Indian Journal of Science and Technology Vol. 5 No. 6 (June 2012) ISSN: 0974- 6846

Evaluation of Indian diabetic risk score for screening undiagnosed diabetes subjects in the community

J.M. Lanord Stanley[1], D. Elantamilan[1], K. Mohanasundaram[2] and T. S. Kumaravel[3]
[1]*Department of Medicine, Tagore Medical College and Hospital, Chennai-600048, India*
[2]*Alliance University, Bangalore-562106, India*
[3]*GLR Laboratories Pvt Ltd, Chennai-600060, India*
kumaravelts@yahoo.com

Abstract

A diabetic screening camp was conducted in villages around Tagore Medical College medical college, Chennai in India. Four simple questions along with one measurement for waist circumference and fasting capillary blood sugar and/or post prandial blood sugar tests in individuals with Indian Diabetic Risk Score (IDRS) ≥60 were employed. Results indicated that IDRS (consisting of factors like age, abdominal obesity, physical activity and family history) predicted the risk of diabetes mellitus with sensitivity of 100% and specificity of 17.6% in individuals with score ≥60 and can be used as an effective tool for screening undiagnosed diabetics in the community.

Keywords. IDRS, Screening tool, undiagnosed diabetes mellitus, India.

Introduction

Diabetes mellitus is one of the leading cause of long term complications and a major health hazard in a developing country like India (Wild *et al.,* 2004). To identify and control the disease the knowledge of its prevalence and risk factors is necessary in the community. For developing countries urbanization is considered to be increasing risk factor with moving away from traditional diet (Ramachandran, 1992). Obesity, decreased physical activity and stress also contributes to the development of diabetes (Shashank, 2005). There are several strategies for screening for diabetes in the population (Nandeshwar *et al*., 2010; Prabha Adhikari *et al*., 2010). Community screening increases the public awareness and highlights the seriousness of the disease and could help in identifying asymptomatic individuals, who can ultimately be brought into management and can modify the course and complication of diabetes (Deepa, 2005).

Indian Diabetes Risk Score (IRDS) developed by Dr. Mohan and his colleagues is one of the strongest predictor of incident diabetes in India (Mohan, 2005). It is a simplified risk score for identifying undiagnosed diabetic subjects using four simple parameters like age, waist circumference, family history of diabetes and physical activity. Here the minimum score is 0 and maximum is 100. A score of 60 and above is indicative of diabetes risk. IDRS is more cost effective, involves simple non biochemical measurements and is easily applicable in a non-hospital setting. It can therefore be used as a simple first step in identifying the individuals with increased risk.

Aims and objectives

The objective of the study is to find out the undiagnosed diabetes by using IDRS and to show that the IDRS is a sensitive and specific screening tool to diagnose undiagnosed diabetes mellitus in population around Vandalur.

Materials and methods

A screening camp was conducted by the Department of Medicine, Tagore Medical College, Chennai. The awareness about this camp was carried out by social workers, by informing the nearby villagers about the screening camp program and the dangers of undetected diabetes mellitus. During the screening camp data *viz*. age, gender, family history of diabetes, exercise status and occupation was enquired and recorded (Table 1) Waist circumference of these subjects was measured at the maximum measurement at the belly, measured in centimeters (WHO, 2002).

Furthermore, fasting and postprandial blood sugar was measured, where ever possible. People were informed to come after overnight fasting. A fasting blood sugar more than or equal to 126 mg% (by one-touch glucose monitoring system) was considered as diabetic. These individuals were also subjected to oral glucose tolerance test with 75 gm of glucose and 2 hours postprandial blood sugar (venous blood) values were measured. Postprandial blood sugar values of over 200

Table 1. Indian Diabetic Risk Score recorded by eliciting the history

	Details	Score
Age (years)	< 35	0
	35 - 49	20
	≥ 50	30
Abdominal obesity	Waist <80 cm (female) , <90 (male)	0
	Waist ≥ 80 - 89 cm (female), ≥ 90 - 99 cm (male)	10
	Waist ≥ 90 cm (female), ≥ 100 cm (male)	20
Physical activity	Exercise (regular) + strenuous work	0
	Exercise (regular) or strenuous work	20
	No exercise and sedentary work	30
Family history	Exercise (regular) + strenuous work	0
	Exercise (regular) or strenuous work	20
	No exercise and sedentary work	30
Minimum score		0
Maximum possible score		100

Indian Journal of Science and Technology Vol. 5 No. 6 (June 2012) ISSN: 0974- 6846

mg% were classified as diabetes mellitus.

Results

A total of 154 people attended the screening camp. Among them 60 (39%) were males and 94 (61%) were females. The age ranged between 19 to 99 years. The mean age for population was 56.1 with a standard deviation of 17.5. Out of a total of 154 subjects, 150 had an IDRS score more than or equal to 40; and 132 had a score of 60 and above. The sensitivity, specificity, positive predictive value and negative predictive value of IDRS using various cut-off values were calculated. The results are given in Table .

The score more than or equal to 60 has 100% sensitivity and 17.6% specificity. When the cut off value is taken as 50 and above, though the sensitivity is maintained, however the specificity reduces significantly to 5.6%. When the cut off value is taken as 70 and above, though the specificity rises to 47.2 %, there is a significant fall of sensitivity to 58.6 %. As a screening tool, without compromising sensitivity we get an optimal specificity at the cutoff IDRS score of 60 and above.

Discussion

Our study shows that Indian Diabetic Risk Score (IDRS) consisting of variables like age, abdominal obesity, physical activity and family history predicted diabetes mellitus with a sensitivity of 100% and specificity of 17.6% when the score is 60 and above. The figures compared with original CURES study by Mohan *et al.* (2005), were 43% of population to be screened, 72.5% sensitivity and 60.1% specificity for an IDRS score of more than or equal to 60. IDRS is easy to administer and its accuracy helps us to screen the diabetes in a larger population.

It does not require any medical or paramedical staffs to collect the data. It can be done even by a layman since it involves collection of data like age, family history, physical activity and measurement of only waist circumference. Screening and early identification of the high risk individuals would help to take appropriate intervention like life style modification. It would help to prevent or to delay the onset of diabetes mellitus.

In comparison with other risk factor scoring system (Ramachandran, 2005), IDRS developed by Mohan *et al.* (2005), where only single waist measurement and three simple questions is one of the best diabetic risk score with very high sensitivity and specificity. It is the most useful tool to predict and screen undiagnosed diabetes in the given population. Our study substantiates the IDRS score 60 and above shows the optimal sensitivity and specificity.

Conclusion

Our study demonstrates that the Indian Diabetic Risk Score is user-friendly, simple, fast, economical and effective. It can be reliably applied as an effective screening tool for individuals with IDRS >60 for diabetes in the community. The score helps to identify the undiagnosed diabetes from the general population.

References

1. Deepa M, Deepa R, Shanthirani CS, Manjula Dutta, Unwin NC, Kapur A and Mohan V (2005) Awareness and knowledge of Diabetes in Chennai- The Chennai Urban Rural Epidemiology Study (CURES-9). *J. Assoc. Physicians of India.* 53, 283-287.
2. Mohan V, Deepa R, Deepa M,Somannavar S and Datta M (2005) A simplified Indian diabetic risk score for screening undiagnosed diabetic subjects. *J. Assoc. Physicians of India.* 53,759-763.
3. Nandeshwar S, Vishal Jamra and Pal DK (2010) Indian diabetes risk score for screening of undiagnosed diabetic subjects of Bhopal city. *National J.Community Med*. 1(2), 176-177.
4. Prabha Adhikari, Rahul Pathak and Shashidhar Kotian (2010) Validation of the MDRF - Indian Diabetes Risk Score (IDRS) in another South Indian Population through the Boloor Diabetes Study (BDS). *JAPI*, 50, 434-436.
5. Ramachandran A, Snehalatha C, Dharmaraj D and Viswanathan M (1992) Prevalence of glucose intolerance in Asian Indians. Urban rural difference and significance of upper body adiposity. *Diabetes care*. Doi: 10.2337/diacare.15.10.1348, 15, 1348-1355.
6. Ramachandran A, Snehalatha C, Vijay V, Wareham NJ and Colagiuri S (2005) Derivation and validation of diabetes risk score for urban Asian. *Diabetes Res. & Clinical Practice*. 70, 63-70.
7. Shashank R Joshi (2005) Indian diabetes risk score. *J. Assoc. Physicians of India*. 53, 755-757.
8. Wild S, Roglic G and Green A (2004) Global prevalence of diabetes, estimates for the year 2000 and projections for 2030. *Diabetes care*. Doi: 10.2337/diacare.27.5.1047. 27, 1047-1053.

Table 2. Sensitivity and Specificity of IDRS in our subjects

IDRS	n	Proportion of population *(in %)	Sensitivity	Specificity	PPV	NPV	accuracy
≥ 20	154	100	100	0	18.8	0.0	18.83
≥ 40	150	97	100	3.2	19.3	100.0	21.43
≥ 50	147	95	100	5.6	19.7	100.0	23.38
≥ 60	132	85	100	17.6	22.0	100.0	33.12
≥ 70	83	53	58.6	47.2	20.5	83.1	49.35
≥ 80	29	19	24.1	82.4	24.0	82.4	71.43
≥ 90	10	6	6.9	93.6	20.0	81.3	77.27

Specificity and sensitivity were calculated at various cutoff levels of IRDS.