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USE OF INDICATORS OF DYSLIPIDEMIA IN THE DIAGNOSIS OF MASKED FORMS OF ARTERIAL HYPERTENSION

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Taking into account the prevalence of arterial hypertension, its role in the development of cardiovascular diseases and mortality, increasing the effectiveness of the treatment of this pathology remains a topical issue of modern medicine. The purpose of the study is to determine the relationship between elevated blood cholesterol levels and masked arterial hypertension. The study involved 827 people aged 19 to 71, these patients without a history of arterial hypertension were divided into 2 groups: 1) with elevated blood cholesterol levels (n=375); 2) with a normal level of cholesterol in the blood (n=186) – the control group. There were no symptoms of arterial hypertension and the main risk factors (smoking, alcohol, obesity, low physical activity). The average blood cholesterol level was 6.16 ± 0.22 mmol/l in the first group and 4.69 ± 0.18 mmol/l in the control group. In the first group, arterial hypertension was detected in 19 people out of 138 (mean systolic pressure 152.6 ± 4.3 mm Hg, diastolic 97.6 ± 3.7 mm Hg), in 14 of them the cholesterol level exceeded 7.5 mmol/l, in the control group the result was negative. Thus, the use of modern devices makes it possible to detect masked arterial hypertension and carry out appropriate preventive measures.

Key words: cholesterol, metabolic disorders, masked arterial hypertension, risk factors

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ВИКОРИСТАННЯ ПОКАЗНИКІВ ДИСЛІПІДЕМІЇ ПРИ ДІАГНОСТИЦІ МАСКОВАНИХ ФОРМ АРТЕРІАЛЬНОЇ ГІПЕРТЕНЗІЇ

Враховуючи поширеність артеріальної гіпертензії, її роль у розвитку серцево-судинних захворювань та смертності, підвищення ефективності лікування даної патології залишається актуальним питанням сучасної медицини. Мета дослідження – визначити взаємозв'язок між підвищеним рівнем холестерину в крові та маскованою артеріальною гіпертензією. Обстежено 827 осіб віком від 19 до 71 року, з яких виділено 2 групи: 1) основна – із підвищеним рівнем холестерину в крові (n=375); 2) контрольна – з нормальним рівнем холестерину в крові (n=186) – були відсутні симптоми артеріальної гіпертензії та основні фактори ризику (куріння, алкоголь, ожиріння, гіподинамія). Середній рівень холестерину в крові становив 6.16 ± 0.22 ммоль/л в основній групі та 4.69 ± 0.18 ммоль/л у контрольній групі. У першій групі виявлена артеріальна гіпертензія у 19 осіб з 138 (середній систолічний тиск 152.6 ± 4.3 мм рт.ст., діастолічний 97.6 ± 3.7 мм рт.ст.), у 14 з них рівень холестерину перевищував 7.5 ммоль/л, у контрольній групі результат був негативним. Таким чином, використання сучасних приладів дозволяє виявляти масковану артеріальну гіпертензію та проводити відповідні профілактичні заходи.

Ключові слова: холестерин, метаболічні порушення, маскована артеріальна гіпертензія, фактори ризику

The study is a fragment of the research project “A modern approach to assessing the medical and social significance of hypercholesterolemia for public health and the socio-hygienic foundations of its prevention at the population”

Taking into account the prevalence of arterial hypertension (AH), its role in the development of cardiovascular disease and mortality, the effectiveness of AH treatment remains a topical issue for medicine. The main risk factors of lethal outcome of cardiovascular diseases are arterial hypertension (13 %), smoking (9 %), low physical activity (6 %), high blood glucose (6 %) and obesity (5 %) [1, 13]. Elevated levels of cholesterol in the blood also significantly increase the risk of developing ischemic heart disease and stroke [1].

The AH is one of the most common diseases of the cardiovascular system, occurring in 25–30 % of the elderly population in developed countries, and is one of the most important causes of disability and death. It is also well known that people with long-term hypertension are more likely (compared to those with normal blood pressure) to develop myocardial infarction, stroke, and chronic heart (or kidney) failure [15].

In many cases, AH is a multifactorial disease closely associated with lipid metabolism disorders. Dyslipidemia and AH are the main risk factors for cardiovascular complications, which are based on the progression of atherosclerosis [10]. Patients with AH and dyslipidemia usually have at least 3 simultaneous risk factors at the same time [3, 6].

The severity of AH (target organ damage and the degree of damage) in patients with metabolic syndrome directly depends on the components of the metabolic syndrome. These patients are 5 times more likely to have heart and brain damage, and 3 times more likely to have kidney damage, and 2 times more likely to have vascular damage than patients with AH without metabolic syndrome. In this regard, the fight against metabolic disorders is of great importance in the prevention and treatment of AH [8, 9].

The danger is that sometimes AH develops in a masked form. At this time, it develops secretly, long-term and can give dangerous complications such as heart attack, stroke [2, 5]. Experts from the European Society of Hypertension (ESH) and the European Society of Cardiology (ESC) inform in their recommendations that most patients with AH do not know their disease [4, 7].

A relatively effective diagnosis of masked arterial hypertension (MAH) is monitoring ambulatory blood pressure 5 times a day (DBPM), which is sometimes not suitable for practical use. Given that one of the main risk factors of AH is an increase in blood CS, in this case, CS may play a role as a marker in the detection (screening) of MAH in population studies.

The purpose of the study was to determine the relationship between elevated blood cholesterol levels and masked arterial hypertension.

Materials and methods. Study design

Total number of patients
(n=827)

Stage 1 – clinical examination, cholesterol measurement.

Stage 2 – patients without a history of hypertension were divided into 2 groups:

With high amount of CS in the blood
(n = 375)

With a normal amount of CS in the blood (control group)
(n=186)

Stage 3 – selection of patients willing to conduct 3x daily blood pressure monitoring (DBPM).

With high amount of CS in the blood
(n = 138)

With a normal amount of CS in the blood (control group)
(n=56)

827 people aged 19–71 were examined. Out of these, patients without a history of arterial hypertension were selected. After appropriate clarifications and on a voluntary basis, blood was taken from the respondents to study the content of cholesterol. The blood test was carried out on site using a portable device “Accutrend Plus” (“Roche Diagnostics GmbH”, Germany) – portable and easy-to-use biochemical analyzer for quantitative determination of glucose, cholesterol, triglycerides and lactate in capillary blood. Test system has high measurement accuracy (from $\pm 3\%$ to $\pm 5\%$ compared to laboratory methods). Cholesterol measurement time – up to 180 seconds. The result was reported to the patients in 1–2 minutes. The amount of CS is displayed on the screen of the device for one minute by taking blood from the finger.

After determining the level of CS patients were divided into 2 groups: 1) with elevated blood cholesterol levels (n=375) – main group; 2) with a normal level of cholesterol in the blood (n=186) – the

control group, there were no symptoms of arterial hypertension and the main risk factors (smoking, alcohol, obesity, low physical activity).

The study was carried out in compliance with international ethical principles (Declaration of Helsinki, 1964). Informed consent was obtained from patients.

All parameters and data were collected in an Excel table and then transferred for processing using the IBM SPSS-20 program. Continuous variables were expressed as mean \pm median ($M \pm m$). Categorical variables are expressed as actual numbers and percentages. Statistical analysis was performed using the nonparametric Mann-Whitney U-test and Student's t-test. Values were considered statistically significant at $p < 0.05$.

Results of the study and their discussion. In our study, we focused on the currently accepted classification of cholesterol levels in the body: normal < 5 mmol/l, elevated level – 5.0–6.4 mmol/l, moderately high level – 6.5–7.8 mmol/l and a very high level > 7.8 mmol/l [12].

Some of patients included in our study, despite the absence of a history of arterial hypertension, noted symptoms similar to the onset of blood pressure – tinnitus, headaches, dizziness, nervousness, restless sleep, periodically observed fatigue, which was mild and quickly passing. Patients did not access to doctors, blood pressure was not measured, some of them took symptomatic drugs.

When determining blood cholesterol, it was found that some patients without a history of arterial hypertension have a high level of this indicator. According to the results obtained, these individuals were allocated to the main group, where the average level of cholesterol in the blood of the examined was 6.16 ± 0.22 mmol/l. The control group included individuals with cholesterol levels within the normal range, here the average level of this indicator was 4.69 ± 0.18 mmol/l, which was significantly lower ($p < 0.01$) than in the main group (fig. 1).

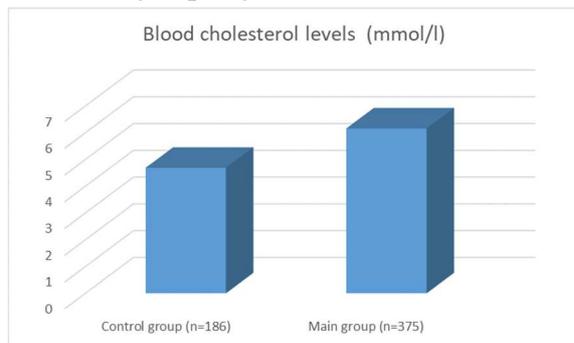


Fig. 1. The mean level of cholesterol in the blood of the examined people.

Patients included in the main and control groups were transferred to the next stage of the study.

At the next stage, a selection of patients willing to conduct 3-x daily blood pressure monitoring (DBPM) was envisaged to detect masked arterial hypertension.

In the main group, 216 people with tonometers were trained in tonometry, then they were asked to measure blood pressure 3 times a day (24-hour (daily) blood pressure monitoring – DBPM), with an interval of 10 days. The response was in 138 patients. The rest of the representatives of this group for various reasons

(impossibility to participate due to the work schedule, difficulties associated with family reasons, etc.) refused to participate in the daily monitoring of blood pressure.

The same work was carried out among 133 people in the control group: they were also trained in tonometry, 56 people agreed to the proposal to measure blood pressure 3 times a day: they performed daily blood pressure monitoring according to our recommendations, and their data were used for further analysis.

Among the representatives of the main group, DBPM revealed arterial hypertension in 19 out of 138 examined (13.8 \pm 2.9 %). In patients from the specified contingent, the average value of systolic blood pressure was 152.6 ± 4.3 mm Hg, diastolic blood pressure was 97.6 ± 3.7 mm Hg. It should be noted that in 14 of them the cholesterol level exceeded 7.5 mmol/l. Of the group of patients with identified masked arterial hypertension (with the so-called “positive” DBPM), only 3 out of 19 had a bad habit in the form of tobacco dependence, and another 4 out of 19 were with overweight, which was combined with low physical activity. It is known that cholesterol levels > 6.2 mmol/l are associated with a very high potential risk of atherosclerosis and its complications [1].

Doctors of the polyclinic prescribed appropriate medication for all those examined with masked arterial hypertension. In addition to antihypertensive therapy, lipid-lowering drugs (e.g., statins) were often prescribed for elevated cholesterol levels, and measures were recommended to correct eating behaviour and maintain normal body weight.

In the control group, DBPM was “negative”, i.e. there were no signs of high blood pressure.

Dyslipidemia and high blood pressure are the main risk factors for cardiovascular complications, which are based on the progression of atherosclerosis [10]. The results obtained in our study are consistent with the data of a number of authors who also found a relationship between arterial hypertension and lipid metabolism disorders. According to the 3rd American NHANES Registry, 15 % of the US population suffers from AH and dyslipidemia at the same time [13].

Regarding the detectability of masked arterial hypertension, there are data from Lyamina N.P. et al. (2015), who in their work, as well as in our study, used the method of daily monitoring blood pressure. In this work, the authors obtained a detection rate of 8.7 % [2]. In our study, the detection rate was 13.8±2.9 %. These figures are higher, however, it should be noted that in the study by the authors mentioned above, the clinical features of masked arterial hypertension in the examined sample were characterized by a complete absence of complaints (in contrast to our patients, who presented some non-specific complaints, such as headaches, dizziness, etc.) and anamnestic data on cardiovascular diseases, as well as an increase in mean hemodynamic pressure, an increase in body mass index. These authors, like us, revealed a higher incidence of dyslipidemia among patients with arterial hypertension and masked arterial hypertension than in patients without arterial hypertension ($p < 0.05$) [2].

According to the study of Stone NJ et al. (2014), in patients with AH and IHD (ischemic heart disease) (mean age about 30), cholesterol was observed to be more than 5.0 mmol/l (hypercholesterolemia) in 67.1 % of cases, triglyceridemia (> 1.7 mmol/l) in 57.1 % of cases [15]. In our study, elevated cholesterol levels above 7.5 mmol/l were detected in 14 out of 138 patients, which, in combination with arterial hypertension, significantly increases the risk of cardiovascular complications. Similar data were obtained in an extensive population study of 12000 patients in Russia as part of the WHOMONICA and APPLE international project: arterial hypertension was found in 59 % of men and 65 % of women, hyperlipidemia in 74 % of men and 84% of women. Patients with arterial hypertension and dyslipidemia usually have at least 3 simultaneous risk factors at the same time [6]. In terms of the “hierarchy” of risk factors in the INTERHEART study, if a patient has 1 isolated factor, then smoking increases the risk of cardiovascular disease by 1.6 times, arterial hypertension – by 3 times, hypercholesterolemia – by 4 times. When there are 2 factors, it is more dangerous to have arterial hypertension and dyslipidemia together (the risk level increases by 9 times) [14].

So, it is necessary to continue research in this area to establish highly informative markers of masked arterial hypertension and methods for their timely detection.

Conclusions

1. Among the persons with a high level of cholesterol DBPM revealed arterial hypertension in 13.8±2.9 % of cases.
2. In persons with high level of cholesterol, the average value of systolic blood pressure founded by DBPM was 152.6±4.3 mm Hg, diastolic blood pressure was 97.6±3.7 mm Hg.
3. Elevated levels of CS may be a reliable marker for masked arterial hypertension. The use of modern devices allows the detection of MAH in population studies and the implementation of appropriate preventive measures.

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THE RESULTS OF SURGICAL TREATMENT OF PATIENTS WITH ACTIVE TUBERCULOUS SPONDYLITIS

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The analysis of the treatment of 60 patients with active TS was performed. The main group (n=30) includes patients with lesions of the thoracic and lumbar vertebrae, operated using a telescopic titanium cage for ventral interbody spondylosis after necrosectomy. A feature of preoperative preparation of patients of the main group was the mandatory etiological diagnosis before treatment, the appointment of a short preoperative course of specific antibacterial therapy, taking into account the results of etiological diagnosis for 2–3 weeks, followed by surgery. The control group included patients (n=30) using traditional approaches to treatment – preoperative preparation using 3–5 specific antibacterial drugs without determining the sensitivity for 2–3 months, followed by surgery – decompressive necrectomy of the affected vertebrae and anterior spondylosis using an autograft. In the comparative analysis of short-term and long-term results of surgical treatment of patients of both groups, the results were obtained, which clearly showed the high clinical effectiveness of the proposed method of treatment of patients of the main group using modern advances in vertebratology.

Key words: specific tuberculous lesions of the spine, improvement of surgical treatment.

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РЕЗУЛЬТАТИ ОПЕРАТИВНОГО ЛІКУВАННЯ ПАЦІЄНТІВ ІЗ АКТИВНИМ ТУБЕРКУЛЬОЗНИМ СПОНДИЛІТОМ

Проведено аналіз результатів оперативного лікування 60 пацієнтів з активним туберкульозним спондилітом. В основну групу (n=30) включені пацієнти з ураженням грудних та поперекових хребців, оперовані із застосуванням телескопічного титанового кейджу для вентрального міжтілового спондилодезу після проведення некрсеквестрکتومیї. Особливістю передопераційної підготовки пацієнтів основної групи було обов'язкове проведення етіологічної діагностики перед початком лікування, призначення короткострокового передопераційного курсу специфічної антибактеріальної терапії з урахуванням результатів етіологічної діагностики протягом 2–3 тижнів з подальшим проведенням оперативного втручання. До контрольної групи увійшли пацієнти (n=30) із застосуванням традиційних підходів до лікування – передопераційна підготовка з використанням 3–5 специфічних антибактеріальних препаратів без визначення чутливості протягом 2–3 місяців з наступним оперативним втручанням – декомпресивна некректомія уражених хребців та переднім спондилодезом аутотрансплантатом. При порівняльному аналізі найближчих та віддалених результатів хірургічного лікування пацієнтів обох груп отримано результати, що достовірно підтверджують високу клінічну ефективність запропонованої методики лікування пацієнтів основної групи з використанням сучасних досягнень вертебології.

Ключові слова: специфічні туберкульозні ураження хребта, удосконалення хірургічного лікування.

The study is a fragment of the research project “Diagnosis of osteoporosis in infectious inflammatory diseases of the musculoskeletal system”, state registration no. 0120U102453.

In Ukraine, the share of extrapulmonary localizations of tuberculosis is approximately 10 % in the overall structure of tuberculosis cases. In the current epidemiological situation, osteoarticular tuberculosis ranks first in the incidence of extrapulmonary tuberculosis in our country and spinal tuberculosis ranks first in the structure of bone and joint lesions [2, 3].

The modern system of surgical treatment of spinal tuberculosis is based on the use of radical, radical-restorative and reconstructive operations [1, 7, 8]. It should be noted that the introduction of surgical methods of spondylitis treatment did not significantly reduce the duration of treatment and disability