

LIPID PROFILE IN PATIENTS WITH STROKE: DIABETICS AND NONDIABETICS

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Abstract

Background: Dyslipidaemia is one of the cardiovascular risk factors, but the association with stroke is not as strong as with heart disease. Diabetic patients who suffered a stroke have hypertension and dyslipidaemia in a higher percentage than nondiabetics.

Objective: we explored the status of lipid profile in patients with diabetes and without diabetes with stroke. Research design and methods: the study was conducted on two lots that included 228 subjects; lot 1 - 136 diabetic patients and stroke recently installed; lot 2 - 92 patients without diabetes but stroke recently installed, hospitalized in the Neurologic Department of the County Emergency Hospital Valcea during 2006-2008.

*Results: The average plasma cholesterol was significantly increased in subjects with diabetes and ischaemic stroke compared with nondiabetics (233.28 ± 47.81 mg / dl vs. 215.74 ± 36.79 mg / dl, $p = 0.01$ *). Hypertriglyceridemia was found in diabetic subjects with ischaemic stroke (199.07 ± 124.03 mg / dl), but not in nondiabetic subjects with ischemic stroke (129.21 ± 64.07 mg / dl) between the two lots being statistically significant difference ($p < 0.05$). The average values of LDL-chol. were increased in diabetic subjects and ischemic stroke vs. nondiabetics (131.91 ± 35.24 mg / dl vs. 121.38 ± 20.94 mg / dl) with a statistically significant difference $p = 0.026$.*

Conclusions: dyslipidaemia is found to be the risk factor for ischemic stroke in diabetic subjects, with statistically significant differences compared to nondiabetics. HDL-cholesterol was found as a protective factor for haemorrhagic stroke in nondiabetic subjects.

Keywords: diabetes, dyslipidaemia, stroke

Introduction

The dyslipidaemia in Type 2 diabetes mellitus include: increased serum levels of triglycerides, decreased HDL (the atheroprotective fraction) and increased serum levels of small and dense LDL. Increased efflux of free fatty acids from adipose tissue and alteration of insulin response induce the

increase of their concentration at the liver level. Consequently, the liver increases VLDL production and synthesis of cholesterol esters. Free fatty acids combined with one molecule of cholesterol form cholesterol esters. The overproduction of triglyceride-rich lipoproteins and the alteration of the clearance, by decreasing lipoproteins lipase lead to hypertriglyceridaemia, common in diabetes.

Objectives

This study proposed assessment of lipid profile of diabetic and nondiabetic patients with stroke; comparison of the lipid disorders in the two groups of patients and evaluation of their involvement as risk factors in stroke.

Material and Method

The study was conducted on two groups that included 228 subjects: group 1 - 136 diabetic patients and recently installed stroke; group 2 - 92 patients without diabetes but with stroke, recently installed, hospitalized in Neurology Department of the County Emergency Hospital Valcea, during 2006-2008. We determined the following biochemical parameters: total cholesterol, LDL-cholesterol, HDL-cholesterol, cholesterol/HDL-cholesterol ratio, triglycerides.

Results and Discussions

Lipid profile lot 1:

Total serum cholesterol level in group 1 was 225.50 ± 53.89 mg/dl. In relation to the proposed target (below 175 mg/dl), 82% of subjects, had a higher than 175 mg/dl value, which demonstrates the possible role in the apparition of stroke in this patients (Figure 1).

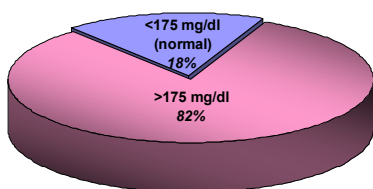


Figure 1. Cholesterol values in patients with DM and stroke

HDL-cholesterol level in lot 1 was 40.84 ± 9.43 mg/dl. Low HDL-cholesterol is one of the lipid parameters common in diabetes and in the group studied, 82% of female subjects and 55% of male subjects had values above the target, confirming the role of this risk factor in stroke.

Serum triglyceride level in lot 1 was 190.24 ± 119.69 mg/dl. Hipertriglyceridemia is the dyslipidaemia common in type 2 diabetes closely related to metabolic control and contributes together with increased LDL-cholesterol and decreased HDL-cholesterol to the occurrence of cardiovascular diseases. More than half of Type 2 diabetes patients studied, presented fasting plasma triglycerides values over the recommended limit (Figure 2).

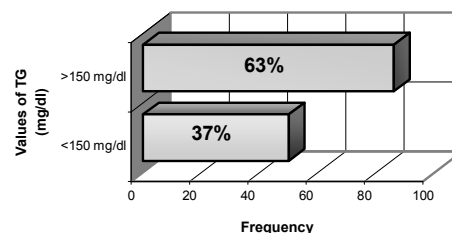


Figure 2. TG values in patients with DM and stroke

The total cholesterol / HDL-cholesterol ratio is a marker of atherosclerosis whose normal value is below 4.5, and the risk of atherosclerosis increases with the increase of this ratio. In the diabetic patients this ratio is recommended to be below 3, but in this study 94% (Figure 3) of the subjects had this ratio above 3, so an advanced process of atherosclerosis, who can explains the production of the stroke.

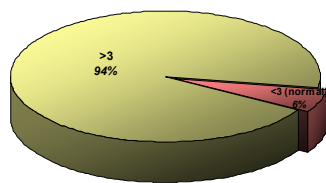


Figure 3. T Chol/HDL Chol ratio in patients with DM and stroke

In lot 1 (subjects with diabetes mellitus), all subjects had LDL cholesterol values above 70 mg / dl, no subject in this lot had normal values of LDL-cholesterol. LDL-cholesterol level in lot 1 was 127.84 ± 35.12 mg/dl.

Lipid profile in group 2:

Total serum cholesterol level in lot 2 was 215.50 ± 35.67 mg/dl. Most nondiabetic (70%) patients had values of total cholesterol above 200mg/dl (Figure 4).

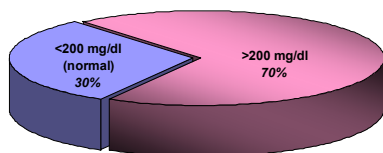


Figure 4. Chol level in patients without DM but with stroke

LDL-cholesterol level in lot 2 was 120.89 ± 20.45 mg/dl. Most patients (80%) (Figure 5) of lot 2 had values of plasma LDL-cholesterol above the values recommended (below 100 mg / dl under ATP-III) and this fact proves the existence of close links between LDL and stroke.

Serum triglyceride levels in lot 2 was 125.20 ± 58.55 mg/dl. In nondiabetic patients the values of triglyceride were normal in 87% of subjects, suggesting that they should not have a direct involvement in the production of stroke in nondiabetic patients (Figure 6).

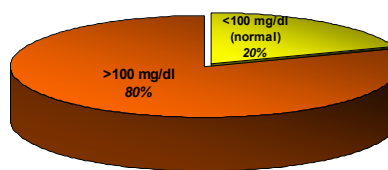


Figure 5. LDL Chol level in patients without DM but with stroke

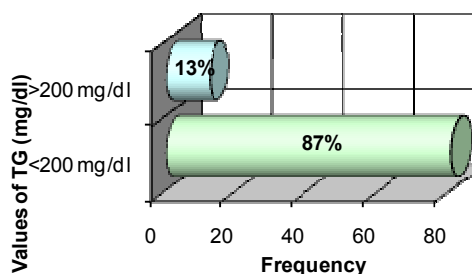


Figure 6. TG level in patients without DM but with stroke

The media of HDL-cholesterol level in lot 2 was 40.70 ± 6.95 . Regarding HDL-cholesterol values analyzed separately by gender, we found that 65% of women had values below the recommended ones (above 45mg/dl) for cardiovascular protection and only 17% of men had values below the recommended ones (above 35 mg / dl).

Comparison between groups

The average plasma cholesterol was significantly increased in subjects with diabetes and ischaemic stroke compared with nondiabetics (233.28 ± 47.81 mg / dl vs. 215.74 ± 36.79 mg / dl, $p = 0.01$ *). A statistically significant difference was found in subjects with haemorrhagic stroke, when comparing the two lots, but here the average plasma cholesterol was higher in lot 2 (214.83 ± 33.01 mg / dl vs. 180.40 ± 66.91 mg / dl, $p = 0.046$ *).

Hipertrigliceridemia was found in subjects with diabetes and stroke ($199.07 \pm$

124.03 mg / dl), but not in nondiabetic subjects (129.21 ± 64.07 mg / dl) between the two lots being a statistically significant difference ($p < 0.05$).

In subjects with haemorrhagic stroke, triglyceride values of the two lots, revealed no statistically significant difference. Plasma triglyceride values were higher in subjects with ischemic stroke in comparison with haemorrhagic one.

The average values of LDL-col. were increased in subjects with diabetes and ischemic stroke vs. nondiabetics (131.91 ± 35.24 mg /dl vs. 121.38 ± 20.94 mg / dl) with a statistically significant difference ($p = 0.026$ *). Regarding HDL-cholesterol we did not find significant differences between the two lots, but we found that HDL-cholesterol was on the one hand the protection factor for haemorrhagic stroke in nondiabetic subjects but, on the other hand, the risk factor for ischaemic stroke in diabetic subjects.

Risk factors for ischaemic stroke in the diabetic subjects (lot 1) were: plasma total cholesterol (RR = 1.561, OR = 7.28, $p < 0.05$ *), plasma triglycerides (RR = 1.193, OR = 3.08 $p = 0.02$ *); HDL-chol (RR=1,787, OR=1,949, $p = 0.04$ *); chol.total / HDL-chol.

ratio (RR = 3.653, OR = 24.43, $p < 0.05$ *). For haemorrhagic stroke we did not find any risk factor with statistical significance in lot 1.

In nondiabetic subjects with stroke, dyslipidaemia was not found as risk factor, but HDL-cholesterol was found to be a protector factor for haemorrhagic stroke (RR= 0,592, OR= 0,14, $p < 0.05$ *).

Conclusions

– Dyslipidaemia with high values of plasma triglycerides and cholesterol was found to be risk factor for ischemic stroke in diabetic subjects, but not for the haemorrhagic stroke.

– Hypertriglyceridemia was significantly higher in diabetic subjects versus nondiabetics.

– HDL-cholesterol was below the recommended values in most female subjects in the lot 1, but without statistically significant difference.

– HDL-cholesterol was in the recommended values (above 35mg/dl) in nondiabetic male subjects, being found as a protective factor for the haemorrhagic stroke.

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