

Risk of Type 2 Diabetes Mellitus among Health Care Providers at Tertiary Care Hospital

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ABSTRACT

Background:Diabetes is a leading public health problem throughout the world, and despite years of research and development, it is one of the fastest growing conditions worldwide. Diabetes along with other non-communicable diseases acts as an obstacle for attaining sustainable developmental goals. It is also responsible for premature death and disability¹. Hence, the early screening which prevents the complications and premature death is very much needed in the society. **Objectives:** 1. To evaluate the risk of type 2 diabetes among health care providers using Indian diabetes risk score. 2. To explore the relationship between Indian diabetes risk score and random capillary blood glucose level. **Methodology:** A cross sectional study was conducted among 250 health care providers of Velammal medical college and Research Institute, Madurai. A pretested semi-structured questionnaire was applied. Indian diabetic risk score (IDRS) was used to assess the risk of getting diabetes. **Results:** Among study subjects 18.4 % had high risk for getting diabetes based on IDRS. Housekeeping staffs had higher risk for diabetes compare to other occupational groups. IDRS was positively correlated with random capillary blood glucose level. High BMI, frequent meat consumption, frequent sweet consumption and low water consumption were significantly associated with high risk for diabetes. **Conclusion:** Even though health care providers are at continuous contact with health care system still the early screening for diabetes risk was not happening. Hence this present study create a milestone to generate awareness among them regarding the importance of early screening to detect the hidden disease. Hence it is recommended that, the screening for diabetes has to be a part of their pre-placement examination and periodical examination.

Key Words: IDRS, Diabetes, Health care providers, Capillary blood glucose.

INTRODUCTION

Diabetes is a metabolic disorder occurs as a result of defective insulin production from pancreas or when the body cannot use the insulin effectively. Insulin regulates the blood sugar level by carrying glucose to the cell. If the glucose cannot get in to the cells then the sugar builds up to harmful levels in the blood.

The major risk factors of diabetes are strong family history of diabetes mellitus, age, obesity and physical inactivity. Insulin resistance is yet another factor which increases the risk of getting type 2 diabetes mellitus. Out of these, the modifiable risk factors like obesity and physical inactivity are increasing day by day in current generation. These two factors along with strong family history of diabetes mellitus becomes a major predictor of type 2 diabetes mellitus. Both obesity and physical inactivity decreases insulin sensitivity which in turn leads to alteration in glucose homeostasis.

Diabetes previously a disease of middle age and elderly, now it is seen in all age groups due to change in lifestyle, dietary habits and stressful working environment².

Diabetes epidemic is increasing rapidly in low and middle income countries in the recent years. As per the 2015 data, India had 69.2 million people living with

diabetes. Out of that more than half (36 million) of the people remain undiagnosed of the condition¹. Based on studies conducted in different part of India, the prevalence of risk of diabetes varies from 33% to 86%³⁻⁸. Lack of physical activity along with obesity plays a major role in poor insulin sensitivity which leads to type 2 diabetes mellitus⁹. The health care providers are at risk of getting diabetes because of their stressful working environment along with lack of physical activity¹⁰. Since diabetes is an iceberg disease the hidden portion of disease is yet to be explored¹¹. For that, in the present study,a simple and validated questionnaire developed by Mohan et.al, called Indian Diabetic Risk Score (IDRS) was used¹². IDRS contains four parameters i.e. age, obesity status, exercise status and family history of type 2 diabetes mellitus.

Objectives: 1. To evaluate the risk of type 2 diabetes among health care providers using Indian diabetes risk score. 2. To explore the relationship between Indian diabetes risk score and random capillary blood glucose level.

MATERIAL AND METHODS

Study design:

Cross sectional study was conducted among health care providers like Doctors, Nurses, lab technicians,

administrative workers and House-keeping workers of Velammal medical college and research institute, Madurai over a period of two months (June and July 2017).

Sample size and selection criteria:

Based on a study conducted by Anand Vardhan et al, the prevalence of risk of diabetes was 33%³.

Sample size $N = Z_{\alpha}^2 pq/d^2$

Z_{α} at 95% confidence interval = 1.96

$p = 33\%$, $q = 100 - p = 67\%$

$d =$ absolute precision = 6%

$N = 236$ rounded off to 250

Total samples needed for the study was 250 and 50 samples was selected from each stratum of health care providers.

Inclusion criteria:

Age above 20 years and willing to participate in the study

Exclusion criteria:

People already having diabetes mellitus

Procedure:

After getting clearance from ethical committee and informed consent from the study participants a pretested semi-structured questionnaire was applied. Data regarding the basic socio-demographic details, family history of diabetes and physical activity level were collected. Waist circumference was measured by using a measuring tape at the mid-point below the lower rib cage and the highest point of the iliac crest. Measurements were taken with the subjects in minimum clothes and when they were breathing quietly at the end of their expirations. Based on the above data Indian diabetes risk score (IDRS) was calculated. Weight was measured using a digital weighing machine and height was measured using inch tape pasted on a wall. Random capillary blood glucose was measured using a valid glucometer with least error margin.

Operational definition:

Box 1. Indian Diabetic Risk Score (IDRS)

Particulars	Score
Age in years	
< 35 (Reference)	0
35 – 49	20
>= 50	30
Abdominal obesity	
Waist <80 cm [female] , <90 [male] [reference]	0
Waist ≥ 80 – 89 cm [female], ≥ 90 – 99 cm [male]	10
Waist ≥90 cm [female], ≥ 100 cm [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

Maximum score = 100; Minimum score = 0

Based on Indian diabetes risk score (IDRS)¹², the risk of getting type 2 diabetes classified as:

Low risk: IDRS score < 30; Medium risk: 30 – 50; High risk: ≥ 60

Box 2. Body mass index (BMI):

Calculated using formula Weight in kg/ height in meter square Asian Classification¹³:

Category	BMI (kg/m ²)
Underweight	<18.5
Normal	18.5-22.9
Overweight	>23
Pre-Obese	23-24.9
Obese class I	25-29.9
Obese class II	>30

Study tools:

Semi-structured questionnaire

Weighing machine

Inch tape

Glucometer

Quality control and confidentiality:

Data were collected and confidentiality was maintained with utmost care by the investigator.

Statistical analysis:

Data were entered in Microsoft Excel and analysis was done using SPSS 16.0. Descriptive analysis like mean and standard deviation was calculated for quantitative variables and proportion for qualitative variables. Association between qualitative variables were assessed using Chi-square test and for continuous variables t-test or ANOVA was used. Correlation coefficient was measured to find out correlation between IDRS score and random capillary glucose level.

Ethical considerations:

Ethical committee clearance was obtained before starting the study

RESULTS

A cross sectional study was conducted among 250 health care providers of velammal medical college hospital and research institute, Madurai. Doctors, nurses, lab technician, house-keeping and administrative staffs were included in the study. In each strata 50 samples were recruited based on convenient sampling.

The mean age among the study participants were 28.87 years with standard deviation of 8.73 years. In the present study female participants were more (83.6%) when compared to male (16.4%). Majority of study subjects were in the upper middle class (46.8%) followed by upper class (22.4%), lower middle (16.8%) and upper lower (14%). Non vegetarian (67.6%) was the predominant dietary habits among the study subjects. Mean BMI among study population was 22.51 kg/m² with standard deviation of 4.602 kg/m². In the present study the proportion of overweight and obesity together contribute a significant bulk with 38.8%. (**Table: 1**)

In the present study majority belongs to age less than 35 years (76.8%), two non-diabetic parents (75.2%), sedentary at work or home (48.8%) and waist

circumference with female <80 or male <90 (58.8%). Then overall IDRS score showed majority belongs to medium risk (59.6%). (Table: 2)

Table 1: Socio-demographic and nutritional profile of study subjects

Variables		Number of subjects	Percentage
Gender	Male	41	16.4
	Female	209	83.6
Socioeconomic status	Upper class	56	22.4
	Upper middle class	117	46.8
	Lower middle class	42	16.8
	Upper lower class	35	14
Diet	Vegetarian	81	32.4
	Non vegetarian	169	67.6
BMI	Underweight	50	20
	Normal	103	41.2
	Overweight	36	14.4
	Obese	61	24.4

Table 2: Distribution of study subjects based on IDRS scoring system

IDRS Domain	Classification	Number (n=250)	Percentage
Age	< 35 years	192	76.80%
	35-49 years	48	19.20%
	>= 50 years	10	4.00%
Family history of diabetes mellitus	Two non-diabetic parents	188	75.20%
	Either parent diabetes	46	18.40%
	Both parents diabetic	16	6.40%
Physical activity level	Vigorous exercise or strenuous work	14	5.60%
	Moderate exercise at work/home	114	45.60%
	No exercise and sedentary at work/home	122	48.80%
Waist circumference	Female <80, male <90	147	58.80%
	Female 80-89, male 90-99	58	23.20%
	Female >= 90, male >= 100	45	18.00%
IDRS overall scoring	Low risk	55	22.00%
	Medium risk	149	59.60%
	High risk	46	18.40%

There was a positive correlation exists between IDRS score and random capillary blood glucose value, it was found to be statistically significant with spearman correlation value of 0.231 and p value of 0.001.(Fig: 1)

Factors associated with diabetes

Factors which found to be significantly associated with diabetic risk were housekeeping by occupation(p=0.001); Upper lower class (p=0.003); Non-vegetarian by diet (p=0.009); Frequent consumption of

meat (p<0.001); Frequent consumption of sweet or pastries (p=0.002); High BMI (p<0.001) and those who consume less amount of water (p=0.019).(Table: 3) Other factors analyzed but not significant were gender, awareness about balanced diet, practicing balanced diet and consumption of fruits, vegetables and fish.

Table 3: Association of socio-demographic and nutritional factors with diabetes risk

Variables		High risk for diabetes	P value
Gender	Male (N=41)	9 (22%)	0.69
	Female (N=209)	37 (17.7%)	
Socioeconomic status	Upper class (N=56)	14 (25%)	0.003
	Upper middle class (N=117)	11 (9.4%)	
	Lower middle class (N=42)	7 (16.7%)	
	Upper lower class (N=35)	14 (40%)	
Occupation	Doctors (N=50)	14 (28%)	< 0.001
	Nurses (N=50)	1 (2%)	
	Lab technicians (N=50)	6 (12%)	
	Housekeeping staffs (N=50)	19 (38%)	
	Administrative staffs (N=50)	6 (12%)	
Diet	Vegetarian (N=81)	8 (9.9%)	0.009
	Non vegetarian (N=169)	38 (22.5%)	
BMI	Underweight (N=50)	0	<0.001
	Normal (N=103)	14 (13.6%)	
	Overweight (N=36)	6 (16.7%)	
Water consumption per day	Obese (N=61)	26 (42.6%)	0.019
	>= 7 glasses (N=86)	8 (9.3%)	
	3 - 6 glasses (N=42)	6 (14.3%)	
Meat consumption	1 - 2 glasses (N=122)	32 (26.2%)	<0.001
	<= 2 times a week (N=214)	26 (12.2%)	
Sweet/pastries consumption	>2 times a week (N=36)	20 (55.6%)	0.002
	<= 2 times a week (N=225)	35 (15.6%)	
	>2 times a week (N=25)	11 (44%)	

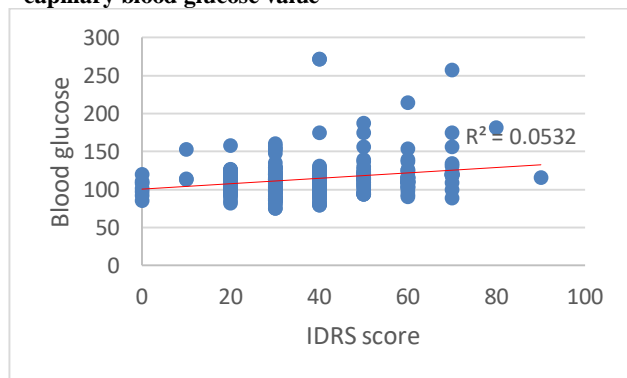
Discussion:

In this study Indian diabetic risk score was used to find out the people who were at the risk of getting diabetes. Out of 250 subjects, 18.4% had high risk, 59.6% medium risk and 22% had low risk Similar results was obtained in a study conducted by Pothukuchi Madhavi et al. with 21.5% had high risk, 52.8% moderate risk, 19.9% had low risk¹¹.

Table 4: Association of random capillary blood glucose with diabetes risk based on IDRS

Variable	N	Random capillary blood sugar (mg/dl)		F value
		Mean	Std. Deviation	
Risk of getting diabetes (IDRS)	Low risk	55	108.87	4.515
	Medium risk	149	112.57	P=0.012 significant
	High risk	46	123.54	

Spearman correlation between IDRS and Random capillary blood sugar = **0.231, p=0.001**

Fig. 1: Correlation between IDRS score and Random capillary blood glucose value

The percentage of people with high risk was more among house keeping staffs with 38%, followed by doctors 28%. This was explained by stressful working environment and change in lifestyle habits. This was concordant with the results of the study conducted by Kjeld Poulsen et al.¹⁰

While comparing socioeconomic status the upper lower class had significantly higher percentage of high risk with 40%. Similarly a study conducted by Uppara V et al. demonstrate that participants with low income have a higher prevalence of diabetes than wealthy participants¹⁴.

Regarding diet, the percentage of high risk was significantly higher among those who were non vegetarian by diet (22.5%), consuming meat more than two times a week (55.6%) and sweet or pastries consumption more than two times a week. This was similar to the results obtained in the study conducted by A Steinbrecher et al. that, meat consumption and processed meat have associated with risk of getting diabetes¹⁵.

The percentage of high risk was more among obese (42.6%) and overweight (16.7%) compared to normal subjects (13.6%). It was concordant with the study conducted by Sanjeev Kumar Gupta et al. that the chances of high diabetic score increases with increase in BMI⁷.

Another interesting factor which found to have high risk for diabetes was decreased intake of water. Those who consume one to two glasses of water per day had higher risk (26.2%) when compared to three to six glasses (14.3%) and seven or more glasses of water (9.3%). This was concordant with the study conducted by Ronan Roussel et al. lower the intake of water higher the risk of hyperglycemia¹⁶.

The mean capillary blood glucose value was significantly increasing with increase in diabetes risk ($p=0.012$) and also there was a positive correlation exists between them (Spearman Correlation $R = 0.231$, $p=0.001$). The result was concordant with the study conducted by Anad Vardhan et al.³ in which the fasting glucose value was significantly increasing with increasing risk and also positively correlated. Similarly the study conducted by V.Mohan et al.¹³ showed that an increase in IDRS was associated with worsening of glucose tolerance.

Conclusion:

In the present study the percentage of high risk for diabetes based on IDRS was 18.4%. Among them housekeeping staffs had higher proportion of high risk score and also had high mean random capillary blood glucose value. Lower socioeconomic status, high meat consumption, high sweet consumption and poor water consumption were some of the factors found to be significantly associated with high risk for getting diabetes. Even though health care providers are at continuous contact with health care system still the early screening for diabetes risk was not happening. Hence this present study create a milestone to generate awareness among them regarding the importance of early screening to detect the hidden disease. Hence it is recommended that, the screening for diabetes has to be a part of their pre-placement examination and periodical examination.

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