



# Indian Diabetic Risk Score- A Tool For Predicting Risk Of Undiagnosed Type 2 Diabetes Mellitus

Sheikh Mohd Saleem<sup>1</sup>, Adnan Firdous Raina<sup>2</sup>, S. Muhammad Salim Khan<sup>3</sup>, Shah Sumaya Jan<sup>4</sup>

<sup>1</sup>MBBS, Post Graduate Scholar, Department of Community Medicine, Government Medical College, Srinagar, J&K, India; <sup>2</sup>MD, Department of Medicine, SKIMS Soura, Srinagar, J&K, India; <sup>3</sup>MD, Head & Associate Professor, Department of Community Medicine, Govt Medical College, Srinagar, J&K, India; <sup>4</sup>MBBS, SKIMS medical College, Srinagar, J&K, India.

## ABSTRACT

**Objectives:** The objective of the study was to assess the performance of the Indian Diabetic Risk Score (IDRS) questionnaire for detecting and predicting risk of Type 2 diabetes mellitus (T2DM) in patients attending a primary health centre.

**Material and Methods:** We conducted a cross-sectional study comprising 1530 adult participants, age (>20 yrs) attending Out-patient department of a primary health centre located at Harwan, district Srinagar without a diagnosis of Type 2 diabetes mellitus. The risk of developing Type 2 diabetes mellitus was assessed using the validated and widely used Indian diabetic risk score. Total Risk Score of each participant was analysed and compared.

**Results:** Data on 1530 participants with unknown diabetes mellitus were analysed with the mean age of 51.5 years, majority 54% females, 64.18% belonging to nuclear family and majority were from lower middle socio economic status. Around 99.73% were non vegetarian population with 19.15% having smoking habits. According to Indian diabetic risk score of Madras diabetic research federation the study population were classified to be low, medium and high risk for developing type 2 diabetes were 70.4%, 19.5% and 10.1% respectively.

**Conclusion:** The IDRS questionnaire designed by Madras Diabetic Research Foundation is a useful screening tool to identify unknown Type 2 diabetes mellitus. The questionnaire is a reliable, valuable and easy to use screening tool which can be used in a primary care setup and better convince people at high risk of Type 2 diabetes mellitus to take action towards healthier lifestyle habits.

**Key Words:** Indian diabetic risk score; Type 2 diabetes mellitus; Prediabetes; Screening; Saleem IDRS

## INTRODUCTION

The prevalence of diabetes is on an increase due to over growth of population, urban life style, physical inactivity, aging and increasing prevalence of obesity. Diabetes mellitus (DM) affects around 8.3% of worlds adult population, and World health organisation has predicted the total number of cases of diabetes mellitus to rise from 371 million in 2012 to 552 million in 2030 [1]. Due to such a huge burden diabetes mellitus has become one of the most common non-communicable diseases affecting all age groups in urban and rural population without urban rural differences.[2,3] The burden has reached to such limits that we may find a diabetic patient in each house hold in India in coming fu-

ture. According to WHO SEARO 3, the projected increase by year 2025 will be 70 million diabetic patients in India posing a huge burden to the economic & health care system of country. The patients with Type 2 diabetes Mellitus may often remain asymptomatic for a longer period of time with abnormal blood glucose, cholesterol and triglycerides. In fact, their diagnosis is often delayed until the development of complications or the disease is diagnosed incidentally by a health professional. Moreover, the management of diabetes with complications is more difficult and expensive. Studies have documented that patients with diabetes Mellitus or impaired glucose tolerance had already developed subclinical atherosclerosis even before diagnosis of diabetes mellitus is confirmed [4]. Therefore, early diagnosis of dia-

### Corresponding Author:

Dr. Sheikh Mohd Saleem, MBBS, Post Graduate Scholar, Department of Community Medicine, Government Medical College, Srinagar, J&K, India; Phone: +91-7006806993; E-mail: saleem.900@gmail.com

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betes mellitus could favour the implementation of preventive measures aimed at preventing complications associated with diabetes mellitus. Furthermore, every year around 5%-10% of individuals with impaired fasting glycaemia and impaired glucose tolerance have a greater risk of being diagnosed with Type 2 diabetes mellitus [5]. It is well understood that Type 2 diabetes mellitus is a preventable disease, so earlier detection of population at risk and subsequent follow-up with interventional strategies can prevent Type 2 diabetes mellitus, improve glycemic control, and decrease its incidence in the population and complication associated with it. [6]. Diabetes mellitus risk scores [7] is an easy, less time consuming, non-invasive, and cost effective approach to assess an individual's risk of Undiagnosed Type 2 diabetes mellitus and dysglycaemia. In our study we have used Indian Diabetes Risk Score (IDRS) developed by Madras Diabetes Research Foundation and Ramachandran A et al.[8,9] which is one of the most frequently used instruments for assessing the risk of diabetes mellitus for Indian population. It comprises of only four variables like Age, Waist circumference, Family history of diabetes & daily physical activity. Indian diabetes risk score assesses whether an individual has undiagnosed Type 2 Diabetes Mellitus or dysglycaemia or the probability of developing Type 2 diabetes mellitus during the following 10 years. Many studies have been done outside Kashmir, India to validate the ability of the Indian diabetes risk score for detection of undiagnosed Type 2 Diabetes Mellitus. However, to our knowledge; no studies have examined the validation of score for detection of undiagnosed Type 2 Diabetes Mellitus in Kashmiri population. We performed this study to evaluate the performance of Indian diabetic risk score for screening of undiagnosed Type 2 Diabetes Mellitus and any dysglycaemia in a representative sample of the Kashmiri population living in Harwan Zone, District Srinagar.

## MATERIAL AND METHODS

A cross-sectional study was undertaken to evaluate the performance of Indian Diabetes Risk Score among adult patients (age >20 years) attending outpatient department of a primary health centre located at Harwan, district Srinagar. Prior ethical clearance from the departmental head and ethical committee was sought out and only those patients who gave written informed consent were included in the study. A total of 1530 patients participated in the study from January 2016 to July 2016. Each participant was selected using systematic sampling where every third adult patient (age >20 years) attending the Outpatient department of primary health care centre was included in the study. Participants with known diabetes mellitus and pregnant women were excluded from the study. We used Indian Diabetes Risk Score designed by Madras diabetes Research association and Ramachandran et al which is one of the most frequently used instruments for

assessing the risk of diabetes mellitus in India. An IDRS value  $\geq 60$  had the optimum sensitivity (72.5 %) and specificity (60.1%) for determining undiagnosed diabetes with a positive predictive value of 17.0%, negative predictive value of 95.1%, and accuracy of 61.3%.[8] Sociodemographic, Anthropometric parameters, Lifestyle factors, Age, BMI, Waist circumference, Family history of diabetes, Use of blood pressure medication, History of elevated blood glucose, Daily physical activity, and daily consumption of vegetables, fruit, and berries were taken into account and recorded on a pre designed Proforma. Total Risk Score of each participant was analysed and compared. Subjects with IRDS score of  $<30$  was categorized as low risk, 30-50 as medium risk and those with score  $\geq 60$  as high risk for diabetes.

Outcome measures: The outcomes are expressed in percentages based on low, medium and high risk of developing diabetes using the IDRS risk score. The minimum score is 0 and the maximum score is 100 and positive score is  $\geq 60$ .

## RESULTS

Our study included 1530 study participants with the mean age of 51.5 years, 54% of participants were women, 64.18% were from nuclear families and most of the participants were from lower middle socioeconomic status. Around 99.73% were non-vegetarian with 19.15% having smoking habits (Table 1). According to Indian diabetic risk score, 70.4%, 19.5% and 10.1% study population were classified to be low, medium and high risk for developing type 2 diabetes. (Table 2 and Figure 1). Table 3 Shows different variables used in Indian diabetic risk score screening questionnaire and their scoring system. Approximately 34% were more than 50 years of age, 13% had high abdominal obesity by waist circumference, 32% were having sedentary habits and 18% had family history of diabetes in both parents.

## DISCUSSION

There are many screening questionnaires and tools developed by various national and international diabetic associations throughout the world, which vary according to the ethnic group, life style and races. Indian Diabetic Risk score (IDRS) is one such screening tool which is clear and easy to use tool developed by Madras Diabetic Research Foundation (MDRF) [8,9] which takes in account only four risk factors like age, waist circumference, physical activity and family history. Indian diabetic risk score is unique in a way that it takes measurement of waist circumference as a measure of abdominal obesity because Indian population is a characteristic of Type 2 diabetes mellitus with lean body mass index. So instead of body mass index, the use of waist circumfer-

ence in the screening makes it a better screening tool for assessing Type 2 diabetes mellitus, since the Finnish group diabetes risk score has included both body mass index and waist circumference having family history and the physical activity and measurement of waist circumference as a measure of abdominal obesity [12]. This plays a very important role in determining the role of developing type 2 diabetes. The Indian diabetic risk score has a sensitivity of 72.5% and specificity of 60.1% based on the largest population based study on diabetes in India CURES [12].

In this study we report on Indian Diabetes Risk Score. Use of such a scoring system is of great significance and could prove to be cost-effective, easy to use, reliable, and valuable screening tool for detecting risk of diabetes. In countries like India where there is a marked explosion of diabetes and over half of the cases remain undiagnosed, Indian diabetic risk score may be used by primary care physicians at a primary care setup in determining risk of developing diabetes mellitus.

The current study assessed the performance of the Indian diabetic risk score questionnaire, and clearly demonstrates that this scoring system can work reasonably well as screening tool, detecting undiagnosed Type 2 diabetes mellitus in the general population. Findings in this study showed a positive association between the Indian diabetic risk score and undiagnosed Type 2 diabetes mellitus in the general population. Using the cut-off Score values of greater or equal to 60 in both men and women, this screening tool had good performance in identifying undiagnosed Type 2 diabetes mellitus.

Studies have shown that Type 2 diabetes mellitus is a major and an important independent risk factor for developing cardiovascular disease and death [10]. Therefore, early identification of people with undiagnosed Type 2 diabetes mellitus and detecting people at risk for developing Type 2 diabetes mellitus in near future is essential for early implementation of preventive measures, reducing economic costs and morbidity associated with diabetic complications.[11]. Type 2 diabetes mellitus is a disease with high prevalence and low incidence so its detection is often delayed and at the time of diagnosis, advanced complications are often present. Hence, using IRDS score which is a simplified and valid questionnaire as a preliminary screening tool followed with more invasive and correct diagnosis in primary care constitute a cost-effective and practical method with a potentially high national impact in terms of public health [12].

Limitation of the study: First, the participants were drawn from a single primary healthcare centre located at Harwan, district Srinagar and, thus, the results may not be applicable to the rest of Jammu & Kashmir state. Secondly, diagnosis of Type 2 diabetes mellitus using biochemical markers was not done and no such invasive procedures were carried out.

## CONCLUSION:

The Indian diabetic risk score questionnaire designed by Madras diabetic research federation is a useful screening tool to identify unknown Type 2 diabetes mellitus. The questionnaire is a reliable, valuable and easy to use screening tool which can be used in a primary care setup. The findings of our study may aid in convincing health care professionals and people at high risk of developing diabetes to take stern action towards healthy lifestyle and achieving the goal of “Health for all”.

**Table 1: Distribution of study participants and its variables**

Variables	Frequency	Percentage (%)
<b>Gender</b>		
Male	704	46
Female	826	54
Total	1530	100
<b>Family Type</b>		
Joint	982	64.18
Nuclear	548	35.81
<b>Diet</b>		
Non-Vegetarian	1526	99.73
Vegetarian	4	0.26
<b>Socio-Economic Status</b>		
Upper	124	8.10
Upper Middle	409	26.73
Lower Middle	613	40.06
Upper Lower	363	23.72
Lower	21	1.37
<b>Smoking History</b>		
Yes	293	19.15
No	1237	80.84
<b>Family History of DM*</b>		
Yes	276	18.03
No	1254	81.96
<b>Family History of HTN°</b>		
Yes	276	15.35
No	1295	84.64

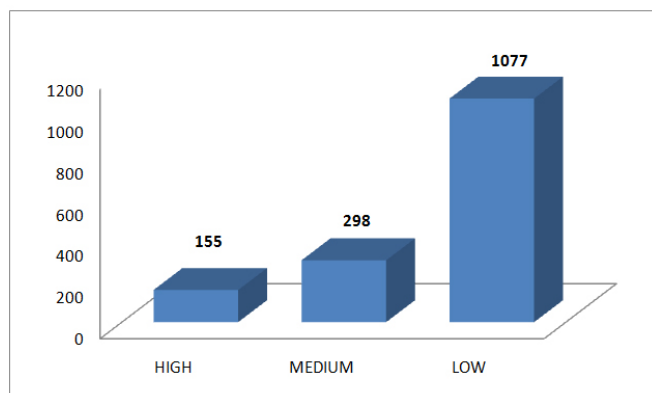
[\*DM=Diabetes Mellitus, °HTN=Hypertension]

**Table 2: Risk of development of Diabetes Mellitus based on IDRS score**

RISK	(n)	Percentage
High	155	10.1
Medium	298	19.5
Low	1077	70.4

**Table 3: Scoring System of IDRS among Study Participants**

Variable	Frequency	Percentage (%)
<b>Age</b>		
0	276	18.03
20	734	47.97
30	520	33.98
<b>Waist</b>		
0	1001	65.42
10	336	21.96
20	193	12.61
<b>Physical Activity</b>		
0	305	19.93
10	732	47.84
20	465	30.39
30	28	1.83
<b>Family History</b>		
0	1254	81.96
10	261	17.05
20	15	0.98



**Figure 1:** Bar diagram representing risk of developing Diabetes mellitus

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