



“A STUDY ON ASSESSMENT OF RISK FACTORS OF DIABETES AMONG ADULT POPULATION”

Diabetology

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ABSTRACT

Background: Diabetes is a chronic disease that occurs either when the pancreas does not produce enough insulin or when the body cannot effectively use the insulin, it produces. Insulin is a hormone that regulates blood sugar.1 Currently, 25.2 million adults are estimated to have IGT, which is estimated to increase to 35.7 million in the year 2045. It is also estimated that nearly 57% of adults with diabetes are undiagnosed in India, which is approximately 43.9 million⁴. **Aim & objectives:** To study socio demographic profile of study subjects. To assess risk of developing type 2 diabetic mellitus using Indian diabetes risk score. **Settings & design:** It was an hospital based cross-sectional study done at teaching hospital of a private medical college. **Methodology:** A total of 200 study subjects attending to the OP registration counter were included by simple random sampling technique and study was done for a period of 2 months. IEC clearance was obtained. **Results:** 95 (47.5%) were at high risk (IDRS >60), 73 (36.5%) were at moderate risk (IDRS 30-50) and 32 (16%) were at low risk (IDRS <30) Among them majority were 85 (42.5%) were 35-49 years age (IDRS-10, 86 (43%) were doing mild physical activity (IDRS-20), 93 (46.5%) people had history of either parents diabetic (IDRS-10), moderate waist circumference 92 (46.0%) were at moderate risk. **Conclusion:** Increase in burden of diabetes day by day disease can be prevented by removing / modifying the risk factor through screening and early diagnosis.

KEYWORDS

Diabetes mellitus, IDRS, Physical activity, Risk factors, Waist circumference.

INTRODUCTION

Diabetes is a chronic disease that occurs either when the pancreas does not produce enough insulin or when the body cannot effectively use the insulin, it produces. Insulin is a hormone that regulates blood sugar. Hyperglycemia, or raised blood sugar, is a common effect of uncontrolled diabetes and over time leads to serious damage to many of the body's systems, especially the nerves and blood vessels¹.

Diabetes is a major cause of blindness, kidney failure, heart attacks, stroke and lower limb amputation. Between 2000 and 2016, there was a 5% increase in premature mortality from diabetes. In 2019, diabetes was the ninth leading cause of death with an estimated 1.5 million deaths directly caused by diabetes. A healthy diet, regular physical activity, maintaining a normal body weight and avoiding tobacco use are ways to prevent or delay the onset of type 2 diabetes¹. According to prevalence estimates by IDF, the diabetes burden is growing faster in low- and middle-income countries (367.8 million) than in high-income countries (95.2 million).²

Diabetes has steadily increased in India and around the world over the last three decades, with India accounting for a sizable portion of the global burden. India's disease patterns have shown a switch due to an epidemiological transition: thus, mortality from communicable, maternal, neonatal, and nutritional diseases (CMNNDs) has decreased significantly, while NCDs and injuries have markedly increased their contribution to overall disease burden and mortality³.

In India, the burden of diabetes has been increasing steadily since 1990 and leaps at a faster pace from the year 2000. The prevalence of diabetes in India has risen from 7.1% in 2009 to 8.9% in 2019. Currently, 25.2 million adults are estimated to have IGT, which is estimated to increase to 35.7 million in the year 2045. India ranks second after China in the global diabetes epidemic with 77 million people with diabetes. Of these, 12.1 million are aged >65 years, which is estimated to increase to 27.5 million in the year 2045. It is also estimated that nearly 57% of adults with diabetes are undiagnosed in India, which is approximately 43.9 million⁴.

Type 2 diabetes is the commonly occurring form of diabetes. More than 95% of people with diabetes have type 2 diabetes which mostly

results from excess body weight and physical inactivity. According to the India state-level disease burden report in 1990, a tenth of the total disease burden in India was caused by a cluster of risk factors that included unhealthy diet, being overweight/obese, high blood pressure, high blood sugar, and high cholesterol, all of which contributed to ischemic heart disease, stroke, and diabetes, which increased to a quarter of the total disease burden in India in 2016⁵. The Global Burden of Disease Study 2016, reported obesity, low-dietary intake of fruits, nuts and seeds, and whole grains, and tobacco use to be the most important risk factors for DALYs and deaths due to diabetes⁶.

Indian Diabetes Risk Score is a simple screening tool that helps predict your risk of developing diabetes. The Indian Diabetes Risk Score predicts the probability of diabetes based on four simple parameters—age, abdominal obesity, family history of diabetes, and physical activity. A maximum score of 100 is given for these categories combined⁷.

IF THE SCORE IS ≥ 60 : Very HIGH RISK of having diabetes: Oral Glucose Tolerance Test (OGTT) is recommended to rule out diabetes. If this is not possible, at least a random blood sugar or a fasting blood sugar should be done. **30 – 50: The risk of having diabetes is MODERATE:** It is still recommended to have the above check-up. **< 30: Risk of having diabetes is probably LOW.**⁷

As there is increase in burden of diabetes day by day if we know the risk factors at early stages then disease can be prevented by removing / modifying the risk factor. So, there is need for this study to decrease the burden and prevent the disease among non-diabetic adults by using Indian Diabetes Risk Score. So, this study was planned to study socio demographic profile of study subjects & to assess risk of developing type 2 diabetic mellitus using Indian diabetes risk score.

METHODOLOGY

It was a hospital based cross-sectional study done at teaching hospital private medical college over a period of 2 months that included all adult patients attending to the OP registration. Patients aged ≥ 30 years & both genders willing to participate in the study & not a known case of diabetes was included in the study and patients with chronic illness, psychiatric patients and pregnant were excluded. Sample size was

calculated by using the formula $n=4pq/l^2$. In a study done by Patil RS & Gothankar JS⁸ in pune, Maharashtra, the prevalence of people at high risk of diabetes was 36.5%. So, Prevalence 'p' was assumed as 36.5%; allowable error 'l' is 20% of p & non response rate was taken as 10%, final sample size 200 included in the study.

Patients attended OP registration counter of Hospital selected by simple random sampling method using lottery method, irrespective of chief complaint and those who fulfil inclusion criteria were included in the study & Data from the study subjects collected by personal interview method using study questionnaire & IDRS proforma. Clearance from the Institutional Ethics Committee was obtained prior to the start of the study. Study tools included Pre tested, pre-validated & semi structured questionnaire consisting of socio-demographic details of study subjects & risk factors of diabetes; IDRS, which comprised of two modifiable risk factors (waist circumference & physical activity) and two non-modifiable risk factors (age & family history of T2DM); Measuring tape; Stadiometer & Bathroom weighing scale.

Operational definitions:

High-risk cases of diabetes⁸ participants with IDRS ≥ 60 were considered at high risk of diabetes. Family history of diabetes⁹ either or both of a subject's parents had diabetes, they were considered to have a positive family history. Physical activity levels¹⁰ were graded based on WHO STEPS definitions of sedentary, mildly, moderately or vigorously physically active. Waist circumference¹¹ measured to the nearest 0.1 cm at the mid-point between the tip of the iliac crest and the last costal margin in the back and at the umbilicus in the front, using a non-stretchable tape, at the end of normal expiration, with the subject standing erect in a relaxed position.

For measuring Waist circumference, stand behind the patient and palpate the iliac crest (the large curving pelvic bone, just below the waist). Palpate and mark the skin on both sides with a horizontal line at its highest point. Palpate the lower rib margin on and mark skin with a horizontal line at the lowest point. Palpate and mark the skin on both sides. Using the measuring tape, make a mark (on both left and right side) identifying the mid-point between those made at the iliac crest and the lower rib margin. Apply the tape at the mid-point marks. Ensure the tape is level with the mid-point marks around the waist. Make the measurement and read the tape during the pause at the end of expiration. Three measurements of waist circumference will be taken and mean value will be considered. Abdominal/central obesity was considered present when the waist circumference was ≥ 80 cm in women and ≥ 90 cm in men. Height of the study subjects will be measured using a Stadiometer. Study subjects will be asked to take off footwear and anything on head that would inflate height (besides hair). Study subjects will be asked to stand over the platform with their arms hanging freely by the sides of the body, palms facing the thighs, legs placed close, bringing knees and ankles together with the back touching against the device. Study subjects will be asked to stand erect with head up and facing straight ahead. By bringing the headpiece down touching onto the upper most point on the head and gently compressing the hair height will be recorded to nearest 0.5 centimetre. Height measurement will be recorded in centimetre's and later converted to meters. **Weight** of the study subjects will be measured using the conventional standard bathroom weighing scale. Instrument will be placed over a flat surface and study subjects will be asked to take off footwear and with minimal clothing study subjects will be asked to stand over the platform of weighing scale with the body weight evenly distributed between both feet and asked to look straight ahead and the weight will be recorded to the nearest 0.1 kilogram. Body Mass Index was evaluated as weight divided by height squared (kg/m^2). Waist to Height Ratio was calculated as waist circumference divided by height.

The data collected was analysed using Microsoft Excel and Trial version of SPSS 23 statistical packages. The data was then presented in proportions and percentages using tables, barcharts and piecharts. Ethical clearance was obtained from ASRAMS BHR Ethics Committee. IEC ref no. ASRAMS BHR-EC / APPROVAL NO. 44 / 2022. Date of approval is on June 24, 2022.

OBSERVATIONS AND RESULTS :

This study was conducted on 200 study subjects among them ,95 (47.5%) were at high risk (IDRS >60) followed by 73 (36.5%) were at moderate risk (IDRS 30-50) and 32 (16%) were at low risk (IDRS <30)

Among them 85(42.5%) were 35-49years age (IDRS-10) followed 62(31%) were <35 years age (IDRS-0) and 53 (26.5%) were >50 years age (IDRS-20). About 86(43%) were doing mild physical activity (IDRS-20), followed by 78(39%) were doing moderate physical activity (IDRS-10), and 36(18%) were doing vigorous physical activity (IDRS-0). Among them 93(46.5%) people had history of either parents diabetic (IDRS-10), followed by 67(33.5%) people had family history of both parents diabetic (IDRS-20), and 40(20%) people had no family history of diabetes (IDRS-0). Among the study subjects, high waist circumference 61(30.5%) were at high risk, moderate waist circumference 92(46.0%) were at moderate risk, low waist circumference, 47 (23.5%) were at low risk. (Table.1)

In this study, sociodemographic characteristics -Gender wise distribution shows 101 (50.5 %) were males & 99 (49.5%) were females. Religion of study subjects ,79 (39.5 %) were Hindus, 52 (26 %) were Christians, 39 (19.5 %) were Muslims & 30 (15 %) belong to other religions. Education wise 93 (46.5%) were illiterate, 40 (20 %) were primary school level 39 (19.5 %) were puc / diploma, 28 (14 %) were educated up to high school level. Most of them i.e., 79 (39.5 %) were other method of occupation, 44 (22 %) homemaker, 43 (21.5%) were daily wage laborer, 34 (17 %) were farming / agriculture. Marital status shows that 156 (78%) were married, & 19 (9.5%) were single, 18 (9%) were widowed, 7 (3.5%) were separated. Socioeconomic class distribution showing 104 (52%) were class II according to BG Prasad classification, 96 (48%) class III according to BG Prasad classification. There were no class I, class II, class IV subjects. (Table.2)

In this study, additional risk factors other than IDRS -144(72%) had excess oil intake, 75(37.5%) had alcohol intake, 70(35%) had smoking, 107(53.5%) had sedentary life style, 109(54.5%) had BMI >27.5 , 130(65%) had stress. (Table.3)

DISCUSSION

IDRS SCORE:

This study was conducted on 200 study subjects among them ,95 (47.5%) were at high risk (IDRS >60) followed by 73 (36.5%) were at moderate risk (IDRS 30-50) and 32 (16%) were at low risk (IDRS <30) Among them 85(42.5%) were 35-49years age (IDRS-10) followed 62(31%) were <35 years age (IDRS-0) and 53 (26.5%) were >50 years age (IDRS-20). About 86(43%) were doing mild physical activity (IDRS-20), followed by 78(39%) were doing moderate physical activity (IDRS-10), and 36(18%) were doing vigorous physical activity (IDRS-0). Among them 93(46.5%) people had history of either parents diabetic (IDRS-10), followed by 67(33.5%) people had family history of both parents diabetic (IDRS-20), and 40(20%) people had no family history of diabetes (IDRS-0). Among the study subjects, high waist circumference 61(30.5%) were at high risk, moderate waist circumference 92(46.0%) were at moderate risk, low waist circumference, 47 (23.5%) were at low risk.

In the study conducted by **Sreeja nittoori et. al.**,¹² 136 study participants, 101 (74.3%) were at high risk (IDRS ≥ 60) followed by 32 (23.5%) at moderate risk (IDRS 30-50) and 3(2.2%) at low risk (IDRS <30). 62 (92.5%) individuals in the age group ≥ 50 year were at high risk compared to 34 (63%) in 35-49 year age group were not similar to this study because of the study population.

In the Study conducted by **Patil RS et.al**¹³ among 383 participants, 140 (36.6%) had a high-risk score (IDRS >60), the majority of participants 209 (54.6%) were in the moderate-risk category (IDRS 30-50) and 34 (8.9%) participants were found to be at low risk for diabetes (IDRS <30) it is nearly similar to this study.

In the study conducted by **Raja Subramani et .al.**,¹⁴ 30% were homemakers and below 35 years age group (IDRS-0) and 32 (6.3%) people were aged above 49 years (IDRS-30). About 87 (17.2%) people had regular exercise and strenuous work (IDRS-0) and 48 (9.5%) people had minimal or no physical activity (IDRS-30). 421(83.4%) people had no family history of diabetes mellitus (IDRS-0) and 26 (5.1%) people had parents who were both diabetic (IDRS-20). According to IDRS score about 12.1% (61) people had high risk of diabetes and 74.7% (377) had moderate risk of diabetes and 13.3% (67) people had no risk of diabetes it is nearly similar to this study.

Socio-demographic Profile:

In this study, sociodemographic characteristics -Gender wise distribution shows 101 (50.5 %) were males & 99 (49.5%) were

females. Religion of study subjects, 79 (39.5 %) were Hindus, 52 (26 %) were Christians, 39 (19.5 %) were Muslims & 30 (15 %) belong to other religions. Education wise 93 (46.5%) were illiterate, 40 (20 %) were primary school level 39 (19.5 %) were puc / diploma, 28 (14 %) were educated up to high school level. Most of them i.e., 79 (39.5 %) were other method of occupation, 44 (22 %) homemaker, 43 (21.5%) were daily wage laborer, 34 (17 %) were farming / agriculture. Marital status shows that 156 (78%) were married, & 19 (9.5%) were single, 18 (9%) were widowed, 7 (3.5%) were separated. Socioeconomic class distribution showing 104 (52%) were class II according to BG Prasad classification, 96 (48%) class III according to BG Prasad classification. There were no class I, class II, class IV subjects.

In the study conducted by **Komal Anand et.al.**¹⁵ it was observed that females (37.4%) were at high risk of having diabetes as compared to males (26.8%). High diabetes risk was seen in 66% of widow/widower, 55.6% of divorced/separated, 37.4% of unmarried and 28.9% of married individuals. Literacy rate was found to be 92.2% and 7.8% were illiterates. High diabetes risk was observed in 75% of professionals while maximum number of skilled, semiskilled and shopkeeper/clerk had moderate to low diabetes risk were not similar to this study.

In the study conducted by **Meera George et.al.**¹⁶ had found that majority of their study population belonged to age group 35-49 years, 62% of study population are female, 14% had high school education and 44.7% were daily wage employees were not similar to this study.

In the study conducted by **Mohammad Suhail Khan et al.**¹⁷ gender wise showed the prevalence of diabetes mellitus in males was high in comparison to females. Majority of study subjects were Hindus. Considered the association of socio-economic status (SES) and IDRS score, it was found that as SES increased, percent of individuals having high IDRS scores also increased it is nearly similar to this study.

CONCLUSION:

In this study, almost half of study participants were having high risk of developing diabetes with IDRS score > 60. Socio demographic profile reveals majority were in age group of 35-49 years, illiterates, hindu by religion & equal ratio male & female participation.

Limitations: This study was hospital based.

Recommendations: As diabetes mellitus is an iceberg disease, early screening helps in decreasing the incidence. By estimation of risk through IDRS will be useful for implementing proper precautionary measures and early intervention of risk factors at primary level.

Conflicts Of Interests: Nil

Acknowledgements: Nil

Table-1: Showing IDRS Risk Assessment Among Study Subjects

S.NO	IDRS SCORE	RISK OF DIABETES	FREQUENCY (%)
1	>60	High	95(47.5%)
2	30 - 50	Moderate	73 (36.5%)
3	30	Low	32(16%)

Table-2: Socio-demographic Profile Of Study Subjects.

SOCIO-DEMOGRAPHIC CHARACTERISTIC	FREQUENCY	PERCENTAGE
AGE		
1.<35 Years	62	31
2.35-49 Years	85	42.5
3.>50 Years	53	26.5
GENDER		
1.Male	101	50.5
2.Female	99	49.5
RELIGION		
1.Hindu	79	39.5
2.Muslim	39	19.5
3.Christian	52	26
4. Others	30	15
EDUCATION		
1.Illiterate	93	46.5
2.Primary school	40	20.0
3.High school	28	14.0
4.Puc/diploma	39	19.5

OCCUPATION		
1.Farming/Agriculture	34	17
2.Daily wage laborer	43	21.5
3.Homemaker	44	22
4.Others	79	39.5
MARITAL STATUS		
1.Single	19	9.5
2.Married	156	78
3.Widowed	18	9
4.Separated	7	3.5
SOCIO-ECONOMIC STATUS (Updated BG Prasad Classification)		
1.Class I	0	
2.Class II	104	52
3.Class III	96	48
4.Class IV	0	
5.Class V	0	

Table-3: Showing Risk Factors Other Than IDRS Among Study Subjects.

	FREQUENCY	PERCENTAGE
EXCESS OIL FOOD INTAKE		
YES	144	72
NO	56	28
ALCOHOL INTAKE		
YES	75	37.5
NO	125	62.5
SMOKING		
YES	70	35
NO	130	65
SEDENTARY LIFE STYLE		
YES	107	53.5
NO	93	46.5
BMI >27.5		
YES	109	54.5
NO	91	45.5
STRESS		
YES	130	65
NO	70	35

REFERENCES

- WHO diabetes factsheet. World Health Organization available from <https://www.who.int/news-room/fact-sheets/detail/diabetes> last accessed on 03/11/2022
- International Diabetes Federation IDF Diabetes Atlas 9th ed Brussels, Belgium International Diabetes Federation 2019.
- Indian Council of Medical Research, Public Health Foundation of India, and Institute for Health Metrics and Evaluation India: Health of the Nation's States - The India State-Level Disease Burden Initiative New Delhi ICMR, PHFI and IHME 2017 Available from: https://www.healthdata.org/sites/default/files/files/policy_report/2017/India_Health_of_the_Nation%27s_States_Report_2017.pdf last accessed on 03/11/22.
- Pradeepa, Rajendra; Mohan, Visvanathan, Epidemiology of type 2 diabetes in India, Indian Journal of Ophthalmology; November 2021 - Volume 69 - Issue 11 - p 2932-2938
- India state level disease burden report Available from: <https://vikaspedia.in/health/health-directory/india-state-level-disease-burden-report-released> Last accessed on 03/11/22.
- Tripathi JP Burden and risk factors of diabetes and hyperglycaemia in India: Findings from the Global Burden of Disease Study 2016 Diabetes Metab Syndr Obes 2018 11 3817
- Into Life "THE INDIAN DIABETES RISK SCORE" available from <https://www.intolife.in/about-diabetes/diabetes-risk-score> last accessed on 03/11/22
- Mohan V, Sandeep S, Deepa M, Gokul Krishnan K, Datta M, Deepa R. A diabetes risk score helps identify metabolic syndrome and cardiovascular risk in Indians – the Chennai Urban Rural Epidemiology Study (CURES-38). Diabetes, Obesity and Metabolism. 2007;9(3):337-43.
- Ahmad J, Masoodi MA, Ashraf M, Rashid R, Ahmad R, Ahmed A, et al. Prevalence of diabetes mellitus and its risk factors in age group of 20 years and above in Kashmir, India. Al Ameen J Med Sci. 2011;4(1):38-44.
- Shah B. Development of Sentinel Health Monitoring Centres for Surveillance of Risk Factors of Noncommunicable Diseases in India (April 2003 to March 2005): Collated Results of 6 Centres. Indian Council of Medical Research: New Delhi. 2005.
- Rao CR, Kamath VG, Shetty A, Kamat A. A study on the prevalence of type 2 diabetes in coastal Karnataka. Int J Diabetes Dev Ctries. 2010;30(2):80-5. doi:10.4103/0973-3930.62597.
- Nittoori S, Wilson V. Risk of type 2 diabetes mellitus among urban slum population using Indian Diabetes Risk Score. The Indian Journal of Medical Research. 2020 Sep;152(3):308.
- Patil RS, Gothankar JS. Assessment of risk of type 2 diabetes using the Indian Diabetes Risk Score in an urban slum of Pune, Maharashtra, India: a cross-sectional study. WHO South-East Asia Journal of Public Health. 2016;5(1):53-61.
- Seshadri SK, Suganya S. Assessment of risk of type 2 diabetes mellitus among rural population in Tamilnadu by using Indian diabetic risk score. Middle-East Journal of Scientific Research. 2014;21(1):223-5.
- Anand K, Jain S, Chopra H, Kumar A, Singh G. Indian Diabetes Risk Score (IDRS): An effective tool to screen undiagnosed diabetes. Indian Journal of Community Health. 2022 Jan 1;34(1).
- George M, Krishnakumar RS, Sam J, Sasi J, Ahmmed I, Habeeb HK. Diabetes risk

- assessment among adults-a cross sectional study. International Journal of Medicine and Public Health. 2020;10(1).
17. Khan MS, Ahmad A, Khan AA, Mahmood SE, Islam M, Arfin SB, Singh AK. A community-based study to assess the sensitivity and specificity of Indian Diabetes Risk Score, among urban Population of District Bareilly, Uttar Pradesh, India.