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ORIGINAL ARTICLE

UTILITY OF INDIAN DIABETIC RISK SCORE (IDRS) IN A RURAL AREA OF COASTAL KARNATAKA, INDIA

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ABSTRACT: CONTEXT: The prevalence of Diabetes is on a rise throughout the world. The major task for the community physicians is identification of individuals at risk in order to delay or prevent the onset of Diabetes Mellitus. The present study was conducted to assess the utility of Indian Diabetic Risk score (IDRS) in a rural area. **SETTINGS AND DESIGN**: A cross-sectional study was conducted during screening camps held at the Rural Maternity and Child Welfare Homes, managed by Department of Community Medicine, Kasturba Medical College, Manipal University, Manipal. **MATERIAL AND METHODS:** Data was collected with respect to Socio-demographic factors, occupation, physical activity and family history of Diabetes. Anthropometric measurements were done and random blood glucose was estimated using a glucometer. All subjects attending the camp above 25 years of age were eligible to be part of the study except known diabetics. **RESULTS:** A total of 251 adults reported for the health camps conducted at the rural centres, out of which the data for 209 participants was complete and eligible. Among 209 subjects, majority (78.5%) were females and 21.5% were males. The IDRS Score of ≥ 60 was obtained for 115(55%) subjects, moderate risk with score ranging 30 to 50 was seen in 90(43.1%) and 4(1.9%) had low risk. Of the 115 subjects who belonged to high risk group, 21 (18.3%) of them had RBS ≥140 mg/dl. **CONCLUSION:** IDRS is a simple useful and cost-effective screening tool for diabetes in resource limited settings.

KEYWORDS: Indian Diabetic Risk Score, random blood glucose, body mass index, rural area.

INTRODUCTION: Diabetes is an "iceberg" disease. Currently there are about 347 million people worldwide with diabetes.[1] Although both the prevalence and incidence of Type 2 diabetes mellitus has been increasing globally, there has especially been a dramatic rise in developing countries due to industrialization and economic transition. More than 80% of diabetes deaths occur in low- and middle-income countries.[2] World Health Organization (WHO) projects that diabetes will be the seventh leading cause of death in 2030.[3] Diabetes affects more than 50 million Indians, 7.1% of the nation's adults and kills about one million a year.[4]

The Indian population has an increased susceptibility to diabetes mellitus. The ethnicity, presumably genetic vulnerability of Asians manifests into diabetes when subjected to unfavorable life styles. Self-reported prevalence of diabetes (5.3%) and hypertension (10.9%) was lower than when measured clinically and biochemically (10.1% and 27.7%, respectively).[5] Moreover in India more than 50% of the diabetic subjects remain unaware of their diabetic status, which adds to the disease burden.[6] The problem is further compounded by the fact that 66% of Indian Diabetics are not diagnosed as compared to 50% in Europe and 33% in USA. [7]

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In primary care most of the screening tests for diabetes like -Fasting blood glucose estimation,[8] two hour post prandial blood glucose estimation, Oral glucose tolerance testing are invasive tests, requires manpower, involves cost for the investigations and manpower and may have low yield or poor community participation. In this context, Indian Diabetes Risk Score (IDRS) is a simplified Risk Score for identifying undiagnosed diabetic subjects in India developed based on Multiple Logistic Regression Analysis derived from Chennai Urban Rural Epidemiological Study (CURES).[9] The IDRS has a sensitivity of 72.5% & specificity of 60.1% for determining diabetes and the advantages are its simplicity, low cost and its applicability for mass screening programmes.[7] The present study was designed to assess the usefulness of IDRS in screening for type 2 diabetes mellitus among the rural population of coastal Karnataka.

MATERIALS AND METHODS: A Cross-sectional study was done at the diabetes screening camps organized at the rural outreach centres from December 2011 - March 2012. These centres namely Rural Maternity and Child Welfare (RMCW) Homes are managed by Department of Community Medicine, KMC, Manipal. All subjects attending the camp above 25 years of age were eligible to be part of the study except known diabetics. A total of 251 adults came for the screening camps conducted at two RMCW Homes. Data was collected with respect to socio-demographic factors, occupation, physical activity and family history of Diabetes using a pre-designed questionnaire. Physical activity was ascertained based on the participant's occupation and leisure time exercise. Anthropometric measurements–height, weight, waist and hip circumference were measured using standard protocols.[10] Random Blood Glucose (RBS) was estimated using a glucometer.

Any subject with RBS value of ≥140 mg/dl was considered as having high risk for developing diabetes. Body mass index was calculated based on the formula – weight in kilograms/height in square metres. Subjects were also categorized as low (<30), moderate risk (30-50) & high risk (≥60) based on IDRS score [9] as shown in Table 1. Health education was imparted pertaining to risk factors, prevention, diagnosis and treatment of type 2 diabetes mellitus after the screening programme. Statistical Package for Social Sciences (SPSS) version 15.0 was used to enter and analyse the data. Categorical data was summarized as frequencies with percentages. Univariate analysis of the factors associated with high risk for diabetes was done using Chi-Square Test. A p-value of <0.05 was considered statistically significant.

RESULTS: A total of 251 adults reported for the health camps conducted at the rural centres, out of which complete data was available for 209 participants. Among 209 subjects, 164 (78.5%) were females and 45 (21.5%) were males as depicted in Table 2. Over half of the study subjects 110 (52.6%) belonged to the age group ≥50 years and 112 (53.6%) of them were housewives. Among the subjects aged ≥50 years, most of them 83 (75.5%) had high risk score (IDRS). According to physical activity classification, 151 subjects out of 209 were having sedentary lifestyle; among whom 106 (70.2%) had high IDRS. Out of 32 subjects with a positive family history for diabetes, 20 (62.5%) belonged to high risk group by IDRS. Most of the males 41 (91.1%) had normal waist-hip ratio (W/H Ratio), whereas majority of women 152 (92.7%) had a high W/H Ratio, among whom 91 (59.9%) had a high risk score.

Only four of the study subjects belonged to low risk group according to IDRS. So, they were included in the medium risk group for analysis. Of 115 (55%) subjects who belonged to high risk group according to IDRS, 21 (18.3%) of them had RBS of ≥140 mg/dl. Seven subjects had RBS value of >200 mg/dl in the high risk group. Of the total (209) study subjects, 107 (51.2%) of them had a body

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mass index (BMI) ≥23.00 kg/m^2, among whom, 20 (18.7%) had RBS value of ≥140 mg/dl. Among the individuals with high W/H Ratio 156 (74.6%), 25 (16.0%) had RBS value of ≥140 mg/dl.

Univariate analysis using chi-square test did not show statistical significance. All the subjects belonging to the high risk group based on RBS values (≥140 mg/dl) were advised to confirm the diabetes status by fasting and post prandial blood glucose estimation.

It was observed that in the underweight category (BMI <18.50), 15 subjects had high IDRS score and among overweight individuals (BMI ≥23.00) 60 of them belonged to high risk IDRS category as shown in Table 3. But this difference was not statistically significant (p>0.05). Three-fourths of the population had a high waist-hip ratio which was significantly associated with IDRS (p=0.02)

DISCUSSION: In this study, the Indian Diabetes Risk Score was used for identifying high risk subjects in rural Karnataka. The use of such scoring systems would be a cost effective tool for screening diabetes especially in developing countries like India where over half of them remain undiagnosed.

The present study identified 115 (55%) subjects to be in the high risk category according to IDRS. In a similar study conducted by Adhikari P et al[11] in Boolor, Mangalore reported that using IDRS score ≥60 as cut-off, 62.2% of people living with undiagnosed diabetes in the population could be detected. In another study done by Gupta et al [12], they found 19% of their study population to have a high risk score.

This indicates that IDRS has excellent predictive value for detecting undiagnosed diabetes in the community and IDRS as a composite indicator is a much stronger risk indicator than examining individual risk factors like age, family history, obesity or physical activity.

According to a study done by Mohan V et al,[13] people with sedentary lifestyle had diabetes. In the present study too, people with sedentary lifestyle and mild physical activity had a higher risk for diabetes. The present study had concurring results with the study from Pondicherry[14] in which the increase in BMI was associated with increased risk for diabetes.

A study done in South India[15] concluded that Asian Indians with Random Capillary Blood Glucose (RCBG) >110 mg/dl at screening can be recommended to undergo definitive testing and a cut off of ≥140mg/dl maximized the sensitivity and specificity for detection diabetes. So, a similar cut-off was chosen for the present study.

Further confirmation with fasting and post prandial blood glucose estimation is required among subjects with IDRS >60 to detect diabetes. But follow-up of the high risk subjects was not fruitful due to cost and time constraints. Also, lifestyle modifications and dietary changes need to be initiated to minimize the risk factors among these groups.

CONCLUSION: This study estimates the usefulness of the Indian Diabetes Risk Score for identifying individuals at high risk of developing type 2 diabetes mellitus in the rural community. Use of the IDRS can make mass screening for diabetes in India more practically feasible and cost effective.

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Sl. No.	Particulars	Score
1	**AGE [YEARS]**	
	• <35 (reference)	0
	• 35-49	20
	• ≥50	30
2	**ABDOMINAL OBESITY**	
	• Waist <80 cm [female], <90 cm [male] (reference)	0
	• Waist ≥80-89 cm [female], ≥90-99 cm [male]	10

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	• Waist ≥90 cm [female], ≥100 cm [male]	20
3	**PHYSICAL ACTIVITY**	
	• Exercise [regular] + strenuous work (reference)	0
	• Exercise [regular] or strenuous work	20
	• No exercise and sedentary work	30
4	**FAMILY HISTORY**	
	• No family history (reference)	0
	• Either parent	10
	• Both parents	20
	• Maximum Score	100
	• Minimum Score	0
	Risk Score <30 – Low risk	
	Risk Score <60 – Moderate risk	
	Risk Score ≥60 – High risk	

TABLE 1: INDIAN DIABETES RISK SCORE (IDRS) DEVELOPED BASED ON MULTIPLE LOGISTIC REGRESSION ANALYSIS DERIVED FROM CURES

(Adapted from - Mohan V et al. A Simplified Indian Diabetes Risk Score for Screening for Undiagnosed Diabetic Subjects. J Assoc Physicians India. Sep 2005; 53:759-63)

Variables	n (%)
GENDER	
• Male	45 (21.5)
• Female	164 (78.5)
AGE GROUP (YEARS)	
• 25-34	24 (11.5)
• 35-49	75 (35.9)
• ≥50	110 (52.6)
OCCUPATION	
• Professional/white collar	19 (9.1)
• Skilled	17 (8.1)
• Semi/unskilled	44 (21.1)
• Unemployed/retired	17 (8.1)
• Housewife	112 (53.6)

TABLE 2: SOCIO-DEMOGRAPHIC CHARACTERISTICS OF THE STUDY SUBJECTS (N=209)

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Variables	IDRS Category		Total (n=209) n (%)
	High risk (n=115) n (%)	Low/Medium risk (n=94) n (%)	
BMI Category (kg/m²)			
(<18.50)	15 (13.0)	14 (14.9)	29 (13.9)
(18.50-22.99)	40 (34.8)	33 (35.1)	73 (34.9)
(≥23.00)	60 (52.2)	47 (50.0)	107 (51.2)
Waist Hip Ratio *			
High	93 (80.9)	63 (67.0)	156 (74.6)
Normal	22 (19.1)	31 (33.0)	53 (25.4)
RBS (mg/dl)			
(<110)	43 (37.4)	39 (41.5)	82 (39.2)
(110-139)	51 (44.3)	43 (45.7)	94 (45.0)
(≥140)	21 (18.3)	12 (12.8)	33 (15.8)

TABLE 3: DISTRIBUTION OF STUDY SUBJECTS ACCORDING TO VARIOUS RISK FACTORS

*p-value =0.02 (chi-square test value=5.240, df=1)

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