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# Assessment Of Diabetic Risk Using The Indian Diabetic Risk Score (Idrs) In A Student Population Of A Medical College In Tamilnadu: A Cross-Sectional Study

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**ABSTRACT:**

**Background:**In contract to western population more than two-third of diabetes cases in India go undiagnosed, especially in younger population. Mass screening of this population appears to be the best tool for early identification and disease prevention. The Indian Diabetes Risk Score (IDRS) appears to be an effective tool in detecting high risk cases.

**Objective**: To assess the risk of developing diabetes mellitus among young medical students using IDRS.

**Materials and methods:** This cross-sectional study was conducted using a semi-structured questionnaire incorporating components of IDRS as a screening tool among 241 studentsand analysed with SPSS Version 26.

**Results**: Our results showed 49.4%, 47.3% and 3.3% of the students had a low, moderate and high risk of acquiring diabetes mellitus respectively. With respect to physical activity 9.9%, 35.6%, 36.5% and 17.8% of students engaged in vigorous, moderate, mild and no physical activity respectively. About 8.2% of students had a positive family history of diabetes in both parents, 35.6% had one parent with the diabetic and 56% of students had no positive family history. Comparison of IDRS and risk factors established a statistically significant correlation for low physical activity and family history of diabetes mellitus ($p<0.0001$).

**Conclusion**: Family history being non-modifiable; low physical activity appears to be the primary modifiable risk factor in young individuals. This study emphasizes the significance of physical activity for primary prevention and lowering disease burden.

**Keywords:** IDRS, Diabetes mellitus, medical students, Physical activity, Family history.

## INTRODUCTION:

Diabetes mellitus is a chronic endocrine disorder that affects effective glucose utilization by the body due to insulin resistance or inadequate insulin secretion. It may often remain asymptomatic for a longer period of time with more young adults getting added to the cohort.[1] It has reached epidemic proportions globally, affecting both developed and developing countries alike. The International Diabetes Federation recently released a concerning report estimating that 422 million people worldwide currently have diabetes and that number is projected to rise to 592 million by 2035 with 79.4 million of those individuals coming from India.[2]No wonder India is often referred to as the 'Diabetic Capital of the World', as it accounts for 17% of the total number of diabetes patients in the world. If the current diabetic scenario continues at the same rate, it might have a disastrous long-term impact on the nation's development, manpower, and economy. Increases in urbanization, aging populations, obesity rates, and physical inactivity are all contributing factors to the rising number of diabetics. Evidence suggests that early identification of diabetes by appropriate screening methods might help prevent or delay vascular consequences, which in turn can lessen the disease's clinical, social, and financial impact, especially in individuals with elevated diabetes risk.[3] At the Madras Diabetes Research Foundation (MDRF), in Chennai, Mohan et al.[4] have created the Indian Diabetes Risk Score (IDRS), a screening tool for predicting undetected diabetes. The IDRS has a 72.5% sensitivity and a 60.1% specificity for identifying diabetic risk.[5] The main benefits of IDRS are its cost effectiveness, comprehensibility, and ease of use.Additionally,Diabetes mellitus type 2 and non-type 2 can be distinguished using IDRS.[6]After being viewed for thirty years as a benign condition mostly affecting the elderly, diabetes is now one of the leading causes of illness and death among young and middle-aged adults. Due to their scholastic responsibilities, with very little time for physical activity, medical students typically have lifestyle characterized by gadgets and sedentary sophistication. There are only a handful of research done on diabetes screening among young medical students. With this in mind we set out to evaluate the risk of developingdiabetes mellitus among young medical students using IDRS.

## METHODOLGY:

**Study design:**Descriptive Cross-sectional study

**Study area & subjects:**This study was conductedin the department of Physiology, among the Phase-I medical students of a private medical college in Chennai, Tamilnadu, India.

**Inclusion criteria:** After explaining the purpose of the study, Phase-I medical students above the age of 18 years willing to participate were included in the study.

**Exclusion criteria:** Students with pre-existing medical conditions such as chronic liver disease, chronic kidney disease (CKD), type 1 diabetes mellitus (T1DM) and thyroid disorder were excluded from the study

**Study duration**: 1 Month(January 2024 to February 2024).

**Sample size**: The estimated sample size was 256 using the formula $Z\acute{a}^2pq/L^2$, where from previous studies the prevalence (p) is 40%, q is 60%, and allowable error (L) = 15% of prevalence (P=6). The estimated sample size = 256. Due to missing data, 15 student's records were excluded. So, the size of the sample is finally 241.[7]

## Ethical consideration:

The study commenced after receiving approval from the institutional ethical committee and written informed consent from the study participants. It was conducted strictly in compliance with the principles set forth in the "Declaration of Helsinki" and by the Indian Council of Medical Research (ICMR)-2000, the Central Ethics Committee on Human Research (CECHR) and others for biomedical research involving human subjects. (Ethics clearance number: SRMIEC-ST0224-951)

**Study tool:** A pre-tested, validated semi-structured questionnaire prepared by the principal investigator and team,incorporating the risk factors for diabetes mellitus and IDRS was used as the survey tool. It collected information under the following subheadings:

1. **Socio-demographic data:**

   Participants self-reported socio-demographic details like age in years, gender (Male/Female), religion (Hindu/Muslim/Christian/others) type of family (Nuclear/Joint) and diet (Vegetarian/Non-vegetarian) were recorded under this section.

2. **Anthropometric measures:**

   This included measures such as height, weight, body mass index (BMI), blood pressure and waist circumferenceall of which were measured using standard guidelines.

3. **Indian Diabetic Risk Score:**

   The IDRSemploys measures such as age, physical activity, waist circumference and family history of diabetes to identify people who are at risk. Among the above 4 risk factors two (Physical activity and waist circumference) are modifiable and remaining

two (age and family history) are non-modifiable. Table 1 provides the scoring and interpretation details. The IDRS will be calculated based on the collected data of the above four risk factors. The minimum score is 0 and the maximum score is 100. Greater the score, higher the risk of developing diabetes mellitus. The study subjects were classified as high risk, moderate risk and low risk, based on the IDRS as per the following score – up to 30 score as low risk, 30-50 score as moderate risk and 60 and above as high risk.

**Definitions:**

**Physical activity:**For classifying physical activity the short version of the International Physical Activity questionnaires (IPAQ) was used as reference.[8] Activities that require a lot of effort, fast breathing, and a significant rise in heart rate for at least ten minutes straight were classified as vigorous intensity activities. Activities that required a moderate level of effort and a notably elevated heart rate for at least ten minutes straight were classified as moderately intense. Sedentary activities at work or home and/or lack of exercise were classified as no physical activity.

**Waist circumference:** A non-stretchable measuring tape was used to take the WC directly on the body, with light clothing, midway between the lowest rib and the iliac crest, and hip circumference at the level of the greater trochanters with legs close together, following a normal expiration.[9]

**Family history:**Subjects identified if none, one or both parents had history of diabetes mellitus.

**Statistical methods:**

Collected data was entered in Microsoft excel and analysed with Statistical package for social sciences (SPSS) Version 26.We computed percentages and frequencies. To see if there was any association between the various factors under investigation, proportions were compared using the Chi Square test. p value less than 0.05 was considered significant.

## RESULTS:

Table 1 shows the study participant's Indian Diabetes Risk Score (IDRS)parameters, frequency and percentage.

All participants were younger than 35 of age. A total of 241 students were examined, about 147 (61%) had waist measurements of less than 80 cm for females or less than 90 cm for

males; 67 (27.8%) had waist measurements of 80-89 cm for females or 90-99 cm for males; and 27 (11.2%) had waist measurements of more than 90 cm for females or more than 100 cm for males.Physical activity scoring shows 24 students (9.9%) engaged in vigorous physical activity, 86 students (35.6%) in moderate physical activity, 88 students (36.5%) in mild physical activity and 43 students (17.8%) in no physical activity. About 20 (8.2%) students had a positive family history, meaning that both parents had diabetes; 86 (35.6%) had just one parent with the diabetic and 135 (56%) had no positive family history.

**Table 1: IDRSparameters, frequency and percentage**

| **IDRS Parameters** | **Score** | **Frequency (n=241)** | **Percentage (%)** |
|---|---|---|---|
| **Age** | | | |
| < 35 years | 0 | 241 | 0 |
| 35-49 years | 20 | 0 | 0 |
| ≥ 50 years | 30 | 0 | 0 |
| **Waist circumference** | | | |
| Waist < 80 cm (female), < 90 cm (male) | 0 | 147 | 61 |
| Waist ≥ 80-89 cm (female), ≥ 90-99 cm (male) | 10 | 67 | 27.8 |
| Waist ≥ 90cm (female), ≥ 100 cm (male) | 20 | 27 | 11.2 |
| **Physical activity** | | | |
| Regular vigorous exercise or strenuous (manual) activities at home/work | 0 | 24 | 9.9 |
| Regular moderate exercise or moderate physical activities at home/work | 10 | 86 | 35.6 |
| Regular mild exercise or mild physical activities at home/work | 20 | 88 | 36.5 |
| No exercise and/or sedentary activities at home/work | 30 | 43 | 17.8 |
| **Family history of diabetes** | | | |
| No diabetes is parents | 0 | 135 | 56 |
| One parent is diabetic | 10 | 86 | 35.6 |
| Both parents are diabetic | 20 | 20 | 8.2 |

| **Maximum score** | 100 | | |
|---|---|---|---|
| **Grade** | | | |
| Score ≥60<br>Score 30-50<br>Score <30 | High risk<br>Moderate risk<br>Low risk | 8<br>114<br>119 | 3.3<br>47.3<br>49.4 |

IDRS-Indian Diabetes Risk Score

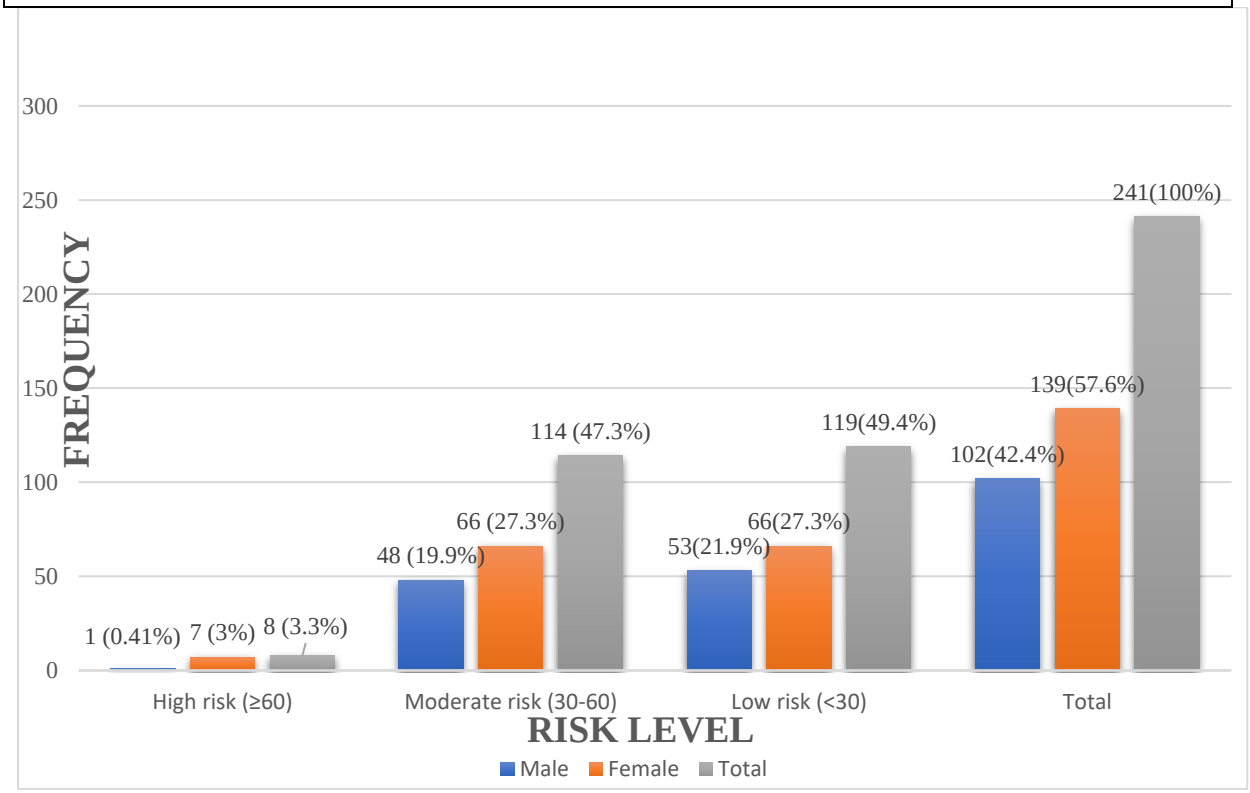
Table 2 (Figure 1) demonstrates that 49.4% of the students had a low risk of acquiring diabetes mellitus, 47.3% had a moderate risk, and 3.3% had a high risk. Compared to males (42.4%), females had a higher chance of acquiring diabetes mellitus (57.6%).

**Table 2: IDRS score for medical students**

| S.no | **Risk level** | **Male (%)** | **Female (%)** | **Total (%)** |
|---|---|---|---|---|
| **1** | High risk (≥60) | 1 (0.41%) | 7 (3%) | 8 (3.3%) |
| **2** | Moderate risk (30-60) | 48 (19.9%) | 66 (27.3%) | 114 (47.3%) |
| **3** | Low risk (<30) | 53 (21.9%) | 66 (27.3%) | 119 (49.4%) |
| | Total | 102 (42.4%) | 139 (57.6%) | 241 (100%) |

IDRS- Indian diabetes risk score

**Figure 1: Gender and IDRS score distribution**




The other risk factors and demographic traits for the students are explained in Table 3. Of the 241 students, 139 (57.7%) were female and 102 (42.3%) were male. The majority of them,

210 (87.1%), were Hindus, followed by 16 (6.6%) Muslims and 7 (2.9%) Christians. 37(15.4%) belonged to a joint family, while the majority, 204 (84.6%), belonged to a nuclear family. Of the students in the study, 216 (89.5%) had a mixed diet, and 25 (10.5%) were vegetarians.

Out of 241students, 203 (84.2%) were normotensive, 31 (12.9%) had prehypertension and 7 (2.9%) had stage I hypertension. Of the study students, 66 (27.4%) were overweight and nearly 2 (0.8%) were obese. 154 (63.9%) individuals were normal, while 19 (7.9%) were underweight.

**Table 3: Demographic characteristics and other risk factors**

| S.No | Characteristic | Frequency (N=241) | Percentage (%) |
|---|---|---|---|
| **1** | **Gender** | | |
| | Male | 102 | 42.3 |
| | Female | 139 | 57.7 |
| **2** | **Nutrition** | | |
| | Vegetarian | 25 | 10.5 |
| | Mixed | 216 | 89.5 |
| **3** | **Family Type** | | |
| | Nuclear | 204 | 84.6 |
| | Joint | 37 | 15.4 |
| **4** | **Religion** | | |
| | Hindu | 210 | 87.1 |
| | Muslim | 16 | 6.6 |
| | Christian | 7 | 2.9 |
| | Others | 8 | 3.3 |
| **5** | **Blood Pressure** | | |
| | Normal | 203 | 84.2 |
| | Prehypertensive | 31 | 12.9 |
| | Stage 1 Hypertension | 7 | 2.9 |
| | Stage 2 Hypertension | 0 | 0 |
| **6** | **BMI** | | |

| | | | |
|---|---|---|---|
| | Underweight (<18.5) | 19 | 7.9 |
| | Normal (18.5-24.99) | 154 | 63.9 |
| | Overweight (25-29.99) | 66 | 27.4 |
| | Obese (>30) | 2 | 0.8 |

BMI- Body mass index

Anassociation of the IDRS score and different risk variables is presented in Table 4. Various risk factors such as gender, family history, physical activity and IDR score arestrongly correlated.A statistically significant probability of acquiring diabetes mellitus was discovered with these ($p<0.0001$). Family type, diet, blood pressure readings, BMI and IDR Score did not significantly correlate with one another.

**Table 4: Association between IDRS and risk factors**

| **S.No** | **Risk factor** | **n= 241** | **IDRS > 30** | **Chi square value** | **p value** |
|---|---|---|---|---|---|
| **1** | **Gender** | | | | |
| | Male | 102 | 49 (40.2) | | |
| | Female | 139 | 73 (59.8) | 0.472 | 0.492 |
| **2** | **Nutrition** | | | | |
| | Vegetarian | 25 | 10 (8.2) | | |
| | Mixed | 216 | 112 (91.8) | 1.259 | 0.262 |
| **3** | **Family type** | | | | |
| | Nuclear | 204 | 106 (86.9) | | |
| | Joint | 37 | 16 (13.1) | 0.952 | 0.329 |
| **4** | **Religion** | | | | |
| | Hindu | 210 | 113 (92.6) | | |
| | Muslim | 16 | 4 (3.3) | | |
| | Christian | 7 | 2 (1.6) | | |
| | Others | 8 | 3 (2.5) | 6.968 | 0.073 |
| **5** | **Blood pressure** | | | | |

| | | | | | |
|---|---|---|---|---|---|
| | Normal | 203 | 107 (87.7) | | |
| | Prehypertensive | 31 | 12 (9.8) | | |
| | Stage 1 hypertension | 7 | 3 (2.5) | | |
| | Stage 2 hypertension | 0 | 0 | 2.283 | 0.319 |
| **6** | **BMI** | | | | |
| | Underweight (<18.5) | 19 | 7 (5.71) | | |
| | Normal (18.5-24.99) | 154 | 82 (67.2) | | |
| | Overweight (25-29.99) | 66 | 32 (26.2) | | |
| | Obese (>30) | 2 | 1 (0.8) | 1.989 | 0.575 |
| **7** | **Family History** | | | | |
| | Present | 106 | 82 (67.2) | | |
| | Absent | 135 | 40 (32.8) | 54.114 | 0.0001* |
| **8** | **Physical Activity** | | | | |
| | Mild to severe | 198 | 79 (64.8) | | |
| | No Physical activity | 43 | 43 (35.2) | 51.051 | 0.0001* |

BMI- Body mass index

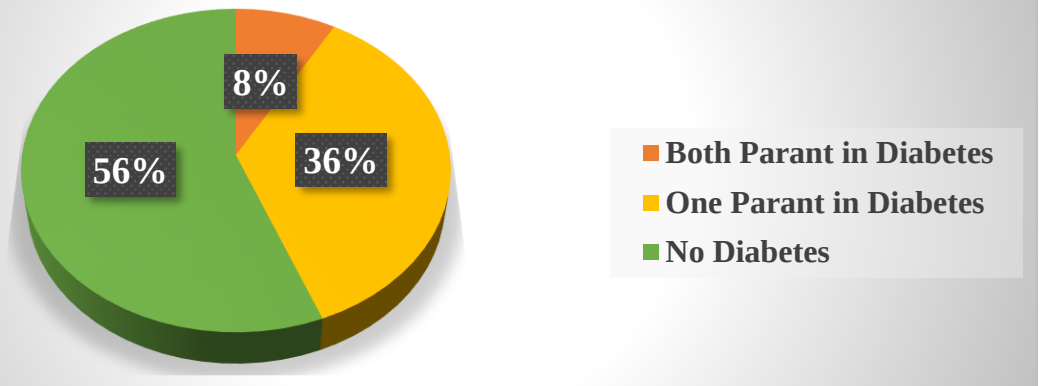
Results are expressed as mean ± SD, * -P< 0.001

## DISCUSSION:

According to the IDRS assessment, 3.3% of medical students are currently at high risk of developing type 2 diabetes mellitus almost similar to the study done byGopalakrishnan et al.[7] which showed5% of high-riskstudents.However, other investigations by Subramani et al.[10], Chowdhury et al.[11], Kumar et al.[12] and Mohan et al.[13] revealed that a greater proportion of individuals—12.1%, 31.5%, 18.66% and 31.2% respectively—were at a high risk of acquiring type 2 diabetes mellitus.Notably, 47.3% had a moderate chance of becoming diabetic, which was consistent with findings from Gopalakrishnan et al. (57.4%)[7], Chowdhury et al. (46%)[11], Kumar et al. (50%)[12],and Mohan et al. (50.32%)[13].According to Gopalkrishnan et al.'s[7] study, nearly 60% of the young medical students had a diabetes risk score of moderate to high. This study indicates that roughly 1.9% of participants fell into the high-risk category, compared to 8% in our study and roughly 47.3% fell into the moderate risk category. A decreased chance of acquiring diabetes mellitus was observed in 49.4% of the medical students. Comparable outcomes were also demonstrated by Gopalkrishnan et al. (40.6)[7], Chowdhury et al. (22.5%)[11], Kumar et al. (31.34%)[12]and Bhatia et al. (31%)[14].The

majority of medical students under the age of 35 were the focus of our investigation. The majority of participants in the studies by Subramani et al.[10], Chowdhury et al.[11]and Kumar et al.[12]was under 35 years old (54.5%, 47.2%, and 49%, respectively), however in the study by Mohan et al.[13], the majority was either over 50 years old (34.24%) or between 36 and 49 years old (34.24%).

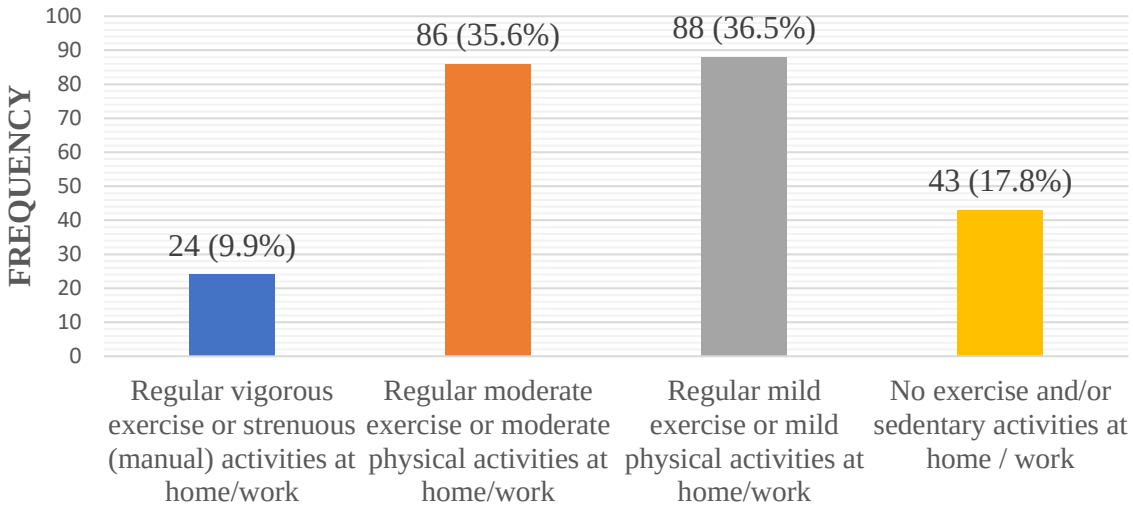
**Figure 2. Family history of diabetes**




The findings of Gopalkrishnan et al.7, Bhatia et al.[14] and our own investigations concerning the existence of a family history of diabetes were strikingly comparable. A negative family history was present in about 56.01% of the participants in our study (figure 2), compared to 53.4% in the Gopalkrishnan et al.[7]study and 68% in the Bhatia et al.[14] study. Similar to Gopalkrishnan et al.[7] (both –7.6%, single parent –39%), 8.29% of research participants had both parents with diabetes and 35.68% of only one of them.

In our study, approximately 36.5% of participants engage in mild physical activity, 35.6% in moderate physical activity, 9.9% in heavy physical activity, and 17.8% in no physical activity at all (figure 3). This is in contrast to a study by Subramani et al.[10], which found that 74.7% of participants engaged in moderate physical activity, 17.2% in heavy physical activity, and 9.5% in no physical activity. Comparably, 49% of participants in the Bhatia et al.[14] study engages in moderate physical activity, 41% do not engage in any physical activity, and 10% engage in heavy physical activity. In contrast to the study conducted by Chowdhury et al.[11], which found a strong correlation between the IDR Score and Body Mass Index, our study demonstrates a substantial link between the Gender, Family History, Physical Activity, and IDR Score.

**Figure 3. Physical activity**




Furthermore, the Chowdhury et al.[11] investigation found a significant and high correlation between the IDR Score and hypertension.

Two primary factors contributed to the higher score in our data: a positive family history (43.98%) and insufficient physical activity (54.3%; No and Mild exercise). A risk factor that cannot be changed is family history. As a result, prompt action is needed to motivate these students to improve their nutrition and level of physical exercise. In order to keep them informed about the health risks linked with diabetes and the different problems that can arise, we organized department guest lecturers and interactive workshops.

**Strengths and Limitations of the Study:**

The current study evaluated the risk of type 2 diabetes in young medical students using the streamlined IDRS tool, which can also be utilized for population-wide screening. An observation of the participants' diabetes risk trend over time is not possible with cross-sectional analysis, which is a limitation of this study. It is also doubtful to extrapolate the study's findings to the broader public because it used a limited sample size.

## CONCLUSION:

Our study demonstrates that more than half of the students had a moderate to high chance of acquiring type 2 diabetes mellitus in future.Low physical activity and a positive family history were the two main risk factors that contributed to the higher score in our data. Additionally positive family history and low physical activity were established to have a

statistically significant correlation for developing diabetes in future. Family history is a risk factor that cannot be altered. Thus, in our study the main modifiable risk factor for diabetes prevention in young adults appears to belack of physical activity. The study's findings highlight how important it is to prioritize and support health promotion in the form of disease screening for primordial and primary prevention. It validates the difficulty the younger generation faces in leading a healthy lifestyle. This study highlights the importance of including physical activity, even in the form of basic activities like brisk walking or skipping, in younger populations daily routines to maintain their health, since this will help to reduce the burden of disease in the future.

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