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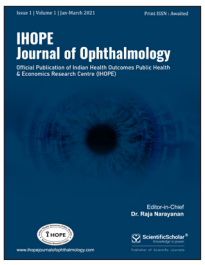

Original Article

Indian diabetic risk score screening of rural adults in Tamil Nadu

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ABSTRACT

Objectives: Diabetes is acknowledged as a key public health problem with the prevalence rate increasing globally and reaching epidemic proportions. It is high time that screening programs are implemented at the community level for early detection of the population, who are at risk of having diabetes mellitus.

Materials and Methods: A community-based and cross-sectional study was conducted in the rural field practice area of a tertiary care hospital in Chengalpattu district, Tamil Nadu. The screening tool used to assess the risk status was the Indian diabetes risk score (IDRS) and the body mass index (BMI) of the participants was also calculated.

Results: A total of 396 formed the study population with the males constituting 47.2% of the study population. The majority were more than 50 years of age. Evaluating the risk status of study subjects using IDRS, the higher IDRS risk score was seen in 48.2% of participants, 47.2% had moderate risk, while only 3.5% had low risk. About 54.2% (n = 198) of participants were found to have a BMI within the normal range, 18.4% were underweight, 20.5% were overweight, and obesity was seen in 6.8% of the participants. A statistically significant association was found between gender and IDRS risk status, whereas no significant association was found between BMI category and IDRS risk status.

Conclusions: Almost half of the study participants belonged to the high-risk category using IDRS screening. For the mass screening of diabetes, IDRS seems practically feasible and acceptable.

Keywords: Body mass index, Diabetes, Indian diabetic risk score, Screening

INTRODUCTION

Diabetes is a major public health problem and the prevalence rate is increasing globally and reaching epidemic proportions.[1] Diabetes is a chronic and metabolic disease pigeonholed by raised blood sugar levels which leads to grave impairment of the eyes, nerves, kidneys, heart, and blood vessels over time.[2] Diabetes currently affects 425 million adults globally, a total that is set to reach 629 million by 2045.[3]

It is a well-known fact that the Indian population is known to have an increased liability to develop diabetes mellitus. The race and genetic vulnerability of Asians manifest in diabetes when exposed to unfavorable lifestyles.[4] The prevalence of diabetes in India among adults was 8.8% and a total of 73 million cases, which is the second highest in the world. Over half of the people living in the country are predicted to be undiagnosed, there is an urgency to escalate awareness

and knowledge of diabetes and its associated complications among healthcare professionals to promote screening and early diagnosis to improve health outcomes and help save lives.[5]

India is an agricultural predominant nation, where most adults are living in rural areas. About 72.2% of the population was living in rural areas. Rapid socioeconomic development in the Indian rural population is leading to a thespian lifestyle transition in the current scenario.[6] A 1970s Indian council of medical research reported that the rural diabetes prevalence was 1% which in the 2000s, has increased to 4–10%.[6] The national program for prevention and control of cancer, diabetes, cardiovascular disease, and stroke was implemented by the ministry of health and family welfare, Government of India in an attempt to plateau this exponential growth in non-communicable disease prevalence, with a primary focus on screening.[7] In alignment with this goal, the present study reports the identification of high-risk candidates for developing Type-2 diabetes using the Indian diabetic risk score (IDRS) screening in rural Tamil Nadu.

MATERIALS AND METHODS

Study design

This was a community-based and cross-sectional study.

Study setting

This study was conducted by rural field practice of Chettinad Hospital and Research Institute, Chengalpattu.

Study duration

The duration of the study was 6 months between January 2020 and June 2020.

Study population

Adults aged 30 years and above residing in the rural field practice area of Chettinad hospital and research institute consented to take part in the research.

Exclusion criteria

Pregnant women and known cases of diabetes (priorly diagnosed, on lifestyle modifications, or medication) were excluded from the study.

Sampling method

Opportunistic screening of the population presenting to the community health and wellness camps using convenience sampling.

Sample size

Considering the results from the study by Mani *et al*.,[8] which reported that 59% had higher IDRS scores; and assuming a 95% confidence interval with a 5% allowable error; the minimum required sample size was calculated to be 387. In this study, 396 study subjects were interviewed.

Data collection

Apart from the general sociodemographic profile and the IDRS risk score, physical measures were also collected using a validated and semi-structured questionnaire.

IDRS includes age, waist circumference, physical activity, and family history of diabetes, with scores ranging from 0 to 100. Interpretations: <30 – low risk; 30–60 – moderate risk; >60 – high risk. An IDRS value of more than or equal to 60 had the optimum sensitivity (72.5%) and specificity (60.1%) for determining undiagnosed diabetes with a positive predictive value of 17% and a negative predictive value of 95%.

All anthropometric measurements were taken as the mean of three consecutive values measured by two separate observers. Body mass index (BMI) was classified based on the World Health Organization classification. A BMI of 18.5–24.9 was considered normal, 25.0–29.9 was overweight, more than 30 was obese and <18.5 was underweight.[8]

Outcome variable

IDRS risk category.

Data analysis

All the data collected will be entered into the Microsoft Excel sheet and will be analyzed using the IBM Statistical Package for the Social Sciences software. Descriptive statistics were expressed in frequency and percentage, while inferential statistics were done by Pearson's Chi-square test. $P < 0.05$ was considered statistically significant.

Ethical consideration

All participants were informed regarding the purpose of the study, benefits, procedure, and confidentiality of the research study. Informed consent was obtained from all the study subjects before the commencement of the study.

RESULTS

A total of 396 people were screened by the IDRS score in a rural area of Chengalpattu district. Among them, 187 (47.2%) were males and 209 (52.8%) were females. Most of the participants were aged more than 50 years (67.3%) and were Hindus (80.6%). Among the participants, 41.2%

were illiterate, while 58.8% were literate which ranged from primary school to the professional degree. Around one-third of the participants were unemployed/housewives (Not-earning). Most of the participants (36.9%) were from the middle class, followed by the lower-middle class (27.3%), upper-middle class (18.9%), lower class (9.6%), and upper class (7.3%). Alcohol and tobacco use was seen in 17.4% and 19.4% of the study participants [Table 1].

Among the study participants, 54.2% (n = 198) were found to have a BMI within the normal range, 18.4% were underweight, 20.5% were overweight and obesity was seen in 6.8% of the participants [Figure 1].

Many of the participants, 68.9% were more than 50 years of age. A waist circumference of more than 80 cm for males and 90 cm for females was considered as the Asian cut-off for abdominal obesity was seen only in 53.8% of the participants. About 90% of the participants were found to have no family history and many of them were having either mild or moderate physical activity. Finally, the higher IDRS risk score was seen in 48.2% of participants, 47.2% had moderate risk, while only 3.5% had low risk [Table 2].

In the review of the association between gender and IDRS risk status using Pearson's Chi-square test, a statistically significant association was observed [Table 3].

In the review of the association between BMI categorization and IDRS risk status using Pearson's Chi-square test after yates continuity correction, a statistically significant association was not established [Table 4].

Table 1: Sociodemographic distribution (n=396).

Sociodemographic variable	Frequency	Percentage
Age		
<35 years	49	12.4
35–49 years	74	18.7
≥50 years	273	68.9
Gender		
Male	136	47.2
Female	2	52.8
Religion		
Hindu	319	80.6
Muslim	42	10.6
Christian	35	8.8
Education		
Illiterate	163	41.2
Literate	233	58.8
Occupation		
Unemployed/homemaker	129	32.6
Employed	267	67.4
Socio-economic status (According to the modified BG Prasad scale)		
Upper class	29	7.3
Upper-middle class	75	18.9
Middle class	146	36.9
Lower-middle class	108	27.3
Lower class	38	9.6
Personal habits		
Tobacco use	77	19.4
Alcohol use	69	17.4
Both	34	8.6
Nil	284	71.7

n is the total sample size. Modified BG Prasad socioeconomic classification is an ordinal scale used for evaluation of socioeconomic status of study subjects in health studies in India.

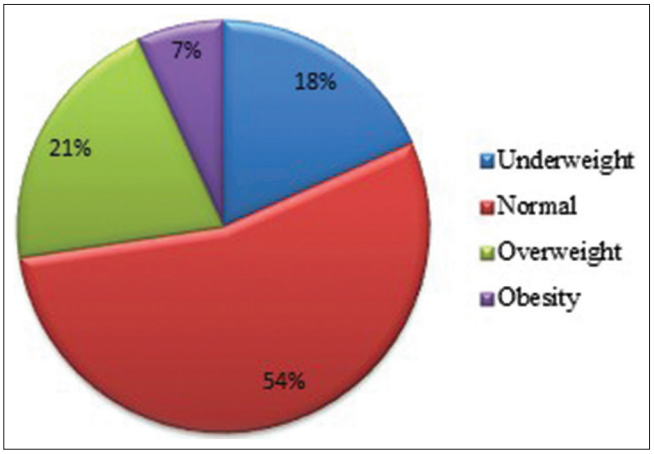

Figure 1: Distribution of participants based on body mass index.

DISCUSSION

The Indian diabetes risk score was used in the study to identify the risk status of diabetics in rural adults. Mohan *et al*. developed IDRS, which was considered to be one of the strongest predictors of diabetes risk screening in India.[7] It comprises two modifiable risk factors such as waist circumference and physical activity; and two non-modifiable risk factors such as age and family history of diabetes.

This study identified that only 3.5% were having low risk, whereas 47.2% and 48.2% were found to have moderate and severe risk, respectively. A similar study was conducted by Brinda *et al*.[9] In the rural area of Karnataka have found that 26% had a lower risk, 49% had moderate risk and 26% had a higher risk. This difference could be due to the fact that the age of the participants was higher in our study and in a different geographical area. Another study done by Gupta *et al*.[10] found that 31% of the population had a higher risk, and varied lifestyles could be the reason for this difference. As this study was conducted in urban areas, while our study was done in rural areas. Nandeshwar *et al*.[1] in 2010 have shown that only 2.8% were at low risk, 28.4% had moderate risk, whereas 68.8% had high risk and Ranadip Chowdhury *et al*.[11] in 2012 have shown that 46% had moderate risk and 31.5% had risk, which was similar to our findings.

In this study, 89% of the participants do not have any family history; this result was concurrent with the other studies

Table 2: Indian diabetic risk score distribution (*n*=396).

Risk factors	Frequency	Percentage
Age		
<35 years	49	12.4
35–49 years	74	18.7
≥50 years	273	68.9
Waist circumference		
<80 cm for female; <90 cm for male	183	46.2
80–89 cm for female; 90–99 cm for male	137	34.6
≥90 cm for female; ≥100 cm for male	76	19.2
Physical activity		
Strenuous activity	2	0.5
Moderate activity	136	34.3
Mild activity	148	37.4
Sedentary activity	108	27.3
Family history		
Nil	354	89.4
Father or mother	38	9.6
Both parents	4	1
Indian diabetes risk score		
Low	14	3.5
Moderate	189	47.7
High	191	48.2

n is the total sample size

Table 3: Association between gender and IDRS risk status.

Gender	IDRS risk status			Total	*P*-value
	Low (%)	Moderate (%)	High (%)		
Male	4 (26.7)	99 (51.8)	50 (26.3)	153 (26.3%)	**<0.001***
Female	11 (73.3)	92 (48.2)	140 (73.7)	140 (73.7%)	

Association was seen using Pearson's Chi-square test, *Statistically significant. IDRS: Indian diabetes risk score

Table 4: Association between BMI category and IDRS risk status.

BMI categorization	IDRS risk status		Total	*P*-value
	Low/ Moderate	High		
Underweight/ normal	11 (73.3%)	275 (72.2%)	286 (72.2%)	0.938
Overweight/ obesity	4 (2.7%)	106 (96.4%)	110 (27.8%)	

Association was seen using Pearson's Chi-square test after Yate's continuity correction. BMI: Body mass index, IDRS: Indian diabetes risk score

done in similar settings. A study by Brinda *et al*.[9] has shown that 91% of the participants had no family history and Patil *et al*.[12] in their study found that 89% had no family history. Whereas, the study by Gupta *et al*.[10] found that only 68% of participants had no family history of diabetes; this could be due to a lack of screening tests at the population level to detect diabetes mellitus.

A statistically significant association was found between gender and IDRS risk status, whereas no significant association was found between BMI category and IDRS risk status. A study by Brinda and Santosh[9] had no significant association was found between BMI category, which was similar to our study findings. However, they found no significant difference between gender and risk status, this could be because our study had a higher female predominance

Limitations

- Distribution of study subjects in terms of age category was not normal and this could be the reason for a higher proportion of participants having IRDS scores of more than 60.
- Convenience sampling method was used, hence the chance of selection bias.

CONCLUSION

In our study, it was seen that almost half of the study participants belonged to the high-risk category using IDRS screening. Gender and IDRS risk status showed a statistically significant association, whereas no significant association was found between the BMI category and IDRS risk status. For the mass screening of diabetes, IDRS seems practically feasible and acceptable.

Recommendations

To identify the hidden part of the iceberg, in terms of diagnosing diabetes, IDRS plays an essential role, as it is practically easy for mass screening. The proportion of the population having a higher risk to obtain diabetes is escalating with every passing day. At the community level, this can be used to identify high-risk populations and can be advised for lifestyle modification and dietary changes in addition to encouraging them to go for diagnostic tests.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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