Original research article

Diagnosing the Missing Case of Diabetes Mellitus and its Risk Factors using Indian Diabetes Risk Score as Screening Tool in a Rural Area

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Abstract

Background: The globe today faces as epidemic of non-communicable diseases (NCD), which will soon surpass communicable diseases. Indian Diabetes Risk score developed by Madras Diabetes Research Foundation and Ramachandran A et al[8] can be used as simple tool to screen the population in an area. **Aim and objectives**: Screening of diabetes mellitus in a rural area by using IDRS. **Material and Methods:** The cross sectional study was done in field practice area of rural health and training centre associated with a medical college. From the survey proforma four important factors like, age, abdominal obesity, family history of diabetes and physical activity were taken to calculate Indian diabetes Risk score- IDRS. The study tool which we have used in this study was IDRS - Indian Diabetes Risk Score - A simplified form of score for screening undiagnosed Diabetics. **Results**: Our study included 610 study participants in which majority 64.26% males, 73.77% belonging to nuclear family and majority were from lower and lower middle class of socioeconomic status. Risk factors calculated for IDRS show 29.18 % of participants were above 50 years and abdominal obesity measured in terms of waist circumference show higher level in males that is 43.11% males were having WC from 91-99 and 24.59% males were having above 100 waist circumference .as physical activity was assessed it shows majority that is 43% were doing moderate activity, 21.48 were doing mild physical activity and 13.44% were sedentary population.
Keywords: IDRS,Diabetes

Introduction

The globe today faces as epidemic of non-communicable diseases (NCD), which will soon surpass communicable diseases both in the developing and developed world. However in NCD due to lack of a clear etiological agent it is heavily dependent on identifying and tackling risk factors. The risk factors like age, gender, family history are non-modifiable while others like smoking, diet, physical activity, hypertension, diabetes etc are modifiable. Diabetes has become one of the most common non communicable diseases and its burden is on the rise among all the age groups.[1,2]

The projected increase by 2025 will be 70- million in India according to WHOSEARO.[3]. As the risk factors like increasing age, obesity, family history of diabetes, lack of physical

activity, stressful environment and dietary habits for Type2 Diabetes were well established. Early screening of at risk population by simple non interventional cost effective tool will be the effective preventive strategy to control this epidemic.

There are many diabetes risk scores available like Finnish Diabetes Risk Score, German Diabetes Risk score, Dutch Diabetes Risk Score using different variables. Various countries and different studies have used diverse diabetes risk scores to detect undiagnosed diabetes. [4, 5, 6, 7,] In the present study, we tried to validate the IDRS, which is a handy tool with the public health specialists to screen for high risk cases without any laboratory support. In India – Indian Diabetes Risk score developed by Madras Diabetes Research Foundation and Ramachandran A et al[8] can be used as simple tool to screen the population in an area. This study was intended to use the IDRS risk score as screening tool for assessing the risk of developing diabetes among rural community and its significance.

Materials and methodology:
The cross sectional study was done in field practice area of rural health and training center associated with a medical college. From the field practice area kasturwadi village was selected by simple random method. A house to house morbidity survey was conducted in the village using a simplified questionnaire taking all demographic details, anthropometry and morbidity profile. From the survey proforma four important factors like, age, abdominal obesity, family history of diabetes and physical activity were taken to calculate Indian diabetes Risk score- IDRS. The study tool which we have used in this study was IDRS - Indian Diabetes Risk Score - A simplified form of score for screening undiagnosed Diabetics.

Anthropometry measurements were made by trained interns. This included weight to nearest 100 g and height, waist circumference and hip circumference to nearest cm. Grade of physical activity was assessed by asking the participants how do they go to their place of work and how far is that from their home, how demanding is their occupation, what kind of physical activities they do at home and do they exercise regularly in leisure time?
Fasting venous blood was collected for evaluation of blood glucose levels. Subjects who were not fasting were excluded from the study. Venous blood samples were collected in fluoride vacutainers. Blood sugar estimation was done by glucose oxidase peroxidase (GOD-POD) method. All those having fasting glucose levels more than 126 mg/dL on venous blood sample were referred and followed up in medical OPD of the hospital for further management.

An IDRSvalue > or = 60 had the optimum sensitivity (72.5 %) andspecificity (60.1%) for determining undiagnosed diabetes with a positive predictive value of 17.0%,negative predictive value of 95.1%,and accuracy of 61.3%.[9]
The study tool has got the scoring given here.

Particulars	Score
Age	
<35	0
35-49	20
>50	30
Abdominal Obesity	
Waist<80cm(female) <90(Male)	0
Waist ≥ 80 – 89 cm [female], ≥ 90 – 99 cm [male]	10

Waist>90cm(female) >9100(Male)	20
Physical activity	
Exercise [regular] + strenuous work [reference]	0
Exercise [regular] or strenuous work	20
No exercise and sedentary work	30
Family history	
No family history [reference]	0
Either parent	10
Both parents	20
Minimum Score	0
Maximum Score	100

Results and Discussion:

Our study included 610 study participants in which majority 64.26% males, 73.77% belongingto nuclear family and majority were from lower and lower middle class of socioeconomicstatus.(Table 1).

Risk factors calculated for IDRS show 29.18 % of participants were above 50 years and abdominal obesity measured in terms of waist circumference show higher level in males that is 43.11% males were having WC from 91-99 and 24.59% males were having above 100 waist circumference .as physical activity was assessed it shows majority that is 43% were doing moderate activity, 21.48 were doing mild physical activity and 13.44% were sedentary population. Familial history in both parents were positive was shown in 14% of cases and 31% were showing positive family history in either parent.(Table 2)

Risk group distribution of study participants show 23.11% were having IDRS score above 60 that is high risk of developing diabetes and 43% were in moderate risk group.(Table3)

Association of IDRS with presence of undiagnosed diabetes show that out of 610 participants 43 were having blood sugar level above 126 and among them 22 were in high IDRS ,11 were in moderate risk group and 10 were in low score group. On applying test of significance p value obtained was less that 0.05 so there is positive association between high IDRS score and blood sugar level. (Table4)**.**The prevalence of undetected diabetes in the current study was 7.4%.

There exists a high proportion of such cases globally, and especially in developing countries. Beagley et al. in their study have given global estimates of undiagnosed diabetes in adults to vary between 24.1% to 75.1% across differentregions of the world.[9] Dasappa et al. have reported prevalence of diabetes, pre-diabetes in urban slums of Bangalore as 12.33% and 11.57% respectively.[10] Lower prevalence of 6.3% was found by Ravikumar et al. in Chandigarh Urban Diabetes Study (CUDS).[11] The Diabetes Epidemiology: Collaborative Analysis of Diagnostic Criteria in Asia (DECODA) studies showed that there are 1.6 cases undiagnosed for every known case of diabetes in the community.[12] Results of different study vary depending upon the population profile, socio cultural practices, dietary habits and different criteria adopted for diagnosing diabetes.

Positive family history plays a vital role in occurrence of diabetes. Ramachandran et al. in a study in south India found that 47% of the people who had diabetes had a positive family history.[13] Similarly in our study also Familial history in both parents were positive was

shown in 14% of cases and 31% were showing positive family history in either parent. Other covariates for diabetes were increased waist circumference and waist hip ratio which have been significantly associated with diabetes in other studies also.

IDRS can be given the title of 'Appropriate technology' in public health which is a strong tool in the hands of public health experts and community health workers to screen and then confirm out the hidden cases of undiagnosed diabetes. It is user friendly, simple, fast, economical and effective. It is easy to administer and at the same accurate too. Moreover, it can be used by community health workers like Auxiliary nurse Midwife (ANM), Multipurpose Worker Male (MPW), Accredited social Health Activist (ASHA) and Anganwadi workers after a short training. Government of India's initiative on tackling NCDs through National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Disease and Stroke (NPCDCS) also focuses on health promotion for behavior change and early diagnosis. Use of tools adapted for local community such as IDRS can provide simple, cost effective method for the public health system for screening of diabetes at an early stage and prevent complications draining majority of resources of already stretched health care system of the country.

Although many screening questionnaires developed by various diabetes associations's throughout the world, certain screening tools vary according to the ethnic groups. One such clear and easily usable tool developed by MDRF by Mohan V utilizing the very simple risk factors like age, waist circumference, physical activity and family history. Almost all the screening questionnaires include the risk factors like, age and weight. This IDRS is unique in a way that having family history and the physical activity and measurement of waist circumference as a measure of abdominal obesity.This plays a very importantrole in determining the roleof developing type 2 diabetes becauseIndian populationis characteristic of type 2 diabetes with lean BMI. Soinstead of BMI, the utilization of Waist circumference in the screening makes it a better screening tool for assessing type2 diabetes,whereas the Finnish group diabetes risk score has included both BMI and waist circumference.

Table 1: Demographic profile of study participants

VARIABLE	NUMBER N=610	Percentages
GENDER		
MALE	392	64.26
FEMALE	218	35.73
FAMILY TYPE		
JOINT	160	26.22
NUCLEAR	450	73.77
SES		
UPPER	48	7.86
UPPER MIDDLE CLASS	70	11.47
MIDDLE CLASS	112	18.36
LOWER MIDDLE CLASS	192	31.47
LOWER	188	30.81

Table 2:Risk score components of study subjects (n=610)

Particulars	Score	Number of subjects	Percentage(%)
Age			
<35	0	241	39.51
35-49	20	191	31.31
>50	30	178	29.18
Abdominal Obesity			
≤80 (female)	0	88	14.43
≥81-89 (female)	10	75	12.30
≥90 (female)	20	58	9.51
≤90 (male)	0	197	32.30
≥91-99 (male)	10	263	43.11
≥100 (male)	20	150	24.59
Physical activity			
Vigorous exercise at home or work	0	130	21.31
Moderate exercise at home or work	10	267	43.77
Mild exercise at work or home	20	131	21.48
No exercise/sedentary	30	82	13.44
Family history			
No family history [reference]	0	328	53.77
Either parent	10	192	31.48
Both parents	20	90	14.75
Minimum Score	0		
Maximum Score	100		

Table 3: Group-wise distribution of subjects in risk groups (n=610)

Group (risk score)	No. of subjects	Percentage (%)	Mean risk score
Group I (<30)	343	56.22	21
Group II (30-50)	126	20.65	43
Group III (≥60)	141	23.11	72
Total no. (%) 100 (100)	100	100	

Table 4: Association of risk score(IDRS) with presence of undiagnosed diabetes

Group (risk score)	No. of subjects	Diabetic(Random BSL>126)	Non Diabetic(Random BSL<126)	P value
Group I (<30)	343	10	333	
Group II (30-50)	126	11	115	0.001
Group III (≥60)	141	22	119	

CONCLUSION

In conclusion, the MDRF-Indian diabetes risk score(MDRF-IDRS) is a useful tool for predicting and screening for undiagnosed diabetes mellitus in the population. Our study has described that the majority ofthe adult population were atmedium and high risk of developing type 2 diabetes, showing the need lifestyle changes to be initiated as soon as possible in rural as per there culture and social style.

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