Priorities of primary prevention
of cardiovascular disease: the results of multicenter international cohort study AHS I (Azerbaijan Heart Study, part I)

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Summary

Objective
The objective of this study was to investigate the prevalence of main CVD risk factors and to assess cardiovascular risk in a cohort of men and women with arterial hypertension (AH) aiming to develop a strategy of primary CVD prevention.

Six centers from three countries took part in a cross-sectional, multicenter cohort study: 4 cities from Azerbaijan (Baku, Ganja, Sheki, Lenkoran), 1 from Georgia (Marneuli) and 1 from Russia (Derbent). The total number of patients was 760, including 503 women (66.2 %) and 257 (33.8 %) men, with the average age of 53 ± 1.15 years (from 30 to 59 years).

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Material and methods

All patients were questioned using international ARIC questionnaire, underwent blood pressure, heart rate, and anthropometric parameters measurement and ECG registration at rest. Fasting blood levels of total cholesterol and glucose were determined. Total cardiovascular risk was estimated using the European SCORE scale.

Results

Mean blood pressure in the examined groups of men and women met the criteria of AH 2–3 stages, it was accompanied by hypertrophy of the left ventricle in 40–70 % of cases, which is known to increase the risk of cardiovascular complications. It has been shown that on average every second patient received combined antihypertensive therapy, while monotherapy was performed in 45 % of patients, and 15 % of patients did not adhere to therapy at all. Among the socio-demographic indicators, attention is drawn to the high incidence of non-working men with hypertension in all cities, the majority of women were housewives. The results of the study showed that the smoking rate in men with hypertension was between 19 % and 60 %, depending on the region. In the cities of Azerbaijan, the frequency of alcohol abuse was not higher than 10 %, whereas in contiguous states this indicator was 2–2.5 times higher in cohorts of men with AH. Abdominal obesity was one of the prominent risk factors for both men and women with AH. Diabetes mellitus in men was found in 9 % of cases, and among women this value was 15 %. The average total blood cholesterol levels of patients with AH met the criteria of mild hypercholesterolemia. Depending on the region and gender, high cardiovascular risk was detected in 20 % — 60 % of cases. Every fourth man and every third woman had very high cardiovascular risk.

Conclusion

For the purpose of primary prevention of cardiovascular complications in persons with hypertension, it is necessary to provide effective control of blood pressure, which will also lead to regression of left ventricular hypertrophy. Along with this, it is necessary to conduct serious work among men to combat bad habits, to correct metabolic disorders, as well as total blood cholesterol and glucose levels. Total cardiovascular risk assessment can serve as a good indicator for estimation of multifactorial prophylaxis efficacy in patients with AH.

Key words

Primary prevention, risk factors, arterial hypertension, cardiovascular risk

Introduction

Cardiovascular diseases (CVD) are the leader among chronic noninfectious diseases for the development of complications and disability of persons of working age, both in developed and developing countries [1]. During the last years there is a noticeable dynamics in the reduction of cardiovascular mortality in the EU and US countries, whereas, high rates of cardiovascular morbidity and mortality still persist in CIS countries, including Azerbaijan. This trend is found among men and women of working age [2]. At the same time, among women the frequency of cardiovascular complications in the structure of mortality was higher than in men [3, 4].

The causes of high cardiovascular mortality include several factors: socioeconomic problems, health system limitations after the collapse of the USSR, adult migration, urbanization, etc. The system of prevention, health check-up and rehabilitation in new conditions has not been restored at the required level [3].

On the other hand, during the last few years high-tech methods of medical assistance have been ac-tively developed in the CIS countries, in particular in Azerbaijan. In this country there are several large vascular centers providing emergency and planned cardiac care. The need for cardiosurgical interventions is covered by the forces of local health structures and specialists.

According to authoritative prospective clinical studies in the development of CVD, an important role is played not only by socio-demographic indicators, but also by so-called risk factors. If we consider CVD as a long-term chronic process (atherosclerotic changes and their complications develop on average within 15 years), then the risk factors act as a triggering mechanism of functional and anatomical changes in the structure of the major arteries [5]. The combination of several risk factors increases the overall risk of developing cardiovascular diseases. There are various scales and tables (SCORE, PROCAM, Framingham) prepared on the basis of prospective studies and designed to calculate the predicted total risk of developing cardiovascular complications taking into account several risk factors [6–8]. The high-risk strategy is

one of the main platforms for the development of CVD prevention [9].

In recent years, the comorbidity of somatic diseases has also been seen as an important factor affecting the ability to work and the prognosis of patients with cardiac pathology [10]. It is not only about pathogenetically interrelated disorders, but also individual diseases of various organs and systems.

Primary prophylaxis of CVD involves the identification and systematic correction of a wide range of social, biological and behavioral risk factors until the moment of disease formation. According to major clinical studies, primary prevention programs can prevent CVD risk by up to 40 %. It is proved that the primary prevention of CVD is economically more effective and expedient in comparison with the use of more complex procedures in patients with CVD complications [9].

The aim of the study

Study the prevalence of major CVD risk factors and assess cardiovascular risk in a cohort of men and women suffering from hypertension with the view to develop a strategy for primary prevention of CVD.

Materials and methods

Cohort formation

Six centers from three states took part in a one-stage multicenter cohort study: 4 cities from Azerbaijan (Baku, Ganja, Sheki, Lenkoran), 1 from Georgia (Marneuli) and 1 from Russia (Derbent). The study had been conducted from September 2015 to October 2016 as part of a cooperation agreement between National Research Center for Preventive medicine of the Ministry of Health of the Russian Federation and the Azerbaijan State Institute of Advanced Training of Physicians named after A. Aliyev.

The total number of patients was 760, including 503 women (66.2 %) and 257 (33.8 %) men. A detailed analysis of the number of cohorts surveyed in different cities is present in Table 1. The average age of the examined patients was 53 ± 1.15 years (varying from 30 to 59 years).

Inclusion criteria. The study included men and women aged from 30 to 59 years with arterial hypertension (AH) 1–3 stages. according to the classification of the European Society of Hypertension [11], with and without other cardiovascular risk factors and somatic diseases.

The criteria for exclusion were: Age < 30 and > 59 years; Presence of chronic heart failure (CHF);

Table 1. **Summary of cohort population in 6 centers**

Cities	Total number of patients in the cohort, n	Men, n	Women, n
Azerbaijan			
Baku	151	48 (32 %)	103 (68 %)
Ganja	200	56 (28 %)	144 (72 %)
Sheki	117	28 (24 %)	89 (76 %)
Lenkoran	115	60 (52 %)	55 (48 %)
Russia			
Derbent	52	12 (23 %)	40 (77 %)
Georgia			
Marneuli	125	53 (42 %)	72 (58 %)

Exertional angina pectoris; valvular and vascular defects; History of stroke of any genesis and myocardial infarction (MI); Atherosclerosis of peripheral vessels; Renal and hepatic impairment; Respiratory insufficiency; Oncological diseases (3–4 stages); Connective tissue disease; Endogenous mental disorders; Bilateral stenosis of renal arteries; Alcohol or drug addiction.

Clinical and instrumental methods

— Standard questionnaire using the Russian (Azerbaijan) version of the ARIC questionnaire: age, marital status, education, social status, hereditary burden, smoking, alcohol consumption, hypertension, therapy and concomitant somatic diseases [12].

The ones who smoked at least one cigarette / cigarette a day were considered as smokers. The status of smoking was defined as follows: never-smokers, smokers in the past, smokers at the moment.

The status of alcohol consumption was assessed by the following criteria: never consumed alcohol during the last year; for men: little and moderately — <168 g ethanol per week, much -> 168 g ethanol per week; for women: little and moderately — <84 g ethanol per week, much-> 84 g ethanol per week.

Measurement of blood pressure (BP) was performed using mechanical tonometer with the accuracy of 2 mm Hg. twice with 5-minute interval, in sitting position at rest. Systolic blood pressure (SBP) was recorded after appearance of the first Korotkov tone (phase I), the diastolic blood pressure (DBP) was recorded after disappearance of Korotkov's tones (V phase). The average of the two measurements was used for the analysis. The information about heart rate (HR) per minute was included in the questionnaire.

Anthropometric parameters: measurement of body height accurate within 0.5 cm; measurement of body mass accurate within 0.1 kg; calculation of body mass index (BMI) (Quetelet index), as the ratio of body mass in kg to the square of the body height

in m; measurement of the waist circumference (WC) accurate within 0.5 cm.

Electrocardiogram registration (ECG) was performed in 12 standard leads in lying position with the use of standardized stationary devices.

ECG criteria (the Sokolov-Lyon criterion and the Cornell volcano index) have been used for the diagnosis of left ventricular hypertrophy (LVH).

Biochemical methods

Blood for sampling was taken from the ulnar vein in the morning after a 12-hour fasting with minimal venous occlusion (pressure under the bundle not> 90 mm Hg, <60 seconds). Serum was obtained after 10 minutes centrifugation at 3000–3500 rpm.

The levels of total cholesterol (Cholesterol) (mmol/l) in serum were determined using enzyme kits and automated colorimetric analyzers.

Plasma glucose levels (mmol/l) in venous blood taken during fasting period were measured by enzymatic hexokinase method with the use of standardized analyzers.

Assessment of cardiovascular risk

Each patient underwent the estimation of the risk levels for the development of complications of cardiovascular diseases (CVD) within 10 years according to the European scale SCORE. Total cardiovascular risk was the following: low risk — <1%, moderate risk — from 1% to 5%, high risk from — 6% to 9%, very high risk — 10–14% [6].

Statistical analysis

Data entry in regional research centers was carried out using the ACCESS MS OFFICE system. Editing and statistical analysis was carried out by the researchers of the National Research Center for Preventive Medicine (Moscow) using the SAS (Statistical Analysis System) software. Descriptive numerical characteristics of the investigated variables: mean, frequencies, standard deviations and standard errors were obtained using PROC SUMMARY, PROC UNIVARIATE, PROC FREQ procedures. Standard significance criteria have been used: χ^2, and Student's t-test (two-sample).

Results

The results of the multicenter clinical study are present on the basis of the analysis of certain groups of violations and indicators taking into account gender aspects. Risk factors for CVD are divided into the following groups: socio-demographic, biological and behavioral.

Social status and demographic characteristics of the surveyed cohort of patients with AH

Marital status, education level and current occupation were analyzed as a part of social status of patients.

In all 6 cities, the absolute majority of men and women groups were married, which could be explained by established regional and national traditions (Table 2). In the examined cohort, divorces were present in less than 1% of cases. About 12% of examined women and 7% of examined men were widowed. Persons with secondary and special education prevailed in analyzed groups of patients with AH. 31% of men had higher education; the same characteristic in women was higher by a third and reached 44%. The highest number of men with AH having higher education lived in Lenkoran, and the majority of women with AH having higher education lived in Ganja. In other cities and neighboring countries the percentage of people with higher and secondary education turned out to be comparable.

The analysis of occupation status of the examined cohort demonstrated that 43% of men with AH were unemployed at the time of examination, and the majority of them belonged to the working-age population. This trend was detected in the capital Baku, regional centers, and the cities of neighboring states. One third part of women had a job, whereas 63% of females were housewives.

Hemodynamic characteristics of the cohorts of men and women with AH

To assess hemodynamic characteristics, we analyzed such parameters as SBP, DBP, HR and LVH determined by ECG criteria.

In all cities, the average SBP index exceeded 160 mm Hg with the exception of Baku. The highest values of SBP were registered in Ganja and Marneuli both among men and women (Table 3). Higher values of DBP were recorded in Ganja, Baku and Derbent.

In general, in all groups high BP values were accompanied by elevated HR with no gender differences (Table 4).

On the one hand, LVH is an indicator of CVD development, and on the other it is a compensatory mechanism of prolonged AH course [11]. The majority of examined patients had AH for at least 3–5 years. Every second patient of the cohort had ECG criteria of LVH (Table 5).

Adequately selected antihypertensive therapy affects not only hemodynamic parameters, but also

Table 2. **Gender characteristics of the social status of the examined cohort (absolute numbers, n)**

Cities	Marital Status		Education		Job Status	
	Men	Women	Men	Women	Men	Women
Baku	Married 46 Single 2	Married 92 Single 2 Widowed 9	Higher 17 Secondary 31	Higher 13 Secondary 90	Employed 24 Unemployed 24	Employed 18 Housewives 85
Ganja	Married 52 Widowed 4	Married 134 Widowed 10	Higher 14 Secondary 42	Higher 32 Secondary 24	Employed 36 Unemployed 18	Employed 83 Housewives 61
Sheki	Married 28	Married 88 Divorced 1	Higher 7 Secondary 21	Higher 18 Secondary 71	Employed 19 Unemployed 9	Employed 30 Housewives 59
Lenkoran	Married 53 Single 4 Widowed 3	Married 44 Widowed 11	Higher 26 Secondary 34	Higher 14 Secondary 41	Employed 30 Unemployed 30	Employed 17 Housewives 38
Derbent	Married 12	Married 39 Divorced 1	Higher 5 Secondary 35	Higher 10 Secondary 2	Employed 6 Unemployed 6	Employed 8 Housewives 32
Marneuli	Married 43 Divorced 1 Widowed 9	Married 47 Divorced 2 Widowed 23	Higher 21 Secondary 32	Higher 17 Secondary 55	Employed 29 Unemployed 24	Employed 30 Housewives 42

Table 3. **Mean values of SBP and DBP in men and women with AH**

	SBP, mm Hg.		DBP, mm Hg.	
Cities	Men	Women	Men	Women
Baku	155.6±3.1	160.6±2.1	97.5±1.5*	96.9±0.9
Ganja	181.7±3.1**	182.7±1.8*	104.3±1.7**	102.4±0.9**
Sheki	160.7±3.2	156.4±2.4	96.8±2.1	93.3±1.3
Lenkoran	164.2±2.3	161.0±1.6	91.7±0.9	92.4±0.7
Derbent	163.3±8.4	164.2±2.7	96.7±3.8	97.8±1.6*
Marneuli	170.1±2.3*	168.1±2.1*	91.2±1.3	90.3±0.8

* p <0.05, ** p <0.01 — significance of differences between groups (in comparison with the group with the minimum average value)

Table 4. **Mean HR (beats per minute) in the examined cohort of patients with AH**

Cities	Men	Women
Baku	74.1±1.9*	77.7±1.2*
Ganja	70.6±1.4	71.7±0.9
Sheki	72.5±3.3	72.2±1.5
Lenkoran	80.7±1.1**	80.0±1.4**
Derbent	69.8±2.2	79.9±2.0**
Marneuli	72.1±1.3	75.7±0.8*

* p <0.05, ** p <0.01 — significance of differences between groups (in comparison with the group with the minimum average value)

Table 5. **Identification of LVH by ECG criteria among men and women with hypertension in different cities, n**

Cities	Men, n	Women,n
Baku	30	67**
Ganja	32	70
Sheki	14	31
Lenkoran	28	30
Derbent	6	25*
Marneuli	36*	44*

* p <0.05, ** p <0.01 — significance of differences between groups (in comparison with the group with the minimum average value) The greatest frequency of LVH was detected among AH patients in Baku, Ganja and Marneuli. Among women with AH, the same analogy was observed for the frequency of LVH (Figure 1).
* p <0.05, ** p <0.01 — significance of differences between groups (in comparison with the group with the minimum average value)

determines the long-term outcome of cardiovascular complications risk [2, 4]. In addition, we analyzed some aspects of prescribed antihypertensive drugs.

Patients with different stages of AH in different cities adhered to antihypertensive monotherapy with the frequency varying from 20 to 65 % of cases (Table 6). The most frequent intake of one antihypertensive drug was registered in the cities of Baku and Ganja. In the group of persons receiving combined therapy, high frequency of taking two or more antihypertensive drugs was detected in 10–30 % of cases. On average,
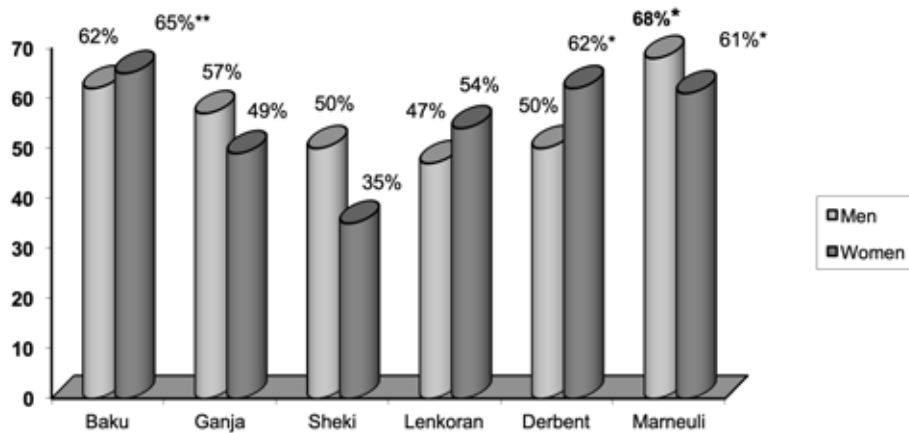
Figure 1. The incidence of LVH in the cohort of men and women with AH

Table 6. **Antihypertensive therapy in the cohort of patients with AH**

Cities	Monotherapy		Combined therapy		Without therapy	
	Men	Women	Men	Women	Men	Women
Baku	31 (64.6%)	79 (76.7%)	13 (27.1%)	12 (11.6%)	4 (8.3%)	12 (11.6%)
Ganja	35 (62%)	42 (29.2%)	19 (34%)	54 (37.5%)	2 (4%)	48 (33.3%)
Sheki	11 (39.3%)	27 (30.4%)	14 (50%)	52 (58.4%)	3 (10.7%)	10 (11.2%)
Lenkoran	8 (13.3%)	6 (10.9%)	35 (58.3%)	40 (72.7%)	17 (28.3%)	9 (16.4%)
Derbent	5 (42%)	16 (40%)	5 (42%)	18 (45%)	2 (16%)	6 (15%)
Marneuli	9 (17%)	25 (34.7%)	16 (30.2%)	41 (56.9%)	28 (52.8%)	6 (8.4%)

Table 7. **Anthropometric parameters of men and women with AH**

Cities	BMI, kg/m^2		WC, cm	
	Men	Women	Men	Women
Baku	30.9±0.6*	31.5±0.5*	103.5±1.3*	98.3±0.8
Ganja	28.2±1.3	27.2±0.9	97.2±1.9	93.3±1.3
Sheki	30.7±1.4*	31.4±0.6	104.2±2.3*	100.4±1.1*
Lenkoran	29.01±0.4	28.8±0.6	101.9±1.6	99.8±1.3
Derbent	27.9±0.6	31.8±0.9*	96.3±1.9	101.1±2.3*
Marneuli	30.3±0.5	30.7±0.9	96.3±1.9	92.8±1.6

* p <0.05 — the significance of differences between groups (compared to the group with the minimum average value)

about 15% of patients with AH and different levels of cardiovascular risk did not receive long-term antihypertensive therapy. This fact was most evident among men with AH in Lenkoran and Marneuli (28.3% and 52.8% of cases, respectively) and women with AH in Ganja (33.3% of cases).

Analysis of behavioral and biological risk factors

In this study, patients were interviewed using an adapted international questionnaire, which allowed determination of the harmful habits presence including alcohol abuse and smoking [13].

About 40% of men with AH took small amount of alcohol regularly (or occasionally). In Baku and Ganja alcohol abuse was detected in 10% and 9% of men, respectively. The lowest frequency of alcohol abuse

was registered among men in Lenkoran and Sheki, while in Derbent and Marneuli this characteristic was present in 25% and 22% of cases, respectively. The smoking status picture was slightly different. Thus, the greatest number of smokers among men with AH was detected in Lenkoran (60%) and Ganja (39%), and the third position was taken by Baku (37%). In other cities, the status of smoking has the following characteristics: in Sheki — every third men with AH smoked (31%), in Derbent — every fourth (25%) and in Marneuli — every fifth (19%) men with AH was a smoker.

The use of alcohol and smoking by women was not recorded in any of 6 cities, which, apparently, could be explained by national and religious traditions.

In this study we estimated such anthropometric parameters like BMI and WC. According to the aver-

Table 8. **Levels of total cholesterol and blood glucose in patients with AH**

Cities	Total cholesterol, mmol/L		Glucose, mmol/L	
	Men	Women	Men	Women
Baku	5.8±0.4*	5.8±0.3	5.8±0.2	6.4±0.3*
Ganja	6.4±0.2*	6.0±0.09*	5.9±0.3	6.4±0.2*
Sheki	5.2±0.2	5.04±0.07	5.6±0.1	5.9±0.2
Lenkoran	5.2±0.1	5.4±0.1	5.4±0.4	5.2±0.2
Derbent	5.3±0.2	5.8±0.2	6.6±0.6*	5.6±0.2
Marneuli	5.5±0.4	5.4±0.4	6.5±0.2*	6.8±0.2**

* p <0.05, ** p <0.01 — the significance of differences between groups (in comparison with the group with the minimum average value)

age statistical values in the whole group, BMI values corresponded to excess body weight and obesity stage 1 (Table 7). The most evident BMI increase was registered in Baku, Marneuli and Sheki, both among men and women. It is known that WC is a marker of abdominal obesity [14]; according to this parameter, all groups regardless of gender are characterized by its high incidence (WC in men> 94 cm, in women> 80 cm). A more pronounced increase of WC values in men with AH was recorded in Baku, Lenkoran, Sheki and Ganja. Similar values were found among women, especially in women from Sheki, Derbent and Baku. Lower values of WC were found in AH patients in Marneuli and Ganja, but their average WC values exceeded the normal numbers by 15–20 %.

According to the protocol, the blood levels of total cholesterol and fasting blood glucose were analyzed in all patients. Mean values of total cholesterol in the blood of men and women with hypertension were higher than normal (Table 8). The highest rates were observed in patients, natives of the city of Ganja, the second position was taken by the patients with AH from Baku. It is interesting to mention that that men and women of both cities had similar trends. Smaller values of total cholesterol were detected in patients from Sheki and Lenkoran.

We observed that the average blood glucose levels were either above the norm or within the upper limit of normal values in all cities. Among the examined men with AH, the most pronounced hyperglycemia was observed in Derbent and Marneuli, while relatively low values of blood sugar were found in men with AH in Sheki and Lenkoran. In general, the frequency of hyperglycemia in women was higher in comparison with men. High fasting glucose in blood was detected in women with AH from Marneuli, Baku and Ganja. We assume that this could be due to the nature of food and lifestyle in urban settings.

Evaluation of cardiovascular risk in the cohort of men and women with different AH stages

One of the main objectives of this project was to assess the risk of cardiovascular complications. For this purpose, the SCORE scale recommended for wide application by the European Society of Cardiology has been used, both at the population level and in cohorts with the presence of various risk factors [6]. During the last 15 years, the SCORE scale has been actively used in the CIS and Russia.

The present study presents data on the incidence of high and very high cardiovascular risk among AH patients. The level of cardiovascular risk varied from city to city, which indicates a heterogeneity of risk factors that had been taken into account for assessing the total cardiovascular risk (Table 9).

Table 9. **Assessment of cardiovascular risk according to the SCORE scale in the examined patients with AH, n (%)**

Cities	Men, n		Women, n	
	High risk	Very high risk	High risk	Very high risk
Baku	21	8	41	29
Ganja	30*	16	56	37
Sheki	8	6	18	17
Lenkoran	16	12	14	12
Derbent	7**	3*	15*	12*
Marneuli	28*	13	31*	29*

* p <0.05, ** p <0.01 — the significance of differences between groups (in comparison with the group with the minimum average value)

Every second male with AH in three cities (Ganja, Marneuli and Derbent) had high cardiovascular risk according with the SCORE scale. In the same cities, it was found that every third man with AH had very high cardiovascular risk. The lowest frequency of high and very high cardiovascular risk was detected among men in Sheki and Lenkoran (Figure 2).

The picture of cardiovascular risk in women is slightly different from men. The highest frequency of very high cardiovascular complications risk was de-
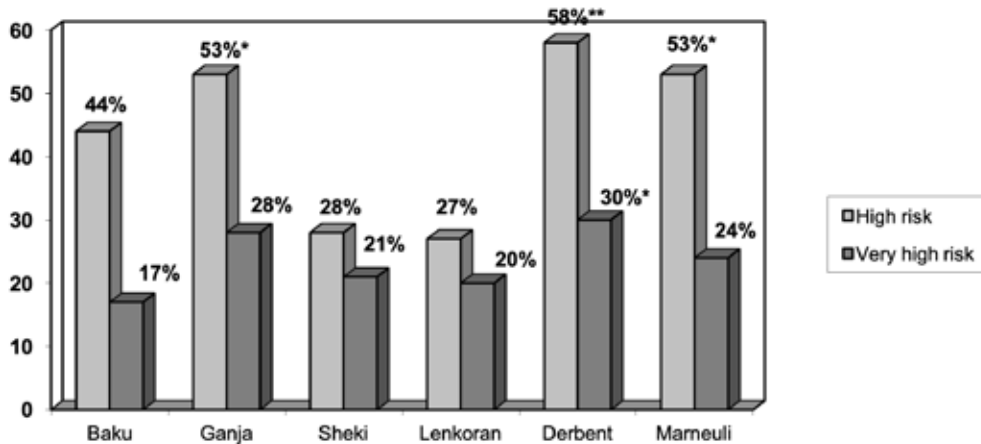
Figure 2. The incidence of high and very high cardiovascular risk in the cohort of men with AH
* p <0.05, ** p <0.01 — the significance of differences between groups (in comparison with the group with the minimum average value)

tected in Derbent and Marneuli with the frequency of 40 % and 44 %, respectively. Very high cardiovascular risk was registered in 26–28 % of women with AH in Baku and Ganja, every fifth woman of the other two cities had very high cardiovascular risk. In four cities more than 40 % of women with AH had a high cardiovascular risk (Figure 3).

Thus, high incidence of high and very high cardiovascular risk has been identified in the cohort of men and women with hypertension in two large cities of Azerbaijan and in the cities of neighboring countries with compact populations of Azerbaijanis.

Somatic comorbidity in patients with AH

Within the framework of the study we investigated gender features of somatic disease occurrence. According to the results, about 20 concomitant diseases of various organs and systems were detected. Among men, the frequency of individual comorbidi-

ties varied from 0.4 % to 9 %. In women with AH somatic diseases were present in 0.4 % –15 % of cases.

In the surveyed cohort of patients with AH, the most frequent somatic disease was diabetes mellitus type 2, its occurrence in women with AH was — 15 % and in men — 9 % (Table 10). 9 % o in 9 % of men with AH had chronic cholecystitis, and 7 % of men had chronic gastritis. Other diseases were detected in less than 4 % of cases.

Osteochondrosis, chronic cholecystitis, chronic gastritis and neuroses were diagnosed in 5–6 % of female cases.

It should be emphasized that somatic diseases are registered on the basis of medical documentation. Examination methods provided in the project protocol did not allow the identification or verification of additional somatic diseases. We assume that the picture of the prevalence of somatic diseases could appear different after in-depth examination.
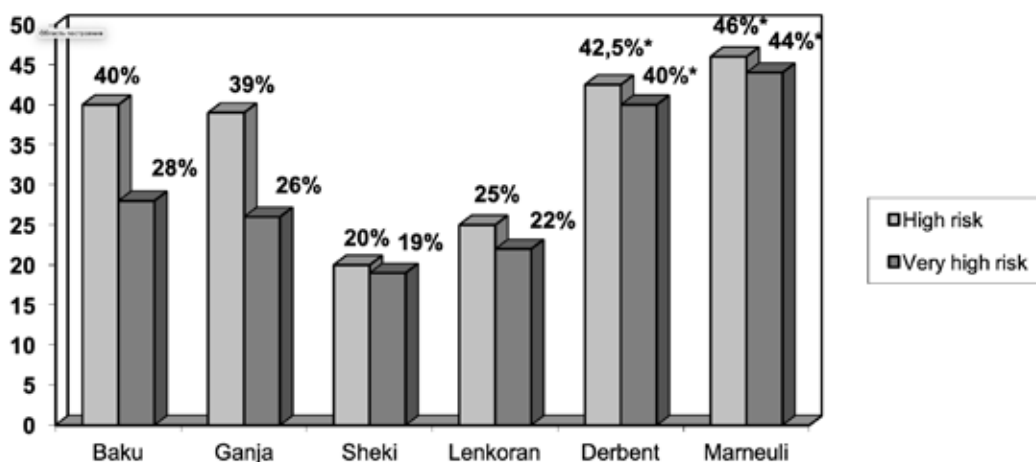

Figure 3. The incidence of high and very high cardiovascular risk in the cohort of women with AH
* p <0.05 — the significance of differences between groups (compared to the group with the minimum average value)

Table 10. **Concomitant diseases in the cohort of patients with AH**

Diseases	Men, n = 257	Women, n = 503
Type 2 diabetes mellitus	24 (9 %)	74 (15 %) *
Chronic. cholecystitis	24 (9 %)	25 (5 %)
Chronic. gastritis	19 (7 %)	29 (5.8 %)
Osteochondrosis	8 (3 %)	32 (6.4 %)
Neurosis	7 (3 %)	24 (4.8 %)
COPD	10 (4 %)	14 (2.8 %)
Urolithiasis	5 (2 %)	2 (0.4 %)
Chronic pyelonephritis	-	6 (1 %)
Cardiopsychoneurosis	-	7 (1.4 %)
Prostatitis	5 (2 %)	-
Fatty degeneration of the liver	6 (2 %)	-
Arrhythmia	3 (1 %)	9 (1.8 %)
Hypothyroidism / goiter	1 (0.4 %)	8 (1.6 %)*
Pancreatitis	2 (0.8 %)	-
Anemia	-	8 (1.6 %)
Psoriasis	1 (0.4 %)	-
Glaucoma	1 (0.4 %)	-
Rheumatism	2 (0.8 %)	-
Gout	-	2 (0.4 %)
Thalassemia	-	1 (0.2 %)

* p <0.05 — significance of differences between groups of men and women

Conclusion

The present study is the first multicenter national project with international participation, analyzing a wide range of risk factors, assessing the total cardiovascular risk and co-morbidity in cohorts of men and women with AH, and taking into account gender aspects.

For the purpose of primary prevention of cardiovascular complications in persons with hypertension, it is necessary to provide effective control of blood pressure, which will also lead to regression of left ventricular hypertrophy. Along with this, it is necessary to conduct serious work among men to combat bad habits, to correct metabolic disorders, as well as total blood cholesterol and glucose levels. Total cardiovascular risk assessment can serve as a good indicator for estimation of multifactorial prophylaxis efficacy in patients with AH.

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