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Original Article

A study of oral glucose tolerance test in offspring of uniparental and biparental diabetics in a tertiary care hospital in north India

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Abstract:

Objective: To study oral glucose tolerance test in offspring of uniparental and biparental diabetics in a tertiary care hospital in north India.

Methods: This was a prospective comparative observational study. A total of 14 families were studied (7 uiniparental-either husband or wife diabetic, 7 biparental-both husband and wife were diabetic).their all offspring were recruited who consented for the study. Each offspring was subjected to a detailed history with clinical examination. Anthropometric parameters, glucose levels, lipid profile, serum uric acid and microalbuminuria were measured.

Results: More than one third of patients of Uniparental (46.7%) and 13.3% of Biparental were between 26-30 years of age. Most of the patients in both the groups were males.There was no significant ($p>0.05$) difference in fasting 1 hour and 2 hour plasma glucose, anthropometric parameters, lipid profile, serum uric acid and microalbuminuria between offspring of Uniparental and Biparental Diabetics. However, increased level of plasma glucose, lipid profile, serum uric acid and microalbuminuria was observed in Uniparental and Biparental than controls.

Conclusion: The findings of this study reflect that there is high level of plasma glucose , lipid profile and serum uric acid among the offspring of diabetics, probably due to some genetic predisposition. If parents with diabetes become more conscious about their status and lead life more carefully, the rate of diabetic offspring will be lower.

Keywords: Diabetes, Oral glucose tolerance test, Parental, Offspring, Lipid profile.

INTRODUCTION

Diabetes mellitus (DM) is the most common metabolic disorder affecting the people worldwide. Even though diabetes has been known since antiquity, only in the last few decades new discoveries have provided great hopes to minimize morbidity and mortality (1).

Diabetes mellitus is a chronic metabolic disease which is characterized by hyperglycemia and various lethal combinations. There are two major clinical classifications of diabetes type 1 and type 2. Type 1 is immune mediated and requires daily administration of insulin and type 2 is more prevalent and occurs either when the β-cells of pancreas do not produce enough insulin or when body cannot utilize insulin effectively. Type 2 diabetes mellitus often associated with both qualitative and quantitative abnormalities of lipoproteins which are responsible for increased incidence of micro vascular and macro vascular complications (2).

India, a developing country with fast industrialization and modern lifestyle is facing a grave problem having the largest number of patients with diabetes which is estimated to reach 80 million by the end of 2030 (3,4). It is also a leading cause of blindness, limb amputation and kidney failure. Lipoprotein abnormality present in type 2 diabetes mellitus includes high level of triglycerides (TG), high level of small dense lipoprotein (LDL-C), high level of very Low density lipoprotein (VLDL-C) and low level of high density lipoprotein (HDL-C) (5, 6). This lipid profile pattern in diabetic patients is known as diabetic dyslipedemia. Many factors are responsible for diabetic dyslipedemia, these are: effect of insulin on liver Apoprotein productions, regulation of lipoprotein lipase (LpL), actions of cholesterol ester transfer protein, and action of insulin on adipose and muscle tissues (7).

Uric acid (UA) is the final product of purine catabolism. High serum UA levels is associated with obesity, dyslipidemia, hypertension and impaired glucose metabolism (8) which contributes in the development of vascular diseases such as stroke, coronary artery diseases and hypertension. In the past, there has been renewed interest in association of uric acid and

cardiovascular disease (CVD) as well as high UA levels are designated as a risk factors (9).

The present study was designed to study oral glucose tolerance test in offsprings of uniparental and biparental diabetics in a tertiary care hospital in north India.

MATERIAL AND METHODS

This was a prospective comparative observational study conducted in the Department of Medicine, Integral Institute of Medical Sciences & Reasearch, Lucknow. The study was approved by the Ethical Committee of the Institute. A total of 14 families were studied (7 uniparental-either husband or wife diabetic, 7 biparental-both husband & wife was diabetic). A total of 10 subjects were included whose parents did not had diabetes and served as controls were also included The consent was taken from each participant before enrolling in the study.

Each offspring was subjected to a detailed history with clinical examination. Anthropometric parameters, glucose levels, lipid profile, serum uric acid and microalbuminuria were measured.

Methods

All the subjects were subjected to OGTT with 75gm glucose load and fasting 1 and 2 hour blood glucose were estimated by glucose oxidase method. OGTT was done as per WHO guidelines. Fasting samples were taken and lipid profile was estimated from the serum using lipid profile kit with the help of semiautoanalyser. Serum uric acid was estimated by the standard method. For microalbuminuria, spot urine sample was taken. Albumin in urine was quantitatively measured by Roche/Hitachi analyzer using immunoturbimetric assay. Microalbuminuria was considered as urinary albumin concentration between 30-300 mg/l in the morning spot urine sample.

Statistical analysis

The results are presented in frequencies, percentages and mean±SD. The Chi-square test was used to compare the categorical variables. The one way analysis of variance (ANOVA) followed by Tukey's post hoc tests was used to compare continuous variables among the groups. The p-value<0.05 was considered significant. All the analysis was carried out on SPSS 16.0 version (Chicago, Inc., USA).

RESULTS

More than one third of offspring of Uniparental (46.7%) and 13.3% of Biparental offspring were between 26-30 years of age. However, 20% of Uniparental and 13.4% of Biparental were between 36-40 years. There was no significant (p>0.05) association of age between the groups. More than one third of offspring of Uniparental (46.7%) and 66.7% of Biparental were males with no significant (p>0.05) association among the groups (Table-1).

Table-1: Distribution of age and gender of offspring between uniparental and biparental

Age and gender	Uniparental (n=15)		Biparental (n=15)		Controls (n=10)		Overall p-value[1]
	No.	%	No.	%	No.	%	
Age in years							
20-25	2	13.3	5	33.3	2	20.0	0.58
26-30	7	46.7	2	13.3	3	30.0	
31-35	1	6.7	3	20.0	1	10.0	
36-40	3	20.0	2	13.4	3	30.0	
>40	2	13.3	3	20.0	1	10.0	
Gender							
Male	7	46.7	10	66.7	4	40.0	0.36
Female	8	53.3	5	33.3	6	60.0	

[1]Chi-square test

Analysis of variance revealed that there was significant (p=0.0001) difference in 1 hour and 2 hours plasma glucose among the groups. The post hoc tests showed that there was significant (p<0.01) difference in 1 hour and 2 hours plasma glucose between Uniparental and controls as well as between Biparental and controls (Table-2).

Table-2: Comparison of fasting 1 hour and 2 hour plasma glucose between uniparental and biparental

	Uniparental (n=15)	Biparental (n=15)	Controls (n=10)	p-value[1]
1 hour (mg/dl)	118.53±41.2[a]	124.67±44.50[b]	81.00±8.40 [a,b]	0.0001*
2 hours (mg/dl)	224.10±60.90[c]	228.60±68.40[d]	183.40±13.70 [c,d]	0.0001*

[1]ANOVA test, *Significant, [a,b,c,d]p<0.01 (Post hoc tests)

There was no significant (p>0.05) difference in the anthropometric parameters among the groups (Table-3).

Table-3: Comparison of anthropometric parameters between uniparental and biparental

Anthropometric parameters	Uniparental (n=15)	Biparental (n=15)	Controls (n=10)	p-value[1]
BMI kg/mtr^2	25.80±3.45	25.45±3.90	25.90±1.86	0.81
Waist circumference in cms	91.80±7.39	88.93±10.35	79.40±6.71	0.22
Hip circumference in cms	97.73±7.55	98.00±5.69	99.10±5.14	0.82
WHR	0.94±0.09	0.91±0.08	0.80±0.46	0.33

[1]Unpaired t-test

Analysis of variance revealed that there was significant (p<0.01) difference in lipid profile except LDL among the groups. The post hoc tests showed that there was significant (p<0.01) difference in total cholesterol between between Biparental and controls. TG was significantly (p<0.01) different between Uniparental and controls as well as Biparental and controls (Table-4).

Table-4: Comparison of lipid profile between uniparental and biparental

Lipid profile	Uniparental (n=15)	Biparental (n=15)	Controls (n=10)	p-value[1]
Total cholesterol (mg/dl)	159.06±43.35	171.20±44.27[a]	147.00±14.81 [a]	0.001*
TG (mg/dl)	197.87±66.50[b]	198.00±62.88[c]	140.40±9.11 [b,c]	0.002*
HDL (mg/dl)	48.67±9.87	47.47±7.91[d]	60.00±6.06[d]	0.003*
LDL (mg/dl)	82.40±23.01	88.93±16.84	78.80±7.11	0.06

[1]ANOVA test, *Significant, [a,b,c,d]p<0.01 (Post hoc tests)

Uric acid was found to be insignificantly (p>0.05) higher among the offspring of Uniparental than Biparental. However, microalbuminuria was observed to be insignificantly (p>0.05) lower among the offspring of Uniparental compared to Biparental (Table-5).

Table-5: Comparison of uric acid and microalbuminuria between uniparental and biparental

Uric acid and microalbuminuria	Uniparental (n=15)	Biparental (n=15)	Controls (n=10)	p-value[1]
Uric acid (mg%)	4.99±0.87	4.61±0.99	4.12±2.12	0.11
Microalbuminuria (mg/L)	18.27±3.99	21.31±6.43	15.80±3.15	0.07

[1]Unpaired t-test

DISCUSSION

In type 2 diabetes, there is an excess maternal transmission of type 2 diabetes, and there are also different consequences of paternal and maternal type 2 diabetes (10). In type 1 diabetes, this issue was previously addressed in only one small study. Hadjadj et al (11) showed an association between maternal history of type-2 diabetes and diabetic nephropathy. Dyslipidemia is a conventional risk factor for CVD and also for cerebrovascular diseases in most cases (12). Family history of parental dyslipidemia is one of the major factors to be considered in the decision of assessing the lipid profile in children and adolescents (13). In this study, high level of plasma lipid levels were observed. This finding of this study is in agreement with the other studies (14, 15). LDL in diabetic patients is deacetylated to a larger extent than in normal individuals, which accumulate in the endothelium and can cause premature development of atherosclerosis in diabetic patients.

Multiple studies have shown that serum uric acid (UA) levels are associated with risk factors for CAD and CVA.

The strong relation with serum UA and dyslipidemia as the other components of metabolic syndrome has been demonstrated by several studies (8, 16). To explain the relationship between hyperuricemia and risk factors for CVD, many reasons have been suggested. Reduced renal clearance or increased proximal tubular reabsorption of UA due to the insulin resistance and increased insulin levels, increased leptin levels and increased fructose consumption which is closely associated with obesity have been proposed as possible causes (17, 18). In this study, there was no significant difference in the uric acid between the groups, however, the level was high. The mean uric acid was higher among Uniparental group, in this group, obesity and WHR was high. Similar high level of serum uric was reported by Akbas et al (19). The effects of improvement of the lipid profile or reduction of UA levels on albuminuria is controversial and beneficial results have not

been clearly demonstrated (20,21). In the present study, there was no significant difference in microalbuminuria between Uniparental and Biparental diabetic patients.

One of the limitations of this study was the smaller sample size. The studies with larger sample size with long term follow-up will give more insight about the effect of parental diabetes on offspring.

CONCLUSION

The findings of this study reflect that there is high level of plasma glucose, lipid profile and serum uric acid among the offspring of diabetic, probably due to some genetic predisposition. If parents with diabetes become more conscious about their status and lead life more carefully, the rate of diabetic offspring will be lower.

Conflict of interest
None
Funding
Self

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