

LIPID PROFILE IN ISCHEMIC STROKE PATIENTS

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ABSTRACT

Ischemic stroke (IS) presents with a rising socio-medical importance as this is the most common cerebrovascular disease worldwide and in Bulgaria as well. Our purpose was to reveal the role of the abnormalities of lipid metabolism for the development of acute ischemic stroke in adult patients. We examined 258 patients, 129 males and 129 females, at a mean age of 71 years hospitalized in the First Clinic of Neurology, St. Marina University Hospital of Varna, in 2007-2013. The blood concentrations of total cholesterol, HDL-cholesterol, LDL-cholesterol and triglycerides were studied. Mean lipid levels were most commonly more elevated in males than in females. There were pathologically higher mean total cholesterol and LDL-cholesterol concentrations but lower mean triglyceride ones. A regular control of the parameters of lipid metabolism and keeping-up the healthy life-style in adult individuals aged over 60 years could ensure a successful IS prevention in our country.

Key words: acute ischemic stroke, total cholesterol, HDL-cholesterol, LDL-cholesterol, triglycerides, city of Varna

Introduction

Ischemic stroke (IS) is the most common cerebrovascular disease worldwide. It causes severe patient's disability and even death despite the competent efforts of the neurologists and other medical specialists. Numerous recent publications are devoted to the main parameters of lipid metabolism and examine the role of triglycerides, cholesterol and lipoproteins in the pathogenesis (6,8,14) and prognosis (2,3,13,19) of IS. These parameters are significant risk factors for IS (1,12).

The objective of this study was to reveal the role of some lipid abnormalities for the development of acute IS in adult patients.

Materials and methods

We examined 258 patients, 129 males and 129 females, hospitalized in the First Clinic of Neurology, St. Marina University Hospital of Varna, in 2007-2013. Their mean age was 71 years (between 70 and 72 years at confidence interval of 95%) and ranged between 53 and 92 years. The levels of total cholesterol, HDL-cholesterol, LDL-cholesterol and triglycerides were studied. Data were statistically processed by using descriptive and variation analyses. SPSS, version 13,0 software was applied. The value of *t*-criterion was considered significant if $p < 0,05$.

Results and discussion

Some of our results are summarized in four tables.

The mean blood levels and their standard deviations of the four main lipid parameters in acute IS patients during the period from 2007 to 2012 are shown in Table 1. The mean high-density lipoprotein (HDL)-cholesterol values are elevated while the triglyceride ones are reduced.

Table 1. Blood lipid levels in IS patients in 2007-2012

blood lipid levels	mean	standard deviation
total cholesterol (in mmol/L) (n=180)	5,26	1,38
HDL-cholesterol (in mmol/L) (n=159)	2,45	1,13
LDL-cholesterol (in mmol/L) (n=158)	1,33	0,53
triglycerides (in mg/mL) (n=178)	1,97	1,44

In 2013, however, the mean concentrations of total cholesterol and low-density lipoprotein (LDL)-cholesterol are higher but those of triglycerides are lower than the normal ones (Table 2).

Table 2. Blood lipid levels in IS patients in 2013 (n=78)

	total cholesterol (in mmol/L)	HDL-cholesterol (in mmol/L)	LDL-cholesterol (in mmol/L)	triglycerides (in mg/mL)
Mean	5,43	1,40	3,03	1,86
standard error of the mean	1,64	0,06	0,16	0,12
standard deviation	0,19	0,57	1,37	1,07
Minimal	2,64	0,54	0,93	0,54
Maximal	12,24	5,20	8,54	5,37

The basic descriptive statistical parameters of these lipid parameters in male and female patients with acute IS for 2013 are compared in Table 3 and Table 4. It is obvious that the concentrations of the total cholesterol and LDH-cholesterol are higher while these of the triglycerides are lower than the normal ones. The gender differences are not statistically significant ($p>0,05$).

Table 3. HDL-cholesterol and LDL-cholesterol levels in male and female IS patients in 2013 (n=78)

Blood lipid levels	HDL-cholesterol (in mmol/L)		LDL-cholesterol (in mmol/L)	
	males	females	Males	females
mean	1,39	1,42	2,99	3,06
standard error of the mean	0,12	0,06	0,25	0,20
standard deviation	0,73	0,35	1,52	1,21
minimal	0,71	0,54	0,93	0,94
maximal	5,20	2,61	8,54	5,87

Table 4. Total cholesterol and triglyceride levels in male and female IS patients in 2013 (n=78)

Blood lipid levels	total cholesterol (in mmol/L)		triglycerides (in mg/mL)	
	males	females	Males	females
mean	5,47	5,39	1,81	1,90
standard error of the mean	0,33	0,20	0,20	0,14
standard deviation	2,06	1,11	1,25	0,87
minimal	2,64	3,48	0,54	0,82
maximal	12,24	8,59	5,37	3,59

Our own data are similar to the recent results in the foreign literature available. The unfavourable changes of these components of lipid metabolism are true risk factors for IS, especially in adult patients.

The prevalence of decreased HDL-cholesterol levels ($p < 0,001$) and elevated LDL-cholesterol ones ($p = 0,036$) is significantly higher in IS patients than in controls. The reduced HDL-cholesterol concentration ($p < 0,001$) acts as independent risk factor for IS in young and middle-aged individuals (16). It may be a risk factor of deep cerebral microbleeds including advanced periventricular hyperintensity status in acute IS patients with a mean age of 70 ± 10 years (4). Such a concentration and internal carotid artery dissection are independently associated with unfavourable functional outcomes as assessed with National Institutes of Health Stroke Scale in IS patients at a mean age of $41,3 \pm 7,6$ years (15). Low HDL-cholesterol, arterial hypertension, diabetes mellitus and tobacco smoking are risk factors for atherothrombotic IS in young adults aged 16-54 years who are treated for first-ever IS in an academic stroke unit in Toulouse, France (7). Low HDL-cholesterol, hyperlipidemia, arterial hypertension, higher age, tobacco smoking, glycemic parameters and duration of diabetes mellitus are independently and significantly related to carotid intima media thickness, that, on its part, is a surrogate and reliable marker of higher risk of IS in the patients with type 2 diabetes mellitus (9).

Higher non-HDL-cholesterol levels are a significant risk factor for the development of atherothrombotic IS (p for trend = 0,098) but reduce the risk of cardioembolic IS (p for trend = 0,007) in the general Japanese population (5). Hypertriglyceridemia correlates with an increased risk of cardiovascular disease, particularly in low HDL-cholesterol values and high LDL-cholesterol ones and might be an independent risk factor for IS, too (10). Multivariable hazard ratios within a 9-year follow-up study of lipid profile components in IS patients in Iran show that triglycerides, non-HDL-cholesterol and LDL-cholesterol are independently associated with increased risk of IS in females only (17). There is hyperlipidemia in 28 out of 31 hospitalized patients with IS in Kathmandu, Nepal (18).

Paradoxically, high admission total cholesterol ($\geq 4,6$ mmol/L) may be associated with increased long-term survival after IS (11).

Conclusion

The common abnormalities of blood lipid concentrations in IS patients require a regular control of these parameters. Besides keeping-up the healthy life-style in adults aged over 60 years could contribute to a more successful primary IS prevention in our country and thus reduce the considerable burden of this disease for society.

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