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Prevalence of Hypertriglyceridemia Among Newly Detected Type-2 Diabetes in Coimbatore

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ABSTRACT

To know the prevalence of hypertriglyceridemia among newly detected Type-2 diabetes in Coimbatore. Three twenty newly detected type-2 diabetes of age 25 years to 45 years were selected for the study. Selected anthropometric, biochemical and clinical profile was analyzed. It was found that 30.6% had borderline high TGL, 6.8% had high TGL and 4% had very high TGL. After 3 months triglyceride and HbA1c was analyzed for the borderline high triglyceridemic diabetics for the sub-samples. It was found that 95% of their triglycerides turned to normal. At the same time HbA1c was reduce by 08% to 2.6% for the selected diabetics. It was found that glycosylated hemoglobin (HbA1c) was positively and significantly related with triglycerides (r= 1 and p<0.00001). Although high triglycerides do not cause diabetes, uncontrolled diabetes can elevate triglyceride levels.

KEYWORDS : Hypertriglyceridemia, HbA1c, anthropometric

Introduction

Globally the number of people with diabetes is expected to rise from the current estimate of 150 million to 220 million in 2010 and 300 million in 2025. Evidence has been accumulated from observational studies and randomized controlled trials on the beneficial effects of good blood glucose control in the prevention of micro vascular and macro vascular damage in people with diabetes. (Meerza et al, 2012)

There are about 3.5 crores diabetics in India and the figure will rise to about 5.2 crores by 2025. Every 5th patient visiting a consulting physician is a diabetic, and every 7th patient visiting a family physician is a diabetic. Prevalence of diabetes is higher in the Indian subcontinent and it is estimated that 20% of global burden resides in the South East Asia Region (SEAR) area, which will be tripled to 228 million by the year 2025 from the current 84 million (Park, 2007). Keeping in view the alarming increase in the incidence and prevalence of diabetics in India, World Health Organization (WHO) has declared India as the —Diabetic Capital of the World‖ (Gupta; 2002).

Irrespective of the pathogenesis of the primary hypertriglyceridemia disorder, the occurrence of poorly controlled diabetes will enhance hypertriglyceridemia and even in the Type II diabetic, with triglycerides in the thousands, dietary and glycemic control, alone, will strikingly ameliorate the hypertriglyceridemia (Reddy et al, 2006)

High triglyceride levels can increase the risk for heart disease, stroke, and nerve damage. There is a link between chronically elevated triglyceride levels and atherosclerosis, as well as insulin resistance. (Mohtar; 1999).A common cause of triglyceride in blood is insulin resistance, that cells won't let insulin or its companion glucose, inside cells. As a result, both glucose and triglycerides build up in blood (Misra and Pnadey; 2001). Hence this study was undertaken with following objectives

- To investigate the nutritional and health status of the newly detected diabetes
- To know the prevalence of hyper tryglyceridemia.
- To correlate TG levels with glycemic control.

Methods

The study was conducted in Coimbatore city, 320 newly detected diabetics who visited the Diabetic Care Clinic were selected for the study on the inclusion criteria - FBS: >100 mg/dl; HbA1c >5.6 % and Oral glucose tolerance test (OGTT): FBS:>126mg/dl, 2hr:>200mg/dl. Those with known hyperlipidemia, complications of diabetes mellitus, and on steroids, diuretics were excluded from the study.

The data collection was carried out through a structured questionnaire which included family history of diabetes, physical activity, lifestyle, anthropometric measurements and clinical parameters. WHO Global Physical Activity Questionnaire, Analysis Guidelines 7 was used. The biochemical investigations that were carried out were FBS, PPBS, HbA1c and TG. All the parameters were run using Roche, Germany - Cobas b 101 POC systems and diagnostic kit.

Results and Discussions

Baseline information

The number of patients studied was 320 and their mean age of the population under the study stood at 34.51 years. In our study 15.9%of the selected diabetics had a positive family history of both parents being diabetic and 29.35% had a positive family history of one parent being diabetic.

Physical Activity

All the selected diabetics were on sedentary life style. Though there was no doubt that physical activity will reduce the risk of many disorders, only 6.8% of them were on regular physical activity.

Association between Physical Activity and Diabetes was reported by Subramani, et al, (2014) 73.5 % of subjects had diabetes among no exercise or sedentary work group. 4.58%subjects were found to diabetic (n=20/436) among regular exercise or strenuous group. The relation between the physical activity and undiagnosed diabetes was statistically significant. (p- value< 0.000)

Food Intake

From the selected 320 diabetics 122 of them were vegetarian and 198 diabetics were non vegetarian. Most of the selected patients followed high carbohydrate diet pattern with saturated fats, bakery items and fried foods.

High carbohydrate intake provides excess of glucose that is absorbed into the bloodstream. In poorly controlled diabetes, excess glucose can be used to make triglycerides. Triglycerides are used as a quick energy source between meals. Leftover calories are stored in the body cells as triglycerides.

Fruits and vegetables intake was found to be lacking. Certain foods seem to affect triglyceride levels more than others, in diabetics, the body has less of a tolerance for these types of foods that include simple sugars, refined processed grains, alcohols, foods high in fat, especially those high in saturated and trans fat.

Among the selected 196 male diabetics, 32 of them had the habit of smoking, 17 males had the habit of alcohol and 71 samples had the habit of smoking and alcohol.

Anthropometric Data
Physical body measurements are key indicators for the prevalence of non-communicable diseases.

The following table-1 gives the mean anthropometric and biochemical data.

Table-1
Mean Anthropometrics and Clinical Profile of the Selected Newly Detected Diabetics (n = 320)

Parameter	Observed values	Standard values
Height (Cm)	158.16	NA
Weight (Kg)	64.4	58.16 (IBW)
BMI	25.86	23.0
FBS (mg/dl)	147.3	80 - 100
PPBS (mg/dl)	251.4	≤180
HbA1c (%)	8.06	≤7

Hypertriglyceridemia results from increased triglyceride production, or reduced triglyceride catabolism, or both. The common forms of hypertriglyceridemia emerge as adults get older and become overweight and sedentary and develop insulin resistance. The most common setting of hypertriglyceridemia is that found with metabolic syndrome, FCHL, and type 2 diabetes.

The following table-II provides the Distribution of the selected diabetics according to triglyceride Levels

Table-II
Distribution of the Selected Diabetics (n = 320) According to Triglyceride Levels

TGLClass	TGL Range (mg/dl)	Mean value of TGL (mg/dl)	Mean HbA1c %	No of diabetics	
				Males	Females
Normal	< 150	101.2	6.6	83	104
Borderline High	150-199	173.4	8.2	82	16
High	200-499	326.5	8.5	19	3
Very High	>500	656.9	9.1	12	1

From the above table-II it is clear that 30.6% (82 males and 16 females) had borderline high TGL. For high TGL samples and very high TGL samples drugs was given to reduce TGL. When diabetes is not under good control, high levels of both glucose (blood sugar) and insulin are present. Insulin helps convert glucose into glycogen (the stored form of glucose) and helps to store glycogen in the liver. When the liver becomes too saturated with glycogen, though, glucose is instead used to create fatty acids that are released into the bloodstream. These fatty acids are used to make triglycerides, which build up in fat cells and contribute to body fat. A common cause of high triglycerides is insulin resistance; that's when cells do not let insulin, or glucose, inside the cells. As a result, both glucose and triglycerides build up in blood.

Table III outlines the correlation between TGL levels and HbA1c of selected 40 Borderline High triglyceridemic diabetics (n=40)

TableIII
Correlation between TGL and glycaemic control (HbA1c)

Selected diabetics	Mean TGL levels (mg/dl)	Mean HbA1c %	Correlation
On detection	169.4	8.3	(r= 1&p<0.00001)
After 3 months	126.7	6.9	

After 3 months triglyceride and HbA1c was analyzed for the borderline high triglyceridemic diabetics for the sub-samples. It was found that 95% of their triglycerides turned to normal. At the same time HbA1c was reduce by 08% to 2.6% for the selected diabetics.

There is a correlation between obesity and hypertriglyceridemia. It was found that 162 diabetics were overweight and 12 diabetics were obese. In most case (61%) the HbA1c was under poor control (>8%) and fair for 22% (7.0% to 8%).

Further, it was found that glycosylated hemoglobin (HbA1c) was positively and significantly related with triglycerides (r= 1 and p<0.00001). Erciyas et al, (2004) reported positive correlation of HbA1c level with TC and TG in diabetic patients. The Diabetes complications and control trial (DCCT) established HbA1c as the gold standard of glycemic control. The level of HbA1c value ≤7.0% was said to be appropriate for reducing the risk of cardiovascular complications. The diabetics with higher HbA1c value (value > 7.0%) can exhibit a significant increase in TC, LDL, TAG and HDL in comparison to patients with HbA1c value ≤7.0% (Rohlfing et al., 2002). Improving glycemic control can substantially reduce the risk of cardiovascular events in diabetics (Selvin et al, 2006).

Conclusion:
Hence it is concluded from the results of this study that HbA1c can be used as a predictor of dyslipidaemia in type 2 diabetics in addition to the parameter for glycaemic control. Thus, early diagnosis of dyslipidaemia can be used as a preventive measure for the development of cardiovascular disease (CVD) in type 2 diabetics.

Although high triglyceride levels do not cause diabetes, uncontrolled diabetes can elevate triglyceride levels.

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