

## Original Research Article

# Risk assessment for diabetes among adult population in urban field practice area of a government medical college in north coastal Andhra Pradesh

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## ABSTRACT

**Background:** The rising prevalence of diabetes in developing countries is closely associated with industrialization and socioeconomic development. The major determinants of diabetics in these countries are population growth, age structure, and urbanization, prevalence of obesity because of increased intake of junk food, lack of physical activity, and stress among urban dwellers. Diabetes is increasingly concentrated in the urban areas. Hence, the present study was undertaken. To assess the risk of developing diabetes among urban adults >20 years using a Simplified Indian diabetes risk score.

**Methods:** A community based cross-sectional study was carried out in Allipuram, an urban field practice area of Department of Community Medicine, Andhra Medical College, Visakhapatnam. The study was conducted among adults >20 years of age in a sample of 400 adults chosen by simple random sampling technique after obtaining informed consent. The sample size was calculated using  $4PQ/L^2$  with 3% absolute precision ( $p=9\%$  from previous studies). The study was done for 2 months (October 15th to December 15th 2019).

**Results:** Majority 158 (39.5%) of study participants are at high risk and 198(49.5%) are at medium risk of developing Diabetes in future. Majority 276 (93.3%) of the study participants do not have family history of diabetes.

**Conclusions:** IDRS is a simple, useful and cost-effective tool for prioritizing and identifying medium and high-risk population for developing diabetes and to subject them for screening of diabetes and making screening programs more cost effective in resource limited settings.

**Keywords:** IDRS, Diabetes, MDRF, CURES

## INTRODUCTION

Globalization, industrialization, urbanization, nutritional transition and faulty life style is mainly responsible for the emerging new health problems, especially Non communicable diseases. Almost 71% of the overall deaths in the world are attributed to Non-Communicable Diseases, of which Diabetes ranks fourth.<sup>1</sup> Diabetes is considered to be the silent killer which ultimately leads to serious complications thereby reducing the quality of life.

According to World Health Organization (WHO) it was estimated that diabetes will affect almost 628.6 million people worldwide by 2045.<sup>2</sup> India has the unfortunate privilege of being “diabetes capital” of the world. As per International diabetic federation there are approximately 72 million diabetics in India (2017) expected to double to 134 million by 2045, out of which prevalence among adults is 8.8% (2017) which is proposed to increase to 11.4% (2045).<sup>3</sup> National family health survey (NFHS 4) also indicates that common age group of 15-49 years are

affected the most with the prevalence of 8% among men and 6% among women having blood sugar levels >140 mg/dl.<sup>4</sup> Diabetes is considered to be the disease which exhibits Iceberg phenomenon with majority of the individuals being hidden as undiagnosed cases. Evidences suggest that early detection of diabetes by suitable screening methods, especially in subjects with risk of developing diabetes will help to postpone the development of the micro and macro vascular complications, thereby reducing the social and economic burden of the disease to the country as well as to the family.<sup>5</sup>

Various risk factors like increased age, central obesity, positive family history of diabetes, lack of physical inactivity, increased stress and faulty dietary habits for Type 2 Diabetes were well established. As a result, many risk predictions tools have been developed globally such as American Diabetes Association (ADA) Risk Tools, Finnish Diabetes Risk Score (FINDRISC), National Health and Nutrition Examination Survey (NHANES) risk score, and study to prevent non-insulin dependent diabetes mellitus (STOP-NIDDM) Risk Score in developed countries.<sup>(6)</sup>

The need for a simple tool for detecting undiagnosed people with diabetes and to identify individuals at risk of developing diabetes in the community is therefore obvious. The Indian Diabetes Risk Score (IDRS), a simple tool to identify individuals at risk of developing diabetes which was developed by Dr. Mohan and colleagues at Chennai by Madras Diabetes Research Foundation (MDRF). The IDRS was derived from the Chennai rural epidemiology population study (CURES) and it was validated.<sup>7</sup>

The components of the tool consist of four variables namely age, family history, waist circumference and physical activity. Individuals were categorized as having high risk when the score is  $\geq 60$ , as having moderate risk when the score is 30 – 50 and as having low risk when the score is <30. To assess the risk of developing diabetes among urban adults >20 years using a simplified IDRS in Visakhapatnam.

## METHODS

A community based cross-sectional study. Urban field practice area of Department of Community Medicine, Andhra Medical College, Visakhapatnam. Study duration: 2 months (October 15th to December 15th 2019). Study population: Adults aged >20 years residing in the study area.

### Inclusion criteria

Individuals aged >20 years, who were present at the time of study and willing to participate in the study.

### Exclusion criteria

Individuals who are known diabetic and who are not willing to participate were excluded from the study.

Sample size: Based on prevalence of diabetes considering a prevalence of 9% ( $p=9\%$  from previous studies)<sup>8</sup> with 95% confidence interval and with 3% absolute precision.

$N = ZP(1-P)/d^2 = 4 \times 9 \times 91 / (3)^2 = 364$  with 10% attrition rate the sample was rounded off to 400.

Sampling technique: Multistage sampling technique was used. Firstly, the urban field practice area of department of community medicine has 4 wards among them one area was selected using Simple Random Sampling technique (Lottery method). Secondly, the complete list of households in that area was obtained, then the houses were selected randomly by random table method till the sample size obtained. Houses were visited and data was collected from the eligible population after obtaining verbal informed consent.

Informed consent: Oral informed consent was obtained from the individuals before the commencement of the study. In all subjects, age, family history of diabetes was obtained and details on physical activity were assessed using a validated questionnaire. Waist circumference measurements in centimeters were obtained using standardized techniques. Data was analyzed using MS Excel and SPSS version 21. Chi square test with p value was used to test the association between IDRS scores and different variables.

Institutional Ethics Committee approval was obtained before conducting the study.

### Study tool

A semi structured interview schedule for socio-demographic details of subjects like name, age, gender and IDRS developed based on Multiple Logistic Regression Analysis derived from CURES (Chennai Urban Rural Epidemiology Study).<sup>7</sup>

The exact Age confirmation was made from the Aadhar card of the study participant. The world health organization and international diabetes federation (IDF) suggest measuring waist circumference in horizontal plane midway between the lowest ribs and the iliac crest. The information on physical activity and the family history were obtained verbally from the study participant.

IDRS ranges from a minimum total score of 0 to a Maximum total score of 100 (total score is sum of score of all 4 variables)

Subjects with an IDRS of <30 were categorized as low risk, 30-50 as medium risk and those with >60 as high risk for diabetes.

**Table 1: IDRS tool derived from CURES for risk assessment of diabetes.**

IDRS	Score
<b>Age categorization</b>	
<35 years	0
35–49 years	20
≥50 years	30
<b>Abdominal obesity (waist circumference)</b>	
<80 cm (female)	0
<90 (male)	
≥80–89 cm (female)	10
≥90 – 99 cm (male)	
≥90 cm (female)	20
≥100 cm (male)	
<b>Physical activity</b>	
Regular vigorous exercise or strenuous activities at home or work	0
Regular moderate exercise or moderate physical activity at home or work	10
Regular mild exercise or mild physical activity at home or work	20
No exercise and/or sedentary activities at home/ work	30
<b>Family history of diabetes</b>	
No family history (reference)	0
Either parent	10
Both parents	20

## RESULTS

A total of 400 people participated in the study. Among them, 62% were males and 38% were females. The age ranged between 21 to 70 years. The mean age in years for population was  $38.76 \pm 12.26$  SD.

Table 2, shows that most of the participants around 179 (44.75%) had waist circumference of 90-99 cm followed by 80-89 cm in 136 (34%). About 78 (19.5%) had sedentary lifestyle. Majority 276 (69%) of the participants did not have family history of diabetes and Only 124 (31%) had family history of diabetes, at least one parent was diabetic.

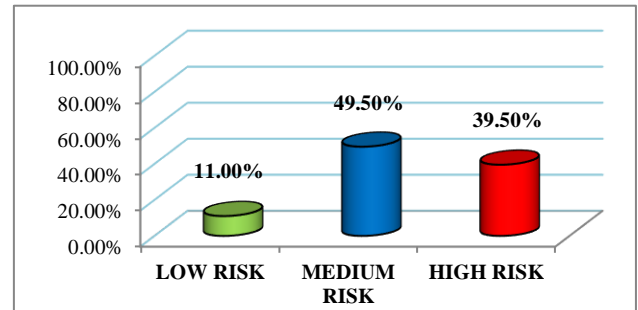
**Figure 1: Distribution of study participants according to IDRS.**

Figure 1, shows that 39.5%, 49.5%, 11% of the individuals were in high, moderate, and low risk group respectively.

Table 3, shows the distribution of study participants based on IDRS components vs risk. The study participants in the age group of 35-49 years and ≥50 years are in high risk of developing diabetes as compared to the participants in the age group of 21-34 years who are in medium risk. More or less both males and females have similar risk of developing diabetes. However, in lines with risk the participants with waist circumference 80-90 cm and >90 cm categories have showed medium risk and high risk respectively. Medium to high risk is seen among the sedentary individuals as compared to other individuals with more or less regular exercise or work.

**Table 2: Distribution of study participants based on IDRS.**

Variable	IDRS score	No. (%)
<b>Age (in years)</b>	21-34	0
	35–49	20
	≥50	30
<b>Abdominal obesity (waist circumference)</b>	<80 cm (female), <90 cm (male)	0
	≥ 80–89 cm (female), ≥90–99 cm (male)	10
	≥90 cm (female), ≥ 100 cm (male)	20
		179 (44.75)
<b>Physical activity</b>	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
<b>Family history of diabetes</b>	No diabetes in parents	0
	One parent is diabetic	10
	Both parents are diabetic	20

**Table 3: Distribution of study participants based on IDRS components Vs Risk.**

Variables		≥60 (high risk)	30-50 (medium risk)	<30 (low risk)
N		N (%)	N (%)	N (%)
Age in years	21-34	179	6 (3.35)	129 (72.06)
	35-49	145	86 (59.3)	59 (40.68)
	≥50	76	66 (86.84)	10 (13.15)
	Total	400	158	198
Gender	Males	248	97 (39.1)	133 (53.6)
	Females	152	61 (40.1)	65 (42.8)
	Total	400	158	198
Waist circumference in centimeters	<80	85	2 (2.3)	51 (60)
	80-89	136	41 (30.1)	83 (61)
	>90	179	115 (64.2)	64 (35.8)
	Total	400	158	198
Family history	No	276	97 (35.14)	139 (50.3)
	Yes	124	61 (49.19)	59 (47.58)
	Total	400	158	198
<b>Physical activity</b>				
Regular vigorous exercise or strenuous activities at home or work		20	0 (0)	12 (60)
Regular moderate exercise or moderate physical activity at home or work		79	24 (30.4)	43 (54.4)
Regular mild exercise or mild physical activity at home or work		223	88 (39.4)	111 (49.8)
No exercise and/or sedentary activities at home or work		78	46 (59)	32 (41)
Total		400	158	198

## DISCUSSION

In this study, Simplified IDRS was used for identifying the high-risk population of developing diabetes in near future and prioritize them to undergo screening for diabetes on regular basis. The use of such a risk score would be of great help in developing countries like India where there is a marked explosion of diabetes and over half of the cases remain undiagnosed diabetes. This is of great significance as use of such scoring system could prove to be a cost-effective tool for assessment of risk of developing diabetes.

As, there are ethnic differences in the risk factors for diabetes, it becomes necessary to determine ethnic specific scores. The risk factors used in this study are those recommended by the American Diabetes Association. Among the participants, 62% were males and 38% were females. Age of the respondents was stratified into 3 categories according to IDRS. 179 (44.75%) were in the age group of 21-34 years, 145 (36.25%) were in the age group of 35-49 years and 76 (19%) were ≥50 years. Similarly, in the study conducted by Chowdhury et al observed that 47.2% of study

subjects were in the age group of 20-34 years, 28.5% were in the age group of 35-49 years, while 24.3% were ≥50 years.<sup>10</sup> In contrast to the present study Geetha et al<sup>9</sup> observed only 14% of study subjects were <35 years of age which is lower, and 55% of study subjects were ≥50 years which is higher while 31% belonged to age group of 35-49 years.

In the present study, it was observed that 39.5%, 49.5%, 11% of the individuals were in high, moderate, and low risk group respectively for developing type 2 DM. These findings were in line with the findings observed in the study done by Patel et al, i.e., 44.23%, 48.57% and 7.2% of the individuals were in High, Moderate, and Low risk group respectively and In a study done by Nagalingam et al 37%, 45% and 18% of the individuals were in High, Moderate, and Low risk group respectively.<sup>11,13</sup> In contrary to the findings of the present study, S Nandeshwar et al, observed that 51.16% & 8.4% were in high risk and moderate risk group respectively.<sup>12</sup> This simple, cost effective, non-invasive IDRS could thus serve as a tool for a primary care physician or a health worker to identify at risk individuals for both diabetes and cardiovascular diseases.

## CONCLUSION

This Simplified IDRS can be a simple, useful and cost-effective tool for prioritizing and identifying high risk population for developing diabetes and to subject them for screening of diabetes and making screening programs more cost effective in resource limited settings. Our study has shown that majority of the adult population were at medium and high risk of developing type 2 Diabetes.

## Recommendations

The medium and high-risk individuals are needed to be identified. These people are advised to visit nearest health care facility for an appropriate diagnostic tests and intervention. However, lifestyle modification is advocated right across the spectrum of IDRS.

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