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Original Research Article

Screening for diabetes using Indian diabetic risk score in the field practice area of tertiary care hospital, Maharashtra

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ABSTRACT

Background: Globally, people living with diabetes were estimated to be 422 million in year 2014. In India, an estimated 7.8% have diabetes. Early detection and prompt treatment for diabetes is key to achieve sustained control and prevent complications. The Indian diabetic risk score (IDRS) is one of simple screening tool to find the risk for diabetes in the community of filed practice area of teaching hospital.
Methods: A community based cross sectional study was conducted in urban and rural field practice area during the period of 1st January to 30th September 2018. As per global health report on diabetes, World Health Organization 2016, prevalence of diabetes in India was found to be 7.8%. Considering allowable error as 20% sample size was 1183 which was rounded up to 1200 with 600 each in urban and rural field practice area. The data was collected with bio- data and IDRS questionnaire which includes age, physical exercise, waist circumference and family history of diabetes.
Results: Total 1200 Study participants were included in the study. It was observed that 821 (68.41%) were female participants and 379 (31.59%) were male participants. High risk for diabetes was observed in 329 (27.42%) participants. Among the high-risk participants, 194 (58.96%) were from the urban area and 135 (41.04%) were from the rural area. The association between increasing BMI with high IDRS was observed and found statistically significant. High blood pressure was observed among the participants having high IDRS and findings were statistically significant.
Conclusions: This simplified IDRS is cost-effective tool to screen the community on large scale.

Keywords: Indian diabetes risk score, Diabetes mellitus

INTRODUCTION

Non-communicable diseases are on rise in India and around 5.8 million Indians die from various non - communicable diseases. Diabetes is among one of these diseases and now it is affecting the younger population. About 422 million people worldwide have diabetes.[1]

Many studies have confirmed that low- and middle-income countries face the greatest burden of diabetes. In India, out of 1.3 billion population 60 million have diabetes. In 2015, over 0.9 million deaths were attributed directly or indirectly due to diabetes in India. WHO projects that diabetes will be the 7th leading cause of death by 2030. It is expected that in India the number of diabetics will increase to about 109 million cases.[2]

The major risk factors which contribute to diabetes are unhealthy diet, physical inactivity, tobacco and alcohol use etc.[3] In India, more than 50% of the diabetic population remains unaware of their diabetes status which added to the disease burden similar to the world

scenario.[4] The measures of the lifestyle modification will help in preventing the onset of diabetes and it has been proved from various studies. Early identification of high-risk population would help in taking appropriate interventions like dietary changes, increased physical activity and this will definitely help to prevent or delay the onset of diabetes in high risk population. The identification of high-risk group will be beneficial to prevent the burden of diabetes in India.[5]

Due to such high burden of diabetes, there was need for simple screening tool for detecting undiagnosed people with disease in the community. The Indian Diabetes Risk Score (IDRS), a simple tool for prediction of undiagnosed diabetes developed by Dr. Mohan and colleagues at the Madras diabetes research foundation (MDRF), Chennai and it was validated using the data from the Chennai urban population study (CUPS).[6] Apart from the health burden, diabetes also imposes an economic burden. The costs associated with diabetes include cost of care, productivity loss and disability, which can be a considerable burden to the individual, families and society. The burden can be reduced to a small extent by screening the population. So, the present study was conducted to screen the high-risk individuals using IDRS in the community of field practice area of a tertiary care centre.

Aim

To study the distribution of IDRS among the adult population of field practice area of a tertiary care centre in Maharashtra

Objectives

- To assess the proportion of study participants with high IDRS among urban and rural population.
- To find relation between body mass index (BMI) and high blood pressure with the IDRS among the study population.

METHODS

A cross sectional study was carried out to screen for diabetes using IDRS score in the field practice area of MIMER Medical College, Talegaon (D), Maharashtra. The study was conducted between 1st January to 30th September 2018 at Urban and Rural Health centre of the college.

As per global health report on diabetes, World Health Organization 2016, prevalence of diabetes in India was found to be 7.8percent.[2] Considering allowable error as 20% and 95% confidence interval the sample size was 1183 (with formula $N=4pq/L^2$) which was rounded up to 1200 with 600 each in urban and rural field practice area. The study participants with age more than 18 years and who has given the informed consent were included in the study. All the participants who have attended OPD at urban and rural field practice centre were included in the study till the sample size is met.

The Institutional Ethical Committee approval was obtained prior to the study. A pre- tested structured questionnaire and IDRS was used for data collection. The questionnaire includes bio- data, height, weight, and blood pressure. Weight was measured to the nearest 100 gm using weighing machine. Height was measured using a stadiometer to the nearest 0.5 cm. Waist circumference was measured midway between lowest rib and the highest point of iliac crest while the subject was breathing quietly at the end of expiration to the nearest 0.1 cm. BMI was calculated using the formula weight in KG divided by height in meter square. The Asian classification of obesity was used to assess obesity as per BMI which includes <18.5 an underweight, 18.5-22.99 normal weight, 23–24.99 overweight, 25-29.9 as obese I and >30 obese II.[7,8]

Blood pressure was measured using sphygmomanometer in right upper arm and in sitting position ensuring the mercury is at heart level. All the participants were requested to take rest for ten minutes before taking the readings.

IDRS includes following four parameters: age in years, abdominal obesity, physical activity and family history of diabetes.[6]

Table 1: Indian Diabetes Risk Score (IDRS).

Categorized risk factors	Score
Age (in years)	
<35	0
35–49	20
≥50	30
Abdominal obesity	
Waist circumference female <80 cm, Male <90 cm (Reference)	0
Female 80–89 cm, Male 90–99 cm	10
Female ≥90 cm, Male≥100 cm	20
Physical activity	
Vigorous exercise or strenuous at work	0
Moderate exercise at work/home	10
Mild exercise at work/home	20
No exercise and sedentary at work/home	30
Family history	
Two non‑diabetic parents	0
Either parent diabetic	10
Both parents' diabetic	20
Total	100

Score ≥60: high risk, 30-50: medium risk, <30: low risk.

Age in years (<35= 0 score; 35-49= 20 score; ≥50= 30 score), abdominal obesity (waist <80 cm in female and <90 cm in male= 0 score; 80-89 cm (female) 90-100 cm (male)= 10 score and ≥90 cm (female) and ≥100 cm

(male)= 20 score), physical activity (heavy exercise + strenuous work=0; moderate exercise at work= 10, mild exercise or light work= 20; no exercise and totally sedentary= 30) and family history of diabetes (no family history= 0; either parent diabetic=10and both parents diabetic= 20).

An IDRS value ≥60 has risk of developing diabetes, 30-50 risk of having diabetes is moderate and <30 having the low risk of having diabetes. IDRS has sensitivity 72.5%, specificity 60.1%, positive predictive value 17.0%, negative predictive value 95.1% and 61.3% accuracy.

Data entry was done in Microsoft excel and the analysis was done using Epi–info version 7.2.2.6 software.

RESULTS

The present study was conducted in the field practice area of Department of Community Medicine, of a tertiary care teaching hospital including 600 participants each from urban and rural health training centre. Total 1200 participants were included in the study.

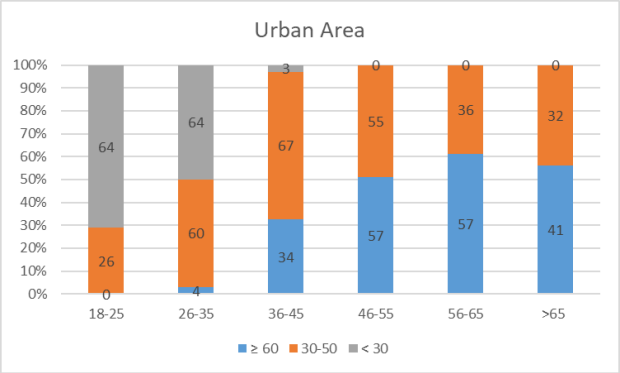

Figure 1: Age-wise distribution with IDRS score (urban area).

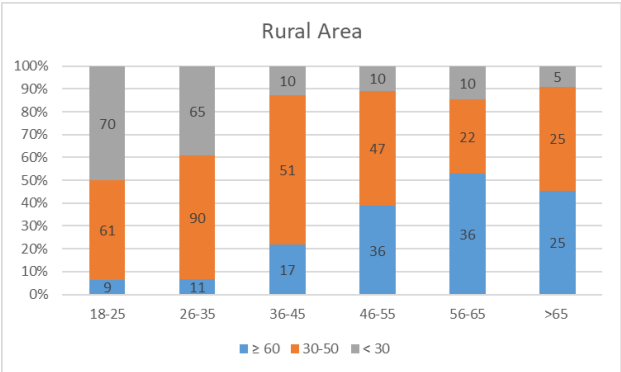

Figure 2: Age-wise distribution with IDRS score (rural area).

Age wise distribution of study participants in both urban and rural area was shown in Figure 1 and 2 respectively. In urban area, the 128 (21.33%) participants were in the age group of 26-35 years followed by 112 (18.66%) participants were in the age group of 46-55 years. In rural area 166 (27.66%) participants were in the age group of 26-35 years whereas 140 (23.33%) were in the age group of 18–25 years. As age of the participants advances, IDRS >60 which is high risk for developing diabetes increases in both urban as well as in rural area. It was observed in our study that IDRS <30 i.e. low risk was not found in participants above the age of 46 years in urban area.

In the present study, it was observed that 821 (68.41%) were female participants and 379 (31.59%) were male participants. In an urban area, 119 out of 371 i.e.32.08% female participants had had high risk for diabetes (IDRS >60) and 75 out of 229 i.e. 32.75% male participants had had high risk for diabetes. In rural area, 103 (22.89%) out of 450 female participants had high risk for diabetes whereas 32 (21.33%) out of 150 male participants had high risk for diabetes.

Table 2: Distribution of study population in urban and rural area according to IDRS.

Study group	IDRS			Total (%)
	≥60 (%)	30-50 (%)	<30 (%)	
Urban	194 (32.33)	276 (46)	130 (21.66)	600 (50)
Rural	135 (22.5)	295 (49.17)	170 (28.33)	600 (50)
Total	329 (27.42)	571 (47.58)	300 (25)	1200 (100)

Table 3: Association between body mass index (BMI) and IDRS among study participants.

BMI values	IDRS					
	>60		30-50		<30	
	Urban	Rural	Urban	Rural	Urban	Rural
18.5-22.99	46	45	134	142	86	117
23-24.99	41	18	43	49	18	24
>25	107	72	99	104	26	29

Table 4: Association between IDRS and blood pressure in urban participants.

IDRS	BP≥140/90 (%)	BP <140/90 (%)	Total
<30	17 (13.07)	113 (86.92)	130
30-50	58 (21.01)	218 (78.98)	276
≥60	68 (35.05)	126 (64.94)	194
Total	143	457	600

Table 5: Association between IDRS and blood pressure in rural participants.

IDRS	BP≥140/90 (%)	BP <140/90 (%)	Total
<30	9 (5.29)	161 (94.7)	170
30-50	46 (15.59)	249 (84.40)	295
≥60	49 (36.29)	86 (63.70)	135
Total	104	496	600

Table 2 shows distribution of Urban and Rural population according to IDRS with high risk, medium risk and low risk. High risk for diabetes was observed in 329 (27.42%) participants. Among the high-risk participants, 194 (58.96%) were from the urban area and 135 (41.04%) were from the rural area. It was observed in the present study that medium risk for diabetes was seen in 571 (47.58%) participants. The medium risk for diabetes was almost similar for both urban and rural study participants.

Body mass index of the study participants and its association with IDRS was shown in Table 3. Normal BMI was observed in 266 (44.33%) participants in urban area while 304 (50.66%) in rural area. The present study shows that 232 (38.66%) participants were obese in urban area whereas 205 (34.16%) participants were obese in rural area. There were 102 (17%) and 91 (15.16%) participants overweight in urban and rural area respectively. The association between increasing BMI with high IDRS was observed and found to be statistically significant ($p<0.0001$).

Table 4 and 5 shows the association between IDRS and Blood pressure among the urban and rural participants. In urban area, out of 194 participants who have high risk for diabetes, 68 (35.05%) had high blood pressure. Similarly, among 135 participants having high risk for diabetes, 49 (36.29%) were observed with high blood pressure in rural area. The current study showed that high blood pressure was observed among the participants having IDRS more than 60 in both urban and rural areas. The findings were statistically significant ($p<0.001$).

DISCUSSION

A cross sectional study was conducted to screen the community using IDRS in the field practice area of a tertiary care teaching hospital. Total 1200 participants were included in the study out of which 600 each from urban and rural area. The present study showed that IDRS is a useful tool to identify high risk individuals who can be targeted for screening for diabetes. IDRS is a cost-effective tool for screening diabetes in developing countries like India having marked explosion of diabetes and over half of them remain undiagnosed.

In the present study, 128 (21.33%) participants were in the age group of 26-35 years followed by 112 (18.66%) participants were in the age group of 46-55 years. In rural area 166 (27.66%) participants were in the age group of 26 -35 years whereas 140 (23.33%) were in the age group of 18–25 years. In a study carried by Choudhary et al showed that 47.2% were in age group of 20 to 34 years, 28.50% were in the age group of 35 to 49 years whereas 24.3% were more than 50 years of age.[3] Majority of the participants in our study were females as compared to males and similar findings were observed in study carried out by Choudhary et al and Pothukuchi et al.[3,9] In study carried out by Brinda et al similar observations were found i.e. 67.3% were female participants as compare to 32.7% were male participants.[10]

It was found that 27.42%, 47.58% and 25% of the participants were in high, moderate and low risk respectively. In the study carried by Patel et al, it was found that there was 23%, 48.57%, and 7.20% high, moderate and low risk respectively for developing diabetes.[11] Similar to the study, the findings are consistent with the study carried out by Adhikari et al who found 29.7% having high risk for diabetes.[12] It was observed that IDRS with high risk in urban area was 32.33% whereas study conducted by Mohan et al in urban area, the high risk IDRS was found to be 42.9 percent.[6] Similarly, a study carried out by Patil et al showed that 36.6.% participants were with high risk IDRS among the urban population.[13] In rural area IDRS with high risk was 22.5%, while it was 18.66% in the study conducted by Gupta et al and 25.98% in the study carried out by Narayanan et al.[14,15]

It was observed that there is significant association between increasing BMI with IDRS with high risk. The similar findings were observed in studies conducted by Gupta et al, Choudhary et al.[3,14]

Diabetes shares many risk factors with other non-communicable diseases like age, physical inactivity, waist circumference and high blood pressure. The study conducted to determine the association of IDRS with high blood pressure which is a risk factor for cardiovascular diseases by Mohan et al shows that with increasing IDRS <30, 30-50, and ≥60, the prevalence of hypertension found to be 9.4, 22.1 and 38.2% respectively.[16] The similar observations were found in our study i.e. 13.07, 21.01 and 35.05% in urban population and 5.29, 15.59 and 36.29% in rural population.

CONCLUSION

The MDRF–IDRS tool is useful to predict many non-communicable diseases like diabetes, metabolic syndrome and cardiovascular diseases. This simplified IDRS is cost-effective tool to screen the community on large scale. As this score includes two modifiable risk factors i.e. abdominal obesity and physical activity will be helpful for lifestyle modifications to reduce the risk for diabetes and other non–communicable diseases.

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Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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