Table 9: distribution of awareness of prediabetes**

SL.NO:	RESPONSE	FREQUENCY	PERCENTAGE
1	Yes	189	57
2	No	140	43
	Total	329	100

**Figure 3: distribution of awareness of prediabetes**



The above figure demonstrates the total study population were divided into 2 groups based on their knowledge about prediabetes. 57% of subjects had positive response regarding the knowledge of pre diabetes and 43% of subjects had negative response regarding it.

**Table 10: distribution of awarness about ways to prevent type 2 diabetes**

SL.NO:	RESPONSE	FREQUENCY	PERCENTAGE
1	Regular Exercise	14	4
2	Balanced healthy diet	27	8
3	Reduce intake of sugary foods and drinks	79	22
4	All the above	223	63
5	Don't Know	10	3
	Total	353	100

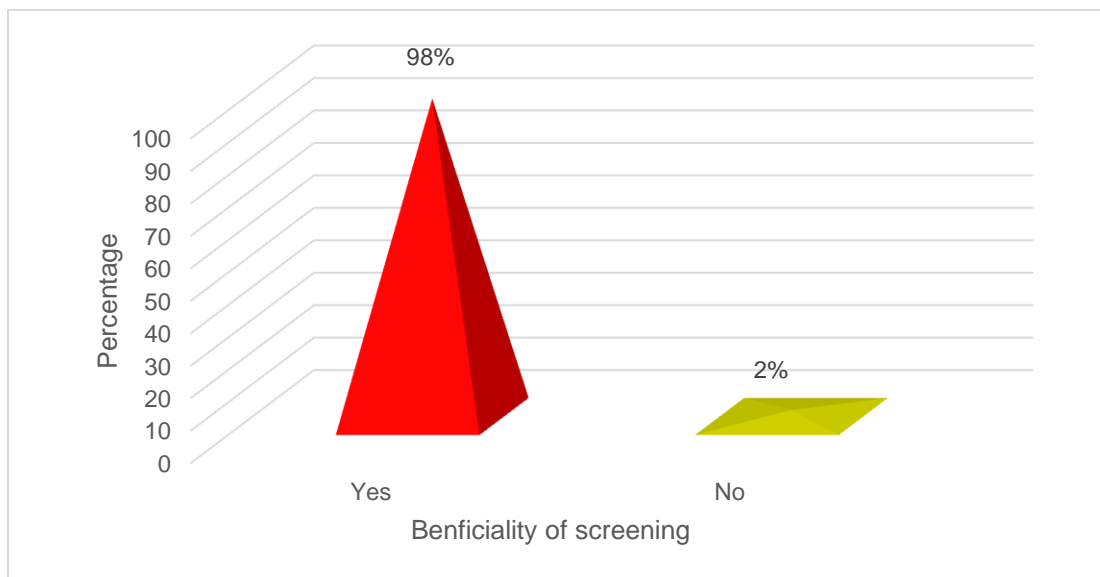
The above table demonstrates that out of the total population, 4% of subjects chose regular exercise as the way to prevent type 2 diabetes, 8% chose balanced healthy diet as the way, 22% chose reduced intake of sugary foods and drinks, 63% of subjects chose all the above methods and 3% of them were unaware about the ways to prevent type 2 diabetes.

**Table 11: distribution of response to beneficiality of screening**

SL.NO:	RESPONSE	FREQUENCY	PERCENTAGE

1	Yes	325	98
2	No	4	2
	Total	329	100

**Figure 4: distribution of response to beneficiality of screening**



The above graph demonstrates the distribution of response to beneficiality of screening by the subjects. Out of 329 population, 98% responded that the screening was beneficial for them and 2% responded that the screening was not beneficial for them.

**Discussion**

The surging burden of Type 2 Diabetes is a dominant concern in healthcare worldwide. Type 2 Diabetes is perceived as a serious public health concern with an extensive impact on health expenditure and human life. The hasty economic development and urbanization have led to increased burden of diabetes across the world. Diabetes alter individual function, capabilities and quality of life leading to eloquent morbidity and untimely mortality. Majority of the respondents were from the age group below 35. The proportion of female and males were 53% and 47% respectively. The prevalence of overweight and

obesity increases with increasing diabetes risk and found higher prevalence of overweight and obesity at moderate to high risk for diabetes. The study corroborates that reduced physical activity increases the risk of Type 2 diabetes. Individuals with no physical activity had significantly high prevalence of diabetes as compared to mild or moderate physical activity. Majority of the study subjects were at high risk of having diabetes, hence screening is of utmost importance so that interventions can be initiated at an early stage. Patients with a family history of diabetes were 5 times more likely to have awareness on diabetes complications than their counterparts.



Knowledge is an important factor in the prevention of progression from prediabetes to diabetes. Prevention of diabetes is very important because Type 2 diabetes is a severe and chronic health condition that can lead to various serious health issues such as kidney failure, heart disease, stroke and blindness. The need for the awareness of conditions to be tested for Type 2 diabetes mellitus is significant. This structured system brought utmost importance for the need for the usage of simple screening technique for the risk assessment of diabetes.

### Conclusion

Diabetes is characterized by elevated levels of blood sugar(or glucose) is a chronic metabolic disease which can overtime leads to serious damage to the heart, eyes, blood vessels, nerves and kidneys. The study data acknowledge that IDRS is a virtuous screening tool for risk assessment of Type 2 Diabetes mellitus. The study accentuate the desire for the need of reaching diabetes education through diverse awareness programs for subject's knowledge about risk factor, complications, physical activity, regular checkups and screening which can attain better control of diabetes and thus dwindle the burden due to diabetes related complication. Mass screening can be conducted for detecting undiagnosed high risk diabetic subjects, cost effectively as it uses simple, inexpensive and safe measures. The study concludes that age, central obesity and physical activity were found to be significantly associated with risk of

diabetes. Despite the fact that we have accomplished the goal to a substantial level, our limitation was; cross-sectional analysis does not permit observation of trends of diabetes among subjects over time.

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