

Original Research Article

Study on prevalence of risk factors of diabetes among adult population in a rural area of West Bengal, India

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ABSTRACT

Background: India is currently in the grip of an explosive epidemic of type 2 diabetes. The International Diabetes Federation (IDF) estimates that by 2030, 8.4% of the adult population will have diabetes in India, which already is the world's diabetes capital. Indian diabetic risk score (IDRS) is a cost effective and simple method for mass screening at community level. The objective of the study was to find out the prevalence of risk factors of diabetes among rural adults of Amdanga, West Bengal and to study the socio-demographic correlates of higher risk.

Methods: A community-based, cross-sectional study was carried out in Amdanga, North 24 Parganas district of West Bengal from 1st August 2019 to 30th September 2019 among 104 adult population on risk status for type 2 diabetes mellitus using IDRS. Interview was conducted using pre-designed semi-structured questionnaire followed by anthropometric measurement. The data were analyzed by SPSS 16.0 version.

Results: Out of 104 study subjects, 9.6% study subjects were not at risk of having diabetes, 45.2% were at moderate risk and 45.2% were at high risk of having diabetes. Marital status, hypertension, outside food intake, exercise and strenuous activity were significantly associated with the risk of diabetes.

Conclusions: Majority of the adult population were at moderate and high risk of developing type 2 diabetes, hence screening is of utmost importance so that interventions can be initiated at an early stage and change of lifestyle should be initiated as soon as possible to delay the occurrence of type 2 diabetes.

Keywords: Amdanga, IDRS, Type 2 diabetes

INTRODUCTION

Diabetes mellitus is a major public health problem and the most common metabolic disorder in the World which affects all age groups. According to IDF 425 million people in the world live with diabetes as of 2017. In most countries the number of individuals with diabetes is steadily increasing.¹ In 2019, Approximately 463 million adults (20-79 years) were living with diabetes; by 2045 this will rise to 700 million. The proportion of people with type 2 diabetes is increasing in most countries. 79% of adults with diabetes were living in low- and middle-

income countries. China has the largest number of people with diabetes in the World (114.4 million), followed by India with 72.9 million. The greatest number of people with diabetes were between 40 and 59 years of age. 1 in 2 (232 million) people with diabetes were undiagnosed.²

In India the prevalence rate of diabetes have increased dramatically since the time the first National survey was undertaken, in 1971. At that time the prevalence was 2.3% in the urban areas and 1.2% in rural areas. The most recent studies suggest prevalence rate 15-20% in urban areas and about half of that in rural areas.³ The reason for the explosive increase in the prevalence of diabetes in

India have been the subject of much study. While a high level of genetic predisposition does play a role, it is unlikely that the genetic makeup of the population has changed so drastically in the past 30 years as to account for the alarming increase in prevalence of diabetes. More likely, increasing prosperity and urbanisation have led to wholesome changes in lifestyle which cause diabetes to manifest individuals who already have a genetic predisposition to the disease.^{3,4} The Indian Diabetes Risk Score (IDRS) is a simple, low cost, feasible tool for mass screening programme at the community level developed by Mohan Diabetes Foundation, Chennai has been validated by other researchers. In a country like India, it can prove to be a cost effective tool for screening of diabetes at the community level. The components of IDSR include age, waist circumference, physical activity and family history of diabetes. The purpose of community based screening for diabetes is to differentiate asymptomatic individuals who are at high risk of Diabetes from individuals at lower risk, so that appropriate preventive strategies can be initiated early. Ideally, screening tests should be rapid, simple, and safe. Since diabetes is an ice-berg disease, most of the subjects remain asymptomatic. Screening for diabetes can identify patients at an early stage of the disease, and identify those who will derive benefit from prevention and early treatment methods.⁵

The objectives of the study were to find out the prevalence of risk factors of diabetes among adults in a rural area of Amdanga, West Bengal and to study the socio demographic correlates of higher risk among them.

METHODS

It is an observational descriptive study cross sectional in design. Conducted in rural field practice area (Daspara, Amdanga Block) of Department of Community Medicine, R G Kar Medical College and Hospital, Kolkata. All the people aged ≥ 18 years of age and un-diagnosed diabetic in the Daspara Hamlet. The study was conducted from 1st August 2019 to 30th September 2019.

Sample size was calculated based on the previous study conducted by Jayakiruhiga et al in Tamil Nadu found that the prevalence of high risk of diabetes mellitus using IDRS Score among adult population was 57.6%.⁶ By taking 95% confidence interval, 10% of absolute precision and 10% non-response rate calculated sample size was 104.

Participants were recruited using systematic random sampling. Total number of houses in the study area was 1153. Sample size was 104, sampling interval (total no of houses/sample size=1153/104) was 11. Every 11th house was selected for the study and from each selected house one adult was included in the study by simple random sampling (lottery method).

Study technique

A predesigned and pretested schedule containing age, physical activity, H/o Diabetes in family gender and waist circumference (IDRS component) and religion, SE status, blood pressure and various anthropometric measurements viz. weight, height, hip circumference were used to collect data. Waist circumference was measured with a non stretchable tape to the nearest 0.1cm at the midpoint between the lowest rib and the iliac crest. Socioeconomic status was assessed by modified BG Prasad Scale based on AICPI August 2019. Weight was measured to the nearest 0.1 Kg and weighing machine was used for weight measurement. Height was measured against a non stretchable tape fixed to a vertical wall, with the participant standing on a firm/level surface and it was measured to the nearest 0.5cm. Hip circumference was measured with a non stretchable tape to the nearest 0.1 cm at the widest part of the hips; usually this corresponds to the groin level for women and about 2-3 inches below the umbilicus in men. Blood pressure was measured by using the sphygmomanometer. All the participants were requested to take rest for ten minutes. Blood pressure was measured in the sitting posture with three separate readings were taken at an interval of minimum five minutes. The average of the three readings was taken and JNC VIII classification was followed. Verbal consent was taken from each individual before commencement of the study. The Indian Diabetes Risk Score was used as the study tool and socio demographic profile was also collected along with the score by using predesigned pretested semi-structured schedule.^{5,7}

IDRS had four components including,⁵

- *Age*: This was categorized into 3 groups; age <35 years was scored as 0, 35- 49 years as 20 and ≥ 50 years as 30.
- *Abdominal obesity*: Males: Individuals with waist circumference ≥ 90 - 99 cm for males as 10, those with ≥ 100 cm as 20 and the rest as 0. Females: individuals with waist circumference ≥ 80 -89 cm as 10, those with ≥ 90 cm as 20 and the rest as 0.
- *Physical activity*: Individuals were coded as 0 if they did leisure time exercise and in addition had physically demanding work in their occupation; individuals who either did exercise or performed physically demanding work were scored as 20 and who not done exercise and a sedentary worker were scored as 30.
- *Family history of diabetes*: Individuals with no family history of diabetes were scored as 0, those with one diabetic parent as 10 and those with both parents diabetic as 20.

Minimum score is 0 and Maximum is 100. Interpretation of score, <30 was low risk, score 30-50 was medium risk and score >60 was high risk.

Inclusion criteria

All adult population aged 18 years and above who were apparently healthy and with no known history of diabetes mellitus.

Exclusion criteria

Those people who were critically ill, not willing to participate in the study.

Statistical analysis

Data were entered and analyzed in SPSS version 16. Continuous data were expressed as mean, median, standard deviation, and 95% CI was used. The categorical data were expressed as percentage / proportions and wherever applicable χ^2 test was used, $p < 0.05$ was considered to be statistically significant.

RESULTS

A total of 104 subjects were included in the study. The mean age was 44.36 ± 14.87 years. Minimum and maximum ages were 21 and 80 years respectively. Among study subjects, 40 (38.5%) were males and 64 (61.5%) were females. 28.8% study subjects were illiterate and 55.8% were unskilled worker. According to modified B G Prasad Scale 47.1% were Class 1 category. Majority of the respondents (53.8) were living in joint family. According to IDRS score, only 10 (9.6%) study subjects were not at risk of having diabetes, 47 (45.2%) were at moderate risk and 47 (45.2%) were at higher risk of having diabetes (Table 1).

Table 1: Assessment results for IDRS parameters (n=104).

Particulars	Score	Frequency (%)
Age (years)		
<35	0	36 (34.6)
35-49	20	29 (27.9)
50	30	39 (37.5)
Abdominal obesity		
Waist <80 cm (females); <90 cm (males)	0	57 (50.0)
Waist 80-89cm(Females); 90-99cm (Males)	10	23 (22.1)
Waist >90 cm (Females); >100 cm (Males)	20	24 (22.9)
Physical activity		
Exercise (regular)+strenuous work	0	15 (14.4)
Exercise (regular) or strenuous work	20	18 (17.3)
No exercise and sedentary work	30	71 (68.3)
Family history		
No history	0	64 (61.5)
Either parent	10	34 (32.7)
Both parents	20	6 (5.8)
IDRS		
No risk	<30	10 (9.6)
Moderate risk	30-<60	47 (45.2)
High risk	>60	47 (45.2)

Table 2: Association of IDRS with Socio-demographic characteristics (n=104).

Socio-demographic characteristics		IDRS				Chi square value df P value
		No risk	Moderate risk	High risk	Total	
Gender	Male	6 (15.0)	18 (45.0)	16 (40.0)	40 (100.0)	2.348 2 0.309
	Female	4 (6.3)	29 (45.3)	31 (48.4)	64 (100.0)	
Marital status	Single	4 (30.8)	8 (61.5)	1 (7.7)	13 (100.0)	20.701 4 0.0001
	Currently married	6 (8.2)	36 (49.3)	31 (42.5)	73 (100.0)	
	Widow	0 (0)	3 (16.7)	15 (83.3)	18 (100.0)	
Literacy status	Illiterate	3 (10.0)	9 (30.0)	18 (60.0)	30 (100.0)	7.473 8 0.474
	Primary school completed	1 (5.9)	8 (47.1)	8 (47.1)	17 (100.0)	
	Middle school completed	1 (4.3)	12 (52.2)	10 (43.5)	23 (100.0)	
	High school completed	3 (17.6)	8 (47.1)	6 (35.3)	17 (100.0)	
	Higher secondary completed	2 (11.8)	10 (58.8)	5 (29.4)	17 (100.0)	
Occupation	Unemployed	0 (0.0)	3 (100.0)	0 (0.0)	3 (100.0)	6.080 6 0.353
	Unskilled	6 (10.3)	23 (39.7)	29 (50.0)	58 (100.0)	
	Semi-skilled	2 (16.7)	4 (33.3)	6 (50.0)	12 (100.0)	
	Skilled	2 (6.5)	17 (54.8)	12 (38.7)	31 (100.0)	
Type of family	Nuclear	6 (12.5)	23 (47.9)	19 (39.6)	48 (100.0)	1.538 2 0.463
	Joint	4 (7.1)	24 (42.9)	28 (56.0)	56 (100.0)	

Figure in parenthesis indicate percentage

Table 3: Association of IDRS with different causal factors of diabetes (n=104).

Variables		IDRS				Chi-square value
		No risk	Moderate risk	High risk	Total	df P value
HTN	Normal	3 (8.3)	25 (69.4)	8 (22.2)	36 (100.0)	20.275
	Elevated BP	0 (0.0)	3 (100.0)	0 (0.0)	3 (100.0)	6
	Stage 1 HTN	3 (7.7)	13 (33.3)	23 (59.0)	39 (100.0)	0.001
	Stage 2 HTN	4 (15.4)	6 (23.1)	16 (61.5)	26 (100.0)	
BMI	Underweight	1 (7.7)	5 (38.5)	7 (53.5)	13 (100.0)	2.515
	Normal	5 (11.4)	23 (52.3)	16 (36.4)	44 (100.0)	4
	Overweight and obese	4 (8.5)	19 (40.4)	24 (51.1)	47 (100.0)	0.641
Intake of outside food	Yes	2 (7.4)	18 (66.7)	7 (25.9)	27 (100.0)	6.901
	No	8 (10.4)	29 (37.7)	40 (51.9)	77 (100.0)	2 0.033
Exercise	Yes	7 (25.9)	15 (55.6)	5 (18.5)	27 (100.0)	16.698
	No	3 (3.9)	32 (41.6)	42 (54.5)	77 (100.0)	2 0.000
Strenuous work	Yes	8 (38.1)	12 (57.1)	1 (4.8)	21 (100.0)	29.915
	No	2 (2.4)	35 (42.2)	46 (55.4)	83 (100.0)	2 0.000

According to IDRS, high risk of diabetes was more common among women (48.4%) compare to men (40.0%). Among single (61.5%) and currently married (49.3%) study subjects moderate risk of diabetes was significantly more common whereas among widow/widower (83.3%) high risk of diabetes was significantly more common. Among illiterate 60.0% had high risk of diabetes. High risk of diabetes was more common those were engaged in unskilled and semi-skilled activity. In joint family (56.0%) high risk of diabetes was more common compare to nuclear family (39.6) (Table 2).

High risk of diabetes was significantly more common those had Stage 1 HTN (59.0%) and Stage 2 HTN (61.5%), whereas among normotensive subjects moderate risk of diabetes was more common (69.4%). Both Underweight (53.5%) and Overweight and obese (51.1%) high risk of diabetes was more common. Moderate risk of diabetes was significantly more common those had taken outside food i.e., 66.7%. Those had not done regular exercise and strenuous activity among them high risk of diabetes was significantly more common (Table 3).

DISCUSSION

IDRS was used to identify the risk status of undiagnosed diabetics among 104 adult population (18 years and above) in a rural community of West Bengal. Out of these only 10 (9.6%) were in low risk category, 47 (45.2%) were in moderate risk, 47 (45.2%) were at high risk group as per IDRS. It shows that a large number (moderate and high risk) of the study subjects had some kind of risk of developing diabetes in future hence active interventions in the form of counselling, health education are required

for these groups. Earlier the interventions are started the later will be the onset of disease and its subsequent complications. However a study done by Jayakiruthiga S et al in an urban area of Tamil Nadu showed 33.9% were at moderate risk and 57.6% were at higher risk of having diabetes.⁶ This difference may be due to the study area being rural where less proportion of study subjects had high risk compare to urban area. Another study done by Ramaiah R et al in a rural area of Karnataka found that 14.84% of the study subjects had high risk of diabetes and 73.19% had moderate risk.⁴ Here prevalence of high risk was low compare to the present study.

In the present study 37.5% study subjects were aged 50 years and above, study conducted in a urban area of South India also noted the same findings.⁸ A previous study by Brinda P et al found that 46.5% study subjects scored 0 for abdominal obesity comparable to the present study where 50% scored 0 for the same.⁹ 68.3% study subjects had not done exercise; they were engaged in sedentary activity, whereas a different findings were noted from the previous studies.⁸⁻¹¹ In the present study 5.8% study subjects had family history of diabetes among both parents, which was a little bit different from the previous study.⁸⁻¹⁰

High risk of diabetes was more common among women (48.4%) compare to men (40.0%), previous studies also stated the same findings.^{9,11} High risk of diabetes was significantly more common among widow / widower (83.3%). Acharya et al noted that high risk of diabetes was significantly more common among the married individual (84.2%).¹²

Now a days Hypertension is also a major non-communicable disease and in this study Stage 1 HTN (59.0%) and Stage 2 HTN (61.5%) was significantly more common those had high risk of diabetes. Hence for reducing blood pressure, physical activity needs to be increased which would subsequently lower Diabetes risk. Study conducted in Delhi found that high risk of diabetes was significantly more common those had normal BMI, but a opposite findings were noted in the present study. High risk of diabetes was more common those were not engaged in strenuous work and exercise and these change was statistically significant.¹²

In conclusion, the Indian diabetes risk score is a useful tool for predicting and screening for undiagnosed diabetes mellitus in the population. Our study has described that the majority of the adult population were at medium and high risk of developing type 2 diabetes, showing the need lifestyle changes to be initiated as soon as possible to delay the occurrence of type 2 diabetes.

Mass screening can be done by using IDRS in developing country like India that is cost effective also. Screening and early identification of high risk individuals would help to take appropriate intervention like lifestyle modification. It would also help in early diagnosis and treatment to prevent or to delay the onset of diabetes mellitus and its complications.

Limitation of the study was recall bias might have played role in reporting of family history by participants.

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