ISSN: 0975-833X

Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 4, Issue, 10, pp.149-151, October, 2012

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

RESEARCH ARTICLE

BMI OR IDRS-WHICH IS THE BETTER PREDICTOR OF RISK FOR DEVELOPING DIABETES MELLITUS SOUTH INDIAN STUDY

[1]Vedapriya Dande Rajasekar, [1]Mittal Anuj, [2]Lavanya Krishnagopal, [3]Kavita, V., [4]Umamaheswari, K. and [5]Balamuruganvelu. S.

[1]Dept. of Community Medicine, Aarupadai Veedu Medical College and Hospital, Kirumampakkam, Puducherry
[2]Dept. of Pathology, Aarupadai Veedu Medical College and Hospital, Kirumampakkam,, Puducherry
[3]Dept. of Community Medicine, Indira Gandhi Medical College and Research Institute, Puducherry
[4]Dept. of Physiology, Indira Gandhi Medical College and Research Institute, Puducherry
[5]Dept. of Microbiology, Madha Medical College and Research Institute, Chennai

ARTICLE INFO

Article History:
Received 18th July, 2012
Received in revised form
14thAugust, 2012
Accepted 17th September, 2012
Published online 30th October, 2012

Key words:
Risk factors,
rural community,
diabetes mellitus,
IDRS

ABSTRACT

Background: Diabetes mellitus (DM) is an "Iceberg disease". Worldwide there are about 150 million estimated cases of diabetes and is predicted to double by 2025. The rising prevalence of DM in developing countries is closely associated with industrialization and socio-economic development. Prevalence rates of diabetes are increasing rapidly in both urban and rural India. Hence this study has been undertaken to find at risk individuals before onset of the disease in our service area.
Aim: To assess the risk of diabetes mellitus in adults ≥20 years by using Indian Diabetic Risk Score, in rural area of Pondicherry.
Methods : A community based cross-sectional study conducted in a village under rural service area of Community Medicine Department. Data collected were entered and analyzed on SPSS software. Test applied were Simple proportion, Chi square test, sensitivity and specificity.
Results: A total of 379 adults aged ≥ 20 years participated in the study, of which 200 (52.8%) were males and 179 (47.2%) were females. By using IDRS score 22.4% were with low risk, 48% with moderate and 29.6% were found to have high risk score, among them 1.2%, 15.4% and 34% were known to have diabetes respectively. Performance of IDRS and BMI for diagnosing diabetes mellitus showed, sensitivity and positive predictive value 56.71%, 33.92%, and 29.85%, 22.22% for IDRS and BMI respectively.
Conclusion: IDRS is the better tool to detect undiagnosed diabetes when compared to BMI. It is an easy and cost effective tool which can be applied to mass for screening high risk individuals. GTT has to be done among subjects with high risk score (IDRS>60) to detect early occurrence of diabetes.

INTRODUCTION

Diabetes mellitus (DM) is an "Iceberg disease". Worldwide there are about 150 million estimated cases of diabetes and is predicted to double by 2025 [1]. The rising prevalence of DM in developing countries is closely associated with industrialization and socio-economic development [2]. In India there are 40 million people estimated to have diabetes and it has earned the dubious distinction as diabetic capital of the world [3]. The study done in the year 2000 by Indian Council of Medical Research (ICMR) reported a prevalence of 2.3% in urban areas and 1% in rural areas, had increased to 12-19% and 4-10% respectively and it was reported to be 13.2% in other studies [4-6]. Thus, prevalence rates of diabetes are increasing rapidly in both urban and rural India. The aim of this study is to use Indian Diabetic Risk Score (IDRS) developed by Mohan *et al* to assess the risk of diabetes mellitus in adults ≥20 years, in rural area of Pondicherry [7].

***Corresponding author:** priyapandiane@yahoo.co.in

MATERIALS AND METHODS

Study design and setting

A community based cross-sectional study was designed to estimate the risk of Diabetes by using IDRS in selected village of Pondicherry. The study was conducted in the field practice area of Rural Health Training Centre (RHTC), Manapet, Department of Community Medicine, Aarupadai Veedu Medical College and Hospital, Pondicherry. There are five villages under RHTC, Manapet. A stratified random sample was taken from each village. All the available adults aged 20 years and above from each selected house were included, after obtaining their oral informed consent. Adults aged <20 years, pregnant mother and those who had not given consent and not present at the time of interview were excluded.

Study questionnaire

A team of trained doctors administered a pre-designed and pre-tested questionnaire and elicited information from the study participants on demographic factors (age, gender, marital status,

Table 1. Socio-demographic risk variables for diabetes mellitus

S.No	Variables		Known case of DM			Chi Square	df	P value
			Yes	No	Total n=379(%)			
1	Age	<35	6 (5.08)	112 (94.92)	118(31.1)	62.73	2	<.0001
		35-49	7 (5.98)	110 (94.92)	117(30.9)			
		>50	54 (37.50)	90 (62.50)	144(38)			
2	Gender	Female	45 (25.14)	134 (74.86)	179(47.2)	12.02	1	0.0005
		Male	22 (11.00)	178 (89.00)	200(52.8)			
3	Education	Illiterate	43 (25.15)	128 (74.85)	212(56)	13.13	2	0.0014
		Primary & Middle	20 (13.33)	130 (86.67)	57(15)			
		Secondary & above	4 (6.90)	54 (93.10)	110(29)			
4	Occupational	Sedentary	50 (23.58)	162 (76.42)	171(45.1))	11.8	2	0.0027
		Moderate	7 (12.28)	50 (87.72)	150(39.6)			
		Heavy	10 (9.09)	100 (90.91)	58(15.3)			
5	SES	I class (Upper class)	13 (12.62)	90 (87.38)	103(27.2)	10.45	4	0.03
		II class (Upper middle)	25 (17.99)	114 (82.01)	139(36.7)			
		III class (Middle)	21 (28.00)	54 (72.00)	75(19.8)			
		IV class (Lower middle)	4 (8.70)	42 (91.30)	46(12.1)			
		V class (Lower)	4 (25.00)	12 (75.00)	16(4.2)			

Table 2. Performance of BMI& IDRS for diagnosing Diabetes Mellitus

S. No		BMI/KDM(%) (95% CI)	IDRS/KDM(%) (95%CI)
1	Sensitivity	29.85 (19.59-42.43)	56.71 (44.08-68.57)
2	Specificity	77.56 (72.44-82.98)	76.28 (71.09-80.08)
3	Positive predictive value	22.22 (14.41-3245)	33.92 (25.41-43.55)
4	Negative predictive value	84.73 (78.85-87.69)	89.13 (84.62-92.48)
5	False Positive	77.77 (67.54-85.58)	66.07 (56.44-74.58)
6	False Negative	16.26 (12.30-21.14)	10.86 (07.12-15.37)

Table 3. Level of risk of diabetic case with IDRS

Level of risk	Risk Score	No. of persons (%)	Diabetic cases (%)
Low risk	<30	85(22.42)	1 (1.2)
Moderate risk	30-50	182(48.02%)	28(15.38)
High risk	>60	112(29.55)	38(33.92)

level of education), socioeconomic factors (household income and occupation), family history of diabetes, lifestyle factor like sedentary life style and details on physical activity. Standard techniques were used to measure height, weight and waist circumference. By using modified B G Prasad classification (calculated based on CPI of April 2011) socio-economic status [SES] was assessed [8] and grade of physical activity was assessed by using our previous study[9]. Mohan *et al. has developed* Indian diabetes risk score (IDRS) which was used to detect high -risk cases. [10]. The parameters for IDRS score comprises of two modifiable (waist circumference & physical activity) and two non-modifiable risk factors (age & family history) for diabetes. If age <35 years score is = 0, if 35-49 years score is=20, if >50 years score= 30, waist circumference <80 cm for female and <90cm for male score = 0, >80-89 cm for female and >90-99 cm male score=10, >90 cm for female and >100 cm for male score=20, physical activities vigorous exercise or strenuous work score=0, moderate exercise work-home=10, mild exercise work/ home = 20, no exercise and sedentary work-home =30, family history of diabetes, no family history = 0, family history present either parent = 10, both parents =20. After addition of all four parameters, the score is interpreted as risk score greater than 60 very high risk, 30-50 moderate risk and less than 30 low risk.

Statistical data analysis

The data collected were entered and analyzed Simple proportions (%) Chi square test, sensitivity and specificity) using SPSS 11.5 (SPSS Inc., Chicago, IL, USA).

RESULTS

A total of 379 adults aged ≥ 20 years participated in the study, of which 200 (52.8%) were males and 179 (47.2%) were females. More than fifty percent were found to be illiterates (56%). Nearly 45.1% of individuals were sedentary workers and only 15.3% were found as heavy workers. Maximum numbers (63.8%) of participants belong to upper and upper middle class, while only 4.2% belong to lower class according to Modified B.G. Prasad's classification. There is significant association of diabetes with age, female gender, illiterates and sedentary workers (table 1). According to IDRS score 22.4% were with low risk score, 48% with moderate and 29.6% were found to have high risk score, among them 1.2%, 15.4% and 34% were known to have diabetes respectively.(table2). Performance of IDRS and BMI for diagnosing diabetes mellitus showed, sensitivity and positive predictive value 56.71%, 33.92%, and 29.85%, 22.22% for IDRS and BMI respectively.

DISCUSSION

Developing country like India, predicted to be the future capital for diabetes, needs a simple and cost-effective tool to screen and detect high risk individuals prior to onset of disease. One such tool was developed by Mohan *et al* (2005) [7] at Chennai is IDRS (Indian Diabetic Risk Score). American Diabetes Association has also recommended this IDRS score [11]. Hence we had applied IDRS to detect at risk individuals. According to our study 30% of the individuals were under high risk group, whereas it was 43% and 19% in similar study done by Mohan *et al* (2005) [7] at Chennai and Sanjay Kumar Gupta *et al* (2010) [12] done at Chunampett and Annechikuppam of Tamil Nadu. In the present study we found that 17.7% were known diabetes, whereas it was 6% in a study done by Sanjay Kumar Gupta *et al* (2010) [12] and 4.9% in a study done by Anil.J Purty *et al* (2009) [13].

Sensitivity and specificity for IDRS (High risk score >60) was 56.7% and 76.3% respectively In this study, whereas in the study done by Mohan *et al* at (2005) [7] Chennai it was 62.2% and 73.7% respectively and it was 94.68 and 44.87% in a study by S Nandeshwar1 *et al* (2010) [14] . The IDRS score when applied for known diabetes we found 33.92% had high risk sore, whereas in the study by S.Nandeshwar1 *et al* (2010) [14] it was 51.6% and study by Sanjay Kumar Gupta *et al* (2010) [12] it was only 6%. Many such type of studies by using diabetes risk score with different criteria were used to detect undiagnosed diabetes in developed countries [15-18]. The difference in results is due to studies done at different geographical settings.

Conclusion

We conclude from our study that IDRS is the better tool to detect undiagnosed diabetes when compared to BMI. It is also an easy and cost effective tool to be applied for mass for screening of high risk individuals. GTT has to be done among subjects with high risk score (IDRS>60) to detect the occurrence of diabetes early.

Limitation

Survey was carried out during the working hours (9.00am 2.00pm), hence in this study the proportion of older people and homemakers are more.

REFERENCES

Anil J Purty, DR Vedapriya, Joy Bazoy, Sanjay Kumar Gupta, , J Cherian, Mohan Vishwanathan. Prevalence of diagnosed diabetes in an urban area of Pudhucherry, India-Time for prevention. Int J Diab Dev Ctries/ Januay-March 2009/ Volume 29/Issue 1.

Ahuja MM, Sivaji L, Garg VK, Mitroo P. Prevalence of diabetes in northern India (Delhi area). Horm Metab Res 1974;4:321-4.

Available from: http://www.diabetes.org/risk-test.jsp. American Diabetes Association for identifying high risk individuals. [last accessed on 2008 Jun

Chow CK, Raju PK, Raju R, Reddy KS, Cardona M, Celermajer DS, *et al*. The prevalence and management of diabetes in rural India. Diabetes Care 2006;29:1717-8.

Glümer C, Carstensen B, Sandbaek A, Lauritzen T, Jørgensen T, Borch-Johnsen K, *et al*. A Danish diabetes risk score for targeted screening: the Inter99 study. Diabetes Care 2004;27:727

Gupta OP, Joshi MH, Dave SK. Prevalence of diabetes in India. Adv Metabolic Disorders 1978;9:147-65.

Lindström J, Tuomilehto J. The diabetes risk score: a practical tool to predict type 2 diabetes risk. Diabetes Care 2003;26: 725-31.

Mohan V, Deepa R, Deepa M, Somannavar S, Datta M. A Simplified Indian Diabetes Score for screening for undiagnosed diabetic subjects. (CURES-24). J Assoc Physicians India 2005;53:759-63.

Nelson KM, Boyko EJ; Third National Health and Nutrition Examination Survey. Predicting impaired glucose tolerance using common clinical information: data from the Third National Health and Nutrition Examination Survey. Diabetes Care 2003;26:2058-62.

Park K. Parks Textbook of Preventive and social medicine. 21st edition. Jabalpur: Banarsidas Bhanot 2011: p362.

Prabha Adhikari*, Rahul Pathak**, Shashidhar Kotian 10Validation of the MDRF - Indian Diabetes Risk Score(IDRS) in another South Indian Population through the Boloor Diabetes Study (BDS) July 2010 • JAPI • VOL. 58.

S Nandeshwar1, Vishal Jamra2, DK Pal.Indian Diabetes Risk Score for screenin undiagnosed subjects of Bhopal city. National Journal of Community Medicine 2010, Vol. 1, Issue 2.3]}.

Sanjay Kumar Gupta, Zile Singh, Anil J Purty, M Kar, DR Vedapriya, P Mahajan, J Cherian Diabetes Prevalence and its Risk Factors in Rural Area of Tamil Nadu July 2010 Indian Journal of Community Medicine/Vol 35/Issue 3 page 396-399.

Sanjay Kumar Gupta, Zile Singh, Anil J Purty, M Kar, DR Vedapriya, P Mahajan, J Cherian Diabetes Prevalence and its Risk Factors in Rural Area of Tamil Nadu. Indian

Sicree R, Shaw J, Zimmet P. Diabetes and impaired glucose tolerance. In: Gan D, editor. Diabetes Atlas. International Diabetes Federation. 3rd ed. Belgium: International Diabetes Federation; 2006;15-103.

Spijkerman AM, Yuyun MF, Griffin SJ, Dekker JM, Nijpels G, Wareham NJ. The performance of a risk score as a screening test for undiagnosed hyperglycemia in ethnic minority groups: Data from the 1999 health survey for England. Diabetes Care 2004;27:116-22.

The Textbook of Community Medicine With Recent Advances by Suryakantha A H 2nd edition 2010 pg. 679-680

WHO (2003), Tech. Rep. Ser., N 916.

****