Relationship between Lifestyle habits and the Indian Diabetes Risk Score in a community based study at Meerut

Amandeep Kaur, Rahul Bansal, Pawan Parashar, Varsha Chaudhary, Bhawana Pant
Department of Community Medicine, Subharti Medical College, Meerut, Uttar Pradesh

CORRESPONDING AUTHOR
Dr. Amandeep Kaur, Department of Community Medicine, Subharti Medical College, Meerut, Uttar Pradesh 250005
Email: angel.amritsar@gmail.com

Abstract

Introduction: Diabetes mellitus, particularly Type 2 Diabetes Mellitus (T2DM), is a rapidly growing global health concern, with India facing a diabetes epidemic. The Indian Diabetes Risk Score (IDRS) is an effective tool for identifying individuals at risk of undiagnosed T2DM by considering factors such as age, abdominal obesity, family history, and physical activity. Lifestyle factors, including diet, screen time, sleep, and stress, are significant contributors to the development of T2DM, making the study of these factors essential for effective prevention strategies. **Aim & Objective(s):** The study aims to estimate the proportion of the population under different risk categories of IDRS and explore the association between various lifestyle habits and high-risk IDRS scores. **Methodology:** A community-based cross-sectional study was conducted in Multan Nagar, Meerut, from September 2022 to August 2023. A sample size of 503 individuals aged 30 and above was selected using a two-stage sampling technique. Data on socio-demographics, family history, dietary habits, physical activity, screen time, addiction history, and stress levels were collected using a pre-tested questionnaire. Chi-square tests were used to analyze the associations, with a p-value < 0.05 considered statistically significant. **Results:** The study found that 53.1% of participants were classified as moderate risk, 35.38% as high risk, and 11.53% as low risk based on their IDRS scores. High screen time and shorter sleep duration were significantly associated with higher IDRS scores (p-value < 0.00001). No significant association was found between dietary habits and high-risk IDRS scores. **Discussion:** Lifestyle factors such as screen time and sleep duration were significantly linked to diabetes risk, aligning with findings from previous studies. Increased screen time and insufficient sleep were associated with a higher risk of T2DM. However, dietary habits did not exhibit a significant correlation with the IDRS, suggesting that other factors may play a more substantial role in the risk of diabetes. **Conclusion:** This study highlights the significant impact of screen time and sleep duration on the Indian Diabetes Risk Score, suggesting the need for interventions targeting these modifiable lifestyle factors to prevent T2DM. While dietary habits did not show a significant relationship with the risk score, further research is needed to explore other contributing factors.

Keywords

Type2 Diabetes Mellitus (T2DM); Indian Diabetes Risk Score (IDRS); Lifestyle factors.

Introduction

Diabetes mellitus is a multi-factorial and complex condition, with global estimates predicting a rise to 629 million cases by 2045, according to the International Diabetes Federation Diabetes Atlas. While it has traditionally been considered a uniform condition, recent research has identified Type 2 Diabetes Mellitus (T2DM) as a collection of distinct and diverse disease subtypes. These findings highlight various patho-physiological mechanisms involved in T2DM, suggesting the potential for personalized treatment strategies targeting specific subtypes of the disease. (1)

India is facing a diabetes epidemic, with over 65 million individuals currently living with type2 diabetes, as estimated by the International Diabetes Federation. This number is expected to

double in the next 20 years. Notably, the prevalence of diabetes in urban areas of India is among the highest worldwide, on par with regions in West Asia and the Pacific that have similarly high rates. (2) Type2 diabetes is the most common form of the disease and is diagnosed based on well-established criteria. The need for screening for Type 2 Diabetes Mellitus is increasing, and one such tool is the IDRS, developed by the Madras Diabetes Research Foundation.

The IDRS takes into account four key risk factors: age, abdominal obesity, family history of diabetes, and physical activity. It includes two modifiable factors (waist circumference and physical inactivity) and two non-modifiable factors (age and family history). This screening not only helps identify individuals with undiagnosed diabetes but also provides insight into the prevalence of undiagnosed cases.(3)

Screening for diabetes plays a vital role in early detection, which can contribute to an improvement in the quality of life-years gained by patients over time. The IDRS, derived from the extensive 'CURES' study on diabetes in India by the Madras Diabetes Research Foundation, has demonstrated a sensitivity of 72.5% and specificity of 60.1% within the Indian population.(4)

Lifestyle factors play a significant role in the development of type 2 diabetes. Key contributors include diet, physical activity, sleep patterns, stress, smoking, and alcohol consumption. Studying the relationship between lifestyle habits and the onset of type 2 diabetes is crucial for understanding prevention strategies, promoting public health, and reducing the incidence of the disease. This knowledge can ultimately benefit individuals and society as a whole.**Aim & Objective(s):** 1. To estimate the percentage of study population under different risk categories of IDRS.

2. Determine the association of different variables with high risk subjects based on IDRS.

Material & Methods

The study was conducted within the urban Meerut. Study population was the people residing at Multan Nagar area of Meerut with age group 30 and above. The period of the study was one year from September 2022 to August 2023. On the basis of prevalence of undiagnosed diabetes to be 9% as taken by study conducted by Komal et.al in Meerut (2022) the sample size of study was calculated using following formula: Sample size (n) = Z^2 pq/ d2 where Z= 1.96 p= prevalence of undiagnosed diabetes (9%) q= 100 - p= 100-9=91 d=allowable absolute error =2.5%, an optimal sample size for study is calculated to be 503. This community-based cross-sectional study was carried out in the Multan Nagar

area, which falls under the urban health and training center of Subharti Medical College.Study's sample size was 503.A list of colonies under UHTC Multan nagar were taken, Multan nagar region comprised of 20 colonies. Two stage sample technique was used, In first stage 4 colonies were randomly selected out of 20 colonies. In second stage for selection of houses systematic random sampling technique was used .For selection of first house we reached the centre of first colony and rotated the bottle and the house towards which the mouth of bottle pointed was selected as a first house. There after every 2nd house taken for data collection, following left hand principal till desired sample size was achieved from 4 colonies. During visit to home, Schedule explaining the purpose of the study written consent was taken and the Schedule was filled. All the filled Schedule were checked for any missed or confusing entry by the researcher at the time of collection itself. A pre-designed/ pre tested questionnaire was used for collection of data which includes socio – demographic details, family history, dietary information, physical activity, screen time, addiction history, stress level. The data collected from the study subjects was entered in Microsoft excel spread sheet 2019. For proportion Chi squire test was applied to find out significant association between independent and dependant variables. Data was analyzed using software statistical Systat13.2. A p-value less than 0.05 was considered as statistically significant.

Results

The study conducted among 503 study participants. Table 1 shows the distribution of individuals across different risk categories based on their IDRS score (Indian Diabetes Risk Score). The majority of individuals were classified as having a moderate risk 267 (53.1%) of developing diabetes, followed by those with a high risk 178 (35.38%). A smaller proportion of individuals were classified as having a low risk 58 (11.53%). Table 2 shows lifestyle patterns across three key dimensions: screen time, sleeping hours, and dietary habits. It reveals that a significant portion of the population allocates 4 hours and more 307(61.0%) for screen time and 196(39.0%) for ≤ 3 hours.In terms of sleep, the majority opt for 7 hours and more (58.85%) follows by ≤ 6 hours 207(41.15%). Table 3 shows the association between different dietary habits and their respective risk levels of IDRS score. According to this study vegetarians and non vegetarians were equally in high risk category (35.4%) However the p-value (0.447) was not found to be statistically significant. Table 4 shows among individuals who spend 4 hours and more on screen time (44.29%)

were at high risk as compared to who spend ≤ 3 hours (21.4%). Among individuals who sleep for ≤ 6 hours (56.5%) falls into the high risk category as compared to those who sleep for 7 hours and more (20.60%).This association was found to be statistically significant (p-value<0.00001).(Table 5).

Table 1: Distribution of study population as per IDRS score

IDRS_SCORE	Frequency	Percent
Low risk	58	11.53
Moderate risk	267	53.1
High risk	178	35.4
Total	503	100

Table 2: Distribution of study population as per the lifestyle factors

Screen time	Frequency	Percent
≤ 3 hours	196	39.00%
4 hours and more	307	61.00%
Total	503	100
Sleeping hours		
≤ 6 hours	207	41.15
7 hours and more	296	58.85
Total	503	100
Dietary habit		
Veg	119	23.66
Non-Veg	384	76.34
Total	503	100

Table 3: Association of IDRS Score with dietary habits of study population

Dietary habits	IDRS SCORE				p-value
	Low risk	Moderate risk	High risk	Total	
Veg	10(8.40%)	67(56.30%)	42(35.3%)	119(23.7%)	0.447
Non-veg	48(12.5%)	200(52.1%)	136(35.4%)	384(76.3%)	
Total	58(11.53%)	267(53.1%)	178(35.4%)	503(100%)	

Table 4 : Association of IDRS Score with screen time of study population

Screen time	IDRS SCORE				p-value
	Low risk	Moderate risk	High risk	Total	<.00001
≤ 3 hours	32(16.3%)	122(62.3%)	42(21.4%)	196(39.0%)	
4 hours and more	26(8.47%)	145(47.23%)	136(44.29%)	307(61.0%)	
Total	58(11.53%)	267(53.1%)	178(35.4%)	503(100%)	

Table 5: Association of IDRS Score with sleeping hours of study population

Sleeping hours	IDRS SCORE				p-value
	Low risk	Moderate risk	High risk	Total	
≤ 6 hours	36(17.4%)	54(26.1%)	117(56.5%)	207(41.2%)	<.00001
7hours and more	22(7.43%)	213(71.95%)	61(20.60%)	296(58.8%)	
Total	58(11.53%)	267(53.1%)	178(35.4%)	503(100%)	

Discussion

In the present study, vegetarians and non vegetarians were equally in high risk category. Supporting these findings, a study by M. Meghachandra Singh et al., (5) done in Delhi also analyzed dietary habits in relation to diabetes risk. Their results indicate that among vegetarians, 19.0% fell into the moderate to high-risk category, while 81.0% were classified in the low-risk category. This study also found that 56.6% of the population had mixed dietary habits, while 43.4% were vegetarians. This indicates that dietary habits alone may not be a strong independent predictor of diabetes risk within these populations. However, given the observed trends, further investigation with larger sample sizes and more comprehensive analyses that account for other potential confounding factors might provide more insights into the relationship between dietary habits and diabetes risk. Individuals who spent 4 or more hours on screen time were at a higher risk compared to those who spent 3 hours or less. The association was statistically significant, indicating a link between screen time and the distribution of IDRS scores. ZhengqiQiu et al. (6) study conducted in China found a significant positive causal relationship between the amount of time spent watching television and the risk of developing type 2 diabetes (T2DM). Specifically, prolonged television viewing was associated with an increased risk of T2DM (OR: 2.39, 95% CI: 1.90 to 3.00, P < 0.01). However, no significant causal link was identified between computer usage and the risk of T2DM. Furthermore, mobile phone usage time was positively correlated with T2DM risk (OR: 1.31, 95% CI: 1.04 to 1.64, P = 0.02), though to a lesser extent compared to television viewing. Z Kmietowicz et al (2017) (7) in their study done in London, Daily screen time exceeding three hours was associated with various risk factors related to the development

of diabetes, including increased adiposity and insulin resistance. More than half of the Individuals who sleep for ≤ 6 hours falls into the high risk category of IDRS as compared to those who sleep for 7 hours and more .This association was found to be statistically significant ,Supporting these findings, a cross-sectional study on 1,258 subjects (Indian = 855, Malay = 403) aged between 40 and 80 years demonstrated that abnormal sleep duration was linked to diabetic kidney disease. Another review highlighted that poor sleep quality and short sleep duration are associated with increased cardio metabolic risk and adverse effects on diabetes, hypertension, obesity, and even some epigenetic changes. Our study aligns with these results, showing a significant association between sleep quality and diabetes risk. Poor sleep quality and shorter sleep durations were particularly correlated with higher diabetes risk score emphasizing the importance of adequate and quality sleep in managing and potentially reducing the risk of diabetes and its complications. These findings underscore the need for public health strategies that address sleep hygiene as part of comprehensive diabetes prevention and management programs.

Conclusion

The study identifies notable correlations between lifestyle factors and the levels of the Indian Diabetes Risk Score (IDRS).Individuals with high screen time, and those with reduced sleep are at higher risk these factors are showing statistical significance. However, in the present study dietary habits do not show significant associations with high IDRS risk. These findings underscore the importance of targeted interventions addressing these high-risk factors to mitigate diabetes type 2 risks in the population.

Recommendation

In the view of the observations made in the present study, the following recommendations are being made for reducing the ever increasing diabetes burden in our society: At primary level, screening should not only be done for diseases, but more importantly for the risk factors of the diseases. This will shift emphasis on health and not just on disease. Proper awareness and counselling facility should be given in urban areas including slums and mohalla's through grass root workers regarding diet, physical activity, addiction, sleep and stress etc in order to prevent risk of Diabetes type 2.As low stress and good coping up skills help in promoting health and well being, therefore importance of reducing stress and its effect on diabetes type 2

should be inculcated in the awareness programs. It is rightly said that "people's health in people's hands". People should be encouraged to attain best possible level of health through their own efforts, this also applies to prevention of Diabetes type 2.It is recommended that we should evolve from biomedical model of health care to a more holistic bio psychosocial model of health care which includes not only physical but social, emotional and spiritual well beings as well, this seem to be true for prevention of Diabetes type 2.

Limitation of the study

In our study absolute error was taken to calculate sample size instead of relative error, which resulted in a smaller sample size and in turn may decrease the power of study. Many questions were related to history of past illness (e.g. family history of chronic diseases, history of addiction, etc) so there may be recall bias. Merging of some Categories of tables were done due to less frequency in some categories as sample size was small. Random blood sugar was estimated by capillary blood with the help of glucometer, which may not estimate the exact blood sugar levels.

Relevance of the study

This study is highly relevant in addressing the growing burden of Type 2 Diabetes Mellitus (T2DM) in India. By exploring the association between lifestyle factors such as screen time, sleep duration, and dietary habits with the Indian Diabetes Risk Score (IDRS), it provides valuable insights for early detection and prevention strategies. The findings underscore the importance of targeting modifiable risk factors in public health initiatives, particularly in urban areas. With lifestyle changes playing a significant role in diabetes risk, this research informs the development of interventions aimed at reducing T2DM prevalence through behavior modification and awareness programs.

Authors Contribution

All authors have contributed equally.

Financial Support and Sponsorship

Nil

Conflict of Interest

There are no conflicts of interest.

Declaration of Generative AI and AI Assisted Technologies in the writing Process

The authors haven't used any generative AI/AI assisted technologies in the writing process.

References

1. Bej S, Sarkar J, Biswas S, Mitra P, Chakrabarti P, Wolkenhauer O. Identification and epidemiological characterization of Type-2 diabetes sub-population using an unsupervised machine learning approach. Nutr Diabetes. 2022 May 27;12(1):27. doi: 10.1038/s41387-022-00206-2. PMID: 35624098;

2. Rajendra N. Gadhavi , ArjunkumarJakasania, An Epidemiological Study to Measure the Prevalence of Risk Factors of Diabetes and Hypertension and to Find the Association between Them: A Cross-Sectional Study in Gandhinagar, Healthline Journal,2017;8(1):1-7

3. Tripathy JP, Thakur JS, Jeet G, Chawla S, Jain S, Pal A, Prasad R, Saran R. Prevalence and risk factors of diabetes in a large community-based study in North India: results from a STEPS survey in Punjab, India. DiabetolMetabSyndr. 2017 Jan 23;9:8. doi: 10.1186/s13098-017-0207-3. PMID: 28127405;

4. Rajan R, Muthunarayanan L. Diabetes Susceptibility Assessment Using the Indian Diabetes Risk Score: A Cross-Sectional Analytical Study on Young Medical Students in Chennai, South India. Cureus. 2023 Dec 1;15(12):e49795. doi: 10.7759/cureus.49795. PMID: 38161536;

5. Singh MM, Mangla V, Pangtey R, Garg S. Risk Assessment of Diabetes Using the Indian Diabetes Risk Score: A Study on Young Medical Students from Northern India. Indian J Endocrinol Metab. 2019 Jan-Feb;23(1):86-90. doi: 10.4103/ijem.IJEM_623_18. PMID: 31016160;

6. A. Mansouri, A.S. Vahed, H. Shahdadi, F. Dashtban, A. Arbabisarjou, The effect of garlic and cumin on blood pressure and glycosylated hemoglobin in patients with type 2 diabetes, Bali Medical Journal, 2018, 7, 156-160

7. Chiu CJ, Taylor A. Dietary hyperglycemia, glycemic index and metabolic retinal diseases. ProgRetin Eye Res. 2011 Jan;30(1):18-53. doi: 10.1016/j.preteyeres.2010.09.001. Epub 2010 Sep 22. PMID: 20868767