

Abstract

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**10-YEAR RISK ESTIMATION OF ATHEROSCLEROTIC  
CARDIOVASCULAR DISEASE IN HYPERTENSIVE PATIENTS**

**Introduction.** Arterial hypertension is one of the most common causes of atherosclerotic cardiovascular disease, which is still the reason of mortality for a lot of persons. Assessment of 10-year risk of atherosclerotic cardiovascular disease in hypertensive patients is very important for further treatment improvement.

**The aim** is the absolute 10-year risk assessment of atherosclerotic cardiovascular disease in hypertensive patients for further correction of treatment.

**Materials and Methods.** We included 61 patients with stage 1 to 2 arterial hypertension into our study. Most of them are women (70%). The patients were ( $56.84 \pm 8.1$ ) years old. The total cholesterol was ( $4.32 \pm 1.0$ ) mmol/l, high and low density lipoprotein cholesterol – ( $1.35 \pm 0.2$ ) mmol/l and ( $2.44 \pm 0.7$ ) mmol/l, respectively.

Online calculator «ASCVD Risk Estimator Plus» was used. It included the assessment of age, sex, race, systolic and diastolic blood pressure, total cholesterol, high and low density lipoprotein cholesterol, presence of diabetes, smoking status, hypertension treatment, consumption of statins or aspirin. The risk was classified as low (< 5%), borderline (5% to < 7.5%), intermediate ( $\geq 7.5\%$  to < 20%), or high ( $\geq 20\%$ ). The results were analyzed statistically using Microsoft Excel.

**Results.** For five persons it was not possible to calculate this risk using the online calculator because of too low values of total cholesterol and low density lipoprotein cholesterol. Low 10-year risk of atherosclerotic cardiovascular disease was confirmed in 30 (53.6%) people, borderline – in 2 (3.6%), intermediate – in 11 (19.6%), high – in 13 (23.2%).

**Conclusions.** Low absolute 10-year risk of atherosclerotic cardiovascular disease was determined in more than half (53.6%) of patients, high – in about quarter (23.2%), intermediate – in the fifth part (19.6%) of patients with arterial hypertension. For the patients with borderline and intermediate risks, it is reasonable to continue therapy with moderate-intensity statins. For hypertensive patients with high risk, high-intensity statin therapy can be recommended and low-dose aspirin might be considered if bleeding risk is not increased. If the absolute 10-year risk of atherosclerotic cardiovascular disease is low, it is reasonable to assess additionally

total cardiovascular risk categories and continue moderate intensity statin therapy in the case of absence of low density lipoprotein cholesterol goal levels with next lipid profile assessment in 8 ( $\pm$  4) weeks.

**Keywords:** arterial hypertension, atherosclerotic cardiovascular disease, statins.

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## Резюме

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## ОЦІНКА 10-РІЧНОГО АТЕРОСКЛЕРОТИЧНОГО СЕРЦЕВО-СУДИННОГО РИЗИКУ У ПАЦІЄНТІВ ІЗ АРТЕРІАЛЬНОЮ ГІПЕРТЕНЗІЄЮ

**Актуальність.** Артеріальна гіпертензія є найбільш поширеною причиною виникнення атеросклеротичного серцево-судинного захворювання, що є частою причиною смертності для багатьох пацієнтів. Саме тому оцінка 10-річного ризику виникнення атеросклеротичного серцево-судинного захворювання у хворих на артеріальну гіпертензію є надзвичайно важливою.

**Мета** – визначення 10-річного абсолютного ризику виникнення атеросклеротичного серцево-судинного захворювання у пацієнтів із артеріальною гіпертензією для розгляду подальшої тактики ведення та необхідності корекції лікування.

**Матеріали та методи.** Було обстежено 61 пацієнта із артеріальною гіпертензією 1-го та 2-го ступенів, більшість із яких були жінки (70 %). Вік хворих склав  $56,84 \pm 8,1$  роки. Середній вміст загального холестерину був  $(4,32 \pm 1,0)$  ммоль/л, холестерину ліпопротеїдів високої та низької щільності –  $(1,35 \pm 0,2)$  ммоль/л та  $(2,44 \pm 0,7)$  ммоль/л відповідно. Дані було проаналізовано із використанням Microsoft Excel.

Ризик було визначено за допомогою онлайн-калькулятора «ASCVD Risk Estimator Plus» із зазначенням віку, статі, расової приналежності, систолічного та діастолічного артеріального тиску, вмісту загального холестерину, холестерину ліпопротеїдів високої та низької щільності, наявності цукрового діабету, статусу курця, прийому антигіпертензивних препаратів, статинів, аспірину. Категорії ризику: низький (< 5 %), граничний (5 % – 7,5%), проміжний (7,5 % – 20 %) та високий ( $\geq$  20 %).

**Результати.** Для п'яти хворих не вдалося визначити даний ризик за допомогою онлайн-калькулятора, що обумовлено занадто низькими значеннями загального холестерину та холестерину ліпопротеїдів низької щільності. Низький 10-річний абсолютний ризик виникнення атеросклеротичного серцево-судинного захворювання було констатовано у 30 (53,6 %), граничний – 2 (3,6 %), проміжний – 11 (19,6 %), високий – 13 (23,2 %).

**Висновки.** Низький 10-річний абсолютний ризик виникнення атеросклеротичного серцево-судинного захворювання було визначено у більше ніж половини (53,6 %), високий – у чверті (23,2 %), проміжний – у п'ятій частині (19,6 %) хворих на артеріальну гіпертензію. При виявленні граничного та проміжного ризику доцільно продовжити прийом середніх доз статинів; високого ризику – висо-

ких доз статинів та низьких доз аспірину у разі відсутності високого ризику кровотеч. При визначенні низького 10-річного абсолютного атеросклеротичного серцево-судинного ризику доцільно оцінити і загальний серцево-судинний ризик та, у випадку відсутності цільових значень холестерину ліпопротеїдів низької щільності, продовжити середньодозову статинотерапію з подальшою оцінкою її ефективності через 8 ( $\pm$  4) тижні.

**Ключові слова:** артеріальна гіпертензія, атеросклеротичне кардіоваскулярне захворювання, статини.

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**How to cite/ Як цитувати статтю:** Chernatska OM, Sibongumusa X. 10-year risk estimation of atherosclerotic cardiovascular disease in hypertensive patients. *EUMJ*. 2021;9(2):145-150

DOI: [https://doi.org/10.21272/eumj.2021;9\(2\):145-150](https://doi.org/10.21272/eumj.2021;9(2):145-150)

### Introduction/Вступ

Arterial hypertension (AH) is the major preventable cause of cardiovascular disease (CVD) and all-cause death globally in Europe [1]. Substantial progress has been made in understanding the epidemiology, pathophysiology, and risk associated with hypertension [2].

Atherosclerotic cardiovascular disease (ASCVD) defined as coronary heart disease, cerebrovascular disease, or peripheral arterial disease presumed to be of atherosclerotic origin [3]. It is the leading cause of morbidity and mortality globally. In the United States, hypertension accounts for more ASCVD deaths than any other modifiable ASCVD risk factor [4].

AH is the major risk factor for both ASCVD and microvascular complications. Moreover, numerous studies have shown that antihypertensive therapy reduces ASCVD events, heart failure, and microvascular complications [3].

Estimating an individual's 10-year absolute ASCVD risk is used to guide decision making for many preventive interventions, including lipid management [5] and blood pressure management [6].

It should be the start of a conversation with the patient about risk-reducing strategies (the "clinician-patient discussion") and not the sole decision factor for the initiation of pharmacotherapy [4].

Ideally, risk charts should be based on country-specific cohort data [7].

**Materials and Methods.** We observed 61 patients with AH. AH was confirmed when the level of systolic and diastolic blood pressure was more than 140 mmHg and 90 mmHg, respectively.

Patients may have AH of stage 1 or 2. The classification of AH was assessed according to 2020 International Society of Hypertension Global Hypertension Practice Guidelines, in which stage 3 of AH is absent and stage 2 is determined for all persons, when the levels of systolic and diastolic blood pressure is more than 160/100 mmHg, respectively. Furthermore, the sorting of stages is not defined according to these latest guidelines [8].

The patients were ( $56.84 \pm 8.1$ ) years old. We observed 18 (30 %) men and 43 (70 %) women. Their race was white. The level of systolic blood pressure was ( $162.84 \pm 8.3$ ) mmHg, diastolic – ( $97.33 \pm 7.1$ ) mmHg. The total cholesterol was ( $4.32 \pm 1.0$ ) mmol/l, high density lipoprotein cholesterol – ( $1.35 \pm 0.2$ ) mmol/l, low density lipoprotein cholesterol (LDL-C) – ( $2.44 \pm 0.7$ ) mmol/l. History of smoking was absent in these patients. The coexistent pathology such as obesity, overweight, dyslipidemia was present in 43 (70 %) of patients.

Participants were treated by dual antihypertensive therapy, which included renin-angiotensin-aldosterone system inhibitors (lisinopril 10–20 mg or telmisartan 40–80 mg once daily in the morning) and calcium channel blocker (amlodipine 10 mg once daily in the evening). Additionally, for improvement of lipid profile disorders confirmed before the examination all of them had been treated with atorvastatin (10–20 mg once daily in the evening) previously.

Online calculator «ASCVD Risk Estimator Plus» was used for determination of it. It can be done only for persons from 40 till 79 years old. Documented ASCVD includes previous acute

coronary syndrome (myocardial infarction or unstable angina), stable angina, coronary revascularization (percutaneous coronary intervention, coronary artery bypass graft surgery, and other arterial revascularization procedures), stroke and transient ischaemic attack, and peripheral arterial disease. Unequivocally documented ASCVD on imaging includes those findings that are known to be predictive of clinical coronary disease with two major epicardial arteries having > 50% stenosis), or on carotid ultrasound [7].

ASCVD Risk Estimator Plus utilizes age, sex, race, systolic and diastolic blood pressure, total cholesterol, high density lipoprotein cholesterol, low density lipoprotein cholesterol, presence of diabetes, smoke, treatment of AH, consumption of statin or aspirin for assessment.

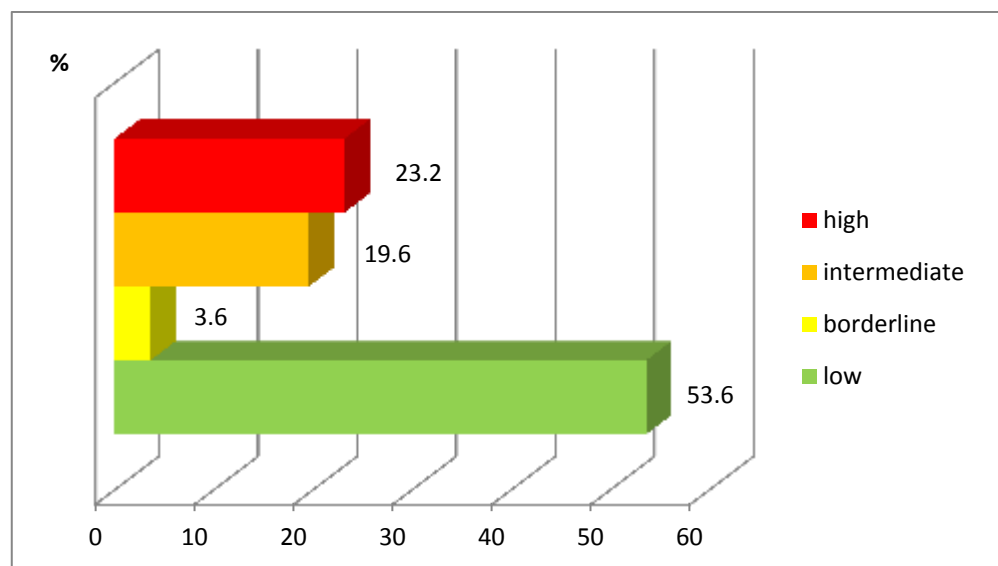
The inclusion criteria of the study were arterial hypertension, obesity, overweight, dislipidemia. The exclusion criteria documented were ASCVD,

cancer, acute viral and bacterial infections, hepatitis, fourth and fifth stage of chronic kidney disease with glomerular filtration rate less than 30 ml/min.

ASCVD 10-year risk is classified by low (< 5%), borderline (5% to < 7.5%), intermediate ( $\geq 7.5\%$  to < 20%), or high ( $\geq 20\%$ ) [4].

**Results and discussion.** For five persons (8 %) it was not possible to calculate ASCVD Risk on online-calculator. In all other 56 patients we evaluated this risk. Three of them had 1.7 mmol/l of LDL-C. The online calculators is invalid for low density lipoprotein cholesterol LDL-C which is less than 1.8 mmol/l. In two persons total cholesterol was too low (3.2 mmol/l) to calculate risk score.

In all other 56 patients we determined this risk. Low ASCVD 10-year risk was confirmed in 30 (53.6 %), borderline – 2 (3.6 %), intermediate – 11 (19.6 %), high – 13 (23.2 %). The results of ASCVD 10-year risk was imaged in Figure 1.



**Figure 1 – 10-year absolute atherosclerotic cardiovascular disease risk in hypertensive patients**

According to 2019 ACC/AHA Guideline on the Primary Prevention of Cardiovascular Disease in adults at intermediate risk, statin therapy reduces risk of ASCVD, and in the context of a risk discussion, if a decision is made for statin therapy, a moderate-intensity statin should be recommended (class I) [4].

Furthermore, in patients at borderline risk in risk discussion, the presence of risk-enhancing factors may justify initiation of moderate-intensity statin therapy (class II B) [4]. The moderate doses of atorvastatin include 10–20 mg daily [9]. Therefore for patients with borderline and

intermediate risk we recommended to continue treatment with such doses.

According to 2019 ACC/AHA Guideline on the Primary Prevention of Cardiovascular Disease Maximal ASCVD risk reduction is desired, it is reasonable to use a high-intensity statin to lower LDL-C by  $\geq 50\%$  [4]. In context of this it is reasonable to recommended high-intensity statin therapy (atorvastatin 40–80 mg daily) for patients with high ASCVD 10-year risk.

According to 2019 ACC/AHA Guideline on the Primary Prevention of Cardiovascular Disease for patients with low (< 5 %) ASCVD 10-year risk it is

recommended to emphasizing of lifestyle for risk factors reduction. In the case of our study the risk factors connected with lipid profile disorders are persistently elevated LDL-C ( $> 4.1$  mmol/l) and triglycerides ( $> 2.0$  mmol/l). In addition, in adults with AH, including those requiring antihypertensive medications weight loss is recommended to reduce BP [4].

The levels of LDL-C in our participants with low ASCVD 10-year risk did not exceed 4.1 mmol/l. Among 30 (53.6 %) patients with low ASCVD 10-year risk the levels of triglycerides were more than 2 mmol/l in 7 persons for which it is recommended to continue lipid lowering therapy.

That is why for further management of 23 participants with low ASCVD 10-year risk and normal triglycerides we decided to analyze additionally the total cardiovascular risk categories with next determination of LDL-C goal levels according to 2019 ESC/EAS Guidelines for the management of dyslipidaemias [7]. For patients without goal levels it is recommended to continue treatment with statins.

#### Conclusions/Висновки

1. Low atherosclerotic cardiovascular disease absolute 10-year risk was determined in more than half (53.6 %), high – in about quarter (23.2 %), intermediate – in the fifth part (19.6 %) of patients with arterial hypertension.

2. Atherosclerotic cardiovascular disease absolute 10-year risk is recommended for hypertensive adults in the case of further treatment improvement.

3. If the atherosclerotic cardiovascular disease absolute 10-year risk is borderline, intermediate it is reasonable to continue therapy which must include moderate-intensity statin (atorvastatin include 10–20 mg daily).

Among the 23 patients, 14 had low total cardiovascular risk and 9 – moderate. The goal levels of LDL-C were not determined in 1 person with low and in 5 with moderate total cardiovascular risk. The absence of high and very high total cardiovascular risk was connected with the sex (all these 23 persons are female), absence of smoking, age (from 44 till 65 years old).

As a result, it was recommended to continue treatment with moderate doses of atorvastatin in 13 patients with low ASCVD 10-year risk with next assessment of lipid profile in 8 ( $\pm 4$ ) weeks.

For persons with the presence of LDL-C goal levels according to 2019 ESC/EAS Guidelines for the management of dyslipidaemias [7] annually checking of lipid profile was advisable.

According to 2019 ACC/AHA Guideline on the Primary Prevention of Cardiovascular Disease low-dose aspirin (75–100 mg orally daily) might be considered for the primary prevention of ASCVD among select adults 40 to 70 years of age who are at higher ASCVD risk but not at increased bleeding risk [4].

4. If the atherosclerotic cardiovascular disease absolute 10-year risk is low it is reasonable to determine additionally total cardiovascular risk categories and continue moderate intensity statin (atorvastatin include 10–20 mg daily) in the case of absence low density lipoprotein cholesterol goal level with further assessment of lipid profile in 8 ( $\pm 4$ ) weeks.

5. For hypertensive patients with high risk high-intensity statin therapy (atorvastatin 40–80 mg daily) can be recommended and low-dose aspirin (75–100 mg orally daily) might be considered among persons who are not at increased bleeding risk.

#### Prospects for future research/Перспективи подальших досліджень

**Perspectives for future research** include assessment of lipid profile spectrum and ASCVD 10-year risk in persons with AH secondly in 6 months for determination of possible reduction of it on the background of moderate-intensity and high-intensity statin therapy.

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(received 13.04.2021, published online 29.06.2021)

(одержано 13.04.2021, опубліковано 29.06.2021)

#### Conflict of interest/Конфлікт інтересів

The authors declare no conflict of interest.

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