

Cardiovascular risk assessment in a cohort of patients with arterial hypertension in Uzbekistan

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Objective

To assess cardiovascular risk in a cohort of men and women with arterial hypertension (AH) in a multicenter study in Uzbekistan.

Materials and methods

We conducted a cross-sectional study that included 582 men and women aged 30–59 years from 3 major Uzbekistan cities (Samarkand, Fergana and Urgench) with stage 1–3 AH and without verified cardiovascular diseases. Patients were asked to complete a questionnaire in order to assess demographic, social, behavioral characteristics and risk factors, as well as clinical status and therapy. Cardiovascular risk was assessed with the European SCORE scale.

Results

The prevalence of smoking was significantly higher in men (70%) compared with women (2%). 15% of men consumed moderate amounts of alcohol. Men tended to have higher arterial pressure readings compared with women. More than 60% of patients with AH had ECG features consistent with left ventricular hypertrophy. Waist circumference exceeded the threshold by 25% in women and by 5–11% in men depending on the region. Mean total cholesterol levels exceeded normal limits by 10% on average and hyperglycemia was identified in at least 15% of the participants. High risk was identified in 30% of participants. A very high risk of cardiovascular disease was identified in 11–13% of women and in an even higher percentage in men.

Conclusion

Every second man and woman with AH in Uzbekistan are at a high and very high risk of cardiovascular complications. This fact can be explained by AH severity, end-organ damage and other risk factors.

Keywords: Arterial hypertension, cohort, risk factor, cardiovascular risk.

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Introduction

21st century cardiovascular diseases (CVD) are the number one cause of work disability and mortality among adults in Eastern Europe and the Post-Soviet States. Simultaneously, in Western Europe the prevalence of CVD has significantly decreased as a result of the implementation of high-technology and prevention programs [1]. However, it is important to note that high-technology medical care affects prognosis more than it does morbidity. As such, the role of primary prevention in decreasing morbidity is difficult to overestimate. First and foremost, primary prevention involves the timely identification and correction of risk factors (RF). There is a great number of potential risk factors, but the World Health Organization (WHO) identified 7 most significant risk factors for the development of CVD and other chronic non-communicable diseases (CNCD). In clinical practice patients are often seen to have many RF simultaneously, which increases their overall risk of cardio-vascular diseases [2].

Arterial Hypertension (AH) is a common disease in the adult population and is a primary cause of stroke and myocardial infarction (MI). Over several decades many studies have been done to uncover effective treatment of arterial hypertension and reduce the risk of severe cardiovascular events [3]. Hypertension is a target for uncovering other diseases as well, since the overall prognosis is not evaluated solely on the basis of one disease, but on a combination of risk factors. This demonstrates the importance of cumulative scoring scales for the prognosis of disease complications.

In Uzbekistan in 2014 a nationwide study was carried out with the support of international organizations aimed identifying RF of chronic non-communicable diseases (CNCD) among working-age individuals. The following information was revealed [4]:

- 37% — excess intake of salt;
- 16.4% — low physical activity;
- 20.2% — excess body weight;
- 33.9% — elevated arterial pressure.

Undoubtedly, the examination of clinical characteristics of hypertension, risk factors, end-organ damage, and associated diseases will allow for the correction of the resulting attributable risk for cardiovascular events. According to the latest European guidelines both a decrease in blood pressure to target values (which were reviewed to factor in the patient's clinical status and age) and the correction of RF have been shown to be effective in decreasing the risk of cardiovascular events [5]. From this point of view, we considered the clinical study of cardiovascular RF with respect to gender to be important and relevant.

Research objective

To assess cardiovascular risk in a group of men and women with arterial hypertension (AH) in a multi-center study in Uzbekistan.

Materials and methods

We conducted a cross-sectional study that included 582 men and women aged 30–59 years from 3 major Uzbekistan cities (Samarkand, Fergana and Urgench) with stage 1–3 AH and without verified cardiovas-

cular diseases. The study was conducted according to the 2017 agreement between the National Research Center for Preventive Medicine of the Ministry of Healthcare of the Russian Federation and the Republican Specialized Scientific and Practical Medical Center for Therapy and Medical Rehabilitation of Uzbekistan.

Inclusion criteria. The study included men and women aged 30–59 with stage 1–3 arterial hypertension as classified by the European Society of Hypertension [11], who did or did not have RF or somatic diseases.

Exclusion criteria consisted of: patients aged over 59 years, presence of congestive heart failure (CHF), stable angina, structural heart or vascular defect, stroke of any origin, history of MI, peripheral artery atherosclerosis, renal or liver failure, respiratory distress, stage 3–4 oncological disease, collagenosis, endogenous psychiatric disorder, bilateral renal artery stenosis, alcohol or other substance abuse disorder.

Clinical and instrumental diagnostic methods included **standard questionnaires** using an adapted (Azerbaijani) version of the ARIC questionnaire: age, marital status, education, social status, family history, smoking, alcohol use, AH characteristics, treatment, and comorbidities [6].

Subjects were considered to be smokers if they smoked at least one tobacco product per day. Smoking status was categorized in the following way: 1) never smoker, 2) former smoker, 3) current smoker. *Alcohol use status* was assessed using the following two categories: 1) has not consumed alcohol in the past year, 2) consumes a small or moderate amount of alcohol (168 ml of ethanol per week for men or 84 g of ethanol per week for women).

Blood pressure was measured using a mechanical pressure cuff with an accuracy of up to 2 mmHg. Measurements were done twice with 5-minute intervals with the patient at rest in a sitting position. Systolic arterial pressure (SAP) was identified by the appearance of Korotkoff sound 1 (phase 1) and diastolic arterial pressure (DAP) by the disappearance of Korotkoff sounds (phase 5). For the analysis the mean of both measurements was used. Heart rate (HR) per minute was also recorded. *Anthropomorphic measurements:* height was measured with an accuracy of up to 0.5 cm; body mass was measured with an accuracy of up to 0.1 kg; body-mass index (BMI, Quetelet index) was calculated as the body weight in kilograms divided by the square of the height in meters; waist

circumference was measured with an accuracy of up to 0.5 cm.

Electrocardiography (ECG) was carried out using 12 standard leads with the patient lying down (standardized stationary apparatus was used). For the diagnosis of left ventricular hypertrophy (LVH) the Sokolow-Lyon index and the Cornell voltage ECG criteria were used.

Laboratory studies—blood samples were taken from the cubital vein after 12 hours of fasting with minimal venous occlusion (tourniquet pressure less than 90 mmHg). Blood was centrifuged for 10 minutes at 3000–3500 rotations per minute. Serum total cholesterol (TC) (mmol/l) was measured using enzyme kits using standardized automated analyzers and photolorimetry. Glucose level (mmoles/litre) in venous plasma was identified after fasting with standardized analyzers using the hexokinase methods.

Cardiovascular risk evaluation. For every patient the risk of fatal CVD within 10 years was identified using the European SCORE scale. Risk was categorized in the following way: 1) low risk—<1%; 2) moderate risk—1–5%; 3) high risk—6–9%; very high risk—10–14% [7].

Statistical analysis. Patient data were registered in local study centers using ACCESS MS OFFICE. Editing and statistical analysis was done using SAS (Statistical Analysis System) by members of the National Research Center for Preventive Medicine of the Ministry of Healthcare of the Russian Federation, Moscow, Russia. Descriptive numerical characteristics of studied variables included mean prevalence, standard deviation, standard error of the mean; these were calculated using PROC SUMMARY, PROC UNIVARIATE, PROC FREQ. Standard significance criteria were used: χ^2 and Student's two-tailed T-test.

Study results and discussion

The primary aim of the study was to identify cardiovascular risk and the prevalence and character of other RF among men and women of working age with AH. This type of multi-center study is the first of its kind in Uzbekistan. The analysis included three different regions of the country, which also allowed for the local evaluation of a wide range of RF. We previously completed a similar study in Azerbaijan, which allowed us to prioritize methods of primary prevention of CVD in patients with AH.

An analysis of socio-demographic indices (parameters) in the studied group showed that a large ma-

Table 1. Sociodemographic characteristics of patients with AH from three cities in Uzbekistan

Variable	Samarkand		Total n=200	Fergana		Total n=179	Urgench		Total n=203
	Women, n=84	Men n=116		Women, n=97	Men, n=82		Women, n=91	Men, n=112	
Age, years	51.1±6.6	52.4±7.2		50.8±7.4	52.1±9.4		49.6±7.4	53.1±6.8	
Marital status, n (%)									
• Married	76 (90.5)	115 (99)	191	89 (92)	80 (97.5)	169	76 (83.5)*	108 (96.4)	184
• Divorced	5 (6)	—	5	2 (2)	—	2	8 (8.8)	3 (2.7)	11
• Widowed	3 (3.5)	1 (1)	4	6 (6)	2 (2.5)	8	7 (7.7)	1 (0.9)	8
Higher education, n (%)	28 (33)	44 (38)	72	26 (27)	33 (40) *	59	19 (20.8)	26 (23)	45
Employment, n (%)	46 (53)	90 (77.5) ***	136	41 (42)	54 (66) **	95	28 (30.7)	70 (62.5) ***	98
Smoking, n (%)	2 (2.3)	92 (79) ***	94	0	56 (68) ***	56	1 (1)	80 (71) ***	81
Alcohol use (Ui. P. Lisitzin groups)		***			***			***	
— Group 1	61 (70)	55 (47)	116	81 (83.5)	32 (39)	113	64 (70.3)	32 (28.5)	96
— Group 2	21 (24)	51 (44)	72	16 (16.5)	46 (56)	62	27 (22)	66 (59)	93
— Group 3	2 (2.3)	10 (9)	12	0	4 (5)	4	0	14 (12.5)	14

Comment.

1. Do not consume alcohol products
2. Consume alcohol products rarely (on festive occasions and family celebrations), no more than once per month on average and in moderate doses (a few units of wine or liquor).
3. Consume alcohol products moderately (1–3 times per month, no more than once per week) in modest amounts during social events (festive occasions, family celebrations, meeting with friends) and without antisocial behavior.

* p<0.05, **p<0.01, *** p<0.001 – statistical differences between compared groups.

Table 2. ECG and central hemodynamic parameters in men and women with AH from three cities in Uzbekistan

Variable	Samarkand		Fergana		Urgench, Khiva	
	Women, n=84	Men, n=116	Women, n=97	Men, n=82	Women, n=91	Men, n=112
SAP, mmHg	153.5±21.6	157.5±19.8	154.8±19.4	156.4±17.6	154.9±20.8	159±18.6
DAP, mmHg	95.8±9.5	97.3±10.2	91.2±10.4	90.8±9.5	92.6±10.2	94.7±8.2
HR, beats per minute	77.9±11.3	74.9±10.4	74.6±12.1	72.8±3.2	78.6±12.4	76.8±1.21
ECG signs of LVH, n (%)	64 (73.5)	84 (72.4)	59 (61)	76 (92.6)*	59 (65)	79 (87)

Comment. * p<0.001 – statistical differences between the compared groups.

majority of patients with AH were married (on average more than 90 % of cases) (Table 1). The number of patients with AH who also had a higher education was less than 40 %. Employment was greater in men than in women by 50–70 % in all regions. Women most frequently worked as homemakers. Smoking was notably very common among men (on average 70 %), and in women it was far less common (no more than 2 %). Similarly, the majority of women did not consume alcohol. In Samarkand and Fergana there was a similar number of men who did not consume alcohol or who consumed alcohol rarely, whereas in Urgench the distribution was different: approximately 60 % consumed alcohol rarely and 13 % consumed alcohol in moderate amounts.

In all of the studied groups with AH the average values for SAP and DAP were higher than target values despite antihypertensive therapy (however, 30 % of patients were not receiving any therapy) (Table 2). Overall, a tendency towards higher blood pressure values among men was noted as compared with women with AH. More than 60 % of patients with AH had ECG signs of LVH at the time of the study, which

undoubtedly is a poor prognostic factor [8]. LVH was more common in men with AH from Fergana and Urgench.

In Uzbekistan a high rate of obesity and excess body weight was noted among working age people [4]. Patients with AH were also noted to have higher levels of anthropometric measurements (Figure 1). In particular, waist circumference (WC) among women was 25 % higher than the cut-off value, while for men this value was higher than the normal by 5–11 % depending on the region. A similar tendency was seen with BMI, which is known to increase the severity of the disease. These parameters are similar to those seen in AH study groups in Azerbaijan and are obviously related to lifestyle and dietary habits in these populations [6].

In the study two markers for CVD were analyzed: TC and fasting glucose levels. Average levels of TC in all groups were above the upper bound of the normal range by 10 % while the highest values were seen in men from the city of Urgench (Table 3). Average fasting glucose values in venous blood demonstrated hyperglycemia (prediabetes and diabetes mellitus type

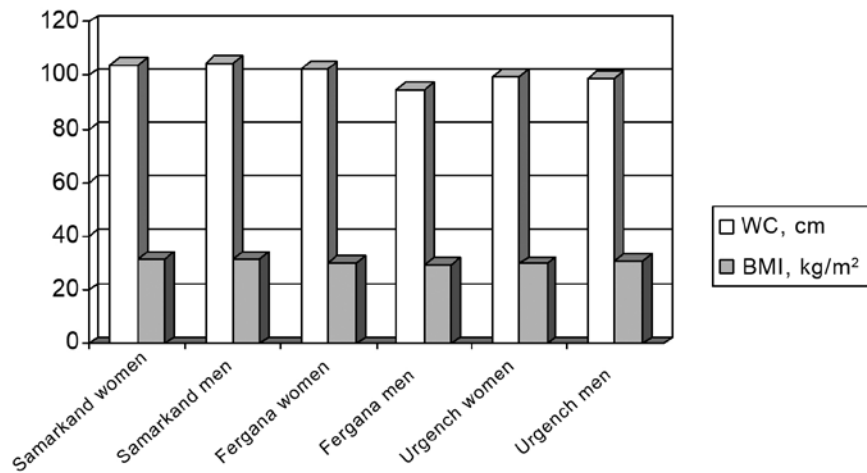


Figure 1. Anthropomorphic measurements in patients with AH. WC = waist circumference (cm), BMI = body mass index (kg/m²)

Table 3. Laboratory markers of CVD in three cities of Uzbekistan

Variable	Samarkand		Fergana		Urgench	
	Women, n=84	Men, n=116	Women, n=97	Men, n=82	Women, n=91	Men, n=112
Total cholesterol, mmol/l	5.4±1.2	5.5±1.1	5.3±1.5	5.4±1.1	5.26±1.2	5.84±1.2*
Glucose, mmol/l	5.3±1.17	5.6±1.3	5.7±1.2	5.5±1.24	5.3±1.21	5.6±1.4

Comment. * p<0.05 — statistical significance between the compared groups.

2) in at least 15% of the studied group. This is determined by the high prevalence of obesity, particularly abdominal obesity. Overall, according to data from the International Diabetes Federation, Uzbekistan and other Post-Soviet States belong to regions of high risk for the development of diabetes mellitus [9,10].

The primary aim of the study was to identify the general risk of cardiovascular events in accordance with the European SCORE scale between men and women with AH as well as RF. Every second patient in the studied group was at moderate cardiovascular risk (Table 4). High risk was seen on average in 30% of cases. Among women high risk of cardiovascular risk was seen in 11–13% of cases, while being somewhat higher in male subjects. This is likely due to men more often being smokers and also having higher blood pressure and TC levels on average [11].

It is necessary to note that a similar tendency was seen in our study with patients from Azerbaijan, specifically that high cardiovascular risk was seen two times more often than very high cardiovascular risk. In these two populations there were variations based

on gender. Very high risk in patients from Uzbekistan was seen more often among men, while Azerbaijan patients had an opposite tendency [6].

As such, this study group of both men and women with AH were at high or very high cardiovascular risk in up to 50% of cases, which may be explained by both the severity and multiplicity of risk factors present as well as lack of preventative treatment.

Conclusion

In the study group from Uzbekistan one third of men and women with AH were seen to have high cardiovascular risk and one fifth to have very high cardiovascular risk. The number of male subjects at very high risk was by 30–50% higher than in female subjects. Average values of arterial pressure and WC were notably elevated, as well as TC and glucose. Analysis by gender demonstrates a higher prevalence of smoking and a greater severity of AH and other risk factors in men.

Considering the large prevalence of cardiovascular events in working-age people in Uzbekistan it is

Table 4. Overall cardiovascular risk according to the SCORE risk chart in patients with AH

Variable	Samarkand		Fergana		Urgench, Khiva	
	Women, n=84	Men, n=116	Women, n=97	Men, n=82	Women, n=91	Men, n=112
Moderate risk, n (%)	36 (43)	49 (42)	39 (40)	38 (46)	37 (40.6)	43 (38.3)
High risk, n (%)	24 (28)	35 (30)	25 (26)	24 (29)	31 (34)	34 (30)
Very high risk, n (%)	10 (12)	20 (17)	11 (11.3)	15 (18.3)	12 (13)	26 (23.2) *

Comment. * p<0.05 — statistical significance between the compared groups.

necessary to implement primary prevention methods among individuals with RF such as AH. Improvement of patient education along with a combination of ef-

fective self-control and multifaceted prevention could decrease the risk of cardiovascular events.

Conflict of interests: None declared.

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