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Risk Assessment of Type 2 Diabetes Mellitus using Indian Diabetes Risk Score among Adults Aged 30 Years and above in Rural Area of District Faridkot, Punjab

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Abstract: ***Diabetes mellitus is a non - communicable, chronic metabolic disorder. Indian Diabetes Risk Score (IDRS) is a simple, cost - effective tool for early detection of undiagnosed cases in the community. Methodology: This is a Community based cross - sectional study conducted in Village Sadiq, District Faridkot from February 2025 to March 2025. Total 170 subjects who were aged 30 years and above living in the village Sadiq for the past one year or more selected in the study. Results: The results of the study shows that More than half (53%) subjects were have moderate risk whereas 27.6% were have high risk and only 19.4% were have low risk of Diabetes mellitus. IDRS score was found to be significantly associated with age, education, smoking habits, monthly income, intake of fruits and vegetables, abdominal circumference and physical activity at 0.05 level of significance. Conclusion: Hence, it is concluded from the results that IDRS is a simple and cost - effective tool to identify individuals at risk for diabetes in community setting.***

Keyword: IDRS, Diabetes Mellitus, Adults, Risk

1. Introduction

Diabetes mellitus is a non - communicable, chronic metabolic disorder which mainly affects adults due to progressive malfunctioning of beta cell or when body cannot use insulin effectively. Insulin is a hormone that regulates blood sugar. Hyperglycaemia (raised blood sugar) due to uncontrolled diabetes for a longer period of time may leads to serious damage to nerves and blood vessels.[1, 2]

In India, nearly 77 million people above 18 years are suffering from type 2 diabetes mellitus and estimated 25 million are prediabetics.3 Unfortunately, near to half of the diabetic patient are not aware about their diabetic status witch further increases the disease burden. Adults with diabetes have higher risk of heart attacks and strokes. Neuropathy with combination with reduced blood flow in the feet increases the risk of foot ulcers, infection, and limb amputation. Diabetic retinopathy is an important cause of blindness due to damage to small blood vessels in retina. Diabetes is a leading causes of kidney failure/Nephropathy and increased risk to develop peripheral vascular diseases and Coronary Artery Diseases.[3]

Indian Diabetes Risk Score (IDRS) was developed by Madras Diabetes research Foundation (MDRF). It is a simple, cost - effective tool for early detection of undiagnosed cases in the community.4 It can be easily used by peripheral health workers such as ASHA, ANM, Community Health officers to identify the high risk individual for diabetes mellitus.

Objectives of study

- To determine the risk of type 2 diabetes mellitus among adults aged 30 years and above
- To find out the association between IDRS with the selected demographic variables.

2. Methodology

Study design Community based cross - sectional study

Study setting Village Sadiq, District Faridkot

Study population All males and females aged 30 years and above living in the village Sadiq for the past one year or more.

Inclusion criteria

- All males and females aged 30 years and above
- No known history of diabetes mellitus
- Who gave their informed consent.

Exclusion criteria

- Know case of diabetes mellitus
- Severely ill patient
- Pregnant and lactating mothers

Sample size and technique

From the previous studies the prevalence of diabetes in Faridkot district was 13% considered for the sample size calculation. Sample size was obtained as 170 by formula $4pq/d^2$ (p= 0.13, q=100 - p= 0.87, absolute precision d= 0.05). Convenient sampling technique was used in present study.

Study duration The study was carried out from February 2025 to March 2025.

Ethical Consideration Ethical permission was obtained from Institute Ethics Committee. Informed written consent was taken from subjects after explaining the purpose of the study.

Description of tool

The Indian Diabetes risk Score (IDRS) is non - invasive, cost - effective screening tool for type 2 diabetes risk, which was developed by Madras Diabetes research Foundation (MDRF).

It helps to evaluate individual at high, moderate or low risk of diabetes mellitus by assessing the four major risk factors two modifiable and two non - modifiable risk factors such as age, family history of diabetes, waist circumference and physical activity. This tool has minimum score of 0 and maximum score of 100. The individuals were classified as having high risk (score>60), moderate risk (score 30 - 50) and low risk (score<30) out of total score of 100.

3. Procedure of Data Collection

The data collectors were trained in the IDRS tool before data collection. Data was collected by house - to - house survey, carried out lane - wise one after the other, to identify the eligible participants. The subjects were explained about the objectives of the study in Punjabi language and informed consent for the study was taken. Data was collected using pre - designed, pre - tested questionnaire for socio - demographic details of subjects like age, gender, education/occupation, dietary habits, smoking habits, family income, no. of times intake of vegetables and fruits, BMI. Dietary history of fruits and vegetables intake was obtained using the World Health Organization (WHO) dietary assessment questionnaire. Adequate fruit consumption was defined as consumption of 100g of fruit every day in a week. Adequate vegetable consumption was defined as intake of > 300 g of vegetables every day in a week. Grades of BMI as per WHO were used. In IDRS tool age, family history of diabetes, waist circumference and physical activity was determined. Anthropometric measurements (height, weight, waist circumference) were measured using standard methods and noted.

Physical activity was classified as vigorous exercise, moderate exercise, mild exercise and no exercise. Vigorous exercise were defined as activities that cause large amount of effort, rapid breathing and a substantial increase in heart rate for at least 10 min.
Moderate exercise were defined as activities that required moderate amount of effort and noticeably increased heart rate for at least 10 min.

Subjects with no family history of diabetes were coded as 0 (score: 0); with one diabetic parent as 1 (score: 10) and with both diabetic parents as 2 (score: 20). Subjects with IDRS <30 were graded as low risk, 30–50 as medium risk and ≥60 as high risk. Subjects with increased risk of diabetes were referred to community health officer for further investigation.

Analysis
Data was entered and complied in Microsoft Excel. Data was interpreted as frequencies and percentage. The association was tested using the Chi - square test. A statistically P value was defined as one that was <0.05.

4. Results

Table 1: Characteristics of the study population N=170

Variable	Frequency	Percentage
Age (in years)		
30 - 35	31	18.2
35 - 49	88	51.8
>49	51	30
Gender		
Male	87	51.2
Female	83	48.8
Occupation		
Housewife	75	44.1
Unemployed	4	2.4
Unskilled	35	20.6
Skilled	10	5.9
Clerical/shop/farmer	33	19.4
Semi - professional	13	7.6
Education		
Non - literate	33	19.4
Primary school	19	11.2
Middle school	28	16.5
Matric school	45	26.5
Higher secondary	31	18.2
Graduate and above	14	8.2
Dietary habits		
Vegetarian	96	56.5
Non - vegetarian	74	43.5
Smoking habits		
Smoker	17	10
Non - smoker	153	90
Family monthly income (in Rs.)		
Upto 10, 000	34	20
10, 001 - 20, 000	70	41.2
20, 001 - 30, 000	23	13.52
30, 001 - 40, 000	30	17.64
40, 0001 - 50, 000	8	4.7
>50, 000	5	2.94
No. of time intake of fruits/day		
Nil	63	37
Once in a day	73	43
Twice in day	31	18.2
More than 2 times	3	1.8
No. of time intake of vegetable/day		
Once in a day	14	8.2
Twice in day	104	61.2
More than 2 times	52	30.6
BMI		
Less than 18.5	4	2.4
18.5 - 24.9	93	54.7
25 - 29.9	57	33.5
>30	16	9.4
Abdominal circumference (Males)		
<90cm	35	40.2
90 - 99 cm	42	48.3
>100cm	10	11.5
Abdominal circumference (Females)		
<80cm	41	49.4
80 - 89 cm	32	38.6
>90cm	10	12
Physical activity		
Vigorous exercise or Strenuous work	26	15.3
Moderate exercise at work/home	78	45.9
Mild exercise at work/home	41	24.1
No exercise and sedentary work	25	14.7
Family history of Diabetes mellitus		
No parent diabetic	106	62.4
Either parent diabetic	58	34.1
Both parents diabetic	6	3.5

In present study total 170 subjects participated. Half of the study subjects (51.8%) were between 35 - 49 years followed by 30% were more than 49 years. In context with gender, 51.2% respondents were male whereas less than half (48.8%) were females.

In relation to occupation, most of the females (44.1%) were house wife, 20.6% subjects were unskilled workers, 19.4% were clerical, farmers and shopkeepers. In present study 2.4% respondents were unemployed.

In present study, less than one - third (26.5%) subjects were having education upto matric, whereas 19.4% were non - literate and only 8.2% were graduates and above.

More than half (56.5%) of respondents were vegetarian and 43.5% were non - vegetarian. In present study, 10% of subjects were smokers.

In relation to monthly family income, less than half (41.2%) were having income between Rs.10, 000 to 20, 000 followed by 17.6% were between Rs.30, 001 to 40, 000.

In present study, near to half respondents (43%) consume one serving of fruit in a day whereas 37% subjects do not take any kind of fruit in a day. In relation to intake of vegetable in a day, near to two - third (61.2%) of subjects consume two servings of vegetables in a day whereas 8.2% subjects consume vegetable once in a day.

In present study, more than (54.7%) respondents have normal BMI whereas 33.5% subjects were over - weight followed by 9.4% obese. In present study, 48.3% males have abdominal circumference between 90 - 99 cm, 11.5% have abdominal circumference > 100 cm and 40.2 % have less than 90%. In females, near to half (49.4%) have abdominal circumference less than 80 cm, 38.6% between 80 - 89cm and 12% >90 cm.

In present study, less than half (45.9%) subjects perform moderate exercise at work/home, 24.1% perform mild exercise at work/home whereas 14.7% perform no exercise and sedentary work. Near to two - third (62.4%) have no family history of diabetes mellitus, 34.1% have either one parent diabetic whereas, only 3.5% have both parents diabetic.

Table 2: Frequency and percentage of IDRS Score among subjects N=170

IDRS Score	Frequency	Percentage
Low risk	33	19.4
Moderate risk	90	53.0
High risk	47	27.6

Table 2 shows the IDRS Score of study participants. More than half (53%) subjects were have moderate risk whereas 27.6% were have high risk and only 19.4% were have low risk of Diabetes mellitus.

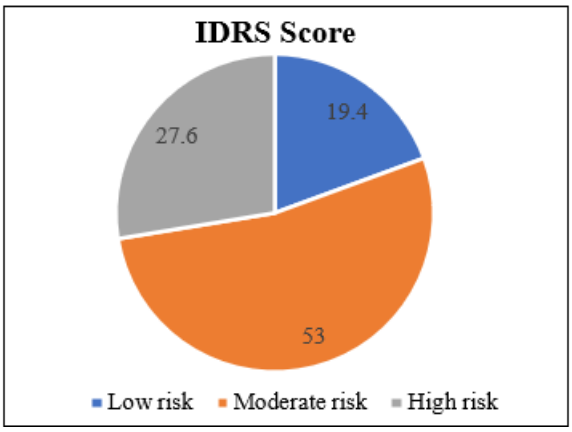

Figure 1: Pie chart showing IDRS Score among study participants

Table 3: Chi - Square value showing association of IDRS Score with selected variables N=170

Variable	Risk of Diabetes mellitus			Chi - square (df) p
	Low risk	Moderate risk	High risk	
Age (in years)				
30 - 35	19	7	5	62.8 (4) **0.00001**
35 - 49	6	44	38	
>49	8	39	4	
Gender				
Male	14	48	25	1.25 (2) 0.53
Female	19	42	22	
Occupation				
Housewife	11	48	16	14.8 (10) 0.13
Unemployed	1	2	1	
Unskilled	10	15	10	
Skilled	2	4	4	
Clerical/shop/farmer	5	19	9	
Semi - professional	4	2	7	
Education				
Non - literate	10	10	13	34.8 (10) **0.0001**
Primary school	8	6	5	
Middle school	5	21	2	
Matric school	5	20	20	
Higher secondary	3	23	5	
Graduate and above	2	10	2	
Dietary habits				
Vegetarian	15	57	24	3.9 (2) 0.14
Non - vegetarian	18	33	23	

Smoking habits				
Smoker	2	2	13	22.9 (2) **0.00001**
Non - smoker	31	88	34	
Family monthly income (in Rs.)				
Upto 10, 000	5	15	14	18.7 (10) **0.04**
10, 001 - 20, 000	12	44	14	
20, 001 - 30, 000	10	10	3	
30, 001 - 40, 000	4	15	11	
40, 0001 - 50, 000	1	3	4	
>50, 000	1	3	1	
No. of time intake of fruits/day				
Nil	21	19	23	24.4 (6) **0.0004**
Once in a day	7	49	17	
Twice in day	4	21	6	
More than 2 times	1	1	1	
No. of time intake of vegetable/day				
Once in a day	4	4	6	41.5 (4) **0.00001**
Twice in day	5	67	32	
More than 2 times	24	19	9	
BMI				
Less than 18.5	1	2	1	8.6 (6) 0.19
18.5 - 24.9	24	44	25	
25 - 29.9	4	36	17	
>30	4	8	4	
Abdominal circumference (Males)				
<90cm	8	21	6	16.7 (4) **0.002**
90 - 99 cm	5	26	11	
>100cm	1	1	8	
Abdominal circumference (Females)				
<80cm	9	28	4	16.2 (4) **0.002**
80 - 89 cm	9	11	12	
>90cm	1	3	6	
Physical activity				
Vigorous exercise or Strenuous work	10	12	4	12.8 (6) **0.04**
Moderate exercise at work/home	12	48	18	
Mild exercise at work/home	8	18	15	
No exercise and sedentary work	3	12	10	
Family history of Diabetes mellitus				
No parent diabetic	20	63	23	8.7 (4) 0.06
Either parent diabetic	12	26	20	
Both parents diabetic	1	1	4	

Table 3 shows that the IDRS score was found to significantly associated with age, education, smoking habits, monthly income, no. of times intake of fruits and vegetables, abdominal circumference and physical activity at 0.05 level of significance. The risk of diabetes, however was not significantly associated with gender, occupation, dietary habits, BMI and family history of diabetes mellitus.

5. Discussion

The present community based cross - sectional study was conducted among adults in Village Sadiq, Faridkot. The prevalence of low, moderate and high risk of diabetes was found to be 19.4%, 53% and 27.6% respectively. These findings were similar with the findings of many studies - Nishant Wadhera et. al in Uttar Pradesh (2020) [5], Smita M Nimbannavar et. al in Karnatak (2023) [6], Susha Bala et. al. in Hyderabad (2018)[7], Preeti Dugg et. al. in Delhi (2019) [8] where majority of subjects were in moderate or high risk group for diabetes.

However, few studies done by Shobha Chaturvedi et. al in Uttar Pradesh (2018) [9], one study in Jammu and Kashmir by Sheikh Mohd Salim et. al (2016) [10] found majority of the subjects to be in low risk group. This difference could be due to different study settings, study periods, sampling techniques and profile of participants etc.

The prevalence of moderate to high risk of diabetes among adults in the present study increased with increases in age of the subjects. This finding is similar with the study conducted in Madhya Pradesh by Garima Namdev et. al. (2018).1[1] This could be due to the fact that age is one of the non - modifiable risk factor in IDRS to assess the risk of Diabetes.

In present study, smoking was found to be significant associated with increasing risk of diabetes. This result is consistent with the study conducted by Nishant Wadhers et. al. in Western Uttar Pradesh has found significant association between risk of diabetes and smoking.[5]

In our study, Vigorous, moderate, mild and no physical activity was carried by 15.3%, 45.9%, 24.1% and 14.7% respectively. In present study, Significant association was found between physical activity and risk of diabetes. This finding is similar with many studies which have shown that

physical activity less than the recommended value (< 150 min per week) does increase the risk of Type 2 diabetes.[12]

In present study, 48.3% males have abdominal circumference between 90 - 99 cm, 11.5% have abdominal circumference > 100 cm. In females, 38.6% have between 80 - 89cm and 12% of females have abdominal circumference more than 90 cm. In our study, increased abdominal circumference is found to significantly associated with risk of diabetes. This result is consistent with the study conducted by Suraj A et. al and Meghwal S et. al in 2019 in with IDRS score was found to be significantly associated with waist circumference.[13, 14]

In present study level of education is found to significantly associated with increased risk of diabetes. This can be due as Individuals with lower education levels may have less access to information regarding health lifestyle, importance of physical exercise and balance diet, which increases the risk of developing diabetes.

In present study, the risk of diabetes, however was not significantly associated with gender, occupation, dietary habits, BMI and family history of diabetes mellitus. The results of study contradict the study conducted by Mongjam Meghachandra Singh et. al (2017) in Delhi, Preeti Dugg et. al. (2019) in Delhi, Ranadip et. al in West Bengal.[12, 8, 15]A study conducted among adults of Tamil Nadu by Kumaran et al.[16] did not reveal a statistically significant relationship between BMI and IDRS which is also similar in present study. The reasons for this finding could be the small sample size and convenient sampling method followed in the study

6. Conclusion

This study evaluate the utility of IDRS tool in early identification of diabetes risk pattern in community. In community setting education awareness with behavioural, lifestyle and nutritional modification is vital to manage the risk of diabetes in community. Peripheral health workers such as ASHA, ANM, Anganwadi workers can be trained in implementation of IDRS tool for early identification, prevention and management of diabetes.

Conflict of interest
There is no conflict of interest.

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