

## A Study on Determinants of Indian Diabetic Risk Score among Adult Population

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### Abstract

**Background:** Diabetes mellitus, long considered a disease of minor significance to world health, is now taking its place as one of the main threats to human health in the 21st century. The past two decades have seen an explosive increase in the number of people diagnosed with Diabetes worldwide.

**Objective:** to determine the association of IDRS status with socio-demographic factors and personal habits among adult population.

**Materials and Method:** Study was carried out among urban adult men and women aged 18 years and above. Study proforma included information on socio-demographic characteristics like gender, marital status, education, occupation, family income, type of family and family size, habits like diet, addiction of tobacco, alcohol or other substance etc. Chi-square test was used to test the association between categorical variables. P value < 0.05 was considered statistical significant.

**Results:** Proportion of participants found with high risk status was higher in female gender, Hindu religion, marital status widowed, illiterate and socio economic status class III and IV. These associations were found statistically significant. No significant association was seen between IDRS status and type of family, tobacco, alcohol consumption and smoking habits of the study participants. Mean BMI of participants increased from low risk group to high risk group.

**Conclusions:** The present study showed significant association between IDRS and socio demographic variables like gender, religion, marital status, education, occupation, socio economic status class.

**Keywords:** Diabetes Mellitus, Determinants, Education, Urban.

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### Introduction

Diabetes is a chronic, metabolic disease characterized by elevated levels of blood glucose (or blood sugar), which leads over

time to serious damage to the heart, blood vessels, eyes, kidneys and nerves. The most common is type 2 diabetes, usually in

adults, which occurs when the body becomes resistant to insulin or doesn't make enough insulin. [1]

Diabetes mellitus, long considered a disease of minor significance to world health, is now taking its place as one of the main threats to human health in the 21st century. The past two decades have seen an explosive increase in the number of people diagnosed with Diabetes worldwide. [2] The prevalence of Diabetes Mellitus is growing rapidly worldwide and is reaching epidemic proportions. [3,4]

Diabetes is an insidious public health problem. The International Diabetes Federation (IDF) indicates that the number of people living with diabetes globally is expected to rise from 366 million in 2011 to 552 million by 2030, if no urgent action is taken. [5]

In India, there are estimated 77 million people above the age of 18 years are suffering from diabetes (type 2) and nearly 25 million are prediabetics (at a higher risk of developing diabetes in near future). More than 50% of people are unaware of their diabetic status which leads to health complications if not detected and treated early. [6]

Adults with diabetes have a two- to three-fold increased risk of heart attacks and strokes. Combined with reduced blood flow, neuropathy (nerve damage) in the feet increases the chance of foot ulcers, infection, and the eventual need for limb amputation. Diabetic retinopathy is an important cause of blindness and occurs as a result of long-term accumulated damage to the small blood vessels in the retina. Diabetes is among the leading causes of kidney failure. [6]

Indian Diabetes Risk Score (IDRS), devised and developed by Mohan et al. at the Madras Diabetes Research Foundation, is a validated tool to identify individuals with high risk of developing type 2 diabetes mellitus (T2DM) in future. It considers four risk factors namely age,

family history, abdominal obesity and physical activity. [7]

Diabetes also exhibits the best example of Iceberg phenomenon with the majority being hidden as undiagnosed cases. Evidences suggest that early detection of diabetes by suitable screening methods, especially in subjects with elevated risk for diabetes will help to delay the micro and macro vascular complications, thereby reducing the clinical, social and economic burden of the disease. [8] With these backgrounds, this study was conducted to determine the association of IDRS status with socio-demographic factors and personal habits among urban adult population of Jhalawar, Rajasthan.

### Materials and Method

Present study was carried out in urban field practice area of Department of Community Medicine, Jhalawar Medical College, Jhalawar, Rajasthan. The present study was a community based cross sectional study carried out from August 2018 to July 2021. The study population for the present study consisted of adult men and women aged 18 years and more, residing in the urban field practice area. People not willing to participate in study, not providing written consent, pregnant and lactating women up to 12 weeks postpartum and people already diagnosed with diabetes and/or taking anti-diabetic medication were excluded. In present study 450 adults were included as study participants after satisfying inclusion and exclusion criteria. For present study, approval was taken from institutional ethical committee before commencing the study. Purpose and nature of the study was explained in details to all study participants and informed written consent was taken from all the participants. A pre designed pretested semi structured proforma was used for collecting information from the study participants. This included information on socio-demographic characteristics like gender,

marital status, education, occupation, family income, socio-economic status, type of family and family size, habits like vegetarian or non-vegetarian diet, addiction of tobacco, alcohol or other substance etc. Modified BG Prasad socioeconomic scale was used to determine the socioeconomic status of study participants. [9] Body mass index (BMI) of the participants was calculated by using the formula:  $BMI = \text{Weight (in kg)} / (\text{Height in meters})^2$ . Indian Diabetes Risk Score sheet was used for determination of risk status for developing diabetes. All participants with moderate and high risk were advised for regular blood glucose monitoring and dietary changes and lifestyle modification.

Collected data was coded and entered into the Microsoft Excel 10. Results are expressed in absolute numbers and percentages in tables. Chi-square test was used to test the association between categorical variables. ANOVA test of significance was applied to get mean difference of quantitative variable among three groups. P value < 0.05 was considered statistical significant.

### Results

In present study, out of total 450 study participants, 57 (12.7%) participants were in low risk, 266 (59.1%) were in moderate risk and 127 (28.2%) were in high risk of developing diabetes according to IDRS score.

**Table 1: Association of IDRS status with socio-demographic characteristics of participants**

Socio-demographic characteristics	Variables	Low risk (n = 57) N (%)	Moderate risk (n = 266) N (%)	High risk (n = 127) N (%)	Total (n = 450) N (%)	p value
<b>Gender</b>	<b>Male</b>	35 (30.7)	61 (53.5)	18 (15.8)	114 (25.3)	<b>&lt;0.05</b>
	<b>Female</b>	22 (6.5)	205 (61.0)	109 (32.4)	336 (74.7)	
<b>Religion</b>	<b>Hindu</b>	23 (6.8)	209 (61.7)	107 (31.6)	339 (75.3)	<b>&lt;0.05</b>
	<b>Muslim</b>	34 (30.6)	57 (51.4)	20 (18.0)	111 (24.7)	
<b>Marital Status</b>	<b>Married</b>	53 (13.5)	225 (57.2)	115 (29.3)	393 (87.3)	<b>&lt;0.05</b>
	<b>Divorced</b>	00 (0.0)	09 (100)	00 (0.0)	09 (02)	
	<b>Widow</b>	04 (20.0)	04 (20.0)	12 (60.0)	20 (4.4)	
	<b>Single</b>	00 (00)	28 (100)	00 (00)	28 (6.2)	
<b>Type of Family</b>	<b>Nuclear</b>	33 (13.0)	154 (60.9)	66 (26.1)	253 (56.2)	<b>&gt;0.05</b>
	<b>Joint</b>	24 (14.5)	89 (53.6)	53 (31.9)	166 (36.9)	
	<b>Three generation</b>	00 (00)	23 (74.2)	08 (25.8)	31 (6.9)	
<b>Education</b>	<b>Illiterate</b>	34 (16.0)	95 (44.8)	83 (39.2)	212 (47.1)	<b>&lt;0.05</b>
	<b>Primary</b>	00 (00)	34 (77.3)	10 (22.7)	44 (9.8)	
	<b>Middle</b>	13 (10.7)	88 (77.3)	20 (16.5)	121 (26.9)	
	<b>High School</b>	10 (27.8)	22 (61.1)	04 (11.1)	36 (8.0)	
	<b>Graduate</b>	00 (00)	27 (73.0)	10 (27.0)	37 (8.2)	
<b>Occupation</b>	<b>Business</b>	10 (30.3)	14 (42.4)	09 (27.3)	33 (7.3)	<b>&lt;0.05</b>
	<b>Job</b>	00 (0.0)	12 (44.4)	15 (55.6)	27 (6.0)	
	<b>Laborer</b>	34 (25.2)	72 (53.3)	29 (21.5)	135 (30)	
	<b>Housewife</b>	13 (5.7)	145 (63.9)	69 (30.4)	227 (50.4)	
	<b>Unemployed</b>	00 (0.0)	23 (82.1)	05 (17.9)	28 (6.2)	
<b>SES</b>	<b>I</b>	14 (14.4)	60 (61.9)	23 (23.7)	97 (21.6)	<b>&lt;0.05</b>
	<b>II</b>	38 (14.2)	161 (60.1)	69 (25.7)	268 (59.6)	

	<b>III</b>	00 (0.0)	32 (65.3)	17 (34.7)	49 (10.9)	
	<b>IV</b>	05 (13.9)	13 (36.1)	18 (50.0)	36 (8.0)	

Table 1 depicts Association of IDRS status with socio-demographic characteristics of participants. Among females, 61.0% were found with moderate risk and 32.4% were found with high risk. Association of IDRS status was statistically significant ( $P < 0.05$ ) with gender of the study participants. Among 339 participants, who belonged to Hindu religion, 61.7% were found with moderate risk and 31.6% were found with high risk. On analyzing association of IDRS status with religion of the study participants, it was also found statistically significant ( $P < 0.05$ ). In marital status, all participants who were divorced found with moderate risk of diabetes. Among widow participants, 60.0% were found with high risk. Association of IDRS status was statistically significant ( $P < 0.05$ ) with marital status of the study participants. No significant association ( $p > 0.05$ ) found between type of family of the study

participants and IDRS status in present study. Among 212 participants, who were illiterate, 44.8% were found with moderate risk and 39.2% were found with high risk. Association of IDRS status was also statistically significant ( $P < 0.05$ ) with education of the study participants. Among unemployed participants, majority (82.1%) were found with moderate risk of diabetes. Among housewives, 30.4% were found with high risk. There was found a statistically significant association of diabetes risk with occupation of the participants. Out of 49 participants who belonged to socio economic status class III, 65.3% were found with moderate risk and 34.7% were found with high risk. Out of 36 participants who belonged to socio economic status class IV, 50% were found with high risk. Significant association ( $p < 0.05$ ) found between socio economic status class of participants and IDRS status.

**Table 2: Association of IDRS status with life style variables of participants**

Habits	Variables	Low risk (n = 57) N (%)	Moderate risk (n = 266) N (%)	High risk (n = 127) N (%)	Total (n = 450) N (%)	p value
<b>Diet</b>	<b>Vegetarian</b>	15 (9.1)	85 (51.8)	64 (39.0)	164(36.4)	<b>&lt;0.05</b>
	<b>Non-vegetarian</b>	42 (14.7)	181 (63.3)	63 (22.0)	286(63.6)	
<b>Smoking</b>	<b>Yes</b>	05 (7.5)	41 (61.2)	21 (31.3)	67(14.9)	<b>&gt;0.05</b>
	<b>No</b>	52 (13.6)	225 (58.7)	106(27.7)	383(85.1)	
<b>Tobacco</b>	<b>Yes</b>	10 (7.0)	92 (64.3)	41 (28.7)	143(31.8)	<b>&gt;0.05</b>
	<b>No</b>	47 (15.3)	174 (56.7)	86 (28.0)	307(68.2)	
<b>Alcohol</b>	<b>Yes</b>	09 (13.6)	40 (60.6)	17 (25.8)	66 (14.7)	<b>&gt;0.05</b>
	<b>No</b>	48 (12.5)	226 (58.9)	110(28.6)	384(85.3)	

Association of IDRS status with life style variables of participants is depicted in table 2. Out of 164 participants taking vegetarian diet, 51.8% were in moderate risk and 39.0 were in high risk of diabetes. There was statistically significant ( $P$

$< 0.05$ ) association between IDRS status and dietary habit of the study participants. Association of IDRS status was statistically non-significant ( $P > 0.05$ ) with tobacco, alcohol consumption and smoking habits of the study participants.

**Table 3: Association of IDRS status with BMI of study participants**

IDRS Score	Mean BMI	Standard Deviation	F value	p value
Low risk	20.88	2.82	43.3	<0.05
Moderate risk	20.95	4.92		
High risk	25.57	5.08		

Table 3 depicts association of IDRS status with BMI of study participants. ANOVA test of significance was applied to know mean difference between three groups of IDRS score. Mean BMI of participants increased from low risk group (20.88) to high risk group (25.57) and it was found statistically significant ( $P < 0.05$ ).

### Discussion

About 422 million people worldwide have diabetes, the majority living in low-and middle-income countries, and 1.5 million deaths are directly attributed to diabetes each year. Both the number of cases and the prevalence of diabetes have been steadily increasing over the past few decades. [1] Presently, more than three-quarters of the estimated 179 million people with diabetes are in the 40-59 years age range, hence it is important to screen individuals early to increase the quality of life and delay complications. [5] Present study was carried out to determine the association of IDRS status with socio-demographic factors and personal habits among urban adult population of Jhalawar, Rajasthan.

In present study, proportion of study participants found with high risk status as per IDRS was higher in female gender, Hindu religion, marital status widowed, illiterate and socio economic status class III and IV. Association of IDRS status was found statistically significant with gender, religion, marital status, education, socio economic status class of the study participants in present study. Similar to our study, Garima Namdev et al [10] found significant association between IDRS and various socio demographic variables like gender, religion, socio economic status, education and occupation of adult

population. A study by Mohammad Suhail Khan et al [11] among urban population of District Bareilly, Uttar Pradesh showed significant association between IDRS and gender whereas no significant association between IDRS and religion and socio-economic status. In contrast to our study, no significant association of IDRS status was seen with gender, occupation and socio economic status among the study participants in an urban resettlement colony of Delhi in the study by Anita Shankar Acharya et al [12].

In present study, there was found statistically significant association of IDRS status with dietary habit of the study participants. In contrast to our study, Mongjam Meghachandra Singh et al [13] reported no significant association of IDRS status with dietary habit of the study participants in their study on young medical students from Northern India.

In present study, association of IDRS status was also found statistically significant with BMI of the study participants. Mean BMI of participants increased from low risk group (20.88) to high risk group (25.57). Similarly statistically significant association between higher BMI with increased diabetes risk was present in the study conducted by Gopalakrishnan et al [14] and Chowdhury et al [15]. Anita Shankar Acharya et al [12] also reported that there was statistically significant association of Diabetes risk with BMI. Dr. P. Getrude Banumathi et al [16] also observed that with increase in BMI of the study participants the percentage of the individuals belonging to risk group also increased and a statistically significant association was seen between the BMI and IDRS risk status.

No significant association was seen between IDRS status and tobacco, alcohol consumption and smoking habits of the study participants in present study. In accordance to our study, there was no statistically significant association between diabetes risk and behavioral risk factors like smoking, tobacco and alcohol use in study by Anita Shankar Acharya et al [12].

### Conclusion

Proportion of participants found with high risk status was higher in female gender, Hindu religion, marital status widowed, illiterate and socio economic status class III and IV. The present study showed significant association between IDRS and socio demographic variables like gender, religion, marital status, education, socio economic status class. Association of IDRS status was also found statistically significant with dietary habit and BMI of the study participants. No significant association was seen between IDRS status and type of family, tobacco, alcohol consumption and smoking habits of the study participants.

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