Secondary prevention in patients with coronary artery disease in Russia and Europe: results from the Russian part of the EUROASPIRE V survey

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Aim. To assess the secondary prevention in Russian patients with coronary artery disease in the long-term period after acute myocardial infarction, acute coronary syndrome (ACS), percutaneous coronary intervention and/or coronary artery bypass grafting, obtained in the European Action on Secondary and Primary Prevention by Intervention to Reduce Events (EUROASPIRE V) survey in comparison with the general population of the study.

Material and methods. EUROASPIRE V is a cross-sectional study with 27 countries, including Russia, which involved patients with ACS or indications for myocardial revascularization. At participating centers, patients admitted to hospital due to ACS or for percutaneous coronary intervention or coronary artery bypass grafting were identified. After 6 months and <2 years after discharge, patients were examined.

Results. In total, 699 patients were identified in Russia, 399 of which visit an interview (women, 27,1%; mean age, 62,8±8,7 years). In the general population of the study, 16,208 patients were identified, 8,261 of which were interviewed (women, 25,8%; mean age, 63,6±9,6 years). At the time of the interview, 18,5% of Russian patients continued to smoke (16,8% in the general study population), the prevalence of overweight or obesity — 85,4 and 81,7%, abdominal obesity — 60,4 and 58,5%, diabetes — 21,9 and 29,3% of patients, respectively. In 19,7 and 16,4% of patients, respectively, diabetes was first diagnosed with a glucose tolerance test in the study. The target glycated hemoglobin was achieved in 47,1 and 54,4%, blood pressure — in 64,0 and 53,7%, low-density lipoprotein cholesterol — in 27,6 and 29,0% of patients, respectively.

Conclusion. There were significant differences between the Russian cohort and the general study population. Some key secondary prevention parameters were more favorable in the Russian cohort, and some parameters — in the general group. In both compared populations, significant reserves are retained for further optimization.

Key words: coronary artery disease, secondary prevention, risk factors, target levels.

Relationships and Activities: none.

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In recent years, undoubted advances have been achieved in the prevention and treatment of cardiovascular diseases (CVD) and, in particular, coronary artery disease (CAD), which makes the greatest contribution to cardiovascular mortality pattern, but even in countries with the most favorable the CVD situation, this problem cannot be considered completely solved [1-3]. Control of cardiovascular risk factors (RF), which are key indicators of the effectiveness of secondary disease prevention, is critically important for reducing the risk of cardiovascular complications and unfavorable outcomes in patients with CAD. The assessment of the adequacy of measures to correct CVD RFs within secondary prevention of CAD is carried out at various levels. International programs of this kind are of particular interest, since they provide an opportunity to globally assess the secondary prevention of CAD, compare it

across regions and countries, and also allow determining priority optimization goals.

One of the most famous international programs is the European Action on Secondary and Primary Prevention by Intervention to Reduce Events (EUROASPIRE), which has been conducted since 1994 by the European Society of Cardiology (ESC) every few years to assess the effectiveness of the practical implementation of current European guidelines for CVD prevention. Currently, five studies of EUROASPIRE have been carried out: in 1995-1996 (EUROASPIRE I) — with the participation of 9 European countries and 3569 patients with CAD [4], in 2000-2001 (EUROASPIRE II) — with the participation of 15 European countries and 5556 patients with CAD [5], in 2006-2007 (EUROASPIRE III) — with the participation of 22 European countries and 13593 patients with CAD [6], in 2013 (EUROASPIRE IV) — with the participation of 24 European countries and 13586 patients with CAD [7] and, finally, in 2016-2017 (EUROASPIRE V) — with the participation 27 European countries and 16208 patients with CAD [8].

Russian centers took part in the hospital parts of the last three studies (EUROASPIRE III, IV and V), which made it possible to conduct not only a comparative analysis with the European population as a whole and for individual countries, but also to analyze the changes over the past period in Russian cohorts. The EUROASPIRE V studies are of particular interest compared to earlier studies due to their wider geography and the fact that at the time of its implementation, modern approaches to the treatment of patients with CAD in Russia were already fully implemented [9, 10].

The aim was to assess the secondary prevention in Russian patients with coronary artery disease in the long-term period after acute myocardial infarction (MI), acute coronary syndrome (ACS), percutaneous coronary intervention (PCI) and/or coronary artery bypass grafting (CABG), obtained in the European Action on Secondary and Primary Prevention by Intervention to Reduce Events (EUROASPIRE V) survey in comparison with the general population of the study.

Material and methods

EUROASPIRE V [8] is a cross-sectional study involving 27 European countries: Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Egypt, Finland, Germany, Greece, Ireland, Italy, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, the Netherlands, Poland, Portugal, Romania, Russian Federation, Serbia, Slovenia, Spain, Sweden, India, Ukraine, Great Britain. In each country, one or more geographical areas were selected, in which inpatient cardiology centers were identified, among which one or more facilities were selected so that all patients with acute CAD or indications for myocardial revascularization using PCI or CABG had a chance of being admitted to the institution. At the participating centers, on the basis of discharge summaries (or registers), all admitted patients (aged 18-80 years) were identified without exception, hospitalized due to ST-segment elevation MI (STEMI), non-STEMI or ACS or for the purpose of elective/emergency PCI or CABG. The period from the moment of patient identification to the interview was ⩾6 months and <2 years. Each of the participating countries was recommended to include in the study at least 400 patients. The exclusion criteria were severe acute conditions, chronic decompensated diseases, severe mental disorders, drug or alcohol dependence, refusal to participate in the study. All patients with documented CAD were invited to interview in order to assess the long-term results of treatment, clinical, psychological status and life quality, the presence and achievement of target RF levels, as well as to assess the adequacy of non-pharmacological and medication recommendations provided to patients. Each patient signed an informed consent.

When analyzing medical records, the authors took into account socio-demographic characteristics of patients, medical history, availability of information on RF (smoking, obesity, hypertension (HTN), dyslipidemia, hyperglycemia), therapy prescribed during hospitalization and after discharge (with the drug names and daily doses), as well as non-drug recommendations for changing lifestyle provided to patients.

During the interview, using a structured individual report form and validated questionnaires, a detailed survey of patients was carried out on the main aspects of lifestyle (smoking, diet, physical activity, psychosocial factors), drug intake and adherence to non-pharmacological recommendations.

The following anthropometric data were recorded: height, body weight, and waist circumference (WC). Overweight was determined in body mass index (BMI) ⩾25 and <30 kg/m^2; obesity — ⩾30 kg/m^2; abdominal overweight — WC ⩾80 and <88 cm in women and ⩾94 and <102 cm in men; abdominal obesity — WC ⩾88 cm in women and ⩾102 cm in men.

Blood pressure (BP) was measured twice after 5-minute rest on the right hand at 5-minute intervals in the sitting position using an automatic BP monitor (Omron M6). Smoking was objectively assessed by the concentration of carbon monoxide in expired air using a Smokerlyser device (Bedfont Scientific, Micro+).

The level of physical activity was assessed by the question: "Do you exercise regularly for at least 30 minutes on average 5 times a week?" and the question of conducting any physical exercise.

All of these data were entered into a patient report form, as well as into an electronic patient form in database of the EURObservational Research Program.

During the interview, fasting venous blood was taken to determine the levels of total cholesterol (TC), high density lipoprotein cholesterol (HDL-C), triglycerides, low density lipoprotein cholesterol (LDL-C), as well as blood glucose and glycated hemoglobin (HbA_{1c}). All patients without diabetes and with a fasting glucose level <11,1 mmol/L underwent an oral glucose tolerance test. Blood glucose concentration was determined using a portable system (Glucose 201RT, HemoCue®, Ängelholm, Sweden). Blood for tests of TC, LDL-C, HDL-C was taken into clot activator tube to determine the level of HbA_{1c} — EDTA (Venosafe). The blood was centrifuged (2000 rpm) at room temperature for 10 min, after which the plasma was placed in coded tubes, frozen at -70° C and sent from all countries participating in the study to

Table 1

Proportion of medical records of patients with CAD, where data on CVD RFs was recorded upon admission to the hospital, in Russian and general population of the EUROASPIRE V study

	Patients of Russian centers	General EUROASPIRE V population
History of diabetes, %	98	85,8
Smoking status, %	88,2	81,4
Body mass, %	68,7	64,9
WC, %	26,3	13,9
Systolic BP, %	83,7	85,8
Total cholesterol, %	80,7	68,7
LDL-C, %	51,6	58,2
Blood glucose, %	83,5	75,1
HbA_{1c}, %	2,8	17,8
OGTT, %	3,3	1,6

the central laboratory (Laboratory in the National Institute for Health and Welfare, Helsinki, Finland), where the appropriate parameters were measured on a clinical chemistry analyzer (Architect c8000; Abbott Laboratories, Abbott Park, Illinois, USA).

Statistical analysis was carried out at the Department of Public Health of the Ghent University (Belgium) using SAS 9.4 (Statistical Analysis System, SAS Institute Inc., USA) software package.

In Russia, the following 4 centers participated in the EUROASPIRE V study: National Medical Research Center for Preventive Medicine (Moscow), City Clinical Hospital № 36 (Moscow), Moscow Regional Cardiology Center (Zhukovsky), and Regional Clinical Hospital (Barnaul). The Russian part of the EUROASPIRE V study was conducted under the auspices of the National Medical Society of Preventive Cardiology. The Russian part of the EUROASPIRE V study by the Independent Ethics Committee of the National Medical Research Center for Preventive Medicine. All patients signed informed consent.

Results and discussion

In total, 699 patients with CAD were identified and included in the study in Russian centers, the mean age of which at the time of hospitalization was 61,7±8,7 years (women, 27,1). In Europe as a whole, there were 16208 patients with the mean age of 62,4±9,6 years (women, 25,8%). At the same time, 9,8% of patients included in Russia at the time of hospitalization were <50 years old, 30,6% — 50-59 years, 43,6% — 60-69 years old, and 16% — ⩾70 years old.

According to the current ESC for CVD prevention [11], in hospitalized patients with CAD who have undergone acute conditions or interventions for myocardial revascularization, it is critically important to start adequate measures for secondary prevention even before discharge from the hospital. From this point of view, an important indicator is the data on the main CVD RFs in the medical records of patients with CAD (Table 1).

In Russian patients and in the general population of the study, there is significant heterogeneity of information on CVD RFs. In the overwhelming majority of cases, upon admission of patients, information about the systolic BP, the diabetes presence and smoking status was noted, while the level LDL-C was recorded only in about half of the cases, while WC levels and key characteristics of carbohydrate metabolism — in a minority of patients. In general, the frequency of RF registration in the medical records of Russian patients was either comparable to that in the general study population, or slightly exceeded it. In particular, in Russian patients, body weight was indicated in 68,7% of cases, WC — in 26,3%, diabetes — in 98%, smoking status — in 88,2%, systolic BP — in 83,7%. In the total sample, these parameters were 64,9, 13,9, 85,8, 81,4 and 85,8%. In Russian centers, information on LDL-C values was recorded in every second patient (51,6%), on TC — in 80,7%. In the general population of the study, information on LDL-C was recorded more often (58,2%) and about the TC level — less often (68,7%). The results of blood plasma glucose and oral glucose tolerance test (OGTT) were more fully reflected in Russian patients (Table 1). The only exception was HbA_{1c}, which appeared much less frequently in Russian medical records (2,8% versus 17,8% in the general population), which is apparently due to the availability of this analysis.

A similar performance was observed in discharge reports of patients — information on RFs was more often indicated in Russian centers than in the EUROASPIRE V study as a whole. In the discharge reports of Russian patients, the smoking status was recorded in 89,0%, the presence of overweight or obesity — in 88,7%, the presence of hypertension — in 98,7%. Lipid metabolism was reflected in 96,5% of cases, carbohydrate metabolism — in 99,5%, kidney function — in 97,0%. In the general population of the study, these parameters were described in 78,3,

71,5, 89,6, 80,5, 76,7 and 84,5% of discharge reports, respectively.

In the Russian cohort, the interview was on average 0,92 (0,67-1,45) years after the initial hospitalization for AMI, ACS, PCI or CABG, while in the general population — after 1,12 (0,82- 1,56) years. Excluding deceased patients and those who could not attend the interview for other objective reasons (significant health deterioration or moving), the response was 67,4% of patients in the Russian cohort and 56,3% in the general sample. Among the Russian participants, there were 27,1% women (25,8% in the general sample). The mean age of Russian patients who came for a interview was 62,8±8,7 years (7,3% — <50 years, 29,8% — 50-59 years, 42,4% — 60-69 years, 20, 6% — ⩾70 years), while in the general population — 63,6±9,6 years (18,4, 20,8, 26,0 and 32,4% in age groups <50 years, 50-59 years, 60-69 years and ⩾70 years, respectively). The overwhelming majority of Russian participants (92,2%) had a history of one or another intervention for myocardial revascularization, mainly PCI (89,2%), while 9,8% of patients had previously undergone CABG. In the general study population, the frequency of previous myocardial revascularization was 88,9%, while the proportion of patients with a CABG history was significantly higher than in the Russian cohort (18,6%); 80,2% of general sample patients underwent PCI. The proportion of patients with involvement of other vascular systems was small both in Russian centers and in the general sample: a history of strokes was noted in 3,3 and 4,1%, and hospitalizations for peripheral arterial disease — in 2,3 and 2,7% of patients, respectively. Hospitalizations due to heart failure were also rare (3,5% and 6,3% of patients, respectively).

As in the earlier EUROASPIRE studies [12, 13], the educational level of the Russian cohort was generally higher than in the general study population: 40,8% of Russian patients had a higher education, 38,5% — specialized secondary education, 20,8% — secondary education (in all EUROASPIRE V countries — 27,2, 15,7 and 42,1%, respectively).

Follow-up of Russian patients after the index clinical event was most often performed by cardiologists (88,7 vs 77,9% in the general study population). About 41,4% of Russian patients were also followed up by a general practitioner (64,8% in the general sample).

In the considered sample with a very high cardiovascular risk, long-term smoking after AMI, ACS and/or myocardial revascularization was reported by 18,5% of Russian patients, while in general sample the proportion of smoking patients was slightly lower (16,8%). At the same time, as in the previous EUROASPIRE IV study [12], smoking prevalence in Russia consisted of a higher smoking frequency in men (23,7%) and a lower one in women (4,6%). Identifying carbon monoxide in the expired air (>10 ppm), carried out in this study, did not reveal a significant change in the proportion of smoking patients (Figure 1).

Although smoking cessation is one of the most effective secondary prevention measures [14, 15], the likelihood of smoking cessation in patients who smoked for a month before the initial hospitalization was low: in the Russian cohort, about two-thirds of the patients who initially smoked continued to smoke; in the general population — slightly more than half. The rate of successful smoking cessation was especially low in Russian women (only 16,7%). It should be noted that at the time of interview, about half (54,1% in total, 53,6% of men and 60% of women) of Russian patients who continued to smoke wanted to quit smoking in the next six months. In the general population of the study, the proportion of patients motivated to quit smoking was even slightly less — 46,6% (47,2% of men and 43,8% of women).

In addition to patients who successfully quit smoking (33,7%), among Russian patients who smoked at the time of index hospitalization, 61,7% reduced the number of cigarettes smoked (49,0 and 37,6%, respectively). This happened despite the extremely low frequency of any medical assistance for smoking cessation: among Russian patients, only 3,1% participated in specialized programs, and pharmacological support was limited only to nicotine replacement therapy (NRT) in 4,1% of patients. Nobody took varenicline or bupropion, which is not available in Russia. In the general sample of the study, these parameters were slightly higher, although the coverage of care for smoking cessation was insufficient: 5,2% of patients were observed in specialized clinics or programs; NRT was received by 7,1%, bupropion — 1,4%, varenicline — 2,4% of patients. Therapy of nicotine addiction had quite pronounced regional differences and in some countries these drugs were prescribed much more often than the European average. For example, in Sweden, NRT was given to 35,4% of smokers with CAD, varenicline — 10,4%, bupropion — 6,2% of patients, while in Ireland, NRT was prescribed to 37,5% of smokers, varenicline — 3,4%, and bupropion was not used at all. Finally, it should be noted that in the centers participating in the EUROASPIRE V study, hospital-based physicians were not involved at all in smoking cessation care. Thus, in the general population of the study, varenicline or bupropion were not recommended for any of the patients at discharge, and only 0,5% of discharge reports included NRT.

Overweight and obesity are another RFs, the importance of which has been emphasized all over the world in recent years [16]. The EUROASPIRE V study assessed both BMI and the degree of visceral adipose tissue according to the WC data. The mean BMI in the Russian cohort was 29,9±4,9 kg/m^2 (men, 29,4±4,8 kg/m^2; women, 31,3±4,8 kg/m^2), while in the general population of the study — 29,2±5,0 kg/m^2 (men, 28,9±4,6 kg/m^2; women, 30,0±5,8 kg/m^2).

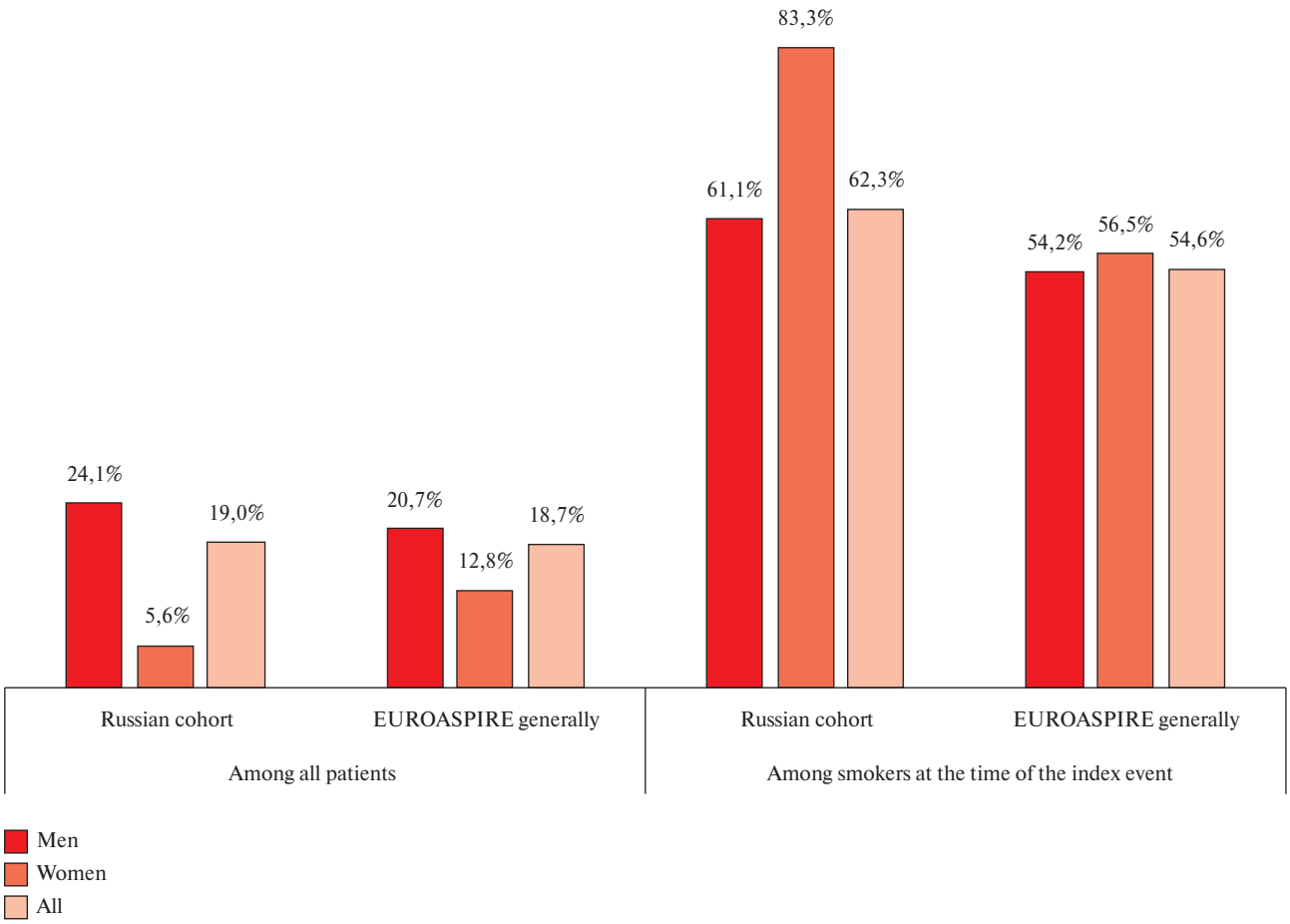

Figure 1. Prevalence of smoking in Russian and general population of the EUROASPIRE V study among all participants and smokers at the month preceding the index event.

Note: Patients were classified as smokers based on survey and/or detection of carbon monoxide in expired air >10 ppm.

An extremely high incidence of overweight and obesity among Russian patients with CAD has been established. Only 14,6% of Russian patients had normal body weight, while in Europe as a whole, there were slightly more such patients (18,3%). At the same time, if the proportion of men with overweight or obesity in Russia was comparable to the general population data, then the situation in Russian women was clearly worse than in the study as a whole (Figure 2). This parameter significantly differed in various countries of EUROASPIRE V, but even in the countries with the best performance, only about a quarter of patients had adequate body weight. Prevalence of obesity (BMI $\geqslant$30 kg/m^2) among Russian patients with CAD was the highest — 47,0%.

Given that abdominal obesity has a higher predictive value than BMI-estimated obesity [17],

the analysis of WC data is also important. These indicators in the Russian cohort practically did not differ from the general population of the study — 103,1±12,1 cm in men and 97,7±12,1 cm in women vs 102,6±12,8 and 98,2±14,2 cm, respectively. The excessive WC (WC $\geqslant$94 cm in men and $\geqslant$80 cm in women) was recorded in 84,4% of our patients, which is slightly more than in the general study population (81,3%). The proportions of patients with central obesity (WC $\geqslant$102 cm in men or $\geqslant$88 cm in women) in the Russian cohort and in the general study population did not differ practically (60,4 and 58,5%, respectively). It should also be noted that in Russia and in other European countries, abdominal obesity was more typical for women (Figure 3).

The overwhelming majority of Russian obese patients (88,2%) were informed by medical workers about this problem (in the general sample — 75,0%). Moreover, in Russia, 44,4% of patients with CAD and obesity during the month preceding the interview tried to reduce body weight (in the general sample — 48,1%). In addition, Russian patients were very motivated in future: 73,3% of patients planned actions to reduce body weight in the next six months, which is almost 1,5 times more than in the general sample (55,2%). It should also be noted that most patients with CAD, received fairly detailed recommendations in this area. Thus, 82,8% of Russian patients received recommendations for diet, 86,1% — for regular exercise (in the general population — 51,7 and 55,0%). Moreover, about two-

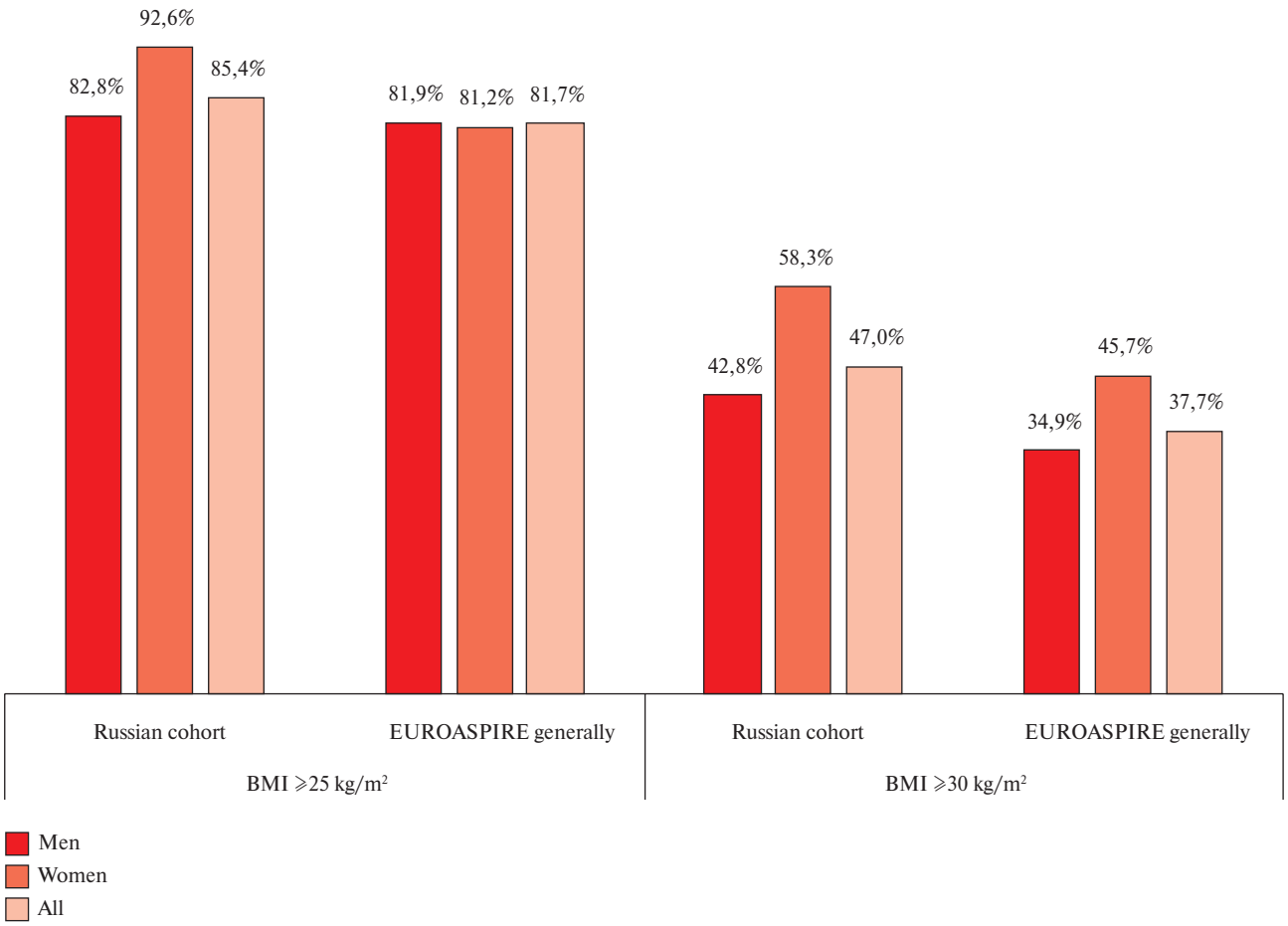

Figure 2. Prevalence of excess body weight and obesity (according to BMI) at the interview in Russian and general population of the EUROASPIRE V study.

thirds of patients from Russian centers (and ~40% of general sample) believed that they were following these advices. The dietary recommendations provided to patients were quite detailed: 93,7% of Russian participants recalled the advice to reduce fat intake, 87,6% — to change the fats consumed, 87,5% — to reduce the daily calorie intake, 92,1% — to increase vegetable and fruit consumption, 90,8% — to eat more fish, 85,0% — to reduce the sugar consumption. These parameters in the general group were slightly lower — 77,3, 68,3, 64,5, 73,2, 66,5 and 67,0%, respectively. Drug therapy for obesity was recommended very rarely — in 3,8 and 8,0% of cases, respectively. Thus, both in Russia and in other EUROASPIRE V countries, there is a combination of a high prevalence of fat metabolism disorders with low efficiency of a routine approach to counseling these patients on healthy diet and body weight management, despite the rather high motivation of the participants. This may be based on, on the one hand, the low availability of nutritional counseling, and on the other, the objective difficulties in correcting body weight in obesity [18, 19].

Diabetes is generally recognized as a significant RF of CVD, moreover, in many cases associated with overweight and obesity [20]. Every fifth patient with CAD who came for an interview to Russian centers had a previously diagnosed diabetes (21,9%; men, 18,3%; women, 31,5%). This is slightly less than in Europe as a whole, where 29,3% of patients had diabetes at baseline (men, 28,0%; women, 33,1%). About 14,9% of Russian patients with previously diagnosed diabetes had diabetic retinopathy, 11,5% — nephropathy, 23,0% — neuropathy. In the general study population, the incidence of retinopathy was slightly higher (16,2%), while the incidence of nephropathy and neuropathy was lower (8,3 and 16,6%, respectively).

In the Russian cohort, measures to manage diabetes were represented by diet and/or other lifestyle changes in 47,1% of participants; 72,4% of patients took oral hypoglycemic drugs and 14,9% received insulin. In the general population, there were 2 times more patients using insulin (31,7%); 56,7% of patients adhered to diet and other non-drug measures and 73,7% of patients received oral hypoglycemic drugs. Regular self-monitoring of blood sugar levels was reported by 87,4% of Russian patients with CAD and diabetes, and among women, such responses were the overwhelming majority — 97,1% versus 81,1% in men. In the study as a

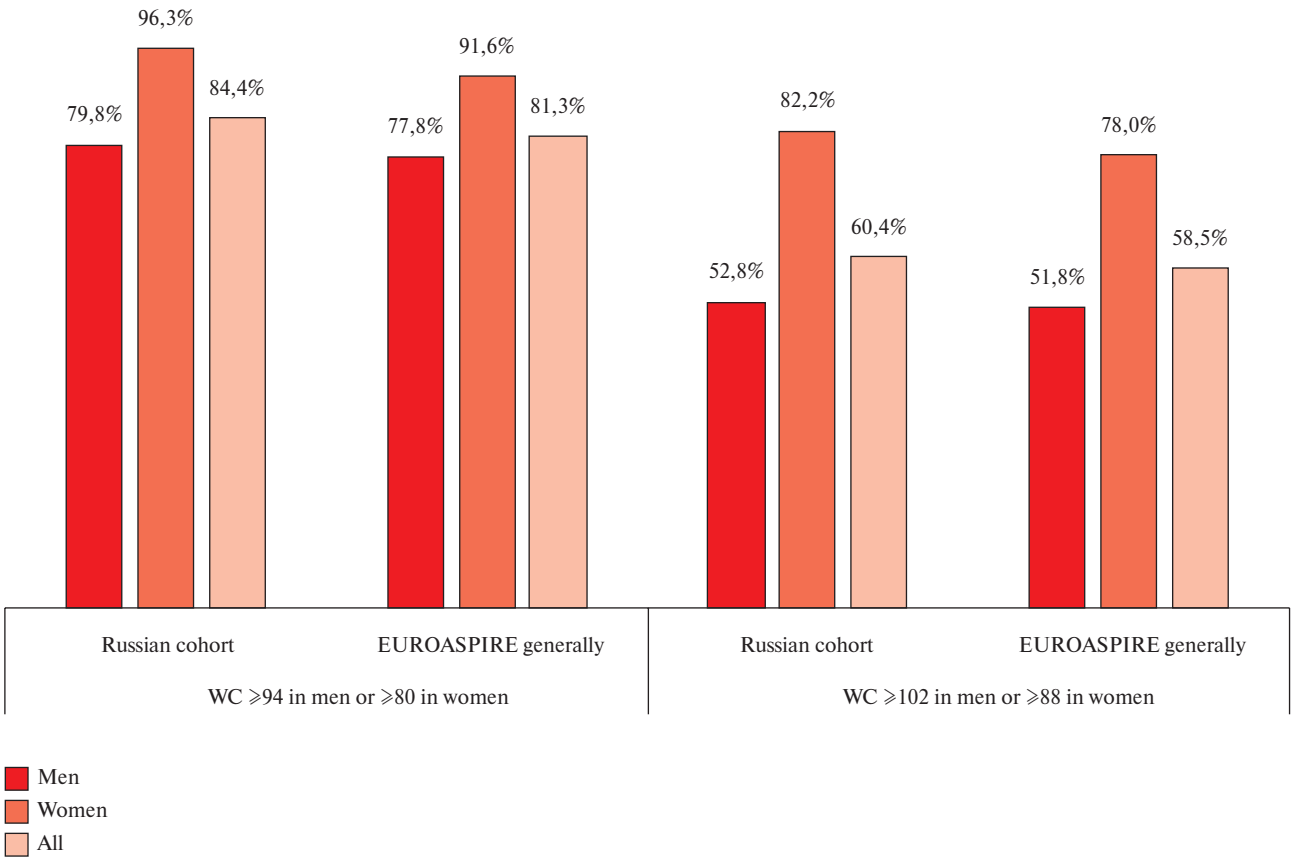

Figure 3. Prevalence of excess WC values and abdominal obesity at the interview in Russian and general population of the EUROASPIRE V study.

whole, self-management of glycemia was carried out by 71,8% of patients with diabetes without significant sex differences.

Nevertheless, despite the self-management, according to patients, the parameters of diabetes management in the Russian cohort were slightly worse than the average for EUROASPIRE V countries, which could be explained by both the lower treatment efficiency and the choice of different target HbA_{1c} levels. In particular, the average fasting glycemic level in diabetes in the Russian cohort was 9,07±3,28 mmol/L (8,75±3,10 mmol/L in men and 9,56±3,54 mmol/L in women), while in the general study population — 8,71±3,01 mmol/L (8,58±2,87 mmol/L in men and 9,03±3,30 mmol/L in women). The average HbA_{1c} level in Russian patients with diabetes was 7,50±1,79% (7,34±1,61% in men and 7,76±2,04% in women), while in general sample — 7,24±1,68% (7,12±1,59% in men and 7,53±1,88% in women). The proportion of patients who achieved an HbA_{1c} <7% in Russian centers (Figure 4) was slightly lower than in the general study population, both in men and women.

Given the high incidence of undiagnosed diabetes, especially in older age groups [21], one of the key features of the EUROASPIRE V study was screening participants for carbohydrate metabolism disorders using OGTT, which was performed in patients without a history of diabetes and with fasting glucose <11,1 mmol/L. As can be seen in Table 2, the test results were fully normative in 38,7% of Russian patients with CAD (,6% in the general group). At the same time, with OGTT, diabetes was first diagnosed in 19,7% of Russian patients with CAD (16,4% in the general study population).

The diagnostic HbA_{1c} level for diabetes (⩾6,5%) was established in 4,5% of Russian patients without a previously established diabetes (men, 5,5; women, 1,4%), while in general sample, a similar data was observed — 4,7% (men, 4,7%; women 4,8%). Even the initial fasting blood glucose level gave reason to suspect diabetes in every tenth Russian patient with CAD. These data and the detection of previously undiagnosed diabetes using OGTT in every fifth patient with CAD in Russia specifies the need for more careful attention to the carbohydrate metabolism parameters at the outpatient stage of care.

BP management is one of the key components of the secondary prevention of CAD. The mean systolic BP in Russian patients with CAD was 129,4±17,8 mm Hg (men, 129,1±17,1; women, 130,3±19,7 mm Hg), while diastolic BP — 78,6±10,9 mm Hg (men, 79,6±10,8 mm Hg; women, 75,8±10,7 mm Hg). In the general population of the study, these parameters were slightly higher: systolic BP — 134,5±18,6

mm Hg (men, 134,3±18,2; women, 134,9±19,7 mm Hg), diastolic BP — 80,7±10,9 mm Hg (men, 81,0±10,7; women, 79,8±11,5 mm Hg). Figure 5 shows the proportion of patients with uncontrolled hypertension at the time of the interview, which among the Russian participants was lower than in the general population of the EUROASPIRE V study — 36,0 vs 46,3% (34,9% vs 46,0% in men and 38,9% vs 47,1% in women, respectively). Antihypertensive therapy was received by 97,2% of Russian patients (men, 96,6%; women, 99,1%) and 95,0% (men, 94,7%; women, 95,8%) in the general population. Medication adherence was rather high: 89,3% of Russian patients and 77,6% of general sample participants reported that they regularly these medications within 2 weeks before the interview. With regard to undiagnosed hypertension, the situation in Russian centers was quite favorable. Among patients without hypertension, a history of blood pressure ⩾140/90 mm Hg (or ⩾140/80 mm Hg in the presence of diabetes) was found only in 12,2% (men, 11,4%; women, 20,0%), while in the general study population this feature was characteristic of more than 2 times more patients — 28,3% (men, 29,8%; women, 21,8%).

The blood lipid levels in the Russian cohort were generally comparable to the general study population: the mean TC in Russian centers was 4,25±1,15 mmol/L (4,19±1,17 mmol/L in men and 4,43±1,08 mmol/L in women) vs 4,28±1,21 mmol/L (4,16±1,15 mmol/L in men and 4,64±1,31 mmol/L in women), LDL-C — 2,38±0,98 mmol/L (2,36±0,99 mmol/L in men and 2,42±0,96 mmol/L in women) vs 2,41±0,99 (2,33±0,94 mmol/L in men and 2,63±1,09 mmol/L in women), HDL-C — 1,14±0,27 mmol/L (1,10±0,26 mmol/L in men and 1,16±0,33 mmol/L in women) vs 1,14±0,30 mmol/L (1,10±0,28 mmol/L in men and 1,25±0,34 mmol/L in women), triglycerides — 1,62±0,97 mmol/L (1,61±1,04 mmol/L in men and 1,65±0,76 mmol/L in women) vs 1,64±1,12 mmol/l (1,63±1,15 mmol/l in men and 1,66±1,05 mmol/l in women).

LDL-C exceeded the target level for patients with CAD in approximately three quarters of the participants both in Russia and in all EUROASPIRE V countries (Figure 6): LDL-C ⩾1,8 mmol/L was recorded in 72,4% of Russian patients (71,5% in men and 74,5% in women) and 71,0% of general sample patients (68,6% in men and 77,9% in women).

In Russian cohort, 88,7% of patients (87,3% of men and 92,6% of women) received lipid-lowering drugs, which was even slightly higher than in the general study — 84,2% (85,7% of men and 80,1% of women). The frequency of achieved LDL-C target level among patients with CAD undergoing lipid-lowering therapy was low both in Russia (30,2%; 31,7% in men and 26,5% in women) and in the general population of the study (32,0; 34,1 and 25,7% respectively), which

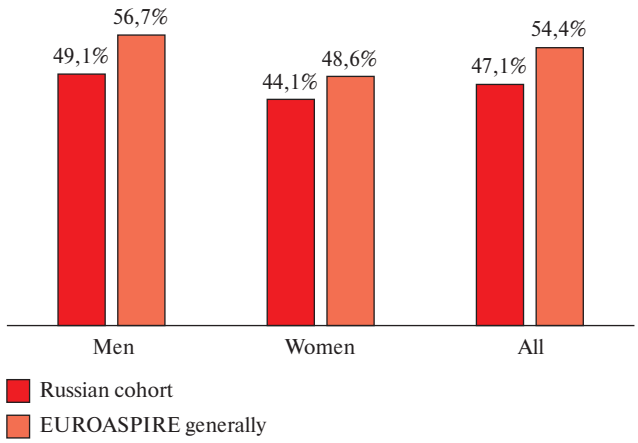

Figure 4. Prevalence of HbA_{1c} <7% at the interview among persons with previously diagnosed diabetes in Russian and general population of the EUROASPIRE V study.

indicates the use of insufficiently effective drugs, insufficient doses and the rare appointment of combined lipid-lowering therapy.

According to patients with CAD, the physical activity recommended by the World Health Organization (>30 min ⩾5 times a week) was followed by 52,0% of Russian patients (55,1% of men and 44,2% of women), which is noticeably higher than in the general sample — 34,4% (36,8% of men and 27,5% of women). In Russian cohort, 52,9% of patients reported that they made some effort to increase physical activity after the initial hospitalization (47,3% in the general study population). About one third of participants purposefully focused in various types of exercise: 30,9% in the Russian cohort and 34,8% in the general group. Also, 33,2% of Russian participants reported that they did not have such exercise at the moment, but intend to increase activity in future (23,8% in the general population). Another 35,8% of Russian patients indicated that they do not plan any sports activities in the future (41,5% in the general cohort).

In Russian cohort, 64,0% of patients (46,2% in the general study population) was recommended to take part in the cardiac rehabilitation program after the initial hospitalization, but only 39,4% were able to complete such a program even by half, which was significantly lower than in the general study group (68,9%).

It should be noted that the EUROASPIRE V study has limitations in that the results obtained for the participating countries cannot be considered completely representative of all CAD patients in the region. Obtaining fully representative national data is practically impossible due to the number of participating countries and the lack of target funding. Moreover, the EUROASPIRE studies mainly included high-quality healthcare facilities, which can skew the overall results for the better. Partly to overcome this limitation is the interval between the initial hospitalization and the interview, during which patients are observed within