

## RESEARCH ARTICLE



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## Screening for Diabetes Mellitus risk using Indian Diabetic risk score in an urban slum in Mysuru

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### Abstract

Globalization of risk factors is the new trend leading to non-communicable diseases and Diabetes ranks fourth. Diabetes owes its major importance to the fact that it is a silent killer which leads to serious sequel reducing the quality of life. Early detection of diabetes by suitable screening methods helps to delay the micro and macrovascular complications, thereby reducing the clinical, social and economic burden of the diseases. To assess diabetes risk using IDRS and other associated factors. Cross-sectional study was done in an urban slum in Mysuru with 136 participants aged >18 years and no history of diabetes. Data was collected using a pre-designed questionnaire after taking written informed consent. Diabetes risk was assessed using MDRF's IDRS. Data was entered in MS Excel and analysed using IBM SPSS v24.  $P < 0.05$  was considered statistically significant. Mean age of the study participants was  $45.24 \pm 15.59$  years. BPL card holders were 99 (72.8%). As per IDRS 49 (36.0%), 41 (30.1%) and 46 (33.8%) had a low, moderate and high risk for diabetes mellitus. Age, marital status, education, having BPL card and IDRS score of study participants were statistically significantly associated. According to IDRS 49 (36.0%), 41 (30.1%) and 46 (33.8%) had a low, moderate and high risk for diabetes mellitus, which is moderate to high. Measures like yoga and creating awareness about risk factors need to be taken to reduce the risk.

**Keywords:** Diabetes mellitus; IDRS; risk factor

### Introduction

The second half of the twentieth century witnessed major health transitions in the world, propelled by socio-economic and technological changes that profoundly altered life expectancy and ways of living while creating an unprecedented human

capacity to use science to both prolong and enhance life. Among these health transitions, the most globally pervasive change has been the rising burden of non-communicable diseases.<sup>(1)</sup> Developed country has transitioned from the problem of communicable diseases to non-communicable diseases, but on the

other hand in developing and underdeveloped countries there is the unfinished burden of communicable diseases and rising trends of non-communicable diseases. Major non-communicable diseases include ischemic heart disease, hypertension, diabetes mellitus and stroke.

Diabetes is fast becoming the epidemic of the 21st century. Over the past 30 years, the status of diabetes has changed from being considered as a mild disorder of the elderly to one of the major causes of morbidity and mortality affecting the youth and middle-aged people.<sup>(2)</sup> It is the eighth leading cause of death in most high-income countries according to the WHO factsheet 2012. This epidemic is increasingly affecting people in low and middle-income countries. Diabetes has emerged as one of the most challenging health problems in the 21st century Indians have been consistently found to have a higher prevalence of diabetes in most studies.<sup>(3)</sup>

According to the International Diabetes Federation (IDF), the number of people globally with type 2 diabetes mellitus (T2DM) will increase to 552 million by 2030, over twice the number in 2000. Nearly 21% of these new cases will be from India, which has the highest number of cases in any country. India currently has 61.3 million diabetics, a figure that is projected to increase to 103 million by 2030. Several studies from different regions of India have shown that the prevalence of type 2 DM is increasing from 8.2% in 1992 to 18.6% in 2008 for urban areas, and from 2.4% in 1992 to 9.2% in 2008 in rural areas. The rising prevalence in developing countries is associated with industrialization, urbanization and socio-economic development indicating the role of not only genetic factors but also environmental factors like quality of life and lifestyle.<sup>(4)</sup> There are three major types of diabetes: type 1 diabetes, type 2 diabetes, and gestational diabetes.<sup>(5)</sup>

Diabetes is also known as a silent disease, exhibiting no symptoms until it progresses to severe target organ damage. Because of the increasing burden of the disease, its iceberg nature, its complications and potential to prevent these complications with earlier diagnosis and treatment; active and opportunistic efforts are required for early diagnosis of diabetes by means of screening. Early identification of individuals with risk factors and appropriate lifestyle intervention would help in preventing or postponing the onset of diabetes mellitus.<sup>(6)</sup>

Indian Diabetes Risk Score (IRDS) developed by Dr. Mohan and his colleagues is one of the strongest predictors of incident diabetes in India. It is a simplified risk score for identifying undiagnosed diabetic subjects using four simple parameters like age, waist circumference, family history of diabetes and physical activity. Here the minimum score is 0 and the maximum is 100. A score of 60 and above is indicative of diabetes risk.<sup>(7)</sup>

With the above context, this study was conducted in an urban slum in Mysuru.

## Objectives

1. To assess risk for diabetes mellitus using Indian Diabetic Risk Score among urban slum population in Medar block, Mysuru.
2. To find the association between Indian Diabetic Risk Score and socio-demographic characteristics among urban slum population in Medar block, Mysuru.

## Methods

This was a cross-sectional study done to observe World Diabetes Day on 14<sup>th</sup> November 2019. A screening camp for diabetes mellitus using Indian Diabetes Risk Score (IDRS) in JSS Urban health centre, Medar block, Mysuru. People were informed about the screening camp prior by field staff and were mobilized to the screening camp on World Diabetes Day. All the participants above 18 years voluntarily willing to participate by giving written informed consent were included in the study. A convenient sampling technique was adopted to recruit study participants. Those who were known case of diabetes mellitus were excluded from the study. A total of 136 study participants were included in the study.

Data was collected using a pre-designed structured proforma. Data regarding age, gender, religion, education, occupation, height, weight, hip and waist circumference, history of smoking and alcohol consumption, physical activity, etc., were recorded.

Data was entered in MS Excel 2000 and analysed using IBM SPSS v24 (Licensed to JSS AHER). Age, gender, BMI, etc., were expressed using descriptive statistics. Chi-square test was used to find an association between IDRS and socio-demographic characteristics. The level of significance was set at 5%.

## Results

A total of 136 study participants took part in the study. The mean age of the study participants was  $45.24 \pm 15.59$  years. The majority of the study participants were aged <60 years 113 (83.1%), females were more 96 (70.96%) and males were 40 (29.4%). Most of the study participants belonged to the Hindu religion 118 (86.8%) followed by Muslim 12 (8.8%) and Christian 6 (4.4%) religions. Study participants from the nuclear family were 91 (66.9%) and belonging to the joint family were 45 (33.1%). Regarding marital status 29 (21.3%) were never married, 88 (64.7%) were currently married and 19 (14.0) were widowed. Study participants studied till high school was 44 (32.4%), illiterates were 23 (16.9%), educated up to post-graduation were 22 (16.2%), primary schooling 13 (9.6%), 13 (9.6%) till PUC, 11 (8.1%) were studied up to middle school and graduates were 10 (7.4%). Below poverty line cardholders were 99 (72.8%). (Table 1).

The vegetarian diet was consumed by 24 (17.6%) and 112 (82.4%) were non-vegetarians. Currently, smoking of tobacco was practiced by 14 (10.8%), alcohol consumption was present in 11 (8.1%). History of hypertension was present in 37 (27.2%) and history of coronary heart disease was present in 7 (5.1%). (Table 2).

According to IDRS 49 (36.0%) were having a low risk, the moderate risk was present in 41 (30.1%) and 46 (33.8%) had a high risk for diabetes mellitus.

Age ( $\chi^2 = 51.683$ ,  $df = 6$ ,  $p < 0.001$ ), marital status ( $\chi^2 = 33.729$ ,  $df = 4$ ,  $p < 0.001$ ), education ( $\chi^2 = 62.973$ ,  $df = 12$ ,  $p < 0.001$ ), having BPL card ( $\chi^2 = 12.584$ ,  $df = 2$ ,  $p = 0.002$ ) and IDRS score of study participants were statistically significantly associated.

There was no statistically significant association between gender ( $\chi^2 = 0.189$ ,  $df = 2$ ,  $p = 0.910$ ), religion ( $\chi^2 = 7.058$ ,  $df = 4$ ,  $p = 0.133$ ) and type of family ( $\chi^2 = 1.164$ ,  $df = 2$ ,  $p = 0.559$ ). (Table 4)

**Table 1.** Sociodemographic characteristics of study participants

Characteristic		Number	Percentage
Age	<40 years	50	36.8
	41 – 60 years	63	46.3
	61 – 80 years	21	15.4
	> 80 years	2	1.5
Gender	Male	40	29.4
	Female	96	70.96
Religion	Hindu	118	86.8
	Muslim	12	8.8
	Christian	6	4.4
Type of family	Nuclear	91	66.9
	Joint	45	33.1
Marital status	Never married	29	21.3
	Currently married	88	64.7
	Widowed	19	14.0
Education	Illiterate	23	16.9
	Primary school	13	9.6
	Middle school	11	8.1
	High school	44	32.4
	PUC	13	9.6
	Graduation	10	7.4
BPL card holder	Yes	99	72.8
	No	37	27.2

**Table 2.** Lifestyle factors and comorbidities of study participants

Habit		Number	Percentage
Diet	Vegetarian	24	17.6
	Non-vegetarian	112	82.4
Smoking	Yes	14	10.8
	No	122	89.2
Alcohol consumption	Yes	11	8.1
	No	125	91.9
Hypertension	Yes	37	27.2
	No	99	72.8
Coronary heart disease	Yes	7	5.1
	No	129	94.9

**Table 3.** Indian diabetic risk score assessment of study participants

Score	Risk	Number	Percentage
<30	Low risk	49	36.0
>30 – 50	Moderate risk	41	30.1
> 60	High risk	46	33.8

## Discussion

A total of 136 study participants took part in the study. The mean age of the study participants was  $45.24 \pm 15.59$  years. The majority of the study participants were aged <60 years 113 (83.1%), females were more 96 (70.96%). Most of the study participants belonged to the Hindu religion 118 (86.8%). Study participants from the nuclear family were 91 (66.9%). Currently married were 88 (64.7%) Educated up to high school were 44 (32.4%), BPL cardholders were 99 (72.8%). Currently, smoking of tobacco was practiced by 14 (10.8%), alcohol consumption was present in 11 (8.1%). History of hypertension was present in 37 (27.2%) and history of coronary heart disease was present in 7 (5.1%).

In a study done by Bala et al., the Mean age was found to be  $35.39 \pm 13.3$  yrs. As per the religion -Hindus were 124 (82.7%) followed by Muslims and Christians. According to the educational status Postgraduates were 3 (2%), Graduates were 27 (18%), Intermediate 46 (30.7%), High school 27 (18%), Middle 23 (15.3%), Primary 3 (2%) and illiterates 21 (14%).<sup>(8)</sup>

In another study by Nagalingam S et al. mean age of 41.5 years, the majority 55% females, 73% belonging to the nuclear

**Table 4.** Association between IDRS and socio-demographic characteristics

Characteristic		IDRS score n (%)			Test of significance
		<30	>30-50	>60	
Age	<40 years	36(72)	11(22)	3(6)	$\chi^2=51.683$ , df=6, p<0.001
	41 – 60 years	11(17.5)	23(36.5)	29(46)	
	61 – 80 years	1(4.8)	7(33.3)	13(61.9)	
	> 80 years	1(50)	0(0)	1(50)	
Gender	Male	15(37.5)	11(27.5)	14(35)	$\chi^2=0.189$ , df=2, p=0.910
	Female	34(35.4)	30(31.3)	32(33.3)	
Religion	Hindu	39(33.1)	37(31.4)	42(35.6)	$\chi^2=7.058$ , df=4, p=0.133
	Muslim	7(58.3)	4(33.3)	1(8.3)	
	Christian	3(50)	0(0)	3(50)	
Type of family	Nuclear	34(37.4)	29(31.9)	28(30.8)	$\chi^2=1.164$ , df=2, p=0.559
	Joint	15(33.3)	12(26.7)	18(40)	
Marital status	Never married	23(79.3)	4(13.8)	2(0.9)	$\chi^2=33.729$ , df=4, p<0.001
	Currently married	22(25)	33(37.5)	33(37.5)	
	Widowed	4(21.1)	4(21.1)	11(57.9)	
Education	Illiterate	7(30.4)	4(17.4)		$\chi^2=62.973$ , df= 12, p<0.001
	Primary school	3(23.1)	3(23.1)		
	Middle school	1(9.1)	7(63.6)		
	High school	8(18.2)	17(38.6)		
	PUC	2(15.4)	7(53.8)		
	Graduation	7(70)	3(30)		
	Post-graduation	21(95.5)	0 (0)		
BPL card holder	Yes	27(27.3)	32(32.3)		$\chi^2=12.584$ , df=2, p=0.002
	No	21(60)	8(22.9)		

family. Around 74% were non-vegetarian population with smoking and alcohol habits 20% and 23 % respectively.<sup>(9)</sup>

In our present study according to IDRS 49 (36.0%) were having a low risk, the moderate risk was present in 41 (30.1%) and 46 (33.8%) had a high risk for diabetes mellitus.

In a study by Nandeshwar S et al., 2.80% were in low risk, 28.40% in moderate risk and 68.80% were in high-risk group as per the IDRS.<sup>(10)</sup> The difference in risk may be due to the inclusion of participants both from low and high socio-economic strata in this study in comparison to our study where BPL cardholders are more.

In another study by Bala et al., low risk 33 (22%), medium risk 60 (40%) and high risk 57 (38%) for diabetes mellitus as per IDRS.<sup>(8)</sup>

In a study done by Nagalingam S et al., low, medium and high risk for developing type 2 diabetes was 18%, 45% and 37% respectively.<sup>(9)</sup>

In a study conducted by Ashturkar MD et al., 25% had low risk, 47.58% had moderate risk and 27.42% had a low risk for developing diabetes mellitus.<sup>(11)</sup>

The findings of the above three studies are similar to our study.

Association between age ( $\chi^2=51.683$ , df=6, p<0.001), marital status ( $\chi^2=33.729$ , df=4, p<0.001), education ( $\chi^2=62.973$ , df=12, p<0.001) and having BPL card ( $\chi^2=12.584$ , df=2, p=0.002) and IDRS score was statistically significantly associated. So advancing age, being married or widowed, low level of education and having BPL card have a higher risk of developing diabetes mellitus.

There was no statistically significant association between gender ( $\chi^2=0.189$ , df=2, p=0.910), religion ( $\chi^2=7.058$ , df=4, p=0.133) and type of family ( $\chi^2=1.164$ , df=2, p=0.559). There is no significant difference among males and females, type of family and religion of study participants.

## Conclusion

In our present study according to IDRS 49 (36.0%) were having a low risk, the moderate risk was present in 41 (30.1%) and 46 (33.8%) had a high risk for diabetes mellitus. IDRS is non-invasive and a simple tool to measure the risk of diabetes mellitus among Indians. Measures need to be taken to decrease the risk by creating awareness regarding physical activity, diet, and other lifestyle factors. Activities like yoga to be promoted and made accessible to all classes of people so that they can be benefitted in preventing not only diabetes mellitus but other non-communicable diseases.

## Limitations

The smaller sample size and convenient sampling used in the study restricts the generalization of results.

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