

## SOME ASPECTS OF LIPID METABOLISM IN HYPERTENSIVE OBESE PATIENTS

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*Objective of study is to analyze the features of lipid metabolism in hypertensive patients with obesity. The study involved 80 patients — 50 men and 30 women aged 35 to 60 years. II degree of hypertension was diagnosed in 60 (60.6 %) patients and III — 20 (39.4 %). All patients diagnosed obese I, II and III degree. In major patients we have pro-atherogenic changes: increase of total cholesterol and cholesterol of low-density lipoproteins. There is a relation between parameters of high-density lipoproteins and daily blood pressure, especially in patients with a profile type dipper.*

*So the presence of the lipid metabolism disorders in hypertensive patients with obesity is one of the strategic targets for therapeutic correction of lipid profile.*

**Keywords:** hypertension, obesity, cholesterol, lipoproteins.

### ДЕЯКІ АСПЕКТИ ЛІПІДНОГО ОБМІНУ В РАЗІ АРТЕРІАЛЬНОЇ ГІПЕРТЕНЗІЇ В ПАЦІЄНТІВ З ОЖИРІННЯМ

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*Метою дослідження є аналіз особливостей ліпідного обміну у хворих на артеріальну гіпертензію й ожиріння. У дослідженні взяли участь 80 пацієнтів — 50 чоловіків і 30 жінок у віці від 35 до 60 років. II ступінь артеріальної гіпертензії був діагностований у 60 (60,6 %) хворих, III — у 20 (39,4 %). Усі пацієнти мали діагноз ожиріння I, II і III ступеня. Для більшості хворих характерні проатерогенні зміни: підвищення загального холестерину й ліпопротеїнів низької щільності. Існує зв'язок між параметрами ліпопротеїнів високої щільності і денного артеріального тиску, особливо в пацієнтів із профілем dipper. Наявність порушень ліпідного обміну у хворих на артеріальну гіпертензію з ожирінням є однією зі стратегічних цілей для терапевтичної корекції ліпідного профілю.*

**Ключові слова:** гіпертензія, ожиріння, холестерин, ліпопротеїни.

### НЕКОТОРЫЕ АСПЕКТЫ ЛИПИДНОГО ОБМЕНА ПРИ АРТЕРИАЛЬНОЙ ГИПЕРТЕНЗИИ У ПАЦИЕНТОВ С ОЖИРЕНИЕМ

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*Цель исследования — анализ особенностей липидного обмена у больных с артериальной гипертензией и ожирением. В исследовании приняли участие 80 пациентов — 50 мужчин и 30 женщин в возрасте от 35 до 60 лет. II степень артериальной гипертензии была диагностирована у 60 (60,6 %) больных, III — у 20 (39,4 %). Все пациенты имели диагноз ожирения I, II и III степени. Для большинства больных характерны проатерогенные изменения: повышение общего холестерина и липопротеинов низкой плотности. Существует связь между параметрами липопротеинов высокой плотности и дневного артериального давления, особенно у пациентов с профилем dipper. Наличие нарушений липидного обмена у больных с артериальной гипертензией с ожирением является одной из стратегических целей для терапевтической коррекции липидного профиля.*

**Ключевые слова:** гипертензия, ожирение, холестерин, липопротеины.

Relationship of dyslipoproteinemia, atherosclerosis, arterial hypertension (AH) and overweight confirmed by many clinical studies, and the presence of atherosclerosis manifested by primarily lipid metabolism disorders [2, 3, 5]. The frequency of cholesterol metabolism disorders, hypercholesterolemia, raising low-density lipoprotein cholesterol (LDL), hyperglyceridemia and reduced high-density lipoprotein cholesterol (HDL) is 80 % in patients with hypertension, while certain types of lipid metabolism are directly related to the nature increased blood pressure (BP) for hypertension [8]. In particular, hyperlipidemia and hypercholesterolemia are important for the development of diastolic hypertension, which is associated

with damage to the vascular wall and atherosclerotic genesis [1, 6]. These are important in the development of large artery stiffness, which is regarded as a factor in increasing cardiovascular risk [2, 4, 7].

**Objective:** to analyze the features of lipid metabolism in hypertensive patients with obesity.

### MATERIALS AND METHODS

The study involved 80 patients, 50 men and 30 women aged 35 to 60 years (mean age 53.3 ± 0.4 years). II degree of hypertension was diagnosed in 60 (60.6 %) patients and III — 20 (39.4 %). All patients diagnosed obese I, II and III degree.

The control group consisted of 20 healthy individuals with a BMI of 25 kg/m<sup>2</sup>.

To investigate lipid metabolism (cholesterol, triglycerides) in the blood serum of patients using sets of reagents firm «Olveks diagnosticum» (St. Petersburg). Conducted quantitative determination of serum HDL, LDL calculation (formula of A. Klimov) and atherogenic index. Ambulatory blood pressure monitoring was performed using the registrar ABPM-04 («Meditech», Hungary).

The combination of obesity and hypertension occurred in 59 (68.0 %) patients, overweight verified in 23 (42.8 %) patients 36 (14.7 %) patients, obesity in 36 (14.7 %) patients. Obesity of I–II degree was found in 14 (38.9 %) patients, III — in 22 (61.1 %). Duration of hypertension averaged 10.1 ± 0.32 years. Changes in lipid metabolism in patients with hypertension characterized by increased levels of total cholesterol in 74 % of patients, which was a whole group of 6.4 mmol/l [5.7; 7.2] ( $p < 0.0001$  compared with healthy people).

## RESULTS AND DISCUSSION

Depending on the stages of hypertension cholesterol level was: in II — 6.4 mg/dl [5.7; 7.3]; in III — 6.5 mmol/l [5.7; 7.2] ( $p < 0.0001$  compared with healthy people).

A similar pattern occurred for VLDL cholesterol and LDL cholesterol, which answered indicators 0.46 mmol/l [0.32; 0.64] and 4.61 mmol/l [3.84; 5.30] ( $p < 0.0001$  in both cases). In II and III stages of AH VLDL cholesterol level hypertension was 0.48 mg/dl [0.34; 0.62] and 0.45 mmol/l [0.34; 0.64], respectively ( $p < 0.0001$  in both cases compared with healthy people). The content of LDL cholesterol was 4.68 mmol/l [3.80; 5.36] and 4.55 mmol/l [3.87; 5.32] ( $p < 0.0001$  compared with healthy people). Atherogenic index was 2.18 in healthy [1.92; 2.36], the whole group with AH — 3.40 [2.58; 4.36] ( $p < 0.0001$ ) and in patients with II stage — 3.46 [2.65; 4.27], in III stage — 3.45 [2.68; 4.41]. Also for lipid metabolism characterized turned reduction in blood HDL cholesterol: in the whole group of patients with hypertension it was 1.43 mg/dl [1.26; 1.78] ( $p < 0.01$ ), at a rate of 1.62 mg/dl [1.48; 1.88], the AH I–II stages — 1.46 mmol/l [1.28; 1.77], the AH III stage — 1.42 mg/dl [1.28; 1.78] ( $p = 0.014$  and  $p = 0.009$  respectively). In the blood of patients with hypertension increase in the content lipoprotein A was marked. In general, patients with hypertension it was 39.80 g/l ( $p < 0.001$ ) [29.6; 55.3] (with levels in healthy subjects 17.8 g/dl [14.4, 21.6]). In I and II stages of hypertension, lipoprotein A content was determined at 36.7 g/dl [29.6; 50.3] and with stage III — 47.2 g/dl [39.5; 55.4] ( $p < 0.0001$  versus the norm in both cases).

Comparative evaluation of content between patients lipoprotein Apo-A showed the presence of significant increase in the III stage of obesity ( $p = 0.002$ ). The same pattern occurred in respect lipoprotein Apo-B: in the plasma of healthy subjects

it was 100.4 g/dl [82.4; 112.6], a whole group of patients with hypertension 131.8 g/dl [118.6; 143.4] ( $p < 0.0001$ ) and by groups of hypertension with obesity: 133.26 g/dl [111.5; 143.2] at stages I–II; 130.3 g/dl [118.3; 142.0] at III stages ( $p = 0.003$  and  $p < 0.0001$  respectively).

The level of Apo-A1 was reduced in the whole group of patients with hypertension to 99.8 g/dl [92.1, 107.8] ( $p < 0.001$ ), (in healthy patients — 130.6 g/dl [118.6; 145.8]); in II stage of AH — 100.51 g/l [95.37; 107.00], in III stage of AH — 98.9 g/dl [92.0; 107.0] ( $p = 0.0003$  and  $p = 0.002$  respectively). The progress of hypertension in patients with obesity is accompanied by lipid metabolism with hypercholesterolemia, increased fractions of LDL and very low density and a decrease in the content of lipoprotein Apo-A1.

The relationship between lipid metabolism and circadian profiles of AP was observed only in respect of HDL cholesterol, which were significantly higher values of its content daily in patients with type profile dipper, while its level was 1.6 mg/dl [1.4; 1.8] and was significantly higher than in the other groups non-dipper ( $p = 0.003$ ), night-peaker ( $p = 0.004$ ) and over-dipper ( $p = 0.049$ ). In the same group was significantly lower atherogenic index, which corresponded to 3.1 [3.6; 3.8] ( $p = 0.021$ ;  $p = 0.03$  and  $p = 0.049$  compared with groups of non-dipper, night-peaker and over-dipper), and the content of Apo-A1 was 104.0 g/l [98.5; 108.3]. The highest level of Apo-A1 — 123.0 g/dl [89.8; 133.8] was determined in a group of patients with a daily night-profile peaker ( $p = 0.048$  compared with patients with a profile of non-dipper).

Logical differences in lipid metabolism and myocardial remodeling type in each group survey has been established. One can only say that the level of total cholesterol was highest in patients with normal cardiac geometry and concentric remodeling of left ventricular (LV) and was 6.6 mg/dl [6.0; 7.2] and 6.5 mmol/l [5.8; 7.6], respectively, which was significantly different from patients with eccentric hypertrophy ( $p = 0.005$  compared with patients with normal geometry and  $p = 0.003$  when compared with concentric left ventricular myocardial hypertrophy).

Pro-atherogenic changes in lipid metabolism were common to all patients with hypertension, obesity as well as without. It was to these earlier patterns of increase of total cholesterol, LDL and VLDL atherogenic factor increases. However, the level of apolipoprotein A and Apo-B in the presence of obesity was most increased.

The content of lipoprotein A and Apo-B was lower in patients with obesity with III stage: lipoprotein A — 34.1 g/dl [26.6; 39.6] ( $p = 0.011$ ), and Apo-B — 120.4 g/dl [105.4; 134.5] ( $p = 0.08$ ) levels of Apo-A1 was increased and reached 100.0 g/dl [97.6; 106.8] ( $p = 0.020$ ). The nature of the major lipid abnormalities in obese hypertensive patients with evidence of early pro-atherogenic changes characteristic dyslipidemia: increase of total cholesterol, LDL and VLDL.

However, we have the question: how dyslipidemia influence on the development of atherosclerotic changes in blood vessels and the formation of hemodynamic features of AP: daily, systolic, diastolic and pulse, which changes depending on the propulsive ability of the heart and the elastic properties of the aorta and large arteries, including their stiffness.

### CONCLUSIONS

1. The nature of the major lipid abnormalities in patients with hypertension with obesity suggests

about early pro-atherogenic changes that are characteristic of dyslipidemia: increase of total cholesterol, LDL and VLDL.

2. There is a relation between HDL cholesterol and daily AP, whereby more significantly in patients with a daily profile type dipper.

The presence of the lipid metabolism in patients with hypertension with obesity is one of the strategic targets for future therapeutic correction in lipid profile with a gradual recovering of endothelial function, which is a promising area of future research.

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