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Assessment of Lipid Profile Parameters among Type II Diabetic Patients: An Institutional Based Study

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Abstract
Background: *Diabetic patients have a greater likelihood of having dyslipidemia, hypertension, and obesity. This form of dyslipidemia remains largely undiagnosed or diagnosed late and under treated in high risk populations, such as patient with type- 2 diabetes. The aim of the study is to investigate the relationship between serum lipid profiles in type-2 diabetic patients.*
Material & Methods: *A cross sectional study done on 200 patients with type 2 diabetes. The participants were already diagnosed as type 2 diabetics and undergoing treatment. According to NCEP-ATPIII guideline, hypercholesterolemia is defined as TC>5.2 mmol/l, high LDL-C when value >2.6 mmol/l, hypertriglyceridemia as TG >3.8 mmol/l and low HDL-C when value <1.0 mmol/l. Dyslipidemia was defined by presence of one or more than one abnormal serum lipid concentration. Diabetes was defined as per American Diabetes Association (ADA) criteria.*
Results: *The mean age of the males (58.1±2.3) were not statistically different (p=0.6402) from that of the females (57.1±1). The mean waist circumference (WC), hip circumference (HC), Body Adiposity Index (BAI) and Body Mass Index (BMI) of the female subjects were significantly high as compared with the male subjects (p=0.0008, 0.0002, 0.000 and 0.0002 respectively). Among the diabetic individuals, 119(59.5%) individuals had only one abnormal lipid profile parameter, 68(34.0%) had two abnormal lipid parameter and 54(27%) individuals had more than 2 abnormal lipid profile parameter.*
Conclusion: *We concluded that early diagnosis can be accomplished through relatively inexpensive blood testing and may be utilized for screening high-risk diabetic patients for timely intervention with lipid lowering drugs.*
Keywords: *Type II Diabetes mellitus, Lipid Profile, Dyslipidemia, BMI.*

Introduction

Diabetes mellitus is a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both. Type 2 diabetes, the most prevalent form of the disease, is often asymptomatic in its early stages and can remain undiagnosed for many years[1]. The prevalence of DM has increased dramatically around the globe, from an estimated 30 million cases in 1985 to 177 million in 2000. It is estimated that, more than 360 million individuals may develop diabetes by the year 2030.[2]

Diabetic patients have a greater likelihood of having dyslipidemia, hypertension, and obesity. Because early detection and prompt treatment may reduce the burden of diabetes and its complications, screening for diabetes may be appropriate under certain circumstances[3]. Dyslipidemia is a risk factor for coronary artery disease, a leading cause of mortality in patients with diabetes mellitus. Dyslipidemia remains largely undiagnosed and under treated in high risk populations, such as patient with type- 2 diabetes.[4] Patients with type 2 diabetes often exhibit an atherogenic lipid profile, which greatly increases their risk of cardiovascular disease compared with people without diabetes. This form of dyslipidemia remains largely undiagnosed or diagnosed late and under treated in high risk populations, such as patient with type- 2 diabetes. The aim of the study is to investigate the relationship between serum lipid profile in type-2 diabetic patients.

Material & Methods

A cross sectional study done on 200 patients with type 2 diabetes. The participants were already diagnosed as type 2 diabetics and undergoing treatment. A written informed consent form was completed by all the participants who were recruited into the study.

Inclusion Criteria

Subjects already diagnosed as type 2 diabetic and under treatment attending the Diabetic clinic were included in the study.

Exclusion Criteria

- Newly diagnosed diabetic patients who are not on treatment and non diabetics were excluded from the study.
- Smokers, alcoholics, and subjects with hepatic, renal, endocrine disorders, and those on lipid lowering agents were excluded from the study.

Methodology

About 6ml of fasting blood samples (overnight fast between 8-12 hours) were drawn from the median cubital vein on the anterior forearm into clot activator/ separating gel tubes (to aid clotting and separate serum), fluoride oxalate tubes (to prevent glycolysis) and EDTA BD vacutainer®, (BD, Plymouth, PL6 7BP. UK).

The clotted blood was centrifuged at 2000 rpm for 5 minutes to separate the serum from the deposit. The serum was used to estimate the lipid profile: Total cholesterol, High density lipoprotein cholesterol and low density lipoprotein.

For serum lipid reference level, National Cholesterol Education Programme (NCEP) Adult Treatment Panel III (ATP III) guideline was referred. According to NCEP-ATPIII guideline, hypercholesterolemia is defined as TC>5.2 mmol/l, high LDL-C when value >2.6 mmol/l, hypertriglyceridemia as TG >3.8 mmol/l and low HDL-C when value <1.0 mmol/l. Dyslipidemia was defined by presence of one or more than one abnormal serum lipid concentration. Diabetes was defined as per American Diabetes Association (ADA) criteria.

Statistical Analyses

The results were expressed as Mean ± SEM (Standard Error of the mean) instead of Standard Deviation which compares population. Statistical significant level was put at $P < 0.05$ unless otherwise stated. SPSS statistical package version 20 was used for data analysis.

Results

In all, 200 subjects were recruited for the study of which 53 (26.5%) were males and 147(73.5%) were females. The mean age of the males (58.1±2.3) were not statistically different (p=0.6402) from that of the females (57.1±1). Some anthropometric variables between male and female subjects showed significant differences. The mean waist circumference (WC), hip circumference (HC), Body Adiposity Index (BAI) and Body Mass Index (BMI) of the female subjects were significantly high as compared with the male subjects (p=0.0008, 0.0002, 0.000 and 0.0002 respectively). There were no statistically

difference recorded in the biochemical variables among the male and female subjects with the exception of triglycerides (p=0.0059) which was higher in females than males (table 1).

Hypercholesterolemia was found in 114(57%) individuals. Similarly, hypertriglyceridemia was found in 124(62%) individuals, decreased HDL-C was found in 149(74.5%) individuals and increased LDL-C was found in 158(79%) individuals. Among the diabetic individuals, 119(59.5%) individuals had only one abnormal lipid profile parameter, 68(34.0%) had two abnormal lipid parameter and 54(27%) individuals had more than 2 abnormal lipid profile parameter (table 2).

Table 1: Demographics, Anthropometric and biochemical variables of the study population stratified by Gender

Parameters	Cases N=200	Male Cases N=53	Female Cases N=147	P-Value
AGE (Years)	57.4±1	58.1±2.3	57.1±1	0.6402
Anthropometry				
WT (Kg)	69.6±1	70.0±1.4	69.4±1.3	0.8048
HT (cm)	160.4±0.6	167.7±0.9	157.8±0.6	**0.0012**
WTCIR (cm)	96.6±1.1	90.6±1.7	98.7±1.3	**0.0008**
HIPCIR (cm)	100.3±0.9	94.8±1.7	102.2±1	**0.0002**
WAIST/HIP RATIO	1.0±0	1.0±0	1.0±0	0.6311
BAI	31.5±0.5	25.7±0.8	33.6±0.5	**0.0008**
BMI (kg/m2)	27.1±0.4	24.9±0.4	27.8±0.5	**0.0002**
Biochemical				
TCHOL (mmol/l)	5.8±0.1	5.6±0.3	5.9±0.1	0.2287
TRIG (mmol/l)	1.7±0.1	1.4±0.1	1.8±0.1	**0.0059**
HDL-C (mmol/l)	1.4±0.1	1.4±0.2	1.3±0.1	0.5248
LDL-C (mmol/l)	3.7±0.1	3.6±0.2	3.8±0.1	0.3821
NON-HDL-C (mmol/l)	1.6±0.1	4.2±0.2	4.6±0.1	**0.0070**
TC/HDL	4.5±0.1	1.6±0.2	1.6±0.1	0.9420
LDL/HDL	3.5±0.1	3.6±0.3	3.5±0.2	0.6830

Table 2: Dislipidimia among the study subjects

Parameter		Frequency	Percentage
T CHOL (mmol/l)	Normal	86	43.0
	High	114	57.0
	Total	200	100.0
TRIG (mmol/l)	Desirable	124	62.0
	High	76	38.0
	Total	200	100.0
HDL (mmol/l)	Low	149	74.5
	Desirable	51	25.5
	Total	200	100.0
LDL (mmol/l)	Desirable	42	21.0
	High	158	79.0
	Total	200	100.0

Discussion

Our study showed that the female population was more than twice that of the male counterpart. This compares well with a study on WHO global data (WHO, 1999)[5] which stated that the prevalence ratio of diabetes between men and women varies markedly, with no consistent trend. The relative difference in frequency between the sexes is probably related to the presence of underlying factors, such as pregnancy and obesity, rather than to a sex-specific genetic tendency[3]. From this study, it was observed that the diabetic subjects were averagely older. This shows type 2 diabetes begins typically in middle life or later, the

prevalence rises with age. This is consistent with studies published by WHO (1999)[5]. This also implies that impact of age as a risk factor of diabetes cannot be overemphasized as this trend has been demonstrated in most study populations around the world.[6]

In the present study, it was noted that females had significantly higher BMI, BAI, hip circumference and waist circumference measurements than their male counterparts. Two studies done by Patiakas et al., 2010[7] and Suhil *et al*., 2015[8] also established a relationship between HBA1C levels and BMI but found no correlation between HBA1C and BAI. Both studies even concluded that BAI is not a better indicator and cannot replace BMI in the study of anthropometric measurements in diabetic patients.

Although there were no significant difference in TC (p=0.2287), LDL-C (p=0.3821) and HDL-C (p=0.5248) levels between male and female, the levels of TG were significantly higher (p=0.0059) in female as compared to male type 2 diabetic patients. This finding is in agreement with other studies (Ram *et al*., 2011[9], Masram *et al*., 2012[4]). Hyperlipidemia in females may be attributed to the effects of sex hormones on body fat distribution, which leads to differences in altered lipoproteins[10].

This study reveals high prevalence of hypercholesterolemia, hypertriglyceridemia, high LDL-C and low HDL-C levels among subjects with high HBA1C levels which are well known risk factors for cardiovascular diseases. Insulin affects the liver apolipoprotein production. It regulates the enzymatic activity of lipoprotein lipase (LpL) and Cholesterol ester transport protein. All these factors are likely cause of dyslipidemia in Diabetes mellitus.[11] Moreover, insulin deficiency reduces the activity of hepatic lipase and several steps in the production of biologically active LpL may be altered in DM[12].

Conclusion

We concluded that early diagnosis can be accomplished through relatively inexpensive blood testing and may be utilized for screening high-risk diabetic patients for timely intervention with lipid lowering drugs.

References

1. American Diabetes Association. Nutrition principles and recommendations in diabetes (Position Statement). *Diabetes Care,2004;* 27(Suppl. 1), S36–S46.
2. Fauci S.A. Harrison's Principles of Internal Medicine. 17th Edition. United States of America. The McGraw Hill Company, 2008.
3. American Diabetes Association. Dyslipidemia management in adults with diabetes. *Diabetes Care,2004;* 27(Suppl. 1), S68–S71.
4. Masram S.W., Bimanpalli M.V. and Ghangle S. Study of Lipid Profile and Glycated Hemoglobin in Diabetes Mellitus. *Indian Medical Gazette,2012.*
5. W.H.O Consultation. Definition, diagnosis and classification of diabetes mellitus and its complications. Part 1: diagnosis and classification of diabetes mellitus. Geneva: World Health Organisation,1999 ; Report no. 99.2.
6. Folsom A.R., Chambless L.E., Duncan B.B. and Gilbert A.C. Pankow JS. Prediction of coronary heart disease in middle-aged adults with diabetes. *Diabetes Care 2003*; 26: 2777-84.
7. Patiakas S. and Charalampous C. "Correlation Between The Glycated Hemoglobin (Hba1c) Level, The Arterial Blood Pressure (AP) And The Body Mass Index (BMI) In Diabetic Patients, And Evaluation Of Its Utility As A C: Pp.17.170." *Journal of Hypertension 2010;* 28: e300.
8. Sushil M.I., Muneshwar J.N., Khan S.T. To Study Body Mass Index, Waist Circumference, Waist Hip Ratio,Body Adiposity Index And Lipid Profile Level In Patients With Type-2 Diabetes Mellitus.

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9. Ram V. M., Prajwal G., Pramod P. R., Prashant R, Khelanand P. S., Dipendra R. P. and Prabin G. Association between glycaemic control and serum lipid profile in type 2 diabetic patients: Glycated haemoglobin as a dual biomarker. *Biomedical Research* 2011; 22 (3): 375-380.
10. Selvin E., Coresh J., Wattanakit K., Steffes M.W. and Sharrett R. HbA1c and Peripheral arterial disease in diabetes, The ARIC Study. *Diabetes Care,2006*; 29: 877-82.
11. Gottsater A., Landin-Olsson M., Fernlund P., Lernmark A. and Sundkvist G. Beta-cell function in relation to islet cell antibodies during the first 3yr after clinical diagnosis of diabetes in type II diabetic patients. *Diabetes Care,1993*;16:902–910.
12. Durrington P. and Sniderman A. Epidemiology and pathophysiology. In: *Hyperlipidemia*. Durrington P, Sniderman A (Eds). Health Press, Oxford, UK,2002: 71–89.