

Prevalance of Prediabetes among Adults and Evaluation of Indian Diabetes Risk Score (IDRS Score) in a Tertiary Care Hospital

Vishnu Viswanathan Nair¹, Srinidhi Rai², Tirthal Rai², Janice DSa³

¹IV MBBS Student, ²Associate Professor , Biochemistry Department ,KS Hegde Medical Academy, Nitte (Deemed to be university) Deralakatte , Mangalore, ³Assistant Professor; Biochemistry Department , A J Institute of Medical Sciences, Mangalore

Abstract

Background: Status of diabetes mellitus has changed in the recent years and now is one of the major cause for morbidity in young adults. Prediabetes is an intermediate stage of impaired glucose tolerance in the natural history of diabetes mellitus. **Objectives:** The present study aims to determine the prevalence of prediabetes in adults (age group 18-35 years) and to calculate the detailed risk score by using IDRS and correlate it with diabetic status. **Methods** Fasting plasma glucose was estimated by hexokinase method. **Results:** Prevalence of prediabetes was 2%. Based on IDRS scoring 40% of the subjects had low risk, 58 % of the subjects had moderate risk and 2% of the subjects had high risk of developing diabetes mellitus. **Interpretation and conclusion:** Screening for diabetes mellitus should be considered for individuals above 18 years for the presence of risk factors including family history of DM, physical activity and obesity using IDRS.

Key words: Diabetes mellitus, Fasting plasma glucose , IDRS score, Physical activity Prediabetes

Introduction

Diabetes mellitus (DM) is a metabolic disorder associated with chronic hyperglycemia due to absolute or relative decrease in insulin secretion and / or insulin action characterised by disturbances of lipid, carbohydrate and protein metabolism. Diabetes mellitus is one of the major health problem affecting populations worldwide. India is known as the “diabetes capital of the world”^[1] Status of diabetes mellitus has changed since the past 30 years from being a disorder of the elderly to one of the major cause for morbidity affecting youth and middle aged person^[2]. Prediabetes is a high risk

intermediate stage in the natural history of diabetes ^[3]. The term prediabetic is an intermediate stage used to describe a person with impaired blood glucose tolerance levels of fasting between 100 and 126 mg/dl of blood or whose 2-hour postprandial blood glucose is 140-200 mg/dl^[4]. Prediabetics are likely to progress to diabetes within ten years or less, if no timely intervention or treatment is done ^[5]. Prediabetic stage represents the tip of the iceberg. Early diagnosis and interventions of prediabetes can decrease the risk for occurrence of type 2 DM and its associated complications ^[6]. Sedentary lifestyle and changing food habits have resulted in an increasingly high prevalence of overweight and obesity since early ages which may increase the risk of developing prediabetes and diabetes mellitus ^[7]. Screening methods are to be employed at the earliest to identify individuals who are at high risk for development of diabetes mellitus. A simple low cost diabetic risk score (IDRS) has been developed by Mohan etal , from their Chennai Rural Epidemiology study (CURES) cohort.^[8] This study is done with the aim of determining

Corresponding author:

Dr. Srinidhi Rai –

MBBS MD, Associate Professor , Biochemistry Department ,KS Hegde Medical Academy, Nitte (Deemed to be university) Deralakatte , Mangalore-575018 Email id: srinidhirai@nitte.edu.in Phone No:9591247186

the prevalence of prediabetes in adults (age group 18-35 years) and to calculate the detailed risk score by using IDRS and correlate it with diabetic status.

Objectives

- To study the prevalence of prediabetes among adults
- Evaluation of Indian Diabetic risk scores among adult prediabetics
- To correlate pre diabetic status with risk factor score of these patients

Methodology

Materials and methods

Study Design: Cross sectional study

Study population: Healthy subjects aged 18-35 years

Sample size: 100

Inclusion Criteria:

- Subjects in the age group between 18-35 years

Exclusion Criteria:

- Subjects not willing to participate

Selection of subjects

The informed consent will be obtained from the selected subjects and who are willing to participate in the study

Ethical considerations

Study was approved by the institutional ethical committee

Method of biochemical analysis

Glucose estimation: Enzymatic reference method with hexokinase

Prediabetes is defined as Fasting plasma glucose level of 100-125 mg/dl after 8-12 hours of fasting (American diabetic association)

IDRS SCORE derived from CURES

Risk Criteria	Details	Scores
Age (years)	< 35	0
Abdominal Obesity	Waist < 80cm (female) < 90cm (male)	0
	Waist < 80 – 89cm(female) < 90-99cms(male)	10
	Waist ≥ 90cm (female)>_100cm(male)	20
Physical activity	Vigorous exercise or strenuous work	0
	Moderate exercise work/home	10
	Mild exercise work/home	20
	No exercise and sedentary work /home	30
Family history	No family history	0
	One parent	10
	Either parent	20
Score	Maximum	70
	Minimum	0

IDRS score was assessed by three simple questions and a waist measurement in all the study subjects. . The students were given scores according to family history of type 2 DM, and physical activity (Sedentary, mild, moderate, vigorous exercise, or strenuous work).

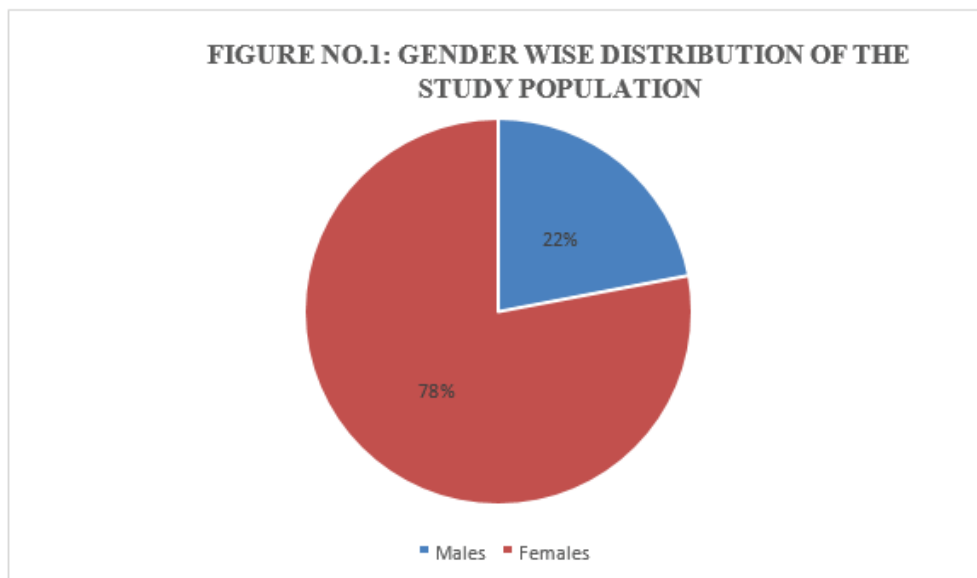
Measurement of waist circumference (WC) (indicates both central as well as general obesity) was

done by using a measuring tape. The WC was taken at the midpoint between the iliac crest and the lower border of the ribs after a normal expiration⁽⁹⁾

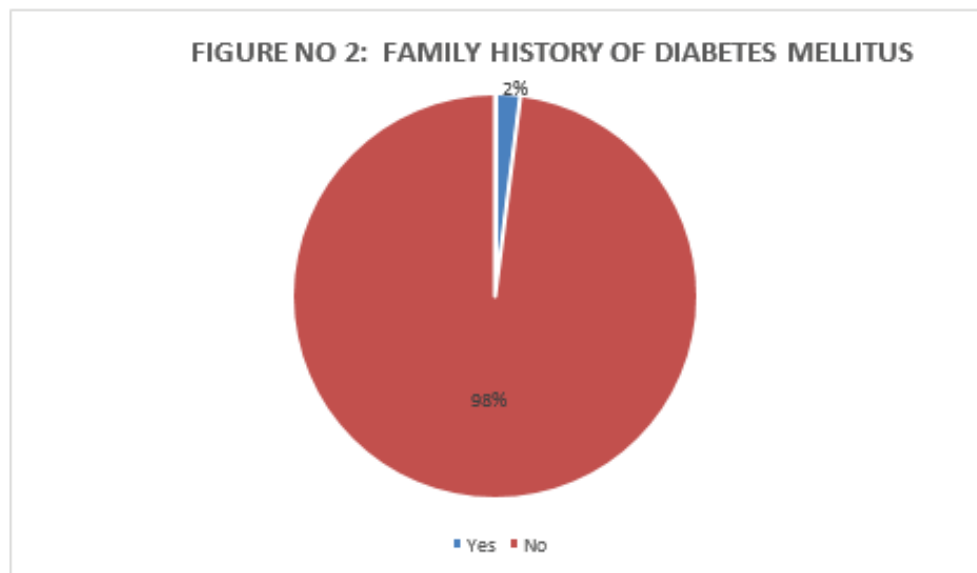
IDRS is a safe, simple and inexpensive tool which consists of four parameters i.e. exercise status, family history of type 2 DM, age, and obesity. The validated IDRS is useful as a tool to screen diabetes risk and to detect undiagnosed type 2 DM.

Results

This study was conducted among healthy individuals in the age group of 18- 35 years were males. (Figure No.1)



Total of 100 subjects were included in the study out of which 22 subjects were females and 78 were males. (Figure No.1)



Family history of diabetes mellitus was present among 2 subjects.

Table No.1: IDRS SCORE OF THE STUDY SUBJECTS

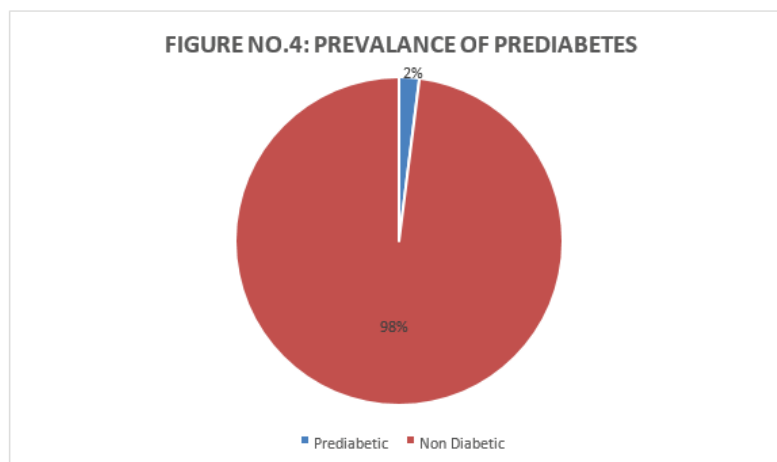
GENDER			
IDRS Group		Frequency	Percent
Low risk < 30	Male	10	25.0
	Female	30	75.0
	Total	40	100.0
Moderate risk 30-50	Male	11	19.0
	Female	47	81.0
	Total	58	100.0
High risk >50	Male	1	50.0
	Female	1	50.0
	Total	2	100.0

TABLE NO.2: DIABETIC STATUS AT DIFFERENT IDRS RISK GROUP

Diabetes Status			
IDRS group		Frequency	Percent
Low risk < 30	non diabetic	40	100.0
Moderate risk 30-50	non diabetic	58	96.6
	Total	58	100.0
High risk >50	Pre diabetic	2	100.0

TABLE NO. 3: MEAN FASTING BLOOD SUGAR BETWEEN IDRS RISK GROUPS

Parameter	Low risk (n=40)	Moderate risk (n=58)	High risk (n=2)
FBS	84.78 ± 5.60	90.99 ± 5.31	98.75 ± 1.77



Prevalence rate = Total number of pre-diabetics / Total number of subjects = 2/100 = 0.02 or 2%

Discussion

In the present study of 100 participants the prevalence of prediabetes is 2%. Based on IDRS scoring 40% of the subjects had low risk, 58 % of the subjects had moderate risk and 2% of the subjects had high risk of developing diabetes mellitus. Study by Arathi D et al on 200 medical students showed the prevalence of prediabetes in 24.5%. Based on IDRS scoring low risk was present in 82.5% of the study group, moderate risk in 16.5% and 1% of the students had high risk of developing diabetes mellitus⁽¹⁰⁾ Prevalence of prediabetes and diabetes mellitus is low in our study compared to other studies. Smaller sample size is the major limitation of our study.

In our study prediabetics had a strong family history of diabetes mellitus. Prediabetics were more obese and had higher abdominal circumference than normoglycaemic subjects. Subjects with moderate risk based on the IDRS score, had sedentary lifestyle.

Even though metabolic changes in prediabetes are triggered mainly by important interactions of genetic and environmental factors, the high absolute risk associated with obesity highlights the importance of lifestyle interventions⁽¹¹⁾. In our study lack of physical activity is a major concern which increases the future risk of developing type 2 DM as without exercise the younger individuals may get more obesity in future. Individuals with family history of diabetes mellitus should be regularly screened for prediabetes and diabetes mellitus. IDRS is a useful tool to predict the future risk of diabetes

mellitus.

Conclusion

Screening should be considered for individuals above 18 years for the presence of risk factors including family history of DM, physical activity and obesity .IDRS is a less expensive tool which helps in screening high risk people for further investigations. IDRS can help both in predicting and preventing the risk of development of diabetes mellitus.

Acknowledgement: Indian council of medical research (ICMR). This study is a part of STS 2017 of ICMR(2017-00921)

Nitte (deemed to be university) for providing an opportunity to conduct this work

No conflicts of Interest

Funding agency: Nitte (Deemed to be University)

References

1. Gupta M, Singh R, S.S Lehl. Diabetes in India: A long way to go. International journal of scientific reports. May 2015;1(1):1-2
2. Wild S, Roglic G, Green A, Sicree R, King H. Global prevalence of diabetes: Estimates for the year 2000and projections for 2030. Diabetes Care. 2004;27:1047–53.
3. American Diabetes Association. Diagnosis and classification of diabetes mellitus. *Diabetes Care*.

- 2014; **37** (suppl 1): 81–90
4. Viswanathan V, Clementina M, Nair BM, Satyavani K. Risk of future diabetes is as high with abnormal intermediate post-glucose response as with impaired glucose tolerance. *J Assoc Physicians India* 2007; 55:833-7
 5. Ramachandran A, Snehalatha C, Mary S, Mukesh B, Bhaskar AD, Vijay V, *et al.* The Indian diabetes prevention programme shows that lifestyle modification and metformin prevent type 2 diabetes in Asian Indian subjects with impaired glucose tolerance (IDPP1). *Diabetologia* 2006; 49:289-97.
 6. Muthunaryanan L, Ramraj B, Russel JK. Prevalance of prediabetes and its associated risk factors among rural adults in Tamil Nadu. *Archives of medicine and health sciences*, 2015, vol 3 :178-184
 7. Shamah-Levy T, Cuevas-Nasu L, Mendez-Gomez-Humaran I, Jimenez- Aguilar A, Mendoza-Ramirez AJ, Villalpando S. [Obesity in Mexican school age children is associated with out-of-home food consumption: in the journey from home to school]. *Arch Latinoam Nutr* 2011; 61: 288–95.
 8. Mohan V, Deepa R, Deepa M *et al.* A simplified Indian Diabetes Risk Score for screening for undiagnosed diabetic subjects. *J. Assoc. of Physicians of India* 2005; 53:755-63.
 9. Han TS, Sattar N, Lean M. Assessment of obesity and its clinical implications. *BMJ* 2006; 333: 695-8.
 10. Arathi D, Naman M. Risk of developing diabetes mellitus among medical students in South India. *J.of Evolution of Med and Den S.* 2015;4(5)-9534-9543
 11. Langenberg C, Sharp SJ, Franks PW *et al.* Gene-lifestyle interaction and type 2 diabetes: the EPIC interact case-cohort study. *PLoS Med* 2014; 11: e100164.