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Risk Assessment of Diabetes Using Indian Diabetes Risk Score (IDRS) Among 30 – 40 Years Population in Urban Health Training Centre, Baghaura, District Jalaun

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Abstract: Diabetes mellitus is a major public health problem in India, with increasing prevalence among younger adults due to rapid urbanization and lifestyle changes. Early identification of individuals at high risk is essential for timely preventive interventions. The Indian Diabetes Risk Score (IDRS) is a simple, non-invasive, and cost-effective tool for community-level screening.

Objectives: To assess the risk of diabetes among adults aged 30–40 years using the Indian Diabetes Risk Score and to determine its association with selected sociodemographic and lifestyle factors.

Methods: A facility-based cross-sectional study was conducted at an Urban Health Training Centre in Jalaun district, Uttar Pradesh, during September–October 2025. A total of 110 adults aged 30–40 years were enrolled using predefined inclusion and exclusion criteria. Data were collected using a pre-tested questionnaire incorporating IDRS components. Random blood glucose was measured for high-risk individuals. Data were analysed using SPSS version 25.

Results: Among the participants, 36.4% were classified as high risk, 54.5% as moderate risk, and 9.1% as low risk according to IDRS. The overall prevalence of diabetes was 9%, while 25% of individuals in the high-risk group had random blood glucose levels suggestive of diabetes. Family history of diabetes showed a statistically significant association with high IDRS risk ($p = 0.038$).

Conclusion: The Indian Diabetes Risk Score is an effective, simple, and feasible screening tool for early identification of individuals at risk of diabetes in urban health-care settings.

Keywords: Diabetes mellitus, IDRS, High Risk, Urban population, blood sugar

Introduction:

- Non-communicable diseases (NCDs) are leading causes of morbidity and mortality among young adults globally. Diabetes mellitus is a rapidly escalating public health issue in India, with urban populations dispro-portionately affected due to lifestyle and environmental transitions. [1]
- According to the International Diabetes Federation (IDF, 2025), 11.1% of the global

adult population aged 20–79 years—approximately 589 million people—are living with diabetes, and this number is projected to rise to 853 million by 2050. [2,3]

- Over 80% of adults with diabetes reside in low- and middle-income countries, and diabetes accounts for more than 3.4 million deaths annually, with global health expenditure exceeding one trillion US dollars in 2024. [1`2]
- The Indian Diabetes Risk Score (IDRS), developed by the Madras Diabetes Research Foundation, is a validated, non-invasive, and cost-effective screening tool using age, family history, waist circumference, and physical activity. However, limited evidence exists regarding its predictive value among younger urban adults aged 30–40 years. [4,5]

Operational Definitions:

- ***Diabetes Mellitus****:* Diagnosed by a physician or Random blood glucose level >200 mg/dl with classic symptoms of diabetes.
- ***Overweight and Obesity****:* BMI ≥25 kg/m2 (Overweight); ≥30 kg/m2 (Obese).
- ***Physical Inactivity****:* Less than 150 minutes of moderate-intensity physical activity per week
- ***High-risk Diet****:* Regular intake of high-sugar, high-fat processed foods.

Research Gap: Despite increasing diabetes awareness and diagnostic services, early adult populations (30–40 years) remain under-researched in district-level datasets, particularly in backward regions like Bundelkhand. Local prevalence, risk factor profiles, and health-seeking behavior in such demographics remain unclear.

Rationale of the study: This study will be confined to individuals aged 30–40 years attending or residing within the catchment area of the Urban in Jalaun. It will exclude known diabetic patients or those currently under treatment for diabetes.

Aim: To Assess the Risk of diabetic among 30–40-year age group using the IDRS in Urban Population of Jalaun district.

Objectives*:*

1. To categorize participants into low, moderate, and high diabetes risk based on IDRS.
2. To determine the association between sociodemographic/lifestyle factors and IDRS levels.

Methodology:

Study Design: Facility-based cross-sectional study.

Study Setting: Urban Health Training Centre (UHTC), Baghaura, Jalaun.

Sampling Technique: Consecutive non-probability sampling technique was used**.**

Study Population: Adults aged 30–40 years attending OPD during the month of September and October 2025. During these two months, the total OPD attendance was 1435. Among them, 180 patients were in the age group of 30 -40 years, of which35 were pregnant women, 20 were already diagnosed with diabetes and 15 did not give consent.

Inclusion criteria:

1. Individuals aged 30 to 40 years attending the OPD during study period.
2. Those who provided written informed consent to participants in this study.

Exclusion criteria:

1. Individuals who did not provide consent.
2. Pregnant women.
3. Severely ill patients or those unable to participate in the study procedures.

- **Data Collection Tool**: Pre-tested questionnaire including IDRS parameters.
- **IDRS Components**: Age, Family History, Waist Circumference, Physical Activity.
- **Blood Sugar Assessment**: Random Blood Glucose measurement.
- **Data Analysis**: SPSS Version 25 used for statistical analysis.

Table 1: Sociodemographic Characteristics of Study Participants

Characteristic	Category	Frequency (n)	Percentage (%)
Age	30 – 34 years	42	38.2
	≥35 years	68	61.8
Sex	Male	40	36.4
	Female	70	63.6
Education	Illiterate	24	21.8
	Primary	16	14.5
	Secondary	34	30.9
	Higher secondary & above	36	32.7
Socioeconomic Class	Class I	9	8.2
	Class II	28	25.5
	Class III	45	40.9
	Class IV & V	28	25.5
Characteristic	Category	Frequency (n)	Percentage (%)
Occupation	Business	11	10.0
	Household worker	11	10.0
	Housewife	45	40.9
	Labourer	7	6.4
	Service	12	10.9
	Retired	6	5.5
	Others	19	17.3
Family History of DM	Yes	12	10.9
	No	98	89.1
Physical Activity	Sedentary to mild	73	66.4
	Moderate to vigorous	37	33.6
Waist circumference(cm)	Men <90, women <80	53	48.6
	Men≥ 90, women ≥80	57	51.4

Table 2: Distribution of Participants by IDRS Category

Risk Category	Frequency	Percentage
Low (<30)	10	9.1%
Moderate (30–60)	60	54.5%
High (≥60)	40	36.4%
Total	110	100%

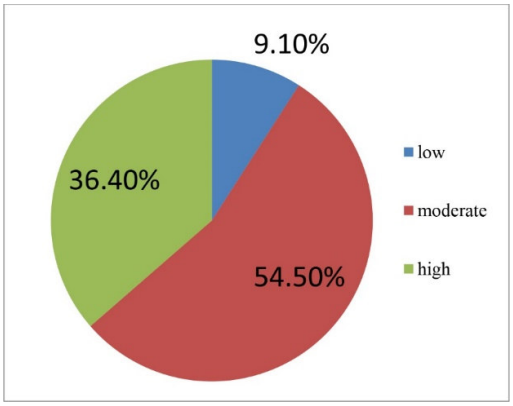


Fig 1: Distribution of Participants by IDRS category

Table 3: Association Between Sociodemographic Factors and IDRS(High Risk Category)

Variable	High Risk n (%)	Not High Risk n (%)	χ^2	df	p-value
Age Group			0.00	1	1.000
30–34 years	20 (50.0)	35 (50.0)			
≥35 years	20 (50.0)	35 (50.0)			
Gender			0.64	1	0.421
Male	18 (45.0)	32 (45.7)			
Female	22 (55.0)	38 (54.3)			
Education			0.27	1	0.602
Illiterate/Primary	11 (27.5)	19 (27.1)			
Above Primary	29 (72.5)	51 (72.9)			
Socio-economic Status			0.32	1	0.571
Lower	9 (22.5)	18 (25.7)			
Others	31 (77.5)	52 (74.3)			

*No sociodemographic factor (age group, gender, education, SES) showed a statistically significant association with high IDRS risk ($p > 0.05$).

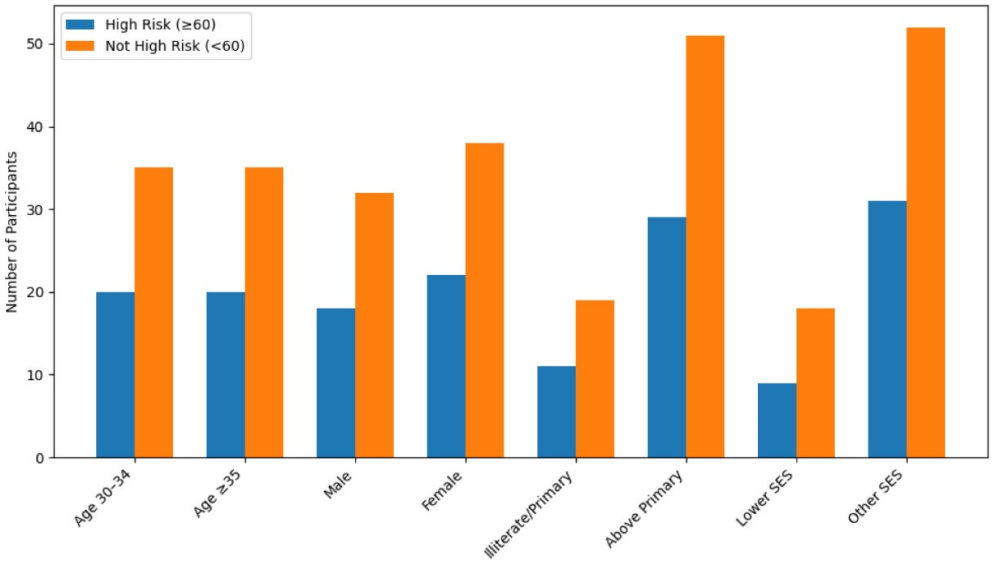


Fig 2. Association Between Sociodemographic Factors and IDRS(High Risk Category)

Table 4: Association Between Lifestyle Factors and IDRS(High Risk Category)

Variable	High Risk n(%)	Not High Risk n(%)	χ^2	df	p-value
Physical Activity			0.08	1	0.775
Sedentary/Mild	26 (65.0)	47(67.1)			
Moderate/Heavy	14 (35.0)	23(32.9)			
Waist Circumference			0.27	1	0.601
Normal (<80 cm)	19(47.5)	34 (48.6)			
High (≥80 cm)	21(52.5)	36(51.4)			
Family History of Diabetes			4.31	1	0.038*
Yes	8 (20.0)	4 (5.7)			
No	32 (80.0)	66(94.3)			

*Family history of diabetes was significantly associated with high IDRS risk ($p = 0.038$), while physical activity and waist circumference were not significant ($p > 0.05$).

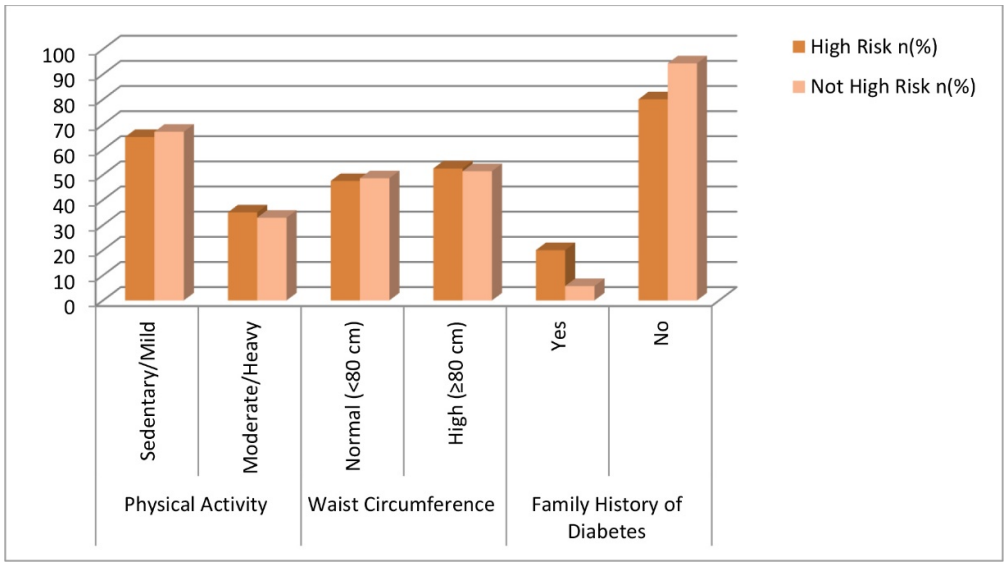


Fig.3: Association Between Lifestyle Factors and IDRS(High Risk Category)

Table 5: Random Blood Glucose Levels Among High-Risk Individuals

Blood Glucose (mg/dL)	Frequency	Percentage
<140	19	47.5%
140 - 199	11	27.5%
>200	10	25%
Total	40	100%

Results:

Prevalence of diabetes mellitus is 9.0% overall and the prevalence of diabetes mellitus in the high – risk group is 25%.

A total of 110 participants aged 30–40 years were included in the study to assess the risk of diabetes using the Indian Diabetes Risk Score (IDRS). Based on IDRS categorization, 10 (9.1%) participants were classified as low risk (IDRS <30), 60 (54.5%) as moderate risk (IDRS 30–60), and 40 (36.4%) as high risk (IDRS ≥60). Thus, more than one-third of the study population belonged to the high-risk category, indicating a considerable burden of diabetes risk among young urban adults.

Association between sociodemographic variables and high IDRS risk category showed no statistically significant relationship. Age group (30–34 years vs ≥35 years) was not significantly associated with high risk (p=1.000). Similarly, gender (p=0.421), education status (p=0.602), and socioeconomic status (p=0.571) did not demonstrate significant association with high IDRS risk.

Among lifestyle and family-related factors, physical activity level was not significantly associated with high IDRS risk (p=0.775). Waist circumference also did not show a statistically significant association with high risk (p=0.601). However, family history of diabetes was found to be significantly associated with high IDRS risk category (p=0.038), highlighting the importance of hereditary predisposition in identifying individuals at greater risk. Overall, IDRS effectively identified high-risk individuals for further screening and preventive interventions.

Discussion:

In the present study, 36.4% of participants were categorized as high risk (IDRS ≥60), while 54.5% were at moderate risk for developing type 2 diabetes mellitus. These findings indicate a significant burden of diabetes risk among young urban adults aged 30–40 years in Jalaun. Our proportion of high-risk individuals is consistent with the findings of Pal et al.[1], who assessed risk in an urban population, and Patil and Gothankar [3], who reported a high-

risk proportion of 36.5% in an urban slum cohort. The majority of our participants falling into the intermediate and high-risk categories (90.9%) mirrors the trends observed by Gangwar et al. [9] in Northern India.

The overall prevalence of diabetes in this study was 9.0%, which increased substantially to 25% among those in the high-IDRS-risk category. This sharp rise in prevalence among high-score individuals validates the predictive accuracy and utility of the IDRS as a screening tool for undiagnosed diabetes, as originally established in the simplified IDRS models by Mohan et al. [4,5]. Furthermore, our results align with the validation studies conducted by Sengupta et al. [6], which emphasize that a higher IDRS score significantly correlates with a higher likelihood of detecting dysglycemia in community settings.

A primary finding of this research was that family history of diabetes was the only factor significantly associated with a high IDRS category (p=0.038). This underscores the dominant role of hereditary predisposition in determining diabetes risk among adults in the 30–40 year age bracket. This significant association is supported by the work of Anand et al. [2] and Chandrupatla et al. [10], who identified family history as a critical independent risk factor for the prevalence of diabetes in urban Indian populations.

Conversely, several factors traditionally linked to diabetes risk did not show statistical significance in this specific cohort. Sociodemographic variables, including age (p=1.000), gender (p=0.421), and socioeconomic status (p=0.571), were not significantly associated with high IDRS risk. Similarly, lifestyle parameters such as physical activity levels (p=0.775) and waist circumference (p=0.601) showed no significant relationship with the high-risk category. These results contrast with studies by Subramani et al. [7] and Patil et al. [8], who found significant associations between lifestyle factors like abdominal obesity and sedentary habits with diabetes risk in North Indian populations.

This discrepancy may be attributed to the narrow and relatively young age band (30–40 years) of our study population or the pilot nature of the study, which utilized a sample size of 110. In this "early adult" demographic, the physiological impact of sedentary behavior and abdominal obesity may not yet have reached the threshold of statistical significance seen in the broader age groups studied by others.

Ultimately, this study addresses a critical research gap in the backward region of Bundelkhand. Given that over one-third of the participants are at high risk, the IDRS serves as a simple, non-invasive, and cost-effective tool for mass screening in resource-limited urban settings where diagnostic tests like HbA1c may not be readily available [4,9].

Limitations of the Study

The present study has certain limitations. First, the cross-sectional design limits the ability to establish a temporal or causal relationship between identified risk factors and the development of diabetes. Second, the study was conducted in a single urban health training centre with a relatively small sample size, which may limit the generalizability of the findings to the wider urban population of the district. Third, random blood glucose estimation was used instead of fasting plasma glucose or oral glucose tolerance test for confirmation of diabetes, which may have led to misclassification in some participants. Additionally, information on physical activity and family history was self-reported and therefore subject to recall bias. Despite these limitations, the study provides valuable preliminary evidence on diabetes risk among young urban adults.

Conclusion:

The study reveals a significant burden of diabetes risk among young urban adults in Jalaun, with 36.4% of participants categorized as high risk (IDRS ≥60) and 54.5% at moderate risk. The predictive utility of the IDRS was validated by the finding that the prevalence of diabetes was 25% among those in the high-risk category, compared to an overall prevalence of 9.0%.

A key finding was that family history of diabetes was the only factor significantly associated with a high IDRS category (p=0.038) in this 30–40-year age group. Other sociodemographic and lifestyle factors, including physical activity and waist circumference, did not show statistically significant associations in this specific cohort, likely due to the narrow age band and the pilot nature of the study. Ultimately, the Indian Diabetes Risk Score is a

simple, non-invasive, and cost-effective tool that is highly effective for the early identification of individuals at risk for type 2 diabetes in community settings.

Recommendation:

1. **Routine Community Screening**: Systematic screening using the IDRS should be implemented at primary health centres for all adults starting from age≥30 to identify "hidden" cases of diabetes and prediabetes.
2. **Targeted High-Risk Surveillance**: Individuals with a positive family history of diabetes should be prioritized for frequent screening and counselling, as hereditary predisposition is a dominant risk factor in early adulthood.
3. **Confirmatory Diagnostic Testing**: All individuals identified as High Risk (IDRS ≥60) should undergo formal diagnostic testing, such as Fasting Blood Glucose or Oral Glucose Tolerance Tests (OGTT), to confirm their glycemic status and initiate early management.
4. **Early Lifestyle Intervention**: Community-based awareness programs should focus on promoting physical activity and healthy dietary modifications even in younger age groups to delay the progression from moderate to high-risk categories.
5. **Shift to Risk-Factor Management**: Primary healthcare should evolve from a biomedical model to a more proactive approach that focuses on managing identifiable risk factors (like obesity and inactivity) rather than just treating the disease after onset.

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