ORIGINAL ARTICLE

Indian Diabetes Risk Score and its Correlation With Body Mass Index and HbA1c in Non-Diabetic Adults

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Abstract:

Background: Indian Diabetes Risk Score (IDRS) was developed by the Madras Diabetes Research Foundation to detect individuals at risk for type 2 diabetes. It comprises of two modifiable factors namely waist circumference, physical activity and two non modifiable risk factors namely age, family history of diabetes. *Objectives*: To study the Indian diabetes risk score in non diabetic adults and its correlation with body mass index and HbA1c levels *Methods:* This study was done as a cross-sectional study among 240 subjects. Non diabetic adults of both sexes were included in the study by systemic random sampling. Known case of diabetes, ischemic heart disease, chronic liver disease, hypothyroidism, chronic renal failure, women using oral contraceptives, pregnant women were excluded. Indian Diabetes risk score and body mass index were recorded. HbA1c was measured in all subjects. All the data collected were analysed using SPSS version 22. *Results:* Among 240 subjects, there were 136 (56.7%) male and 104(43.3%) female. Among them there were 99 (41.3%) subjects in the age group of 35-49 years. Of the total 240 subjects 115 (47.9%) had a family history of diabetes in one parent. According to Indian diabetes risk score 80 (33.3%) subjects were in high risk category. There were 96(40%) overweight subjects according to body mass index scale and in that 46(47.9%) were in high risk category. HbA1c was in prediabetic range of 5.7-6.4% in 102 (42.5%) subjects, in that 56 (54.9%) were in high risk group. *Conclusion:* Indian diabetes risk score is a useful screening tool for detecting future onset of diabetes mellitus. It correlates well with body mass index and HbA1c.

Key words: IDRS, Body mass index, HbA1c, Prediabetes.

Introduction:

India is considered to be the diabetic capital of world with maximum number of diabetic subjects [1]. There is increasing incidence of diabetes because of increasing obesity, overweight, sedentary life style and diet pattern [2]. Indian diabetes risk score(IDRS) was developed based on the results from their Chennai Urban Rural Epidemiology Study (CURES) at the Madras Diabetes Research Foundation (MDRF) to detect individuals at risk for type 2 diabetes [3]. The advantages of IDRS are its simplicity, low cost and it is easily applicable for mass screening programmes [4]. Prediabetes is a high risk intermediate stage in the natural history of diabetes [5]. The term prediabetic is an intermediate stage used to describe a person with impaired blood glucose tolerance levels of fasting between 100 and 125 mg/dl of blood or whose 2-hour postprandial blood glucose is 140-199mg/dl and HbA1c of 5.7 to 6.4 [6]. Prediabetics are likely to progress to diabetes within ten years or less, if no timely intervention or treatment is done [7]. Early diagnosis and interventions of prediabetes can decrease the risk for occurrence of type 2 DM and its associated complications [8]. In this study we have analysed the Indian diabetes risk score and its correlation with body mass index and HbA1c levels in non diabetic subjects.

Aims and Objectives are To study the Indian diabetes risk score in no diabetic adults and To study its correlation with body mass index and HbA1c levels.

Material and Methods:

This study was done as a cross-sectional study in department of general medicine at Trichy SRM medical college hospital and research centre from January 2021 to June 2022. The study protocol was approved by the Institutional Ethics Committee of the hospital. Study participants were included by using systemic random

sampling to avoid selection bias. Every fifth non diabetic adult with age more than 18 years of both sexes visiting the outpatient department were included in the study. Known case of diabetes, ischemic heart disease, chronic liver disease, hypothyroidism, chronic renal failure, women using oral contraceptives, pregnant women were excluded from the study. A written informed consent was obtained from the study subjects. A detailed history including age, sex, life style, socioeconomic status, medical history and previous drug history were recorded. Indian diabetes risk score namely family history of diabetes mellitus, age, physical activity were recorded. Measurement of waist circumference was done by using a measuring tape. The waist circumference was taken at the midpoint between the iliac crest and the lower border of the ribs after normal expiration [9]. Height in meters(m) and body weight in kilograms(kg) were measured with light clothes, bare feet and body mass index (BMI) in kg/m^2 was calculated. Obesity was defined as per WHO criteria [10]. Glycated hemoglobin (HbA1c) was assayed by using high performance liquid chromatography method. All the data collected were analysed using SPSS 22 software (International Business Machines Corporation, Released 2013. IBM SPSS Statistics for Windows Version 22.0. Armonk NY). Pearsons Chi square was applied to find out significant association between the two characteristics which are in form of frequency. P value < 0.05 was considered significant whereas p <0.01 was considered highly significant.

Results:
Among the total 240 subjects, there were 136 (56.7%) male and 104(43.3%) female . Among them there were 99 (41.3%) subjects were in the age group of 35-49 years (Table 1). Waist circumference 90-99cm in male subjects were 70(51.4%) (Table 2) and 80-89 cm in female subjects were 49(47.1%) (Table 2). Of the total 240 subjects 115 (47.9%) had a family history of diabetes in one parent and 34 (14.2%) subjects had family history in both parents (Table 3). In our study, it was observed that (46.7%) 112 subjects were doing moderate exercise at work/home and 91(37.9%) subjects were doing mild exercise at work/home

(Table 4). According to India diabetes risk score 80 (33.3%) subjects were in high risk category (Table 4). There were 96(40%) overweight subjects according to body mass index scale and in that 46(47.9%) were in high risk category (Table 5) and HbA1c was in prediabetic range of 5.7-6.4% in 102(42.5%) subjects, in that 56 (54.9%) were in high risk group according to Indian diabetes risk score (Table 6)

Table 1: Distribution of age

Age (years)	IDRS score	Number (n)	Percentage (%)
< 35	0	97	40.4
35-49	20	99	41.3
>50	30	44	18.3

Table 2: Abdominal obesity of study subjects

Waist circumference (Male)	IDRS score	Number (n)	Percentage (%)
<90 cm	0	50	36.7
90-99cm	10	70	51.4
>100cm	20	16	11.7
Waist circumference (Female)	**IDRS score**	**Number (n)**	**Percentage (%)**
<80 cm	0	41	39.4
80-89 cm	10	49	47.1
>90 cm	20	14	13.4

Indian Diabetes Risk Score (IDRS) comprises of two modifiable factors namely waist circumference, physical activity and two nonmodifiable risk factors namely age, family history of diabetes. It has a total score of 100 of which a score of <30 belongs to low risk, score 30-59

Table 3: Family history of diabetes and physical activity of study subjects

Family history	IDRS score	Number (n)	Percentage (%)
Nil	0	34	14.2
One parent	10	115	47.9
Both parents	20	91	37.9
Physical activity	**IDRS score**	**Number (n)**	**Percentage (%)**
Vigorous	0	15	6.3
Moderate	10	112	46.7
Mild	20	91	37.9
No activity	30	22	9.2

moderate risk and >60 high risk category [3]. Among 240 subjects include in our study, majority of the participants were males 136 (56.7%) and 104 (43.3%) were females. Among them there were 99 (41.3%) subjects were in the age group of 35 -49 years. Of the total 240 subjects 115 (47.9%) had a family history of diabetes in one parent and 34 (14.2%) subjects had family history in both parents. Our observation is in line with the study done by Singh et al. &   Vikrant Prabhakar et al who observed

Table 4: Frequency table of Indian diabetic Risk Score

Category	Number (n)	Percentage (%)
High risk(>60)	80	33.3
Moderate risk(30-60)	104	43.4
Low risk(<30)	56	23.3

Table 5: Association between BMI and Indian diabetes risk score

Family history	IDRS score	Number (n)	Percentage (%)
Nil	0	34	14.2
One parent	10	115	47.9
Both parents	20	91	37.9
Physical activity	**IDRS score**	**Number (n)**	**Percentage (%)**
Vigorous	0	15	6.3
Moderate	10	112	46.7
Mild	20	91	37.9
No activity	30	22	9.2

Statistically significant association of positive family history of diabetes study, it was observed that 112(46.7%)Subjects were doing with moderate to high diabetes risk in future [11,12]. In our moderate exercise at work/home and 91(37.9%) subjects were doing mild exercise at work/home. Subject with moderate - high risk based on IDRS score had sedentary lifestyle. This was significant as a study done by Mohan et al. And Gupta et al [13,14] found that people who havesedentary and moderate physical activity had high risk for diabetes. There were 96(40) overweight and 19 (7.9) were obese according to body mass index scale and had higher abdominal circumferencethan normoglycemic

subjects. This was significant as a study done by Ross R et al, which showed that the waist circumference provides both independent and additive information to BMI for predicting morbidity and afford practitioners with important opportunity to improve the health of subjects [15]. In our study according to Indian diabetes risk score 80 (33.3%) subjects were in high risk category and 104 (43.4%) were in moderate risk. This wassimilar to the study done by Namdev G, et al, which shows statistically significant high and moderate risk score [16]. In our study, in that 96(40%) overweight subjects 46(47.9%) were in high risk category (IDRS score > 60). This was significant as study done by Khan MM et al., which showed significant association between Indian Diabetes Risk Score with BMI. In our study HbA1c

Table 6: Association between HbA1c and Indian diabetes risk score

HbA1C Category	Diabetic risk status (%)			Chisque are value	P-value
	High	Moderate	Low		
At Risk (5.7-6.4 %) n=102 (42.5)	56(54.9)	37(36.3)	9(8.8)	42.803	<0.001
Normal (<5.7%) n=138(57.5)	24(17.4)	67(48.6)	47(34.1)		

was in prediabetic range of 5.5-6.4% in 102 (42.5%) subjects, in that 56 (54.9%) were in high risk group according to Indian diabetes risk score.This was significant as study done by Khan MM et al, which showed significant association between Indian Diabetes Risk Score with HbA1c [17]. In our study subjects with overweight and prediabetes were in high risk category according to Indian diabetes risk scoreso they are in risk of developing future onset of diabetes and its complication.

Conclusion:
Indian diabetes risk score is a useful, cost-effective screening tool for detecting adults at high risk for future onset of diabetes mellitus and it is easily applicable in a primary care setting. Indian diabetes risk score well with body mass index and HbA1c.It can also be usedfor mass screening outreach programs.
Conflict of Interest - Nil
Sources of Support- Nil

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