Original Research Paper

Volume - 14 | Issue - 09 | September - 2024 | PRINT ISSN No. 2249 - 555X | DOI : 10.36106/ijar

General Medicine

INDIAN DIABETIC RISK SCORE AS A SCREENING TOOL FOR UNDIAGNOSED DIABETES IN ADULT POPULATION IN PUDUCHERRY.

Dr. Saranya V Post Graduate, Department of General Medicine, SVMCH & RC, Puducherry, India.

Dr. Kasipandian S Professor, Department of General Medicine, SVMCH & RC, Puducherry, India.

Dr. Suresh. K Professor and Head, Department of General Medicine, SVMCH & RC, Puducherry, India.

ABSTRACT **Background** Diabetes is a major public health problem. Diabetes also exhibits an iceberg phenomenon where majority of the cases were hidden in the community as undiagnosed ones. **Objectives** To identify the high-risk subjects for screening of undiagnosed diabetes mellitus using IDRS and evaluating the IDRS as a screening tool. **Material and Methods** The present study was cross sectional study carried out among adults more than 18 years in the department of general medicine for a period of 3 months. The sample size was estimated to 135. Those who were already diagnosed to have diabetes and unwilling to participate were excluded from the study. The data was collected in a semi structured questionnaire. Statistical analysis was done using descriptive statistics. **Results** The mean IDRS score among the participants was 56.29 ± 18.71. 54 (40%) were having a score between 50 and 60. 44 (32.6%) were having score between 70 and 80. Among the participants with IDRS score of more than or equal to 60, 27 (36%) were diabetic and among those with IDRS score of less than 60, none was diabetic. The sensitivity was 100%, specificity was 55.6%, the positive predictive value was 36%, the negative predictive value was 100%. The accuracy of IDRS was found to be 64.4% **Conclusion** The IDRS is a valid screening tool among the population undiagnosed with diabetes mellitus.

KEYWORDS : IDRS, diabetes, risk, sensitivity, specificity, predictive value, diagnosis.

INTRODUCTION

Diabetes is chronic disease where the blood glucose levels get elevated and there will also be disturbed metabolism of fats and proteins. Either lack of insulin production or decreased ability of the calls to utilise insulin are the two reasons responsible for the elevated blood glucose levels. Diabetes can be classified into type I, type II and gestational diabetes. Type I is insulin deficient while type II is insulin resistance[1]. The multisystem complication of diabetes includes both microvascular – retinopathy, nephropathy, neuropathy and macrovascular complications – ischemic heart disease, stroke, peripheral vascular disease[2].

The prevalence of diabetes is said to get doubled globally by the year 2030[3]. India is one of the epicentres of global diabetic pandemic[4]. In the year 2030 it is predicted that around 79.4 million individuals will be suffering from diabetes in India[3]. It was documented that type 2 diabetes in Asian population occur in a much younger age and at lower levels of body mass index[4]. Hence Asian people are at increased risk of getting diabetes than the rest of the world. In a developing country like India, it was often stated that the diabetes prevalence was usually underestimated as many undiagnosed cases will remain in the community and the diagnosis will be usually made only on the occurrence of complications. According to a study by ICMR, it was estimated that around 30 to 80 percentage of the diabetes cases remain undiagnosed and thus untreated[5].

Indian diabetic risk score is a screening tool that is cost effective for detecting individuals with higher risk of getting diabetes mellitus. It uses four parameters selected in the basis of multiple logistic regression model[6]. The study was also evaluated and found the scale at a cut off of 60 had a sensitivity of 100% by Stanley L et al[7]. The present study was done with the objective of identifying the high-risk subjects for screening of undiagnosed diabetes mellitus using IDRS and evaluating IDRS as screening tool.

MATERIAL AND METHODS

The present study was cross sectional study carried out in the department of general medicine, Sri Venkateshwaraa Medical College Hospital and Research centre, Puducherry among the adults aged more than 18 years. The period of the study was 3 months and carried out between September 2023 to November 2023. Ethical clearance for the study was obtained from the institutional ethics committee. The sample size for the study was calculated using the formula $n = Z^2Pq/E^2$, Where P is the proportion of population with characteristic of interest and it is 10% from the article by Singh MM et al. The q was (1-p) = 90%. Keeping E-Standard allowable error as 5%. The sample size was estimated to be 135. Persons who were previously diagnosed with diabetes and those who were unwilling to participate were excluded from the study. Informed consent was obtained from all the participants.

The data was collected using a semi structured interview schedule. The questionnaire consisted of two parts. Part A dealt with sociodemographic characteristics and comorbidities and part B consisted of details regarding Indian Diabetic Risk Score (IDRS). The sociodemographic variables included were age, sex, occupation and place of residence. Following which the anthropometric measurements was recorded which included height, weight and waist circumferences. From the above measurements Body Mass Index (BMI) was calculated using the formula weight in Kgs/ (height in metres)^2. The data pertaining to IDRS (Table 1) was then collected. IDRS consists of four categories, two modifiable risk factors (waist circumference and physical activity) and two non-modifiable risk factors (age and family history of diabetes). A person with a score of 60 or above was considered as high risk for diabetes. Finally following aseptic precautions, venous blood is taken and the random blood sugar was estimated.

The data collected were entered into Microsoft excel 2019 and the master chart was created. The master chart was then loaded onto SPSS version 26 for statistical analysis. Descriptive statistics were used in analysis of the data. The qualitative variables were expressed using frequency and percentage. Sensitivity, specificity, positive predictive value, negative predictive value and diagnostic accuracy were calculated. Bar charts used to represent the data pictographically.

RESULTS

Out of the 135 participants included into the study, 42 (31.1%) were aged less than 35 years and 55 (40.7%) were in the age group 35 to 49 years. 96 (71.1%) were females and 39 (28.9%) were males. 48 (35.6%) resided in urban area and 87 (64.4%) were from rural area. 23 (17%) were doing skilled occupation, 35 (25.9%) were doing semiskilled job and 77(57%) were doing an unskilled job. 64 (47.4%) had reported a family history of diabetes (Table 1).

The mean height among the participants was 158.35 ± 9.02 cms. The mean weight among the participants was 61.07 ± 13.47 Kgs. The mean BMI among the participants was 25.28 ± 5.08 Kg/m^2. The mean waist circumference among the males and females was 89.25 ± 14.71 cms and 89.09 ± 15.76 cms, respectively (Table 2). The proportion of participants doing both regular exercise and strenuous activity was 6 (4.4%), the proportion doing either regular exercise or strenuous exercise was 62 (45.9%) and those doing neither was 67 (49.6%) (Fig 1).

The mean IDRS score among the participants was 56.29 ± 18.71. 54 (40%) were having a score between 50 and 60. 44 (32.6%) were having

score between 70 and 80 (Table 4). 27 (20%) were found to be diabetic based on the random blood sugar values obtained (Fig 2).

Among the participants with IDRS score of more than or equal to 60, 27 (36%) were diabetic and among those with IDRS score of less than 60, none was diabetic. The sensitivity was 100%, specificity was 55.6%, the positive predictive value was 36%, the negative predictive value was 100%. The accuracy of IDRS was found to be 64.4% (Table 5).

DISCUSSION

Diabetes is a metabolic disorder characterised by raised blood glucose levels leading to both microvascular and macrovascular complications[1,2]. The prevalence of diabetes is on a raise globally and the proportion is more among the Indian Population[3,4]. Asian people are at increased risk of diabetes than the rest of the population[5]. It is important to screen the population for diabetes and a cost-effective screening tool is vital to achieve the above. Indian Diabetic Risk Score has the potential to act as a cost-effective screening tool for diabetes. The present study was done with the objective of identifying the high-risk subjects for screening of undiagnosed diabetes mellitus using IDRS and to evaluate IDRS as a screening tool.

The mean IDRS score among the participants in the present study was 56.29 ± 18.71 and 55.6% were found to have a IDRS score of more than or equal to 60, indicating higher risk of diabetes among them. The above proportion is a considerable one as more than half of the studied individuals were at increased risk for diabetes mellitus. Chowdry et al reported that in their study among the rural population the proportion of participants with high risk and moderate risk as 77.5%[8].

20% of the study participants were found to be diabetic in the present study. The sensitivity and specificity of IDRS in the present study was 100% and 56%, respectively. The positive predictive value was 36%. The negative predictive value was 100% and the diagnostic accuracy was 64.4%. Joshi Rs stated that IDRS is based on a largest population-based study on diabetes in India and it had sensitivity and specificity of 72.5% and 60.1%, respectively[9]. Nagarathna R et al reported the area under the curve for the IDRS to be 0.763 indicating it as a good tool for screening diabetes. The study also found the sensitivity of the tool to be 78.1% and specificity as 62.6%[10].

A study by Adhikari P et al reported more specificity than sensitivity for the IDRS tool at the cut off of 60 which was not the case in the present study[11]. A study by Sharma KM et al reported that at a cut off of more than or equal to 60, the area under the curve was 0.894 with sensitivity and specificity of 83.8% and 81%[12]. Dudeja LCP et al reported a sensitivity of 95.1% and specificity of 28.9% which was quite similar to the present study[13]. Ramachandran A et al conducted a similar study among the UK Asian cohort and reported a sensitivity of 92.2% and specificity was 25.7%. The above percentages were similar to the present study[14]. Nagalingam S et al also in their study concluded IDRS as a valid tool for screening among the Indian population[15]. Mohan and Anbalagan had proposed that in addition to the utilisation as screening tool, IDRS can also be used to predict the occurrence of complications among those already diagnosed with type II diabetes mellitus[16].

The strength of the present study is that this was conducted among the south Indian population in a tertiary care centre frequently visited by people from rural areas. The study results may not be generalisable and if done shall be done with caution.

CONCLUSION

The IDRS is a valid screening tool among the population undiagnosed with diabetes mellitus. Utilisation of IDRS will aid in segregating the undiagnosed diabetic individuals into those with high risk for diabetes and low risk for diabetes. It could also act as an educational tool.

Table 1: Components Of Indian Diabetes Risk Score[6].

Risk factors		Score
Age (years)	<35	0
	35-49	20
	>50	30
Abdominal Obesity (Waist circumference)	< 80 cms (females) < 90 cms (males)	0
	≥ 80 – 89 cms (females) ≥ 90 – 99 cms (males)	10
	≥ 90 cms (females) ≥ 100 cms (males)	20
Physical activity	Exercise regular + strenuous work	0
	Exercise regular or strenuous work	20
	No exercise and sedentary work	30
Family history	No family history	0
	Either parent	10
	Both parents	20
Minimum score – 0		
Maximum score - 100		

Table 2: Sociodemographic Characteristics Among The Participants (n=135)

Variables		N	%
Age (years)	<35	42	31.1
	35-49	55	40.7
	>50	38	28.1
Sex	Male	39	28.9
	Female	96	71.1
Residence	Urban	48	35.6
	Rural	87	64.4
Occupation	Skilled	23	17
	Semi-skilled	35	25.9
	Unskilled	77	57
Family history of diabetes	Present	64	47.4
	Absent	71	52.6

Table 3: Mean Anthropometric Measurements Among The Study Participants (n=135).

Measure		Mean ± SD
Height (in cms)		158.33±9.02
Weight (in Kgs)		61.07 ± 13.47
Waist circumference (in cms)	Males	89.25 ± 14.71
	Females	89.09 ± 15.76
BMI (Kg/m2)		25.28 ± 5.08

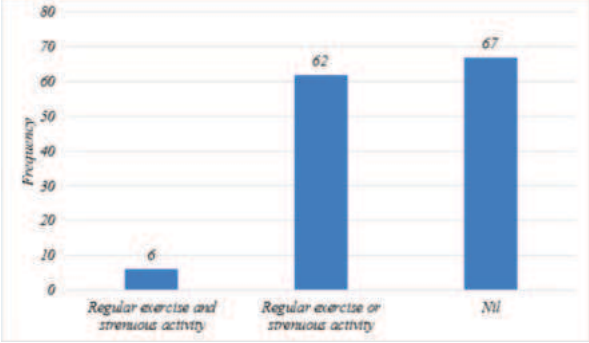

Fig 1: Bar Chart Showing Distribution According To Physical Activity.

Table 4: Distribution According To IDRS Score Obtained Among The Participants (n=135).

Variables		N	%
IDRS	0-20	8	5.9
	30-40	24	17.8
	50-60	54	40
	70-80	44	32.6
	>80	5	3.7
Mean IDRS score – 56.29 ± 18.71			

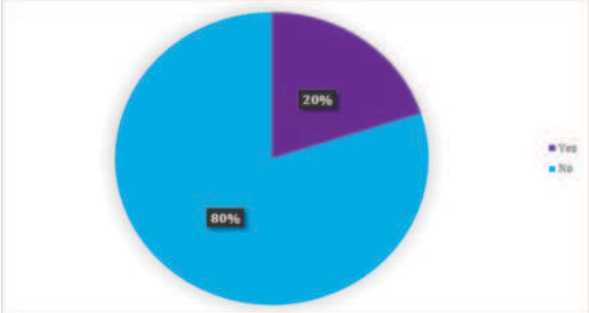

Fig 2: Pie Chart Showing Distribution According To Diagnosis Of Diabetes Among The Participants (n=135).

Table 5: Cross Tabulation Between Idrs Score And Actual Diagnosis Of Diabetes.

IDRS score	Diabetic		Normal		Total	
	N	%	N	%	N	%
≥ 60	27	100	48	44.4	75	55.6
< 60	0	0	60	55.5	60	44.4
Sensitivity		100.00%		87.23% to 100.00%		
Specificity		55.56%		45.68% to 65.12%		
Positive Predictive Value		36.00%		31.30% to 40.99%		
Negative Predictive Value		100.00%		94.04% to 100.00%		
Accuracy		64.44%		55.75% to 72.49%		

REFERENCES

1. Roglic G. WHO Global report on diabetes: A summary. International Journal of Noncommunicable Diseases. 2016 Apr 1;1(1):3-8.
2. Forouhi NG, Wareham NJ. Epidemiology of diabetes. Medicine. 2010 Nov 1;38(11):602-6.
3. Kaveeshwar SA, Cornwall J. The current state of diabetes mellitus in India. The Australasian medical journal. 2014;7(1):45.
4. Unnikrishnan R, Anjana RM, Mohan V. Diabetes mellitus and its complications in India. Nature Reviews Endocrinology. 2016 Jun;12(6):357-70.
5. Anjana RM, Deepa M, Pradeepa R, Mahanta J, Narain K, Das HK, Adhikari P, Rao PV, Saboo B, Kumar A, Bhansali A, John M, Luaia R, Reang T, Ningombam S, Jampa L, Budnah RO, Elangovan N, Subashini R, Venkatesan U, Unnikrishnan R, Das AK, Madhu SV, Ali MK, Pandey A, Dhaliwal RS, Kaur T, Swaminathan S, Mohan V; ICMR–INDIAB Collaborative Study Group. Prevalence of diabetes and prediabetes in 15 states of India: results from the ICMR-INDIAB population-based cross-sectional study. Lancet Diabetes Endocrinol. 2017 Aug;5(8):585-596. doi: 10.1016/S2213-8587(17)30174-2. Epub 2017 Jun 7. Erratum in: Lancet Diabetes Endocrinol. 2017 Aug;5(8):e5. PMID: 28601585.
6. Mohan V, Deepa R, Deepa M, Somannavar S, Datta M. A simplified Indian Diabetes Risk Score for screening for undiagnosed diabetic subjects. The Journal of the Association of Physicians of India. 2005 Sep 1;53:759-63.
7. Stanley J.M., Elantamilan D., Mohanasundaram K., Kumaravel T.S. Evaluation of Indian diabetic risk score for screening undiagnosed diabetes subjects in the community. Indian J Sci Technol. 2012;5(6):2798–2799.
8. Chowdhury R, Abhijit M, Lahiri SK. A study on distribution and determinants of Indian Diabetic Risk Score (IDRS) among rural population of West Bengal. National journal of medical research. 2012 Sep 30;2(03):282-6.
9. Joshi SR. Indian diabetes risk score. JAPI. 2005 Sep; 53:755-7.
10. Nagarathna R, Tyagi R, Battu P, Singh A, Anand A, Nagendra HR. Assessment of risk of diabetes by using Indian Diabetic risk score (IDRS) in Indian population. Diabetes research and clinical practice. 2020 Apr 1;162:108088.
11. Adhikari P, Pathak R, Kotian S. Validation of the MDRF-Indian diabetes risk score (IDRS) in another south Indian population through the boloor diabetes study (BDS). J Assoc Physicians India. 2010 Jul 1;58(434):6.
12. Sharma KM, Ranjani H, Nguyen H, Shetty S, Datta M, Narayan KV, Mohan V. Indian Diabetes Risk Score helps to distinguish type 2 from non-type 2 diabetes mellitus (GDRC-3). Journal of diabetes science and technology. 2011 Mar;5(2):419-25.
13. Dudeja P, Singh G, Gadekar T, Mukherji S. Performance of Indian Diabetes Risk Score (IDRS) as screening tool for diabetes in an urban slum. Medical Journal Armed Forces India. 2017 Apr 1;73(2):123-8.
14. Ramachandran A, Snehalatha C, Vijay V, Wareham NJ, Colagiuri S. Derivation and validation of diabetes risk score for urban Asian Indians. Diabetes research and clinical practice. 2005 Oct 1;70(1):63-70.
15. Nagalingam S, Sundaramoorthy K, Arumugam B. Screening for diabetes using Indian diabetes risk score. Int J Adv Med. 2016 May;3(2):415-8.
16. Mohan V, Anbalagan VP. Expanding role of the Madras diabetes research foundation-Indian diabetes risk score in clinical practice. Indian Journal of Endocrinology and Metabolism. 2013 Jan;17(1):31.