ORIGINAL ARTICLE

Risk assessment of Diabetes using the Indian Diabetes Risk Score in an urban resettlement colony of East Delhi

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Abstract

Background- The burden of diabetes in India is expected to worsen in the coming years. Indian Diabetes Risk Score (IDRS) is a validated and cost-effective tool to identify risk of developing diabetes among population. **Objectives**- To assess the risk of Type 2 Diabetes mellitus using the IDRS in adults aged 30 years and above and to study the association of risk of diabetes with other factors. **Material & Methods**- A cross-sectional study was conducted in Kalyanpuri area of East Delhi. Data collection was done from August to December, 2018. 494 residents aged 30 years and above were included in the study. Data was collected using a semi-structured questionnaire. SPSS version 23 was used for data analysis. **Results**- 43.7 % of the study subjects were aged 50 years or above and majority (65.38%) were females. More than half (59.31%) of the subjects were found to have high risk of diabetes. Age and central obesity were found to be significantly associated with risk of diabetes (p<0.05). Risk of developing diabetes was not associated with gender. **Conclusion**- Early detection of risk of diabetes by periodic screening and appropriate behavioral change communication would be effective in controlling the diabetes crisis.

Keywords

Diabetes, Indian Diabetes Risk Score, Waist circumference, Physical activity

Introduction

Diabetes has emerged as a global pandemic of the 21st century. Approximately 463 million adults (20-79 years) were living with diabetes worldwide in 2019. (1) Of the different types, Type 2 Diabetes mellitus (T2DM) is the most common. (1) Considered to be a disease of the developed countries earlier, it is now more prevalent in developing countries. Various factors are responsible for this change in prevalence and pattern of spread. The workforce in developing countries has shifted to less physically demanding occupations following industrialization and mechanization. Over the years, there has also been changes in dietary patterns of the population with more inclination towards unhealthy diet which along with family history and other factors contribute to this increasing prevalence.

India has the second largest number of adults living with diabetes worldwide (77 million). (1) The burden of diabetes in India is expected to worsen in the coming years. Almost half of the diabetics in India are unaware of their disease status. (2) There is need for mass awareness and screening programs to identify and overcome the disease burden. The present study was planned to identify subjects who are at risk of developing diabetes using the Indian Diabetes Risk Score (IDRS).

Aims & Objectives

1. To assess the risk of Type 2 Diabetes mellitus using the IDRS in adults aged 30 years and above.
2. To study association of risk of diabetes with various factors.

Material & Methods

Study type- Community-based, cross-sectional study.

Study Population- Residents of blocks 12 and 18 of Kalyanpuri.

Study Area- Kalyanpuri area of East Delhi is an urban resettlement colony and is one of the field practice areas of Department of Community Medicine of one of the premier medical college of New Delhi.

Study Duration- Data collection was done from August to December, 2018.

Sample Size calculation- Kalyanpuri has eleven blocks numbering 11 to 21. Out of these, blocks 12 and 18, were randomly selected. Four hundred and ninety-four residents of the two blocks were included in the study.

Inclusion criteria-

1. Residents aged 30 years and above.
2. Those who gave consent for the study.

Exclusion criteria-

1. Those who were previously diagnosed as diabetic.
2. Those who were pregnant.

Strategy for collection- Data was collected using a semi-structured questionnaire. Anthropometric measurements were done using standard methods and recorded.

Working definition- The Indian Diabetes Risk Score (IDRS) is a validated tool to identify individuals with high risk of developing type 2 diabetes mellitus (T2DM). (3) It considers four risk factors namely age, waist circumference, physical activity and family history of diabetes. The study participants were classified into Low risk (<30), Moderate risk (30-50) and High risk (=>60) based on the scores obtained.

	Score
Age	
<35 years	0
35-49 years	20
=>50 years	30
Waist circumference	
Waist <80 cm (female), <90 cm (male)	0
Waist =>80-89 cm (female), =>90-99 cm (male)	10
Waist =>90 cm (female), =>100 cm (male)	20
Physical activity	
Regular vigorous exercise or strenuous (manual) activities at home/work	0
Regular moderate exercise or moderate physical activity at home/work	10
Regular mild exercise or mild physical activity at home/work	20
No exercise and/or sedentary activities at home/work	30
Family history of diabetes	
No diabetes in parents	0
One parent is diabetic	10
Both parents are diabetic	20

Ethical Approval- This study was part of an Indian Council of Medical Research (ICMR) task force project titled "Health Accounting Scheme". Institutional Ethical Committee clearance was obtained.

Consent- A written consent was obtained from the study participants.

Data Analysis- Statistical Package for Social Sciences (SPSS) version 23 was used for data analysis and p<0.05 was considered as statistically significant.

Results

Out of 494 study subjects, 43.7% were aged 50 years or above (Table 1). Majority (65.38%) of the study subjects were females. Among those who were illiterate (32.19%), majority (86.16%) were females. Most (57.29%) of the study subjects were housewives. Most of the males (56.14%) as well as females (60.99%) were having high IDRS values (Table 2). Waist circumference of half (52.05%) of the male subjects was =>90-99 cm while most (60.68%) of the females had waist circumference =>90 cm (Table 3). Majority (82.39%) of the subjects said that they regularly did mild exercise or physical activity at home or work while 15.79% did no exercise or had sedentary activity. There was no family history of diabetes in majority of the subjects (82.39%). Increasing age, larger waist circumference and sedentary lifestyle with lack of physical activity were found to be significantly associated with risk of diabetes (p<0.05) (Table 4). Majority (75%) of the subjects with family history of diabetes of both parents were found to have high risk score. Risk of developing diabetes was not significantly associated with gender (p>0.05).

Discussion

In our study, 43.7% of the subjects were aged 50 years and above followed by those between 35-49 years age (38.9%) and the rest were between 30-<35 years of age. The age-wise distribution varied according to the availability of subjects at the time of the study. Most (65.38%) of the study subjects were females which is similar to other studies conducted in India. (4,5,6,7) This might be due to the timings during which our study was conducted which coincided with working hours of most of the population of Kalyanpuri area. In our study, majority (67.81%) of the subjects were literate which is similar to the finding of Chandigarh Urban Diabetes Study conducted by Walia R

et al. (6) However, rate of illiteracy was higher among females in our study. In the present study, most (57.29%) of the study subjects were housewives while 23.68% were unskilled, semi-skilled and skilled workers. This is similar to the finding of Garg A et al in Delhi whereby majority of study subjects were housewives followed by unskilled, semi-skilled and skilled workers. (8) In our study, majority (82.59%) of the subjects were married which is in line with the findings of Prenissl J et al and Kumar C et al. (2,9)

In our study, more than half (59.31%) of the subjects were having high IDRS values while 37.65 % were with moderate risk scores. Similar findings were observed in a study conducted by Toppo NA et al in Jabalpur, Madhya Pradesh. (10) In a study conducted by Dudeja P et al also, it was found that majority of the subjects who were previously undiagnosed for diabetes, were having high IDRS values. (11) High IDRS values were seen in greater percentage of both males as well as females in our study. Waist circumference which corresponds to central obesity, is a simple, non-invasive and accurate predictor of the risk of type 2 diabetes and is better than other indices like Waist-Hip Ratio (WHR), Abdominal Volume Index (AVI), conicity index and Body Mass Index (BMI).(4,12) It has cut-off values of 85 cm for men and 80 cm for women among Asian Indian adults.(13) In the present study, central obesity was found to be highly prevalent among both male and female study subjects. Majority of the males had high waist circumference of =>90-99 cm (52.05%) and =>100 cm (22.22%). Similarly, majority of females had high waist circumference of =>80-89 cm (25.39%) and =>90 cm (60.68%). This finding is similar to the finding of Khan MM et al in Lucknow (U.P) where waist circumferences of majority of males and females were more than the cut-off values. (14)

In the present study, majority (82.39%) of study participants reported to be involved in mild physical activity while the rest were involved in sedentary activity (15.79%), strenuous activity (1.42%) and moderate activity (0.4%). In a study conducted in the same Kalyanpuri area by Singh A et al, majority (62.9%) of the study subjects were moderate workers and 31.2% were sedentary workers. (15) This difference might be due to the fact that in our study, the type of physical activity was self-reported and depended on the self-perception.

Various studies have shown that genetic factor plays an important role in diabetes. (4,16) However in our study, though majority (88.87%) had no family history of diabetes, almost 97% of subjects were found to be having moderate (37.65 %) to high (59.31%) risk of developing diabetes as per IDRS. This is in line with the findings of Khan MM et al and Singh A et al whereby majority of study subjects did not report any family history of diabetes. (14,15) This might be attributed to the unawareness of study subjects regarding previous history of diabetes in their families. However, this finding is alarming and stresses on the need of awareness generation along with

appropriate dietary changes and lifestyle modification even among people with no previous family history, in view of this ever-increasing burden of diabetes.

In the present study the risk of diabetes as predicted by the IDRS, increased significantly with age (p=0.000) which is similar to the findings of Dasappa et al and the Chandigarh Urban Diabetes Study.(4,6) There was no significant association of gender with risk of diabetes (p=0.298). Huebschmann AG et al in their narrative review also concluded that association of gender alongwith various biological, environmental and behavioral mediators for T2DM needs further extensive research.(17) In our study, family history was not significantly associated with risk of diabetes (p=0.865). This is similar to the finding of Dasappa et al whereby family history was not found to be significantly associated with pre-diabetes. (4) However, high IDRS values were observed among those who had at least one parent (64.7%) or both parents (75.0%) diabetic indicating higher chances of developing diabetes.

Majority (85.5%) of study subjects with high waist circumference, that is, =>100 cm in males and =>90 cm in females, had high risk scores. Waist circumference which is an estimate of central obesity was significantly associated with increased risk of diabetes (p=0.000). This is similar to the findings of various other studies done in India. (4,12) In the present study, 75.6% of subjects with sedentary lifestyle had high IDRS values as compared to 56.3% subjects who were physically active and had high risk scores. Our study found that physical activity has a significant association with risk of diabetes (p=0.003). This is in line with several other studies whereby physical inactivity was found to be significantly associated with diabetes and pre-diabetes. (4,6,18)

Conclusion

As per our study, the risk of diabetes increases with age. Majority of the study subjects were apparently healthy and were yet found to be having high risk scores. Significant association was seen between waist circumference and the risk of developing diabetes in future. Physical inactivity was also found to be significantly associated with risk of diabetes. The association of gender with risk of diabetes needs to be investigated further.

Recommendation

Rapid changes in lifestyle in India following economic growth and improvement of standards of living with an inclination towards Western culture has led to dramatic rise in the burden of Type 2 diabetes mellitus and various other non-communicable diseases. A significant issue is the unawareness of the population regarding their diabetes status. Early detection of risk of diabetes by periodic screening and appropriate behavioral change communication for adopting a healthy lifestyle might control the diabetes crisis of the country in future.

Relevance of the study

Assessment tools like IDRS can help in rapid screening of community and can be employed on a larger scale to identify the prevalence of risk factors of diabetes in the population.

Authors' Contribution

Each author has contributed equally.

Acknowledgement

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Tables

TABLE 1 SOCIO-DEMOGRAPHIC PROFILE OF STUDY SUBJECTS (N=494)

Socio-demographic profile		Gender		Total (%) N=494
		Male (%) n=171 (34.62)	Female (%) n=323 (65.38)	
Age group (in years)	<35	26 (29.55)	62 (70.45)	88 (17.81)
	35-49	60 (31.58)	130 (68.42)	190 (38.46)
	=>50	85 (39.35)	131 (60.69)	216 (43.72)
Education	Illiterate	22 (13.84)	137 (86.16)	159 (32.19)
	Up to High school	98 (42.24)	134 (57.76)	232 (46.96)
	Above High school	51 (49.51)	52 (50.49)	103 (20.85)
Occupation	Housewife	-	283 (100)	283 (57.29)
	Unskilled/Semi-skilled/Skilled	99 (84.62)	18 (15.38)	117 (23.68)

	Semi-professional/ Professional/Student/Retired	31 (86.11)	5 (13.89)	36 (7.29)
	Clerk/Shop-keeper	25 (86.21)	4 (13.79)	29 (5.87)
	Unemployed	16 (55.17)	13 (44.83)	29 (5.87)
Marital status	Married	151 (37.01)	257 (62.99)	408 (82.59)
	Unmarried	7 (46.67)	8 (53.33)	15 (3.04)
	Others	13 (18.31)	58 (81.69)	71 (14.37)

TABLE 2 RISK OF DIABETES AMONG STUDY SUBJECTS AS PER RISK SCORE (N=494)

Gender	Risk of Diabetes (as per IDRS)			Total
	Low Risk (<30) No. (%)	Moderate Risk (30-50) No. (%)	High Risk (=>60) No. (%)	No. (%)
Male	6 (3.51)	69 (40.35)	96 (56.14)	171 (100)
Female	11 (3.41)	115 (35.60)	197 (60.99)	323 (100)
Total	17 (3.44)	184 (37.25)	293 (59.31)	494 (100)

TABLE 3 IDRS COMPONENTS OF STUDY SUBJECTS (N=494)

IDRS component	Number of Subjects	Percentage (%)
Waist circumference		
<80 cm (Female)	45	13.93
<90 cm (Male)	44	25.73
=>80-89 cm (Female)	82	25.39
=>90-99 cm (Male)	89	52.05
=>90 cm (Female)	196	60.68
=>100 cm (Male)	38	22.22
Physical activity		
Regular vigorous exercise/strenuous physical activity at home or work	07	1.42
Regular moderate exercise/moderate physical activity at home or work	02	0.4
Regular mild exercise/mild physical activity at home or work	407	82.39
No exercise/sedentary activity at home or at work	78	15.79
Family history		
No parent diabetic	439	88.87
One parent diabetic	51	10.32
Both parents' diabetic	4	0.81

TABLE 4 ASSOCIATION OF STUDY SUBJECTS CHARACTERISTICS & RISK OF DIABETES AS PER IDRS (N=494)

Characteristics of Subjects	Risk of Diabetes as per IDRS			Chi-square
	Low risk (%)	Moderate risk (%)	High risk (%)	value (p value)
Age (in years)				
<35	13 (14.8)	73 (83.0)	2 (2.3)	217.85 (0.000)
35-49	0 (0.0)	88 (46.3)	102 (53.7)	
=>50	2 (0.9)	25 (11.6)	189 (87.5)	
Gender				
Male	4 (2.3)	72 (42.1)	95 (55.6)	2.42 (0.298)
Female	11 (3.4)	114 (35.3)	198 (61.3)	
Family history of Diabetes				
No parent	14 (3.2)	168 (38.3)	257 (58.5)	1.277 (0.865)
One parent	1 (2.0)	17 (33.3)	33 (64.7)	
Both parents	0 (0.0)	1 (25.0)	3 (75.0)	
Waist circumference				
=>100cm (Male), =>90cm (Female)	0 (0.0)	34 (14.5)	200 (85.5)	193.51 (0.000)
=>90-99cm (Male), =>80-89cm (Female)	1 (0.6)	87 (50.9)	83 (48.5)	
<90cm (Male), <80cm (Female)	14 (15.7)	65 (73.0)	10 (11.2)	
Physical activity				
Active	15 (3.6)	167 (40.1)	234 (56.3)	11.323 (0.003)
Sedentary	0 (0.0)	19 (24.4)	59 (75.6)	