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ORIGINAL RESEARCH

Prevalence of pre-diabetes and cardio-metabolic risk factors in first degree relatives of patients with type-II diabetes mellitus

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Abstract
Background: The term dysglycaemia means, broadly, the abnormality of glucose levels. The present study was conducted to assess prevalence of pre-diabetes and cardio-metabolic risk factors in first degree relatives of patients with type-II diabetes mellitus.
Materials & Methods: 94 first degree relatives of patients suffering from Type 2 DM of both genders were included. Parameters such as weight (Kg) and height (cm) and BMI was measured. Waist circumference, fasting lipid profile, fasting blood sugar (FBS), post prandial blood sugar (PPBS), glycated haemoglobin (HbA1c) was performed.
Results: Out of 94 patients, males were 60 and females were 34. Age group 30-34 years had pre-diabetics seen in 3, 35-39 years in 7, 40-44 years in 9 and 45-49 years in 11. The difference was significant (P< 0.05). The mean value in subjects with present diabetes and absent diabetes of BMI (kg/m2) was 27.8 and 25.1, LDL (mg/dl) was 148.4 and 128.2, HDL (mg/dl) was 44.2 and 35.2, TG (mg/dl) was 130.2 and 154.9, FBS (mg/dl) was 92.3 and 110.4 and HbA1c (%) was 5.6 and 5.7 respectively. The difference was significant (P< 0.05).
Conclusion: First degree relatives of patients with type 2 DM patients have high prevalence of pre-diabetes and other cardio metabolic risk factors.
Key words: cardiovascular disease, pre-diabetes, Metabolic syndrome

Introduction

The term dysglycaemia means, broadly, the abnormality of glucose levels. The glucose impairment can occur many years before type 2 diabetes mellitus (T2DM), establishing a condition known as pre-diabetes. Even though this metabolic disorder is initial, the risk to the development of some co-morbidities, such as cardiovascular disease, seems to increase. Identifying individuals at the earliest stage of dysglycaemia would be useful to allow the adoption of strategies for preventing or delaying the progression of the disease.[1]

The pre-diabetes stage is identified by impaired fasting blood glucose (IFG), impaired glucose tolerance (IGT), or impaired glucose regulation [glycated haemoglobin—HbA1c

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between 42 and 47 mmol/mol (6.0–6.4%)] and it indicates the risk of developing T2DM.[2] This is particularly relevant in first degree relatives (FDRs) of people with type 2 diabetes, who are at even greater cardiovascular and diabetes risk. There is a high prevalence of pre-diabetes in relatives of type-2 diabetes mellitus patients observed in many western studies.[3] There are only few Indian studies done on this topic. The prevalence of diabetes is on rise worldwide. Type 2 DM is the more prevalent form of diabetes.[4] Research indicates that in addition to the lifestyle factors, there is a significant genetic predisposition amongst the cases of type 2 DM, as evidenced by higher risk with positive family history and concordance at in twins. Recently, it has also been realized that the Diabetes and cardiovascular diseases may have interlinked under lying mechanism, in addition to multiple common risk factors.[5] The present study assessed prevalence of pre-diabetes and cardio-metabolic risk factors in first degree relatives of patients with type-II diabetes mellitus. The World Health Organization (WHO) has defined pre-diabetes as a state of intermediate hyperglycemia using two specific parameters, impaired fasting glucose (IFG) defined as fasting plasma glucose (FPG) of (110 to 125 mg/dL) and impaired glucose tolerance (IGT) defined as 2 h plasma glucose of (140-200 mg/dL).

Materials & Methods

The present study comprised of 94 first degree relatives of patients suffering from type II DM of both genders. The consent was obtained from all enrolled patients.

Data such as name, age, gender etc. was recorded. Parameters such as fasting lipid profile, fasting blood sugar (FBS), post prandial blood sugar (PPBS), glycated haemoglobin (HbA1c) Waist**:** hip was taken. Supine blood pressure was recorded for both arms. Weight (Kg) and height (cm) and BMI was measured. P value < 0.05 was considered significant.

The cutoffs for normal values were as follows:

1. Fasting blood sugar (FBS): upto 100mg/dL
2. Post prandial blood sugar (PPBS): upto 140mg/dL(lunch)
3. Glycated haemoglobin (HbA1c): 6.5%
4. Low density lipoprotein cholesterol (LDL): upto 100 mg/dL
5. High density lipoprotein cholesterol (HDL): 40 mg/dL
6. Triglycerides (TG): 150mg/dL
7. Impaired Fasting Glucose (IFG)-Fasting blood sugar-100-125mg/dL
8. Impaired Glucose Tolerance- Postprandial blood sugar-140-199mg/dL
9. BMI: 24.9kg/m2
10. WHR: 0.90 for males and 0.85 for females

Impaired glucose tolerance (IGT) and impaired fasting glucose (IFG) are intermediate conditions in the transition between normality and diabetes.

Results

Table I Distribution of patients

Gender	Pre-diabetes		P value
	Absent	Present	
Male	40	20	0.68
Female	24	10	

Table I shows that out of 60 males 20 and out of 34 females 10 were pre diabetes respectively. The difference was not significant (p>0.05)

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Table II Age and pre diabetes status wise distribution

Age group (years)	Pre-diabetes		P value
	Absent	Present	
30-34	4	3	0.04
35-39	15	7	
40-44	20	9	
45-49	25	11	
Total	64	30	

Table II shows that age group 30-34 years had pre-diabetics seen in 3, 35-39 years in 7, 40-44 years in 9 and 45-49 years in 11. The difference was significant (P< 0.05).

Table III Assessment of parameters

Parameters	Pre-diabetes		P value
	Absent	Present	
BMI (kg/m2)	24.1	27.8	0.02
WHR	0.88	0.94	0.03
LDL (mg/dl)	128.2	149.4	0.03
HDL (mg/dl)	46.2	37.2	0.01
TG (mg/dl)	122.2	156.9	0.04
FBS (mg/dl)	94.3	112.4	0.04
PPBS(mg/dl)	128.25	148.76	0.02
HbA1c (%)	5.6	5.8	0.09

Table III, graph I shows that the mean and value in subjects with present pre-diabetes and absent pre-diabetes of BMI (kg/m2) was 27.8 and 24.1, WHR 0.94 and 0.88, LDL (mg/dl) was 148.4 and 128.2, HDL (mg/dl) was 37.2 and 46.2, TG (mg/dl) was 156.9 and 132.2, FBS (mg/dl) was 112.4 and 94.3, PPBS (mg/dl) 148.96 and 128.76, HbA1c (%) was 5.8 and 5.6 respectively. The difference for all the laboratory parameters was significant except HbA1c.

Graph I Assessment of parameters

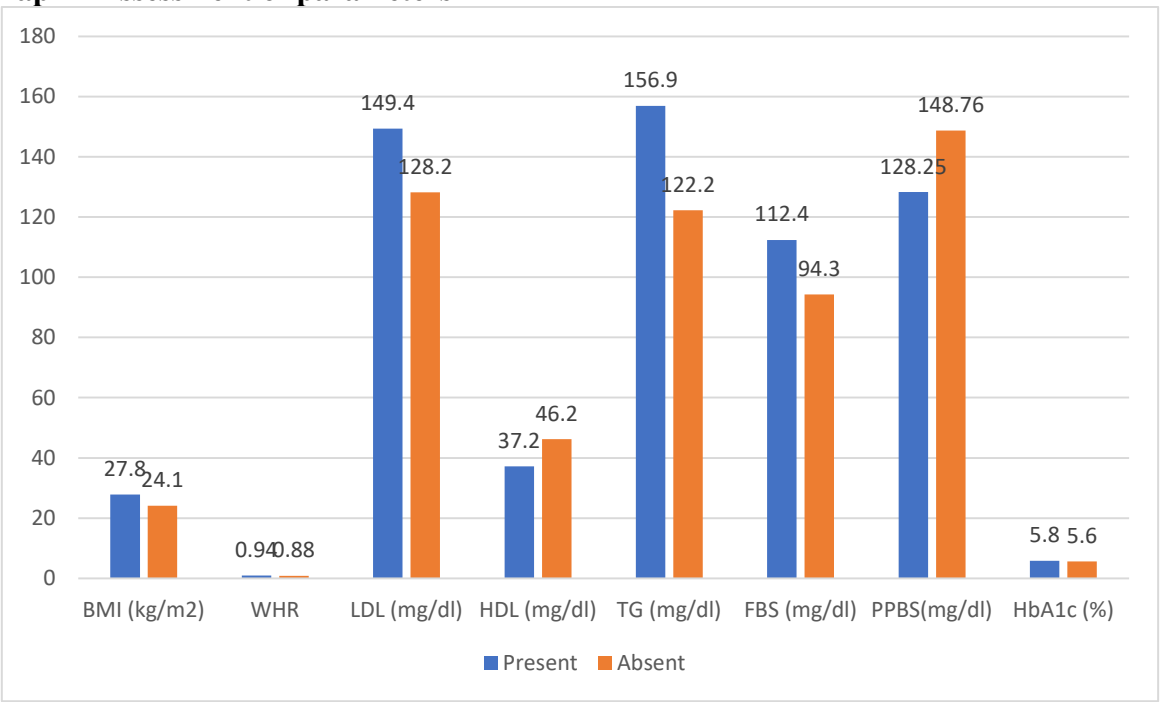

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Table IV Pre diabetic patients detected with impaired fasting glucose (IFG) and impaired glucose tolerance (IGT) tests

Parameters	Number	P value
Only IFG	2	0.01
Only IGT	6	
Both IFG and IGT	22	
Total	30	

Table IV shows that pre diabetic patients were detected with only IFG in 2, only IGT in 6 and in both IFG and IGT in 22 cases. The difference was significant (P< 0.05).

Discussion

Metabolic syndrome (MetS) is an important public health problem worldwide, and its prevalence is increasing.[6] Patients with MetS are at greater risk of cardiovascular disease and type 2 diabetes.[7] According to the International Diabetes Federation, approximately 415 million people were suffering from diabetes worldwide, and this number is expected to exceed 640 million by the year 2040.[8] It is estimated that half of patients with diabetes are unaware of their disease and are thus more prone to developing diabetic complications. Type II DM has become an observably global public health problem.[9]The present study was conducted to assess prevalence of pre-diabetes and cardio-metabolic risk factors in first degree relatives of patients with type-II diabetes mellitus.

We found that out of 94 patients, males were 60 and females were 34. Janghorbani et al[10] assessed the incidence of and risk factors for the development of Met S in FDRs of patients with type 2 diabetes. A total of 3217 FDRs of consecutive patients with type 2 diabetes was included. The prevalence of Met S was 35.8%. The incidence of Met S was 4.3% (4.6% men and 4.2% women) per year. Multivariate analysis revealed that impaired glucose tolerance (IGT), impaired fasting glucose (IFG) (RR 1.39 and lower HDL (RR 1.34 were associated with Met S.

We found that age group 30-34 years had pre-diabetics seen in 3, 35-39 years in 7, 40-44 years in 9 and 45-49 years in 11. Gholi Z et al[11] assessed the associations of TG, glucose and waist circumference with the prevalence of pre-diabetes and diabetes in 1544 first degree relatives of Type 2 DM patients, they found that the mean age of the population having Pre-diabetes (52 years) was higher than the population without pre-diabetes. The mean BMI of the population having Pre diabetes (25.12 kg/m2) was more than the population without Prediabetes (24.39 kg/m2) and the difference was found to be statistically significant.

We observed that the mean value in subjects with present diabetes and absent diabetes of BMI (kg/m2) was 27.8 and 24.1, , WHR 0.94 and 0.88, LDL (mg/dl) was 149.4 and 128.2, HDL (mg/dl) was 46.2 and 37.2, TG (mg/dl) was 122.2 and 156.9, FBS (mg/dl) was 94.3 and 112.4 and HbA1c (%) was 5.6 and 5.56 respectively. Kishore et al[12] found that the prevalence of prediabetes amongst the first- degree relatives of type 2 DM was found to be 26%. The prevalence of cardio metabolic risk factors observed amongst the first- degree relatives of patients of type 2 DM were: history of CVD in 12%, over weight by BMI in 73%, overweight by WHR in 54%, hypertension in 32%, dyslipidemia in 47%. The prevalence of prediabetes was found to be more in the first degree relatives of diabetes patients who were overweight (by BMI) (32.88%) than those first degree relatives with the normal weight (by BMI) (7.41%).

Conclusion

Authors found that first degree relatives of patients with type 2 DM patients have high prevalence of pre-diabetes and other cardio metabolic risk factors.

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References

1. Diamond J. Medicine: diabetes in India. Nature 2011;469:478– 9.
2. Yang W, Lu J, Weng J, Jia W, Ji L, Xiao J et al. Prevalence of diabetes among men and women in China. N Engl J Med 2010;362: 1090–1101.
3. Weigensberg M, Goran M. Type 2 diabetes in children and adolescents. The Lancet 2009;373:1743-4.
4. Wagner R, Thorand B, Osterh off M, Müller G, Böhm A, Meisinger C et al. Family history of diabetes is associated with higher risk for prediabetes: a multicentre analysis from the German Center for Diabetes Research. Diabetologia 2013;56:2176–80.
5. Wild S, Roglic G, Green A. Global prevalence of diabetes: estimate for the year 2000 and projections for 2030. Diabetes Care 2004;127:1047–53. 4.
6. Scuteri A, Morrell CH, Najjar SS, Muller D, Andres R, Ferrucci L, et al. Longitudinal paths to the metabolic syndrome: can the incidence of the metabolic syndrome be predicted? The Baltimore Longitudinal Study of Aging. The Journals of Gerontology Series A Biological Sciences and Medical Sciences 2009;64:590–8.
7. Palanippan L, Carnethon M, Wang Y, Hanley A, Fortmann S, Haffner S, et al. Predictors of the incident metabolic syndrome in adults: the Insulin Resistance Atherosclerosis Study. Diabetes Care 2004;27:788–93.
8. Han TS, Williams K, Sattar N, Hunt KJ, Lean ME, Haffner SM. Analysis of obesity and hyperinsulinemia in the development of metabolic syndrome: San Antonio Heart Study. Obesity Research 2002;10:923–31.
9. Sheu WHH, Chuang SY, Lee WJ, Tsai ST, Chou P, Chen CH. Predictors of incident diabetes, metabolic syndrome in middle-aged adults: a 10-year follow-up study from Kinmen. Taiwan Diabetes Research and Clinical Practice 2006;74:162–8.
10. Balkau B, Vernay M, Mhamdi L, Novak M, Arondel D, Vol S, et al. The incidence and persistence of the NCEP (National Cholesterol Education Program) metabolic syndrome The French D.E.S.I.R. study. Diabetes and Metabolism 2003;29: 526–32.
11. Carnethon MR, Loria CM, Hill GO, Sidney S, Savage PG, Liu K. Risk factors for the metabolic syndrome: the Coronary Artery Risk Development in Young Adults (CARDIA) study, 1985–2001. Diabetes Care 2004;27:2707–15
12. Janghorbani M, Amini M. Metabolic syndrome in first degree relatives of patients with type 2 diabetes: Incidence and risk factors. Diabetes & Metabolic Syndrome: Clinical Research & Reviews. 2011 Oct 1;5(4):201-6.
13. Gholi Z, Heidari-Beni M, Feizi A, Iraj B, Askari G. The characteristics of pre-diabetic patients associated with body composition and cardiovascular disease risk factors in the Iranian population. J Res Med Sci 2016;21:20-26.
14. Arcot Krishna Kishore, Sreeram Praveen, Sandeep Rai. A study of prevalence of pre-diabetes and cardio-metabolic risk factors in first degree relatives of patients with type-II diabetes mellitus. International Journal of Health and Clinical Research, 2022;5(1):286-291.